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THE MARINE OBSERVER

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VOL. XXX No. 189 JULY 1960

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Editorial

In April this year, the British weather ship *Weather Observer*, formerly the 'Flower' class corvette *Marguerite*, completed her hundredth patrol of 24 days at an ocean station in the North Atlantic. It was in September 1946 that the first International Civil Aviation Organisation (I.C.A.O.) North Atlantic Ocean Station Agreement was signed in London by representatives of 13 countries operating civil airlines across that ocean, whereby thirteen ocean stations were established. In August 1947, *Weather Observer*, the first of the British ocean weather ships, occupied station for the first time. By June 1949, all thirteen stations were in operation, the operating countries being U.S.A. (7 stations), U.K. (2), Canada–U.S.A. (1), France (1), Netherlands–Belgium (1) and Norway–Sweden (1). All four British ocean weather ships were in operation by February 1948.

As a result of further conferences, the number of stations was reduced to eleven in 1949 and to nine in 1954, for reason of economy. Since 1954, these nine stations have been continuously in operation—the four Western stations B, C, D and E being manned by vessels of the United States Coast Guard while the five Eastern stations A, I, J, K and M have been the joint responsibility of France, Netherlands, Norway and Sweden, and the United Kingdom. The basic principle of the Agreement has always been that each nation's contribution to the scheme is based upon the number of Atlantic crossings of civil aircraft belonging to that nation—and those nations which use the Atlantic air routes but do not operate weather ships contribute in cash towards the cost of operating the ships.

During the 13 years that the Atlantic weather ships have been in operation, their regular observations of meteorological conditions at the surface and in the upper atmosphere—augmented by the regular surface observations made aboard hundreds of merchant ships—have made a major contribution to our knowledge about the meteorology of that ocean. Such knowledge is made freely and speedily available to meteorologists throughout the world, and there seems little doubt that this international network has contributed in no small measure to the safety and economy of aircraft and shipping and to the accuracy of weather forecasts generally. Thus, the men who serve in the weather ships, together with the voluntary observers in the merchant ships, can rightly feel that they have done a good job, for the common good.

In April 1960 the fifth North Atlantic Ocean Station Conference, attended by representatives of 17 nations whose aircraft regularly traverse the Atlantic, was held at The Hague under the auspices of I.C.A.O. The object of the conference, which was called at the suggestion of the Netherlands government, was broadly to persuade the cash-contributing countries to contribute a little more towards the cost of operating the weather ships. The financial arrangements of the weather ship scheme are rather complicated and those made at the 1954 conference had failed to take account of the present universal tendency of rising costs. The results of this conference at The Hague, which was eminently successful, are an excellent example of the broad minded and realistic attitude of the countries concerned. Under the new arrangements the United Kingdom, for example, which operates about 1·7 vessels in excess of its theoretical responsibility, will now receive about £30,000 more than previously in cash, towards the cost of this excess operation.

Those attending the Conference were hospitably entertained by their Netherlands hosts and among the activities enjoyed was a visit to the Netherlands Weather Ship *Cirrus* and a tour of the Rotterdam Docks.

The year 1960 is a busy one for other international conferences with a nautical flavour. There was the Law of the Sea Conference in April, the International Conference on Safety of Life at Sea was held in May and June, and in August the Commission for Maritime Meteorology of the World Meteorological Organisation will meet at Utrecht; the results of both the last-named are of considerable interest to mariners and will be commented upon later in *The Marine Observer*.

The effect of the weather upon safety at sea is obvious—fog, storms and ice being the chief villains of the piece. Although a lovely summer was enjoyed in Britain in 1959, the annual report of the Royal National Life-boat Institution seems to indicate that the year generally was not all beer and skittles in so far as gales around our coast were concerned, for the life-boats were launched more frequently than in any other peace-time year since 1824. Included in their work for 1959 was the rescue by the Moelfre life-boat of the crew of the small British coaster *Hindlea* off Anglesey in a force 12 wind, during which the life-boat had to go alongside the wreck on 10 separate occasions; for this the coxswain was subsequently awarded the rare R.N.L.I. Gold Medal for Gallantry.

This incident provides an illustration of the continued need for study and research into safety at sea, in so far as the weather is concerned. There is still quite a lot that can be done in the way of improvements in the design and construction of ships and of their equipment and in the provision of navigational aids. And the meteorologist, although he cannot control the weather, can continue to strive in the direction of improved forecasting facilities, so that the mariner can be adequately forewarned of dangerous weather conditions. Questions of this nature are being discussed at the international conferences mentioned above. But whatever devices and improvements are introduced for the safety of shipping, there always comes a time when the skill of the individual as a seaman is called to account.

C. E. N. F.

WORK OF THE MARINE DIVISION OF THE METEOROLOGICAL OFFICE, THE VOLUNTARY OBSERVING FLEET AND THE WEATHER SHIPS DURING THE YEAR ENDED 31ST MARCH, 1960

1. Voluntary Observing Ships

The Port Meteorological Officers at London, Liverpool, Southampton, Glasgow and Cardiff and the Merchant Navy Agents at Newcastle, Hull and Leith have done their best between them to visit each Voluntary Observing Ship at least once every 3 months. Between them they have made nearly 4,500 visits to Voluntary Observing Ships during the year. In some cases it is difficult to arrange such frequent visits, because the ship concerned may seldom call at a port where there is one of these representatives, or her stay in port may be too short for such a visit to be arranged. The Port Meteorological Officers and Merchant Navy Agents have done their best, with the somewhat limited length of time they get aboard any particular ship, to give the officers instruction and guidance in their voluntary observing duties and to advise them as to meteorological information which is available for shipping. A special effort has been made whenever practicable to see the radio officer, in addition to the observing officers.

The British Voluntary Observing Fleet, as shown in Table 1, has averaged about 680 during the year and is comprised as follows:

(a) *Selected Ships*, which are supplied on loan with a full set of meteorological instruments and make complete observations (Code Form F.M. 21A) and transmit them by radio to selected radio stations ashore, wherever their voyages take them.

(b) *Supplementary Ships*, which make somewhat less detailed observations than those made by Selected Ships and are supplied on loan with only a barometer, an air thermometer and screen. They use an abbreviated code form (F.M. 22A) for their radio weather messages.

Selected and Supplementary Ships have, as is customary, noted in their meteorological logbooks useful observations of sea surface currents and ice. Aurora observations have been regularly recorded and many ships have sent in observations of whales for the National Institute of Oceanography. The wide variety of observations of natural phenomena which have been received is evident from the " Marine Observers' Log ".

	1959									1960		
	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
Table 1. Number of British Observing Ships												
No. of Selected Ships	492	490	490	483	481	485	490	493	493	483	485	481
No. of Supplementary Ships	60	59	62	64	65	65	60	54	55	52	52	54
No. of Coasting Vessels (' Marid ' Ships)	100	95	93	91	92	93	86	82	80	82	81	82
No. of Light-vessels	13	13	13	13	14	14	14	14	14	14	14	14
No. of Trawlers	33	35	35	30	38	38	36	38	33	33	34	34
Table 2. Ships' Radio Weather Messages received at Dunstable												
No. reporting to Dunstable (from all areas):												
British Selected and Supplementary Ships	301	311	340	310	302	342	321	259	278	308	278	295
Daily average of messages	112	101	101	98	101	102	117	111	102	106	105	114
British Coasting Vessels (' Marid ' Ships)	47	58	58	55	47	47	51	47	43	39	43	47
Daily average of messages	13	15	17	17	16	15	15	13	13	11	13	13
Foreign Ships	257	258	249	260	284	269	265	305	277	271	287	313
Daily average of messages	48	26	25	25	27	28	28	25	27	27	27	30
Light-vessels	11	11	11	11	11	11	11	11	11	11	11	11
Daily average of messages	35	34	33	34	34	34	35	36	36	36	35	36
Trawlers	25	28	30	24	29	30	32	37	28	24	24	21
Daily average of messages	25	22	20	13	17	22	26	27	19	22	10	21
No. of reports made to Dunstable per month from the North Sea area (51°30′–61°N., 4°W.–7°30′E.) *:												
Selected	63	61	62	87	106	118	99	65	71	67	49	117
Supplementary	159	178	207	66	186	168	199	139	113	145	64	85
British Coasting Vessels (' Marid ' Ships)	183	208	194	186	162	120	146	131	103	100	101	138
Trawlers	195	209	154	154	198	161	206	196	89	127	149	283
Total from the North Sea area	600	656	617	493	652	567	650	531	376	439	363	623

* These figures are also included in the figures from all areas, above.

(c) *Coasting vessels*, which make sea surface temperature observations when in British coastal waters and transmit them in a brief code to British coast stations (by W/T or R/T). When in the North Sea, these ships include in their report wind, weather and visibility observations, to meet the needs of meteorologists in various countries bordering that sea.

(d) *Light-vessels*, which make observations of wind, waves, visibility and air and sea temperature. Eleven of these send coded reports by R/T; the remainder merely record the observations for climatological purposes. (Reports from *Dowsing*, *Galloper* and *Royal Sovereign* light-vessels are included in the B.B.C.'s ' 5-minute weather bulletins for shipping '.)

(e) *Trawlers*, which make visual observations (no instruments being needed) and transmit them by W/T and R/T (in Code Form F.M. 23A) to radio stations in the United Kingdom, Canada, Iceland or Norway as convenient (depending on the area in which they are fishing).

(f) *Auxiliary ships*. These ships are only asked to make and transmit by radio meteorological observations when in areas where shipping is sparse. Their observations are similar to those made by trawlers, but with addition of pressure and temperature readings using the ship's own instruments. The Auxiliary Ship scheme was instituted as part of the I.G.Y. programme, but the World Meteorological Organisation has decided that their observations are so useful that these ships will now become a permanent feature of this voluntary work.

The total number of British Selected and Supplementary Ships has averaged about 550, out of a world total of about 3,300.

Table 2 shows that a daily average of over 100 messages has been received at the Meteorological Communications Centre at Dunstable from British ships in the eastern North Atlantic. The network from this ocean area thus continues to be satisfactory, but it is obvious that in the North Atlantic, as in other oceans, there are largish gaps at times where there doesn't happen to be any ship, but this is unavoidable. About 56% of the messages from ships in the eastern Atlantic were received within an hour and 78% within two hours.

The number of radio weather messages received from trawlers has shown a very satisfactory increase and has averaged about 760 a month compared with 550 a month last year and 150 a month in 1956. Reports from these ships in far northern waters continue to be very valuable. There is evidence that the voluntary observers aboard the trawlers are showing considerable keenness in this work.

The North Sea is another area in which special efforts have been made to try to get more observations from merchant ships (Selected and Supplementary Ships, coasting vessels and trawlers), and there was a small but steady increase in the number of observations received in this area compared with 1958. (See Table 2.)

There are no definite statistics as to the number of reports transmitted by British ships in other areas, except the Hong Kong area, where the monthly number of reports averaged about 120 during the year. Records received from the British ships show they do send their observations regularly as provided for in the international scheme.

The British Voluntary Observing Fleet includes ships of about 110 shipping companies, and covers all the trade routes of the world (as shown in Table 3). The contribution which these ships make to world meteorology is thus considerable.

The observations received in the Meteorological Office in the logbooks from British Voluntary Observing Ships, and those taken from the teleprinter messages sent in by trawlers and coasting vessels, have been punched on to cards during the year and have thus been made available for climatological work and for answering enquiries.

Lieut.-Commander L. B. Philpott, the Nautical Officer, who scrutinises all the logbooks when they are received in the Office, gives a very good report as to the quality of the observations which have been made during the year. His general

Table 3. Numbers of British Selected Ships on main routes from and to the United Kingdom

Australasia	111	Atlantic coast of S. America	28
Far East	45	Pacific coast of S. America	21
Persian Gulf	25	Pacific coast of N. America	14
S. Africa	24	Europe, mainly northern Europe	14
N. Atlantic	91	Falkland Is. and Antarctic	7
W. Indies	20	World-wide 'tramping'	90

impression is that the quality of this voluntary work has never been better during the years that he has worked in the Office. The voluntary observers aboard British ships can be assured that their work is very carefully examined.

2. Ocean Weather Ships

The British weather ships completed 12 years of service in the North Atlantic during the year. The Royal Navy anti-submarine frigate H.M.S. *Amberley Castle* was taken over by the Air Ministry in November 1959 for conversion to an ocean weather ship at a shipyard in Blyth. She is the second vessel of this class to be converted; the first, formerly H.M.S. *Oakham Castle*, has now completed nearly 18 months' satisfactory service as Ocean Weather Ship *Weather Reporter*. It is expected that the remaining two 'Flower' class vessels will be replaced within the next 12 months or so. The general layout of *Amberley Castle* will benefit from experience gained aboard *Weather Reporter*; living accommodation, meteorological office, radio and radar offices and chart room will be somewhat more spacious and better arranged and more modern commercial radio equipment will be installed.

During the year, weather ships operated in rotation with the French and Netherlands ships at Ocean Stations 'A' (62°N., 33°W.), 'I' (59°N., 19°W.), 'J' (52°30'N., 20°W.), 'K' (45°N., 16°W.). Special observations of water temperature gradient with the bathythermograph were continued aboard all ships and observations of waves, by means of an electric wave recorder in *Weather Reporter*, were also continued. Plankton and sea surface samples were obtained for the Ministry of Agriculture, Fisheries and Food and for the Scottish Home Department.

Microfilm copies of observations recorded aboard British weather ships were made and distributed in exchange for similar records from other operating countries of the North Atlantic Ocean Station Agreement.

3. Marine Climatology and Enquiries

The average number of logbooks received per month was 90 from Selected and Supplementary Ships and three from Auxiliary Ships. Logbooks and upper air data have also been received from weather ships operating at stations A, I and J, as the Meteorological Office is the official authority for the climatological treatment of observations on those three stations. Microfilm copies of observations made at other ocean stations have also been received. All the above observations have been punched on to cards as soon as possible after they have been received in the Office.

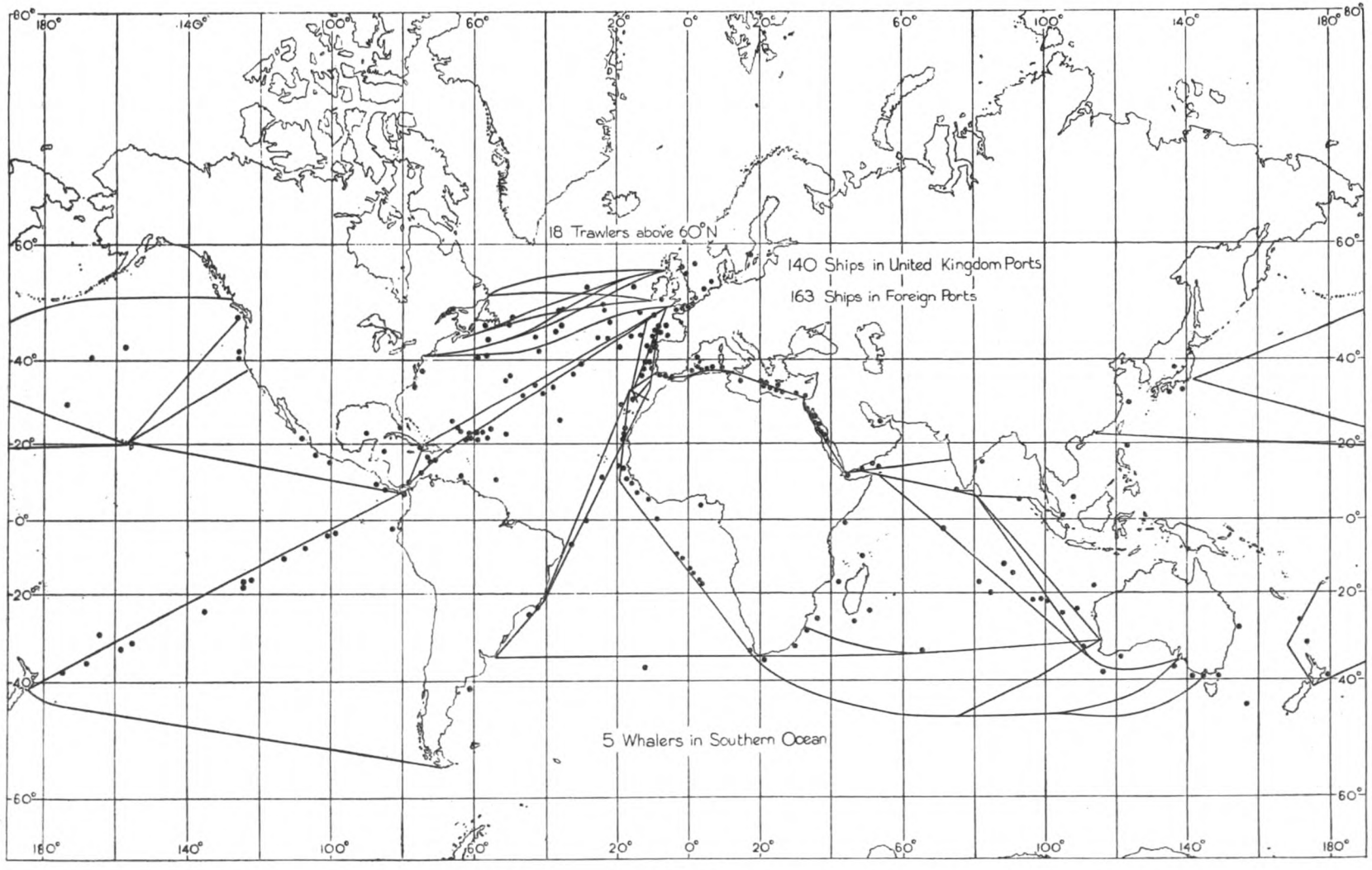
The computation of wave height frequencies for 5° squares of latitude and longitude for each month for all ocean areas was continued and is nearing completion.

An investigation into the seasonal variation of sea surface temperature round the coasts of the British Isles was completed and a paper written on the subject.

An investigation into the downward penetration of snowfall was started, using data from North Atlantic ocean weather ships.

Work continued with the tabulation of radiation records made by British ocean weather ships during the year, in a form suitable for punching on to cards.

The number of enquiries dealt with was greater than last year. Information was supplied to government departments, meteorological services of other countries,



The positions of British ships which made observations on 31st March, 1960.

scientific institutions, shipping companies, commercial firms and private individuals. The following are examples of the range covered:

Tables showing the frequency of wave heights in specified ranges in the Dungeness area were sent to a nuclear power company.

Representatives from a hydraulics research station examined data in connection with an investigation into waves off the Tees.

The Indian Meteorological Service was given extracts from the weather logs of ships in the Bay of Bengal and Arabian Sea during certain periods, in order to make a technical and scientific study of a cyclonic storm.

A shipping company was informed of the probability of ice in the Belle Isle Strait and the entrance of the St. Lawrence river.

Information about the prevailing winds in certain months over the sea routes U.K. to Australia, Australia to San Francisco, and San Francisco to Japan, was supplied to the National Physical Laboratory in connection with the design of screens for deck spaces on passenger vessels.

A request was met, from an enquirer in California, for particulars of the weather experienced off the Old Head of Kinsdale at the time of the sinking of the *Luisitania* on 7th May, 1915.

Weather reports were supplied to the Ministry of Transport for investigations into a number of shipping casualties. Personal attendance of a Scientific Officer was necessary at a civil action brought by a former crew member of a trawler against a trawler insurance company. The man had suffered personal injuries when the trawler was shooting gear.

4. Currents and Ice

Six Admiralty Pilots were revised and ocean current notes supplied for 26 Admiralty navigational charts.

It is hoped, with help from the British Shipbuilding Research Association and the Ship Division of the National Physical Laboratory, to improve estimates of ships' drifts in adverse sea and weather conditions. This will again facilitate a more precise analysis and investigation of ocean currents.

Ice information was received by radio from the Meteorological Communications Centre and by post from the Canadian Meteorological Service, the U.S. Coast Guard, the Danish Meteorological Service, the Norwegian Meteorological Service, merchant ships, trawlers and Fishery Research Ships. Baltic Sea ice data are received throughout the ice season from almost every country with a coastline in the Baltic Sea. Facsimile ice maps are received regularly from Canada, giving the distribution of ice over large areas of Canada and adjacent seas.

Information concerning the ' present ' distribution of field ice and icebergs in areas adjacent to the North Atlantic and Baltic Sea have been supplied to ship-owners, trawlers, Fishery Research Vessels and the Royal Air Force. Information and advice about ice conditions has been given to ships operating from the United Kingdom, to Canada and the United States via the St. Lawrence River and Seaway.

5. Publications

(a) *The Marine Observer* was published quarterly.

(b) A third edition of the *Marine Observer's Guide* was published.

(c) A second edition of *Monthly Meteorological Charts and Sea Surface Current Chart of The Greenland and Barents Seas* was published.

6. Awards

Resulting from a detailed examination of meteorological logbooks received from voluntary observing ships, Excellent Awards are being presented to the master, principal observing officer and radio officer aboard those ships whose records came in the first 100 in order of merit. (See the note by Lieut.-Commander Philpott on page 117.) The books selected are *The Planet Earth*, edited by D. R. Bates,

(*Opposite page 116*)

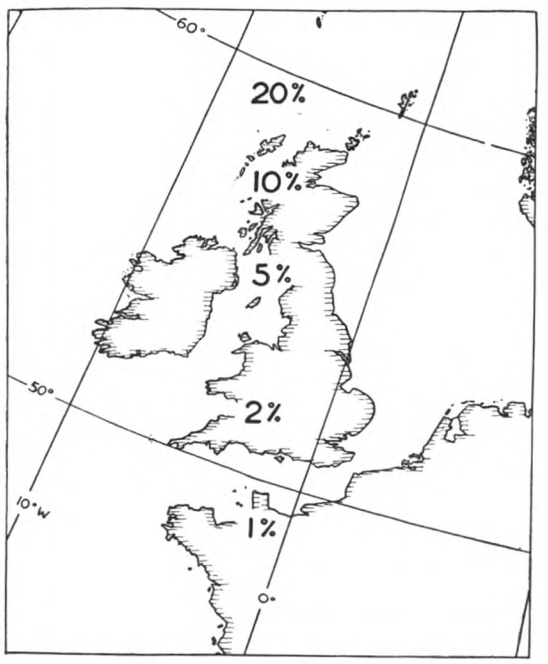


Fig. 1. Map of Aurora Survey area with percentages of nights during 1700 to 1872 for which aurora was reported, as found by H. Fritz.

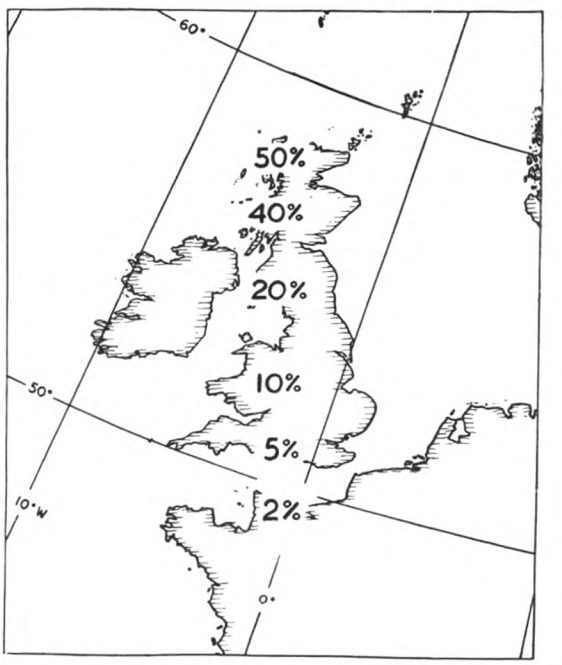


Fig. 2. Map of Aurora Survey area with percentages of nights during 1957 and 1958 when aurora would have been visible, given ideal conditions.

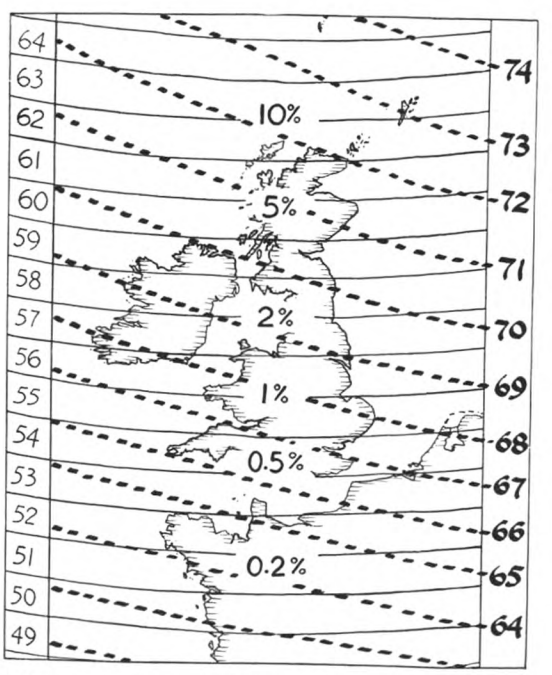


Fig. 3. Map of Aurora Survey area with percentages of nights during 1957 and 1958 having aurora overhead.

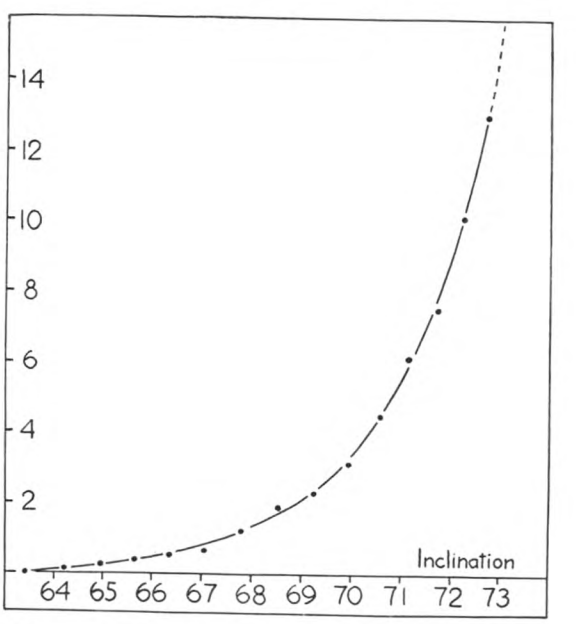
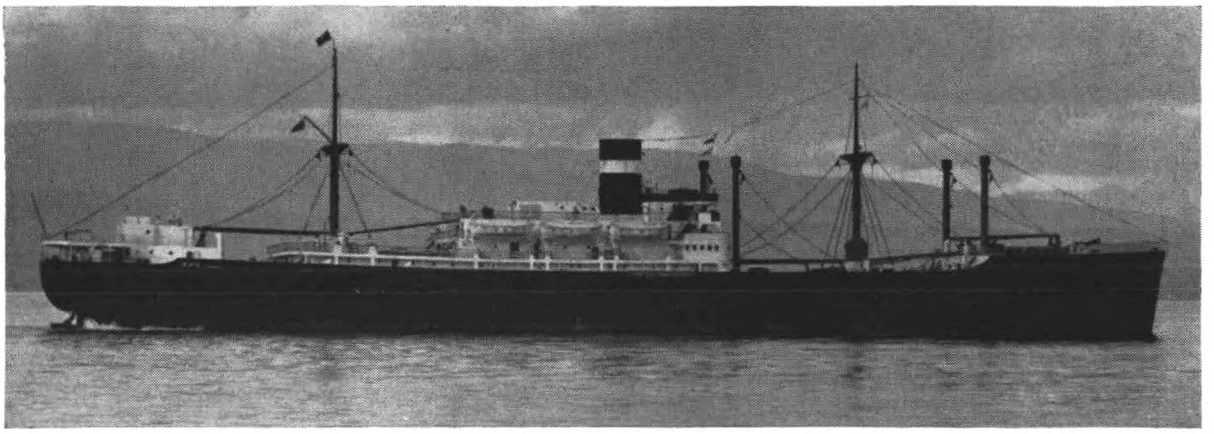


Fig. 4. Percentages of nights with aurora overhead in the Aurora Survey area during 1957 and 1958.

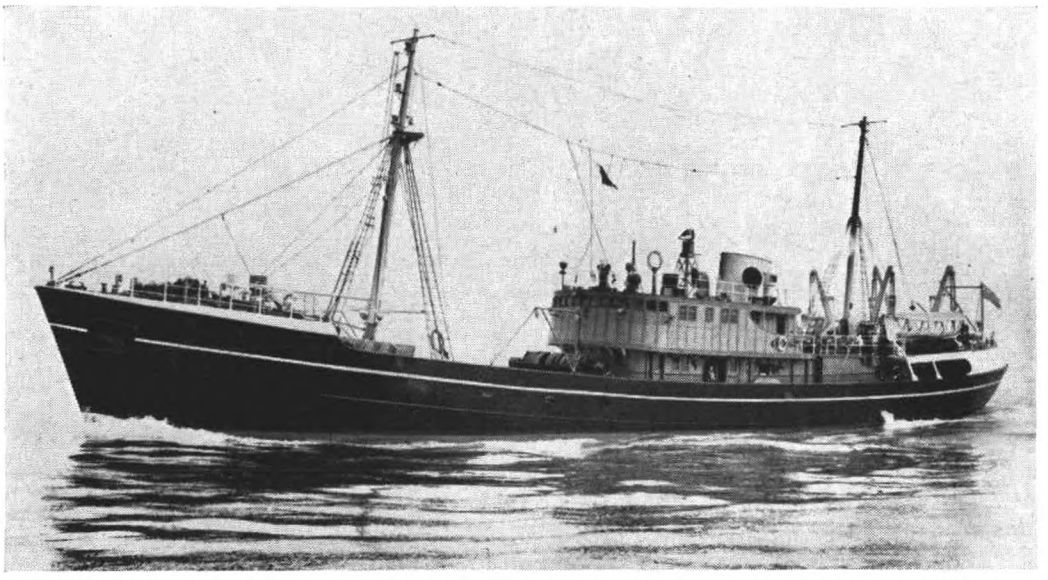
(See article on p. 145)

(*Opposite page 117*)



By courtesy of W. Ralston, Ltd. (Photographers), Glasgow C.2

Lismoria (Donaldson Bros. & Black, Ltd.), Captain R. McNie.



By courtesy of Alex. Hall & Co., Ltd.: photo by A. J. B. Strachan, Aberdeen

Explorer (Dept. of Agriculture & Fisheries for Scotland), Captain E. A. Bruce.

By courtesy of Skyfotos

Hadrian Coast (Aberdeen S.N. Co., Ltd.), Captain W. G. M. Wyness, M.B.E.

The three ships which gained the highest markings for their meteorological logbooks during the year ended 31st March, 1960 (see page 121).

and *The University Atlas*. Similar awards are also being made to two trawlers and two coasting (' marid ') vessels, the basis of their awards being the number of observations received from the ships by radio.

Barographs were presented during the year to four masters of British Selected Ships for consistently good meteorological work over a long period (see *The Marine Observer*, October 1959).

EXCELLENT AWARDS, 1959–1960

A hundred years ago, on 5th April, 1860, we received a meteorological logbook from the barque *Hound*, of Liverpool, covering a voyage to and from Singapore made during the period 27th March, 1859 to 5th February, 1860. According to our registers this was the first logbook to receive an assessment. It was assessed 'good'.

Six days later, a meteorological log was received from the ship *Conflict*, of Liverpool, covering a voyage to and from Calcutta in the period 11th July, 1859 to 27th March, 1860. This appears to have been the first book to have been awarded the classification 'excellent'.

Awards to voluntary observing ships in the form of "charts and books containing information as to the wind and ocean currents and the most desirable tracks to follow in order to make the quickest and surest passages" had been proposed by Admiral FitzRoy, our first Director, at the beginning of 1855, but the registers do not tell us who received these. It is recorded, however, that in the early days every ship sending in a meteorological logbook classed as 'excellent' received a special letter of thanks. No written record of material awards to masters and officers of voluntary observing ships appears to exist until the publication of the July 1924 number of *The Marine Observer*.

Since then the July number has always contained a list of the captains, principal observing officers and, since the war, radio officers who have qualified for an Excellent Award, for their meteorological records received during the year ending the previous 31st March.

This year's list appears on page 118 and once again it is our pleasant duty to congratulate those named there, in recognition of their voluntary work for us. The captains and officers named will be individually notified of the awards as soon as these are ready for distribution, but if any officer sees his name in the list before he receives the official letter, we would be glad if he would write to us, claiming the award and giving us the address to which he would like it sent. This may save considerable time and subsequent correspondence. We shall continue last year's practice of sending a blank headed card to be filled in by officers who have not already had one, whereby we may be advised information as to the correct spelling of his name, his initials, decorations and signature, so that the personal record card kept for him in this Office will not get confused with that of any other officer of the same name.

The assessing of ships' meteorological logbooks and the classification of them for the Excellent Awards is a task not lightly undertaken. The Voluntary Observing Fleet comprises all types of ship, engaged in all trades on all sea routes, and it is seldom that we could expect one meteorological logbook to bear direct comparison with another. It is for this reason that the assessing of the logbooks is always done by a seaman, familiar with ships and sympathetic of the standard of observations which can reasonably be expected from each type, ranging from the two-mate short sea trader with R/T worked by a deck officer to the large passenger liner keeping a 24-hour radio watch. The yardstick for the excellent award is the amount of effort and willingness to help which has gone into the compiling of the logbooks.

In the year ended 31st March, 1960 the best books were received from the following eleven ships:

1. *Explorer* (Department of Agriculture & Fisheries for Scotland, research ship), Captain E. A. Bruce.

EXCELLENT AWARDS (Year ended 31st March, 1960)

Ship	Captain	Principal Observing Officer	Senior Radio Officer	Owner/Manager
Anno	J. C. Cowie	R. Vickery	A. Richie*	Mitchell & Rae, Ltd.
Apollo	G. V. Barnes	W. R. Kays	P. Howells*	Bristol S.N. Co., Ltd.
Baskerville	W. J. Coull	R. Gibbens	R. Thorburn	W. Runciman & Co., Ltd.
Beaverford	L. H. Johnston, M.B.E.	C. J. Allister	K. Pearce	Canadian Pacific Steamships
Benvannoch	J. P. Robertson	G. B. Goldie	E. Fitzgerald	Ben Line, Ltd.
Birmingham City	F. R. Neil	T. Chappell	A. B. Pilkington	Bristol City Line
British Sailor	R. C. D. Flamsteed	M. J. Hooper	W. Sharkey	B.P. Tanker Co., Ltd.
Bylands Abbey	T. W. Westerdale	M. T. W. Walker	F. Drury*	British Transport Commission
Cairngowan	I. G. Foster	R. H. Sinclair	E. Johnston	Cairns, Noble & Co., Ltd.
Caledonia	D. Blair	D. Barclay	J. McConnell	Anchor Line, Ltd.
Calgaria	J. L. Downie	H. D. McDiarmid	J. Moody	Donaldson Bros. & Black, Ltd.
Caltex Canberra	J. H. Hall	F. I. Bodger	D. S. Hunter	Overseas Tankship (U.K.), Ltd.
Cape Clear	T. P. Edge	D. Cormack	S. McNally	Lyle Shipping Co., Ltd.
Cardiganshire	R. T. Harries	T. I. Card	K. Bent	Glen Line, Ltd.
Cato	H. G. Mowat	E. Powell	A. S. Phillips*	Bristol S.N. Co., Ltd.
Ceramic	F. A. Smith	N. J. Case-Green	R. O'Shaughnessy	Shaw Savill & Albion Co., Ltd.
City of Brisbane	E. G. Chapman	A. J. Evans	G. Barlow	Ellerman Lines, Ltd.
City of Winchester	J. W. Wotherspoon, M.B.E.	P. G. Evans	W. H. Carmichael	Ellerman Lines, Ltd.
Clan Brodie	A. V. Gordon	J. C. Attwood	S. Riley	Clan Line Steamers
Clan Campbell	K. C. Simpson	G. B. Charleson	R. F. Cole, M.B.E.	Clan Line Steamers
Clan MacBrayne	C. H. A. Thomas	D. Finlayson	G. Finlay	Clan Line Steamers
Clan Maclaren	J. de Garis	P. Pickering	R. W. Moore	Clan Line Steamers
Clan Maclay	J. West	J. Sutherland	D. Gray	Clan Line Steamers
Corinthic	A. C. Jones	R. E. Altham	T. J. Lillis	Shaw Savill & Albion Co., Ltd.
Cortona	A. L. Hunter	R. S. McLundie	J. Stewart	Donaldson Bros. & Black, Ltd.
Cumberland	P. P. O. Harrison	E. Fawcett	J. Bilton	Federal S.N. Co., Ltd.
Deerpool	J. R. Copping	D. N. McLeod	R. Knight	Sir R. Ropner & Co., Ltd.
Dilwara	B. A. Rogers, D.S.C., R.D.	R. J. D. Elston	G. H. Syer	British India S.N. Co., Ltd.
Diomed	W. J. Moore, D.S.C., R.D.	C. Myles-Hook	A. J. Bourne	A. Holt & Co.
Dorset	J. E. Bury	R. Jones	R. Ormerod	Federal S.N. Co., Ltd.
Durango	E. N. Giller, M.B.E.	R. N. Miller	R. G. Cain	Royal Mail Lines
Echo	J. Thatcher	N. J. Llewelyn	M. A. Salisbury*	Bristol S.N. Co., Ltd.
Edenmore	N. Coubrough	W. J. Brown	R. Sadler	Furness Withy & Co., Ltd.
Edward Wilshaw	R. W. Porter-Reynolds	P. B. Bushell	L. J. S. Cohn	Cable & Wireless, Ltd.
Empire Star	G. T. King	I. C. Wood	D. R. Clark	Blue Star Line, Ltd.
Explorer	E. A. Bruce	P. S. Burn	J. S. Steven	Dept. of Agric. & Fisheries for Scotland

Gloucester	S. G. Robinson, M.B.E.	M. J. Collins	P. Leigh	Federal S.N. Co., Ltd.
Gloucester City	W. Stoodley	M. F. Williams	R. Milner	Bristol City Line
Gothic	L. J. Hopkins	A. J. Worricker	B. J. McGovern	Shaw Savill & Albion Co., Ltd.
Hadrian Coast	W. G. M. Wyness, M.B.E.	A. Thain	P. M. Bowie*	Aberdeen S.N. Co., Ltd.
Hauraki	R. G. Hollingdale	R. S. Hall	M. B. Wood	New Zealand Shipping Co., Ltd.
Hector	C. F. Lock	M. J. Godbehear	A. Torrance	A. Holt & Co.
Helenus	T. R. Phillips	I. E. Johnston	A. E. Holman	A. Holt & Co.
Hemiglypta	S. A. Greenaway	J. M. Connolly	J. P. Connolly	Shell Tankers, Ltd.
Hinakura	N. L. Warren	J. Hume	R. F. Jay	New Zealand Shipping Co., Ltd.
Hurunui	F. Pover	W. G. Chaplin	A. Titley	New Zealand Shipping Co., Ltd.
Imperial Star	G. L. Evans, O.B.E.	R. A. Colebrook	D. Whitehead	Blue Star Line, Ltd.
Ixion	G. Edge, M.B.E.	J. S. Hunter	W. W. Beebee	A. Holt & Co.
John Biscoe	W. Johnston	B. G. Turner	I. Williams	Falkland Is. Government
Journalist	D. Wolstenholme	B. C. Roberts	W. Stirling	T. & J. Harrison, Ltd.
Kenya	H. B. W. Cray, M.B.E.	B. N. Penman	J. Masterman	British India S.N. Co., Ltd.
Kirkham Abbey	H. H. Fox, M.B.E.	D. C. Thomas	R. Carmichael*	British Transport Commission
Laurentia	T. S. Graham	R. Dootson	D. Murray	Donaldson Bros. & Black, Ltd.
Limerick	C. Parry, O.B.E.	B. M. Gardner	R. Pearson	Avenue Shipping Co., Ltd.
Lismoria	R. McNie	R. Brewster	J. Limpitlaw	Donaldson Bros. & Black, Ltd.
Loch Garth	C. C. Dingle	P. R. Brown	F. E. Page	Royal Mail Lines
Loch Loyal	F. J. Swallow	J. C. Jardine	J. Barter	Royal Mail Lines
Marengo	J. K. Marrow	D. Clough	G. Shilson	Ellerman's Wilson Line, Ltd.
Marie Louise Mackay	W. D. Harper	G. Nunns	T. O'Neil	Commercial Cable Co.
Marna	W. Spence	J. Carnie	W. Watt*	Chr. Salvesen & Co.
Milo	J. L. Jenkins	W. G. Summerfield	C. Knight†	Bristol S.N. Co., Ltd.
Montreal City	F. M. Harris	J. M. Dawson	A. V. Chappell	Bristol City Line
Newfoundland	C. H. Kenyon	R. W. Holmes	J. C. Keegan	Johnston Warren Lines, Ltd.
New York City	N. Ramsay	A. F. Ashton	A. Brooke	Bristol City Line
Nestor	A. McDonald	K. W. Jack	T. King	A. Holt & Co.
Norfolk	C. P. Robinson	R. G. J. Davis	H. W. Hartson	Federal S.N. Co., Ltd.
Orcades	R. W. Roberts, O.B.E., D.S.C.	J. S. FitzWalter	D. MacRae	Orient S.N. Co., Ltd.
Otaio	H. N. Lawson, R.D.	M. W. Elsam	P. H. Broome	New Zealand Shipping Co., Ltd.
Paparoa	D. A. G. Dickens	M. A. Hill	F. Wilson	New Zealand Shipping Co., Ltd.
Perseus	H. C. Large	A. Dyne	C. R. McAnerney	A. Holt & Co.
Port Adelaide	W. Eastoe	D. Packman	W. Beverly	Port Line, Ltd.
Port Brisbane	E. E. Roswell	I. Lister	I. Foley	Port Line, Ltd.
Port Fairy	P. G. Packwood	A. Hodgson	M. Hannon	Port Line, Ltd.
Port Hardy	R. L. Hagley	E. H. Jones	G. C. Talbot	Bibby Bros. & Co.
Port Launceston	V. G. Battle	R. D. Henderson	F. V. Hurford	Port Line, Ltd.
Port Lincoln	E. J. Arnold	J. F. Sheldrake	W. Cowie	Port Line, Ltd.
Port Vindex	E. W. R. Young	J. Burtt	N. Hodgson	Port Line, Ltd.
Port Wyndham	R. H. Finch	M. J. Sebbage	T. McMinn	Port Line, Ltd.

* Deck Officer † Relieving Master

Ship	Captain	Principal Observing Officer	Senior Radio Officer	Owner/Manager
Potaro	R. Phillips	B. J. Hotter	W. E. Chapman	Royal Mail Lines
Queensland Star	R. White, D.S.C.	B. Wood	H. Griffin	Blue Star Line, Ltd.
Rangitiki	P. S. Calcutt	W. Davidson	C. L. Lambe	New Zealand Shipping Co., Ltd.
Richard de Larrinaga	H. H. Kay, O.B.E.	F. J. Waring	J. W. Hunter	Larrinaga S.S. Co., Ltd.
River Afton	J. P. Johnson	P. R. Robertson	V. H. George	Hunting & Son, Ltd.
Rookwood	A. Dover	B. C. Tyler	S. M. McFaul	W. France, Fenwick & Co., Ltd.
Runswick	J. S. Pinkney, O.B.E.	S. McCudden	A. N. Marsden	Headlam & Son
Saxonia	E. A. Divers, C.B.E., R.D.	T. Boyd	E. Bishop	Cunard S.S. Co.
Shuna	T. Henry	J. B. Fyfe	T. G. Watson	Glen & Co., Ltd.
Southern Cross	L. H. Edmeads	M. J. A. Clark	H. Matthews	Shaw Savill & Albion Co., Ltd.
Southern Harvester	L. Bartho	W. N. H. Andersen	A. Turnbull	Chr. Salvesen & Co.
Surrey	A. C. Davies	J. E. Sherwood	T. W. Gallacher	Federal S.N. Co., Ltd.
Sussex	J. R. Ramsay	D. W. D. Pitt	T. D. Mason	Federal S.N. Co., Ltd.
Tarantia	R. S. Paton	I. K. Walker	D. McCrae	Anchor Line, Ltd.
Teviot	J. M. F. Anderson	B. Burch	R. Randle	Royal Mail Lines
Tongariro	I. Y. Batley	D. E. LeCornu	R. Holmes	New Zealand Shipping Co., Ltd.
Trelevan	I. M. Price	D. R. Mitchell	J. H. James	Hain S.S. Co., Ltd.
Trellisick	G. A. McKay	A. V. Rowles	E. Salmon	Hain S.S. Co., Ltd.
Tremayne	L. H. White	G. C. Blight	P. R. Day	Hain S.S. Co., Ltd.
Tremeadow	S. K. Hawken	J. H. B. Armstrong	A. R. Watt	Hain S.S. Co., Ltd.
Trevince	F. G. Bolton	W. R. Clipson	J. Hanly	Hain S.S. Co., Ltd.
Velletia	J. A. Thomson	T. I. Davies	G. Barling	Shell Tankers, Ltd.

MARID SHIPS (Coasting vessels)

Duke of Argyll	W. N. Greenwood	J. D. Nash	E. A. Greenwood	British Transport Commission
Teano	F. Barnard, M.B.E.	N. O. Cook	A. E. Hodson*	Ellerman's Wilson Line, Ltd.

* Deck Officer

TRAWLERS

Skipper	Wireless Operator	Ship	Owners
A. E. Hall	L. Hought	*Prince Charles*	St. Andrew Steam Fishing Co., Ltd.
		William Wilberforce	St. Andrew Steam Fishing Co., Ltd.
B. C. Wharam	D. Verity	*St. Christopher*	St. Andrew Steam Fishing Co., Ltd.
		Prince Charles	St. Andrew Steam Fishing Co., Ltd.

Hadrian Coast (Aberdeen S.N. Co., Ltd.), Captain W. G. M. Wyness, M.B.E.
Lismoria (Donaldson Bros. & Black, Ltd.), Captain R. McNie.

2. *Teviot* (Royal Mail Lines), Captain J. M. F. Anderson.
3. *Apollo* (Bristol S.N. Co.), Captain G. V. Barnes.
Caltex Canberra (Overseas Tankship Co., Ltd.), Captain J. H. Hall.
Diomed (A. Holt & Co.), Captain W. J. Moore, D.S.C., R.D.
Hinakura (New Zealand Shipping Co., Ltd.), Captain N. L. Warren.
John Biscoe (Falkland Is. Government), Captain W. Johnston.
Tarantia (Anchor Line), Captain R. S. Paton.
Trevince (Hain S.S. Co., Ltd.), Captain F. G. Bolton.

This is the sixth year in which we have published a 'short list' and we must congratulate *Tarantia* on appearing for the third time, whilst *Explorer*, *Hadrian Coast* and *Trevince* are making their second appearance. The customary photographs of the best three ships appear opposite page 117 and special mention must be made of *Hadrian Coast*, whose photograph is published for the second consecutive year.

A noteworthy feature of this year's Excellent Award list is that no fewer than nine of the ships are fitted with R/T only and carry no radio officer. In these the award which would have gone to the radio officer, had one been carried, goes to another deck officer. The ships of 46 shipping companies are sharing this year's awards, a good example of the uniform keenness and enthusiasm of the officers in all types of ships and in all trades.

In the year under review, 1077 meteorological logbooks were received from selected and supplementary ships. Of these, 406 (37·7 per cent) were assessed excellent.

Once again this is an improvement on the previous year's figures, indeed there has been a steady improvement since 1954 when the percentage of books classed excellent stood at 17·3. Such an improvement inevitably means that although the standard required for an excellent assessment remains the same, the standard required for an excellent award becomes higher, as the number of awards is still limited to 100 in each year.

Awards to Marid ships for their consistent help in sending radio messages of sea temperatures around the home coasts, and to trawlers for their non-instrumental observations made, often under conditions of acute discomfort, in the high Arctic, are listed on page 120. The work of these ships is unspectacular, but has nevertheless been a great help to the meteorologist, both at home and in countries bordering the northern waters in the preparation of forecasts for the benefit, not only of shipping, aviation and other forms of transport, but also of the general public.

In making these awards it has always been our aim to give a book which will be acceptable and prized by the recipient, and a good deal of thought is given to the selection of books. We have found over the years that a world atlas is by far the most popular award. We feel that ideally the first award to an officer should be an atlas. The books, however, have to be ordered several months before they are required for distribution and we must always guard against ordering too many atlases for fear of there not being enough 'new customers' to take them up. For this reason there may be officers who are disappointed at not having received an atlas even though they have already had one or two awards. Encouraged by the fact that successive years have always brought us more 'new customers' than we had anticipated, we have now increased the number of atlases and decreased correspondingly the number of books. There is now a reasonable prospect that the first award to an officer will be an atlas, and officers in this year's list who have already had two awards, neither of which has been an atlas, may be sure that this year they will receive one.

It would be helpful to us if, in acknowledging the initial letter informing him of the award, any officer who does not want an atlas would let us know.

L. B. P.

THE MARINE OBSERVERS' LOG

July, August, September

The Marine Observers' Log is a quarterly selection of observations of interest and value. The observations are derived from the logbooks of marine observers and from individual manuscripts. Responsibility for each observation rests with the contributor.

TROPICAL REVOLVING STORM

Arabian Sea

M.V. *Cilicia*. Captain A. C. Johnston. Karachi to Liverpool.

22nd May, 1959, at 0000 G.M.T. Cyclone reported in 15° 00′N., 63° 30′E., heading NW. Weather at ship: wind SW., force 3; barometer 1002 mb; air temp. 86°F, sea 90°.

At 1200 cyclone reported to be moving round to WNW. at 8 kt. Weather at ship: wind E'ly, force 5; barometer 999 mb; air temp. 89°, sea 89°; heavy SE'ly swell. The wind gradually increased, frequent moderate rain showers were experienced and the barometer dropped steadily until 1800, when it stood at 985 mb. Wind NW'ly, force 9; air temp. 80°, sea 85°; very heavy confused swell. At this time the ship was assumed to be close to the centre of the depression. Torrential rain squalls reduced visibility to zero. The vessel's speed was reduced to suit the poor weather conditions and her course and speed became approximately the same as those of the cyclone, which had now gone on to a SW'ly heading. These weather conditions prevailed until 0300 on 24th May when the wind backed to W., force 9, and the barometer rose to 988·5 mb. At 0600 on 24th May the wind backed to SW'ly, rain squalls became less frequent and less intense, and the barometer rose steadily until 0900 when it stood at 992 mb.; wind SW., force 6; air temp. 87°, sea 87°.

The vessel at this time was entering the Gulf of Aden, and although the general weather conditions continued to improve, a moderate sand haze was experienced until arrival at Aden. The sky remained heavily overcast throughout the entire period.

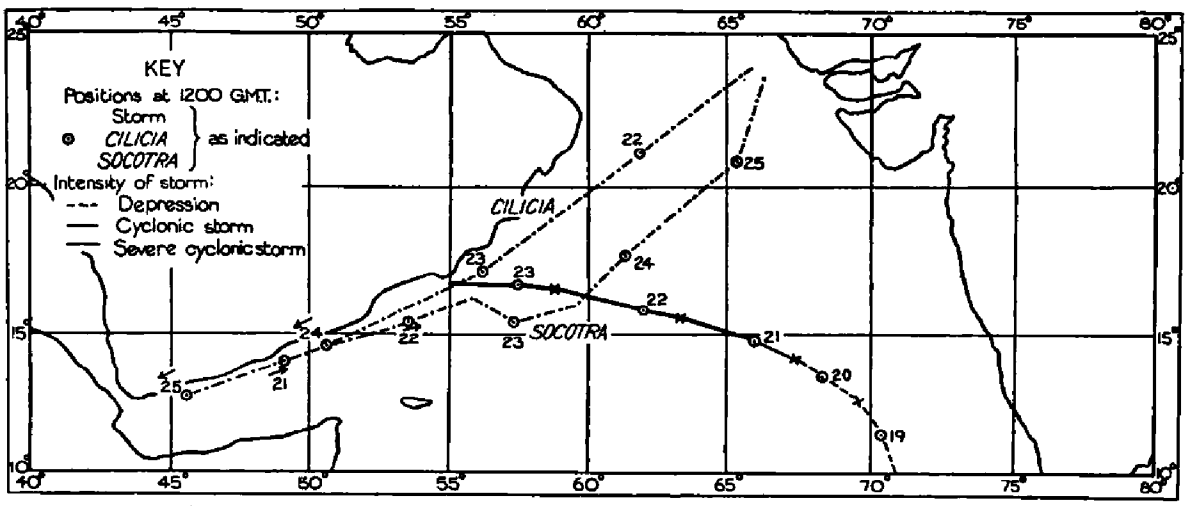
Position of ship at 0000, 22nd May: 23° 00′N., 65° 00′E.

Note 1. This observation was forwarded to the India Meteorological Department, whose comment is as follows:

"Storms in the Arabian sea during the month of May are not frequent. The last one recorded occurred during May 1941.

"The storm of May 1959 apparently formed out of an easterly wave moving from Sumatra to Ceylon between 12th and 16th May, 1959. The wave moved into the Laccadives area where conditions became markedly unsettled on 18th May. On 19th May, 1959, the unsettled conditions concentrated into a depression which further intensified into a cyclonic storm on the evening of 20th May, and into a severe cylonic storm by mid-day of 21st.

"S.S. *Socotra* on passage from Aden to Karachi passed practically through the centre of the storm and from her log it seems that the storm probably did not have a calm centre. The maximum height of waves recorded by the ship was 29 ft and the maximum wind force 60 kt.



Positions of cyclone, *Cilicia* and *Socotra*.

"An interesting feature was the damage caused at considerable distances from the storm by the swell which it produced. Numerous sailing vessels along the west coast of India ran into serious difficulties, rough seas breached the sea wall at Bombay on 25th May, threatening to cut off road as well as telecommunications between the city and its suburbs. The storm at that time was about a thousand miles away from the Indian coast and was moving away.

"Whereas we are frequently handicapped for want of sufficient observations from ships during storm periods, it was found that during this particular storm there was a remarkably good number of excellent observations received from ships, so that the progress of the storm could be confidently traced and adequate warnings issued. This was partly because of the nearness of the storm to the sea routes, e.g. Aden to Bombay, etc., but chiefly because of the excellent response from ships who took frequent special observations."

Note 2. Unfortunately the meteorological logbook of the *Socotra*, already seen by the Indian Meteorological Service and mentioned in the note above, does not give us any narrative of the storm. It shows, however, that at 0000 G.M.T. on 23rd May in 16° 36′N. 56° 00′E., her wind was 030° 24 kt, having backed from 220° 5 kt in the previous 6 hours. About this time she appears to have altered course to the S. of E. to avoid the approaching storm. From 0400 until 1600 she made observations every two hours and cleared them either to Bombay or to Colombo, a very commendable proceeding. It was unfortunate that at 1030 her barometer was smashed. There is thus no accurate record of her lowest pressure, though the barograph recorded its absolute minimum of 926·8 mb half an hour later. At 1200, when in 15° 12′N., 57° 18′E., the wind was from 290° 60 kt with wave height 29 ft (the observation quoted in *Note* 1, above). The wind thereafter backed some 80° whilst maintaining its strength for the next 3 or 4 hours, when it backed a further 3 points and abated to force 9.

DISCOLOURED WATER

North Atlantic Ocean

S.S. *Caltex Edinburgh*. Captain C. M. Edward, O.B.E. Rio Grande do Sul to Aruba.

1st September, 1959. At 1900 G.M.T. the vessel entered an area of discoloured water which had a clear-cut edge lying in a direction of 320°. The sea temp. rose 3°F. The density of the discoloured water was 1018, while that in the ballast tanks was 1027. At 1800: wind ESE., force 3; sea temp. 80°F.

Position of ship at 1800: 5° 00′N., 50° 00′W.

Note. Dr. T. J. Hart, of the National Institute of Oceanography, comments:

"This was from a position on the shelf of French Guiana where the seasonally accentuated northerly deflection of the trade wind is bound to induce some dynamic upwelling. The enrichment thus caused may be locally augmented by land run-off (river waters)."

SET AND DRIFT

Gulf of Aden

M.V. *Glenorchy*. Captain J. B. Anderson. Singapore to Aden. Observer, the Master.

15th-16th August, 1959. A star fix was obtained at 1824 S.M.T. on 15th August under good conditions and the following morning at 0814 a position was found from land bearings. In the interval between these two observations the set and drift were found to be 096° and 42 miles respectively, the drift being far in excess of any the Master had previously experienced in this area. The sea temp. dropped between 0400 and 0800 S.M.T. from 83°F to 73°. Subsequent bearings showed that the current persisted until 0854 at a rate of 3 kt and setting in the same direction. The wind was light and variable throughout the period.

Position of ship at 0000 G.M.T. on 16th: 12° 48′N., 46° 12′E.

Note. This is a very useful contribution to our knowledge of the upwelling of cold water south of Aden during the seaon of the SW. monsoon.

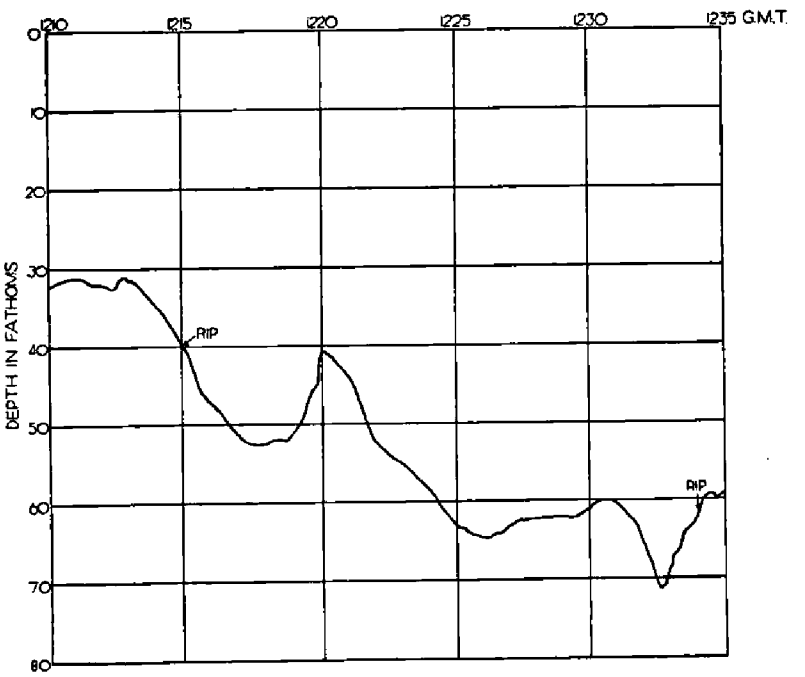
It is evidence of strong sets away from the coast at night even in the absence of strong winds. It also confirms that these sets are associated with a fall in sea temperature.

DISTURBED WATER

Irish Sea

S.S. *Slieve Bloom*. Captain G. J. Butterworth. Holyhead to Dublin. Observer, the Master.

3rd September, 1959. At 0747 G.M.T., when 12 miles from South Stack Light, Anglesey, on a bearing of 284°, a line of turbulent water was crossed. It lay in a N.–S. direction and resembled the disturbed water immediately in the wake of a ship. The sea was almost calm and there were light N'ly airs.



Echo-sounding record, 9th September.

Again, on 9th September at 1215 G.M.T., an area of disturbed water was encountered in the same position as on 3rd. It was slightly clouded, compared with the green colour of the surrounding sea. The ship, travelling at 15·3 kt, rolled, on passing the rip, although the sea was calm.

The 50 fm line was crossed on 9th about 1¾ miles W. of the area of the upwelling.

For several miles the depth averaged 60 fm, although on two occasions the echo sounder gave 70 fm; subsequently the depth increased to 80 fm. Another disturbed area was crossed, associated with the first 72 fm trench, but no rolling occurred. Admiralty Chart No. 1411 shows soundings of between 43 and 27 fm within a few miles E. of the 50 fm line in this area.

On the first occasion, the disturbed water was met 3½ hours before H.W. Liverpool springs (28·9′); on the second occasion, the time was 3¼ hours before H.W. Liverpool (26·4′).

Experience over several years has been that ships bound E. or W. roll more than usual at this distance west of South Stack, both when the tide is flooding and ebbing, the position usually being passed at night.

Position of ship (approx.): 53° 21′N., 5° 02′W.

Note 1. The Admiralty Atlas of Tides and Tidal streams shows that at the position about 12 miles from South Stack Light, on a bearing of 284°, tidal currents flowing north or south have a local maximum speed of 3 to 3½ kt at springs, both when the tide is flooding and ebbing. It is probable that the turbulent water was associated with the strongest part of the tidal current acting over an irregular bottom.

Note 2. This observation has been sent to the Hydrographer of the Navy.

Gulf of Aden

S.S. *Magdapur*. Captain J. Richardson. Aden to Trincomalee.

15th July, 1959. At 1500 G.M.T. an upwelling was observed 3 miles due S. of Ras Marshaq, which was brown and peaty in colour, having the appearance of fresh water. Much plankton, short grass and bottom vegetation was floating on the surface.

At 1800: sea temp. 86°F, wind, light and variable.

Position of ship at 1800: 12° 48′N., 46° 42′E.

Note. This is another very interesting observation illustrating the great power of the upwelling vortex south of Aden. These phenomena are associated with the period of the SW. monsoon. See the report above from M.V. *Glenorchy*.

FALL IN SEA TEMPERATURE

North Atlantic Ocean

M.V. *Runswick*. Captain J. S. Pinkney, O.B.E. Galveston to Land's End (f.o.). Observer, Mr. S. Ward, Chief officer.

22nd August, 1959. Between 1800 and 1900 G.M.T. the sea temp.—taken by canvas bucket—was found to have fallen 17°F, due presumably to the vessel having crossed from the Gulf Stream to the cold water of the Grand Banks. At 1800: air temp. 59°F, sea 77°. At 1900: air temp. 50°, sea 60°.

Position of ship at 1900: 42° 24′N., 48° 52′W.

Note. It is true that M.V. *Runswick* on this occasion passed from Gulf Stream water into cold Arctic water. This observation was made south of the normal southerly limit of the cold water. The latter half of 1959 was remarkable for the large southward movement of cold Arctic surface water into the north-west Atlantic, which accounts for the southerly position of this sea temperature discontinuity.

Gulf of Aden*

M.V. *Cilicia*. Captain A. C. Johnston. Observers, Mr. A. McKendrick, 2nd officer, Cadet Crump and duty Engineer officers.

24th July, 1959. At 0125 S.M.T., after the vessel rounded Balfe Point L.H., Perim Island, the air temp. was found to have fallen from 88°F to 78° in five min. The sea temp. also showed a marked change, having dropped to 71°; at midnight in

* See also the report from M.V. *Glenorchy* on page 124.

the Strait of Bab-el-Mandeb it had been 90°. With the change of temp. the visibility decreased from 8 miles to 3 miles. On continuing the passage from Perim to Aden the sea temp. rose again and reached 75° by 0330: by 0800 it was 84°.

Position of ship: vicinity of Perim Island.

Note. This is a further interesting example of the fluctuations of sea temperature in the Gulf of Aden during the up-welling generated by the SW. monsoon winds.

S.S. *Mahanada.* Captain G. A. Jackson. Djibouti to Aden. Observer, Mr. R. Holland, Chief officer.

27th August, 1959. The sea temp. (by condenser intake) fell from 84°F at 1600 G.M.T. to 68° at 1700. During the hour, the vessel crossed the 100 fm line. There was a corresponding fall of air temp. from 90°F to 79°. Wind NW'ly, force 4.

Position of ship at 1630: 12° 21′N., 44° 17′E.

S.S. *Clan Chisholm.* Captain J. V. Findlay. Aqaba to Aden. Observer, Mr. C. F. Irvine, 3rd officer.

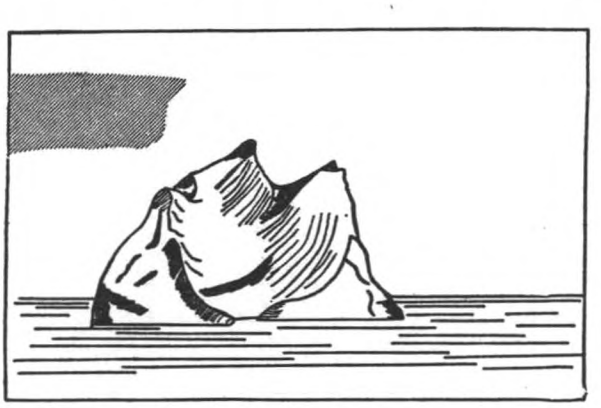
16th September, 1959. As the vessel left the vicinity of Perim Island about 1600 G.M.T., the sea temp. fell rapidly to about 68°F, the reading at noon having been 89°.

Position of ship at noon: 12° 42′N., 43° 18′E.

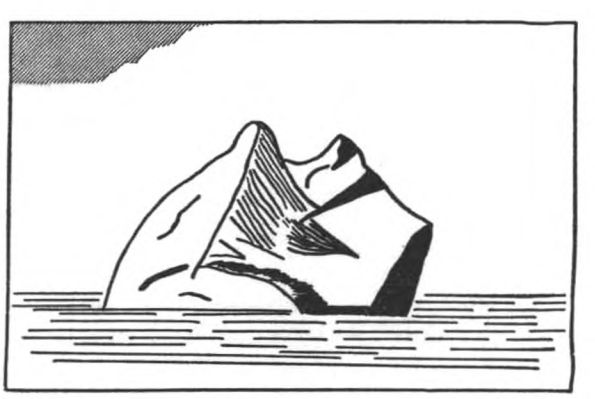
ICEBERGS

North Atlantic Ocean

S.S. *Birmingham City.* Captain F. R. Neil. Avonmouth to Montreal. Bergs measured and sketched by Mr. T. Chappell, 2nd officer.

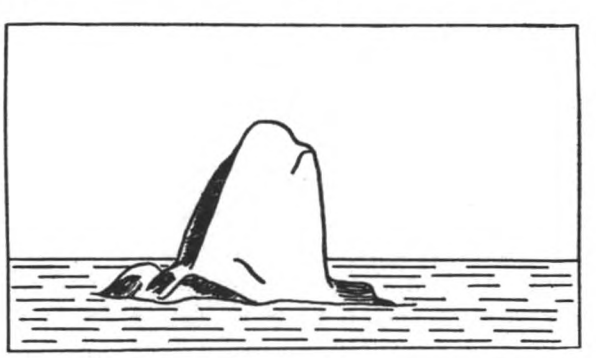


(1)



(2)

5th August, 1959. At various times during the day icebergs were sighted in fine, clear weather, and the accompanying sketches show the appearance of two of the most outstanding examples. The first berg was remarkable in having a deep hollow



(3)

scooped out of one face. Sextant angles were taken and the berg found to be 225 ft high and 350 ft long. The second berg was 100 ft high and approx. 150 ft long: numerous growlers were scattered around it. Air temp. ranged from 49°F to 69° during the period 0600 to 1800. Sea temp. was 47°, rising to 59° by 1800. Sea slight.

Position of ship: at 0600, 52° 24′N., 52° 54′W.; at 1800, 51° 30′N., 56° 24′W.

18th August, 1959. A third berg (Fig. 3) was seen on passage from Montreal to Swansea. Its measured height was 55 ft. Air temp. 56°F, sea 51°. Sea calm.

Position of ship at noon: 51° 36′N., 56° 00′W.

Note. The position of these icebergs is quite normal but the complexity of their structure and shape is of interest. We are anxious to get good ice photographs.

RADIO FADE-OUT

Indian Ocean

M.V. *Fresno City*. Captain D. Beynon. Geraldton W.A. to Cape Town. Observer, Mr. P. J. White, Radio officer.

14th July, 1959. During the period 0330 to 0500 G.M.T. a complete radio fade-out was experienced on all H/F bands, while reception on M/F bands was unaffected. A check made with the Master's personal receiver and also with M.V. *Brockleymoor*, 180 miles SSE. of our position, confirmed this. At 0455 on the 18 mc/s and 22 mc/s bands some clearing was observed, though the fade out was still evident from 12–17 mc/s. By 0500 reception was again normal on all bands. A large sunspot near the centre of the sun's disc was seen by the 3rd officer, using his sextant.

Position of ship: 28° 00′S., 97° 30′E.

Note. Mr. G. O. Evans, of the G.P.O. Radio Research Branch, comments:

"Dellinger fade-outs of the type experienced by M.V. *Fresno City* between 0330 and 0500 G.M.T. on 14th July, 1959 were reported by receiving stations in Hong Kong and Singapore and occurred between 0340 and 0500 and between 0335 and 0535 respectively. The Dellinger fade-out reported by M.V. *Fresno City* was probably associated with two large sunspots which were visible during this period. One of the large sunspots was observed to be near the centre of the sun's visible hemisphere on 14th July, 1959, and had dimensions of about $\frac{1}{10}$ of the sun's diameter.

"This Dellinger fade-out was followed 28 hours later by severe ionospheric and magnetic disturbances." [See below.]

North Atlantic Ocean

S.S. *Gloucester City*. Captain W. Stoodley. Boston to Cardiff. Observer, Mr. R. Milner, Senior Radio officer.

15th July, 1959. At 1200 G.M.T. signal reception from Canada and U.S.A. became difficult and at 1400 it faded out completely. Reception from Europe was possible until about 1600 when all frequencies above 3 mc/s became completely dead.

16th July. At 0005, signals from European stations became audible on frequencies below 9 mc/s. Frequencies above that remained blank. At 1200 signal strength of European stations improved somewhat and by 1800 reception was possible on all H/F frequencies, although the level of electrical interference remained high. Signals from Canada and U.S.A. were inaudible throughout the day.

17th July. Further improvements in ionospheric conditions were noted. Static interference on H/F was at a high level but communication with European stations was possible. Canada and U.S.A. were still unheard.

During the period of disturbed conditions, ocean weather ships were unable to relay the vessel's weather observations to Washington.

Position of ship: on 15th at 1800, 47° 18′N., 42° 36′W.; on 16th at noon, 48°48′N., 36° 54′W.; on 17th at noon, 50° 24′N., 28° 48′W.

Note 1. Mr. G. O. Evans, of the G.P.O. Radio Research Branch, comments:

"15th–17th July, 1959, inclusive, were days of severe magnetic and ionspheric disturbances.

This severe magnetic disturbance started at 0600 G.M.T. on 15th July, 1959 and was followed a few hours later, at 1600, by a severe ionospheric disturbance.

"Radio paths (great circles) from the ship to the North American stations penetrated deeper into the Auroral Zone than radio paths to the European stations. As the ship sailed eastwards and away from the Auroral Zone the absorptive effect of the Auroral Zone on the radio waves directed to the European stations diminished while the effect on the radio waves directed to North America remained substantially unchanged. This explains why European stations became audible before the North American stations.

"During this period all North American circuits incoming to the United Kingdom were seriously interrupted.

"This severe magnetic and ionospheric disturbance was probably associated with two large sunspots which were visible during this period."

Note 2. These fade-outs occurred during a period of great auroral activity (see page 136).

PHOSPHORESCENT WHEEL

East Indian Archipelago

S.S. *Stanvac Bangkok.* Captain W. Rutherford. Lautoka (Fiji) to Tandjong Uban (Bintan Island, Indonesia). Observer, the Master.

Between 2350 ship's time on 27th September and 0010 on 28th September, 1959. Light easterly wind, slight sea, very dark and clear. Course 290°, speed 15 kt.

As we were passing through a fleet of fishing vessels, I and the Officer on watch were keeping a sharp look out through binoculars and thus observed the phenomenon from start to finish. The first indication of anything unusual was the appearance of white caps on the sea here and there, which made me think that the wind had freshened, but I could feel that this was not so. Then flashing beams appeared over the water, which made the Officer on watch think that the fishing boats were using powerful flashlights. These beams of light became more intense and appeared absolutely parallel, about 8 ft wide, and could be seen coming from right ahead at about ½ sec intervals. At the time, I thought I could hear a swish as they passed, but decided that this was imagination. They did not appear like rings or arcs of a circle, unless it was a circle so big as to make them appear as straight lines. It was like the pedestrian's angle of a huge zebra crossing passing under him whilst he is standing still. When this part of the phenomenon was at its height it looked as if huge seas were dashing towards the vessel, and the sea surface appeared to be boiling, but it was more or less normal around a fishing vessel which we passed fairly close. The lights of various fishing vessels were visible through the beams of light, though dimmed by the brightness of the latter. The character of the flashes changed and took on the appearance of beams from a lighthouse situated about two miles on the starboard bow, or as if the centre of a giant wheel was somewhere on the starboard bow with the beams as its spokes. As the beams from the wheel on the starboard bow weakened, the same pattern appeared on the port bow at the same distance and regularity. The wheel on the starboard bow revolved anticlockwise and the one on the port bow revolved clockwise, i.e. both wheels were revolving towards the ship. The wheel on the starboard bow diminished as the one on the port bow increased: when the latter was at its peak the one on the starboard bow had disappeared.

The next change was that the beams appeared to be travelling in the exact course of the ship, like a following sea, i.e. the beams now seen were a reversal of those seen at first. At the time they appeared I asked the Officer on watch what he saw, in case through blinking my eyes I was not seeing these correctly. The Officer on watch agreed that the beams were now 'chasing' us. I cannot tell from how far astern these were forming, as I could not actually see them further aft than the funnel (which is right aft, this ship being a tanker), but I could clearly see them passing from aft along the ship's side. I was not looking aft very much because I was picking my way through these small fishing vessels.

Presently all the beams gradually ceased and the surface of the sea could be seen again. At that time for about 2 min, as far as the eye could see, there were rings

of light about 2 ft in diameter and 6 ft apart in the sea, flashing in and out with rhythm. The flashing reminded me of a treeful of glow-worms. Although the flashes or beams of light appeared to be above the surface of the water, I think this was an illusion and that the actual light was in the water, flashing in and out at regular intervals. During the wheel effect, I was reminded of the apparent motion of these electric signs which give the appearance of objects moving by the flashing on and off of various lights. The ship seemed to be in the centre of the disturbance and at one time I had the feeling that she was actually causing it, and that if I reduced speed or altered course, I would alter the pattern accordingly. I could not try this, however, as I had to get clear of the fishing vessels as soon as possible. Had I not read of this phenomenon in the West Coast of India Pilot, page 18, I would have been much concerned as to the safety of the ship, especially at the first appearance of giant waves dashing towards us.

I have seen the sea quite bright over large areas before, but never anything to move about like this.

Position of ship: 6° 20′S., 113° 07′E.

Note. Mr. E. W. Barlow comments:

"An observation of the phosphorescent wheel was made in the Persian Gulf in 1879, and is the earliest one of which a record has been found. Although over 80 years have elapsed, the wheel, which is subject to considerable variations in different observations, remains one of the most striking and mysterious of all natural phenomena, for which no satisfactory explanation can yet be given. The observation is noteworthy on account of the unusual presence of the parallel bands, before and after the appearance of the wheels. A number of observations have been received in which parallel bands have been seen to change into the wheel or vice versa. In the above observation the direction of the parallel bands was at right angles to the ship's course; this has been seen before but in some observations the bands bear no relation to the course and may on some occasions change their direction rapidly."

PHOSPHORESCENCE

South Atlantic Ocean

M.V. *Imperial Star.* Captain G. L. Evans, O.B.E. Teneriffe to Cape Town. Observer, Mr. D. Hulme, 4th officer.

5th August, 1959. At 2300 G.M.T. the ship passed through phosphorescence in the form of bright circular flashes which appeared to come from just below the surface and were about 3–4 ft in diameter. The circles were brightest at the centre, where the flash originated and as this radiated outwards it correspondingly decreased in intensity. Although a flash lasted only one sec, the area around it continued to glow for a couple of sec. The phosphorescence was seen for 20 min. Sea temp. 42·1°F; wind SE., force 5; sea rough with moderate swell.

Position of ship: 9° 10′S., 2° 37′W.

Note. Mr. E. W. Barlow comments:

"This is a rather rare phenomenon, though a number of previous observations of the same character have been received. In about half of these, luminous water is seen to rise from subsurface depths, before expanding on the surface. In the remainder, including the above observation, no such rise occurs.

Arafura Sea

S.S. *Caltex Canberra.* Captain J. Hall. Botany Bay to Dumai. Observer, Mr. J. J. Purchall, 3rd officer.

24th July, 1959. At 1100 G.M.T. the sea ahead was seen to be brilliantly lit up and at 1115 the vessel entered an area of phosphorescence, which, from a distance, bore a resemblance to sea fog. From horizon to horizon, the entire sea appeared to be milky white, having an intensity which varied from place to place. Numerous patches of bright phosphorescence were observed in the bow wave. A sample of water was taken in a bucket and when examined in the dark a great number of minute organisms were seen in suspension, apparently stationary. When the surface of the water was agitated the brilliance increased and the small particles

clustered together to form patches about one inch in diameter. The brilliance was maintained for 30–40 min, but, after an hour, nothing more could be seen. The ship remained in the milky sea until 1400, the phosphorescence gradually becoming weaker, until only occasional patches showed in the bow wave. From 1115 to 1400, the distance steamed was 33 miles. The sea temp. remained constant at 78·5°F. Wind ESE., force 4; sea slight to moderate.

Position of ship: 8° 45′S., 128° 47′E. (15 miles south of Sermata Island).

Note. Mr. E. W. Barlow comments:

"The phenomenon observed does not appear to be of the same nature as the 'white water' quite frequently seen in the Arabian Sea. From the bucket observation it would appear that the colour of the sea was green. It is a well-known fact that if light is below a certain degree of intensity it fails to stimulate colour perception in the human eye, so that this is the probable explanation of the milky white appearance. A few similar observations have been received from other parts of the oceans where, as far as is known at present, the true 'white water' does not occur."

GREEN FLASH

Irish Sea

S.S. *Empire Cymric.* Larne to Preston. Observer, Mr. H. H. McGibney, Chief officer.

27th August, 1959. At sunrise (0520 G.M.T.) a vivid green flash lasting 2 sec was seen as the sun's lower limb cleared the horizon. As soon as this occurred, the sun was examined through a 'haze screen', with 7 × 50 binoculars and it was observed to change shape, having a flat top, sharply corrugated sides and a rounded lower limb. This unusual shape persisted for three min, until the sun was obscured by the base of Sc 3° above the horizon. Air temp. 60°F; wind variable, force 1; sea rippled; visibility excellent; 1/8 Sc.

Position of ship: 54° 16′N., 5° 07′W.

Note. This is an exceptional phenomenon and one requiring a very special vertical distribution of temperature, probably in association with an abnormal distribution of humidity. It is an inverted green flash. The normal green flash at sunset is due to the red end of the solar spectrum setting before the blue end. The above is a sunrise phenomenon in which the red end of the spectrum appears to have risen ahead of the blue end. The peculiar image of the sun is consistent with the special state of the atmosphere which produced the unusual green flash.

South Pacific Ocean

S.S. *Devon.* Captain A. C. Rollinson. Balboa to Brisbane. Observer, Mr. A. Batt, 4th officer.

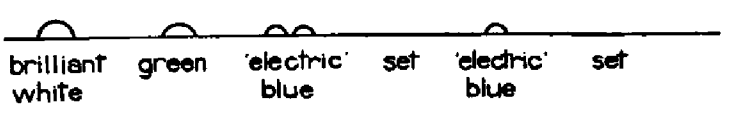
2nd July, 1959. At 0120 G.M.T. at sunset, the green flash observed through binoculars was seen to spread from the edge of the sun's disc towards the centre. The interesting feature of the observation was that the Chief and 2nd officers, although looking for the flash, from a different position on the vessel, did not see it. The flash was seen at a height of 52 ft but not at 40 ft. At 0000 G.M.T.: air temp. 74°F, wet bulb 71°; visibility excellent; wind variable, force 1; sea slight; no cloud.

Position of ship: 2° 15′S., 109° 13′W.

BLUE AND GREEN FLASH

South Pacific Ocean

S.S. *Gothic.* Captain L. J. Hopkins. Wellington to Balboa. Observer, Mr. M. Jenkins, 4th officer.



16th August, 1959. The setting sun at 0044 G.M.T. was watched through binoculars. Before the last segment of the disc disappeared below the horizon it changed

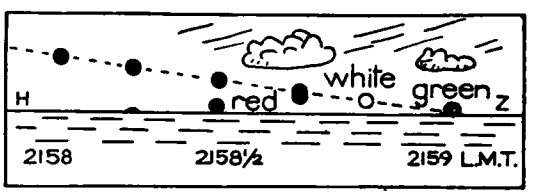
from brilliant white to brilliant green and then appeared to split into two small pieces, both of which were a vivid 'electric blue'. The sun set about a second later and almost immediately a small blue segment reappeared, to set again about ½ sec later. Air temp. 71·5°F, wet bulb 70°, sea 70°; wind SE., force 1; low swell; visibility excellent.

Position of ship: 15° 16'S., 110° 53'W.

GREEN FLASH AT SETTING OF VENUS

South China Sea

M.V. *Diomed.* Captain W. J. Moore. Hong Kong to Rejang River. Observers, Mr. C. Myles-Hook, 3rd officer and Midshipman R. J. Evans.



1st July, 1959. At 2156 S.M.T. as Venus was approaching the horizon it presented its normal bright appearance, but 2 min later it turned blood red in colour: at 2158½ a red, double image was seen, the lower part of which lay on the horizon. As the planet set at 2159 it momentarily became a bright green colour, the sequence of events being as shown in the diagram. Small amounts of cloud present; wind S'E, force 3; sea slight; air temp. 87°F, wet bulb 79°, sea 85°.

Position of ship: 15° 16'N., 112° 57'E.

Note. This type of observation has been published frequently in this journal. A detailed explanation is at present impossible. One can only report the variety and complexity of the phenomena experienced. It is, however, important to report this type of observation with care and if possible with measurements so that the observations may be useful in any future statistical analysis of the phenomenon.

CREPUSCULAR RAYS

Caribbean Sea

M.V. *Taranaki.* Captain C. Beck. Kingston to Port of Spain. Observers, all officers.

3rd September, 1959. At 1820 L.M.T., 3 min after sun had set behind a bank of Sc (C_L4), bluish white beams of light, separated from one another by broad and brilliant blue streaks, were seen diverging upwards from the cloud, towards the zenith. Overhead, they were less clearly defined, but as the bands converged towards the east, their intensity increased again. They appeared to meet in a point at the horizon.

A patch of Cs (C_H8), lying towards the W. in the path of the beams, was divided into two distinct halves. One appeared white, while the other was dark grey, the line of separation being sharply defined. Air temp. 82°F, wet bulb 77°, sea 83°; wind, calm.

Position of ship: 17° 41'N., 76° 33'W.

Note. This is a very complete account of crepuscular rays but quite typical (See *Marine Observer's Handbook*, page 73). The variation in the illumination of Cs suggests some complexity in the atmosphere at the cirrus level.

BROCKEN SPECTRE

off Takoradi

M.V. *Apapa.* Captain R. W. Philip. Bathurst to Takoradi. Observers, Mr. G. D. Pari-Huws, Chief officer and members of crew.

26th August, 1959. Thick fog giving a visibility of about 150–200 yd, and

approximately 150 ft deep lay on the water at 0915 G.M.T. The sun was right astern at 50° altitude and, shining through the fog, it cast upon the water 38 ft below, the shadows of members of the crew working on the forecastle head. Each shadow was surrounded by a miniature coloured halo whose apparent diameter was about 5 ft. Colour was faint, that of the outside of the halo being violet. Air temp. 72½°F, wet bulb 72°, sea 72°.

Position of ship: 4 cables from Takoradi Harbour entrance.

Note. The phenomenon was first noted on the Brocken mountain in Germany, but it is most common in Arctic regions where it is seen on every occasion of simultaneous sunshine and fog. The coloured rings are known as a 'glory', and a typical series of colours seen in a well developed one is as follows: there is a general whitish yellow colour round the shadow, surrounded with rings of colour which, in order outwards, are dull red, bluish-green, reddish-violet, blue, green, red, green, red. A white bow at a considerable distance outside the 'glory' is sometimes also seen.

The shadow of the observer on thick fog may be seen at night, if there is a bright artificial light behind him.

LIGHTNING

South China Sea

M.V. *Diomed.* Captain W. J. Moore. Singapore to Manila. Observer, Mr. C. Myles-Hook, 3rd officer.

4th June, 1959, 1330–1440 G.M.T. Vivid lightning was seen, and occasional thunder heard, 3 or 4 miles from the ship. At 1200: sky $\frac{5}{8}$ clouded, 2/8 $C_L 2$, scattered Cirrus; air temp. 85·1°F, wet bulb 79·0; bar. 1008·9 mb; wind 220°, 7 kt.

See photograph on opposite page.

Position of ship at 1400: 7° 28′N., 108° 28′E.

Note. This observation has been forwarded to Dr. B. F. J. Schonland.

ST. ELMO'S FIRE

North Pacific Ocean

M.V. *Trelissick.* Captain G. A. McKay. Tamano to Fiji Islands. Observer, Mr. F. M. Marchant, 2nd officer.

28th September, 1959. Between 1640 and 1655 G.M.T. the sky was heavily clouded and there was thunder and lightning accompanied by light drizzle. St. Elmo's fire, in the shape of small greenish blue globules 6 in. to 9 in. apart, was seen along the whole of the main aerial and yardarm stays. The trucks of both masts were surrounded by a spherical glow approximately 1 ft in diameter. No change was observed in the behaviour of the compasses. At 1800: air temp. 75°F, wet bulb 73°, sea 78°; wind NE., force 5.

Position of ship: 32° 39′N., 136° 07′E.

Note. This appears to have occurred in unstable polar air moving southwestwards in the vicinity of the North Pacific polar front.

WATERSPOUT

North Sea

S.S. *Zena.* Captain L. W. Loose. Archangel to Rotterdam.

29th July, 1959. At 0705 G.M.T. three waterspouts were observed to form in succession, about 17 miles to the SW. of the ship. The first one, which persisted for 15 min, formed a distinct, solid column, presenting a good radar target. It dissolved completely and was replaced by another of smaller size. This, in turn, was superseded by a third spout of more indistinct appearance. The original spout

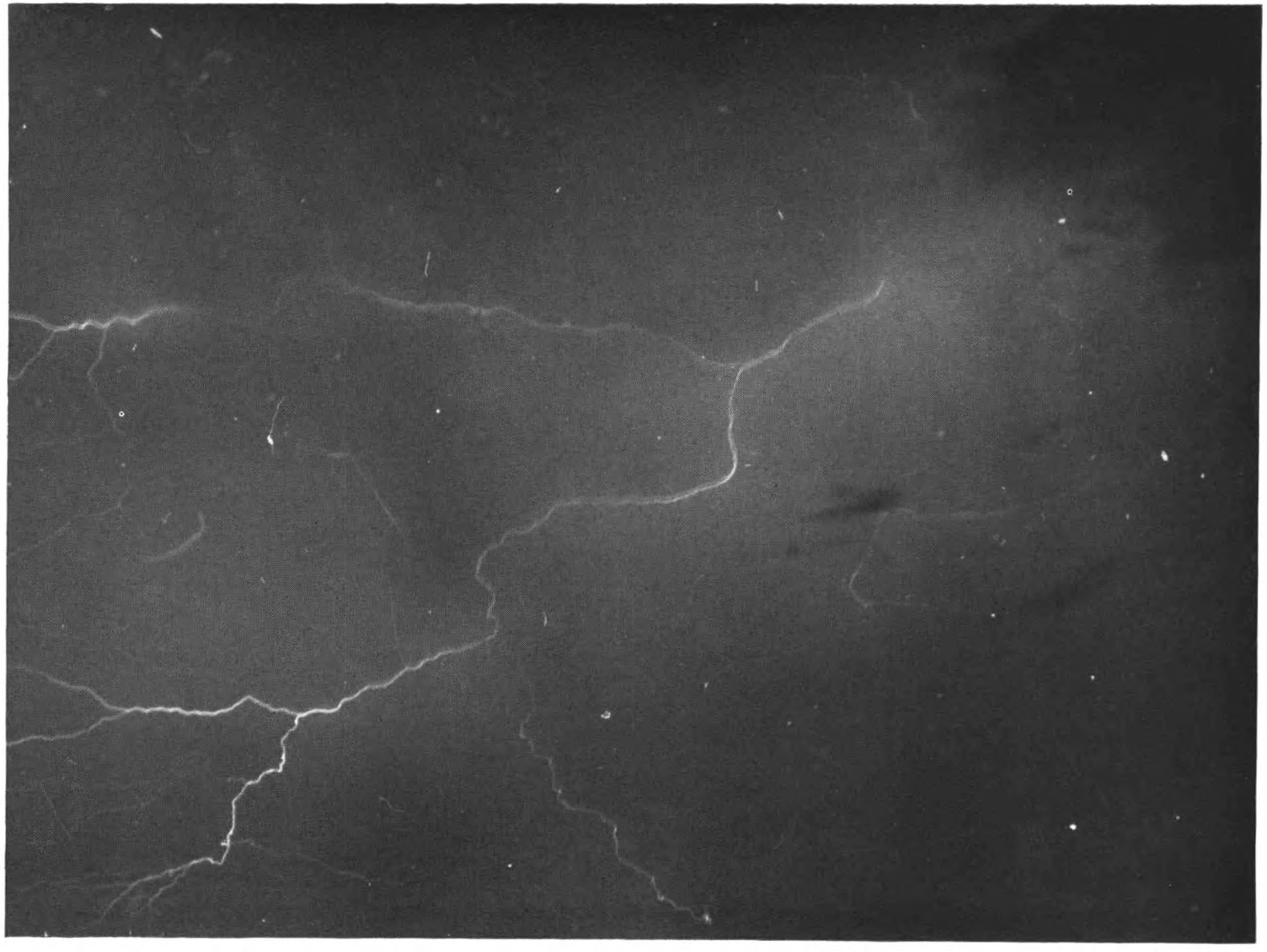


Photo by Mr. C. Myles-Hook, 3rd officer

Lightning observed from M.V. *Diomed* (see page 132).

(*Opposite page 132*)

(*Opposite page 133*)

Photo by Mr. John A. Weston, 2nd officer

Roll cloud observed from S.S. *Waihemo* (see page 133).

disintegrated gradually and was the only one which reached to the sea, while the other two appeared to fade out almost instantaneously after being visible for about 2–3 min only. It was not possible to observe any rotary motion in the columns. At 0600 G.M.T.: air temp. 63°F, wet bulb 58°, sea 64°. Wind E'S, force 1.

Position of ship: 54° 51′N., 3° 58′E.

Note. This is included because of the rareness of waterspouts in the North Sea and is therefore a very useful record. The waterspout occurred in a shallow depression containing areas of instability. These were intensified locally by high sea temperatures in the North Sea.

ROLL CLOUD

Australian Waters

S.S. *Waihemo.* Coasting off New South Wales.

1st September, 1959. The photograph reproduced on opposite page was taken at 1530 E.A.S.T.

Position of ship: 36° 15′S., 150° 35′E.

Note 1. When the cloud formation occurred, there was a shallow depression off New South Wales, and a cold, maritime polar airstream was flowing northwards along the coast. This interesting photograph illustrates what was probably a mild line squall in the cold, moderately unstable airstream.

Note 2. This observation was forwarded to us by the Director of the Canadian Meteorological Branch.

SANDSTORM

Gulf of Aden

S.S. *Ixion.* Captain G. Edge. Sydney to Aden. Observer, Mr. J. S. Hunter, 3rd officer.

16th July, 1959. When about 20 miles E. of Aden at 1500 G.M.T., the vessel ran into a storm of very fine sand which persisted until 0000 on 17th. At times the visibility, even for bright lights, was reduced to about ½ mile. The wind was SW'S, force 5. After sailing from Aden on the morning of 17th, as the wind increased from calm to force 4, the sand again appeared from the S., with the visibility falling to about 4 miles. Later, in the southern Red Sea, occasional sandstorms were experienced—the sand in every case being very fine. At noon on 16th: air temp. 88°F, wet bulb 81°.

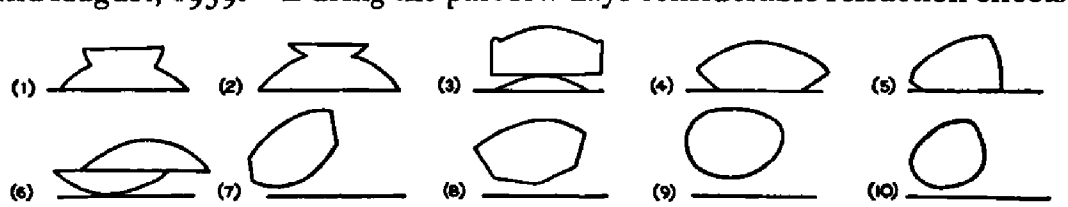
Note. This observation is typical of the SW. monsoon season in the Gulf of Aden, which is one of frequent storms and instability. Storms in this area in July can frequently arrive from a N'ly or NNW'ly direction, in air above the SW. monsoon. On 16th July at noon, a trough of low pressure lay NNE.–SSW. across the Yemen and French Somaliland, giving rise to moderate NW'ly winds over Eritrea and strong SSW. winds over the Aden area.

ABNORMAL REFRACTION

South African Waters

S.S. *Crofter.* Captain W. E. Williams. Las Palmas to Durban. Observers, Mr. J. M. Connolly, 3rd officer and Mr. A. D. Fraser, Radio officer.

22nd August, 1959. During the past few days considerable refraction effects have



been seen by all the ship's officers, but the appearance of the moon when rising tonight at 1920 G.M.T. was quite phenomenal. The sequence of the changes, shown in the ten sketches, occupied only 4 min, from 2111½ to 2115½ (S. African time).

The real shape of the moon at the time is illustrated at (10). Air temp. 68°F, sea 68°, dew point 52°; wind E., force 1.

Position of ship at 0000 G.M.T. on 23rd: 32° 48′S., 28° 54′E.

Gulf of Aden

S.S. *Esso Manchester.* Captain R. Hutt. Ras Tanura to Suez. Observer Mr. W. McCormick, 3rd officer.

1st September, 1959. At 0830 G.M.T. a vessel of about 15,000 tons was seen approx. 8 miles ahead of us. Refraction effects caused an image of this ship, right way up, to form immediately above it, giving the appearance of a vessel with another one on the top of it. The bow wave was also doubled and resembled a waterfall extending from the upper edge of the top 'ship' to the waterline of the real one. Funnel smoke from all the vessels in the vicinity was lying close to the sea surface, presumably trapped by a temperature inversion. Air temp. 84°F, wet bulb 75·5°, sea 68°; wind, calm; sea smooth.

Position of ship: 13° 29′N., 43° 54′E.

Note. The observer in his remark concerning funnel smoke has indicated the reason for this phenomenon, i.e. abnormal vertical distribution of temperature along the path of the light from the observed ship.

South Pacific Ocean

M.V. *Greathope.* Captain R. Cook. Suva to Auckland. Observer, Mr. M. Harrison, 3rd officer.

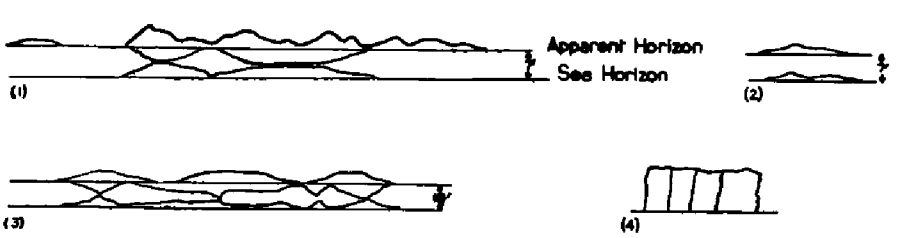
20th July, 1959. As Venus was nearing the horizon before setting at 0900 G.M.T. it changed in colour from white to red, then, about 40 sec before it finally disappeared, two images were seen, the left one being white and the other one red. The sky was clear of cloud and there was bright moonlight. Wind, light and variable.

Position of ship: 31° 50′S., 175° 35′E.

Australian Waters

M.V. *Idomeneus.* Captain A. G. Surtees. Sydney to Melbourne. Observers, Mr. D. A. Hunt, 2nd officer, Mr. A. O. Proudfoot, 3rd officer and Midshipman B. G. Gouldthorpe.

11th September, 1959. Conditions of abnormal refraction were observed between 0315 and 0545 G.M.T., the vessel being, early in the period, at a distance from the land which varied between approx. 30 and 65 miles. Later on, the distance was some 15 miles from the coast. During the afternoon the horizon was elevated by between 7 and 10 minutes of arc above what appeared to be the normal sea horizon.



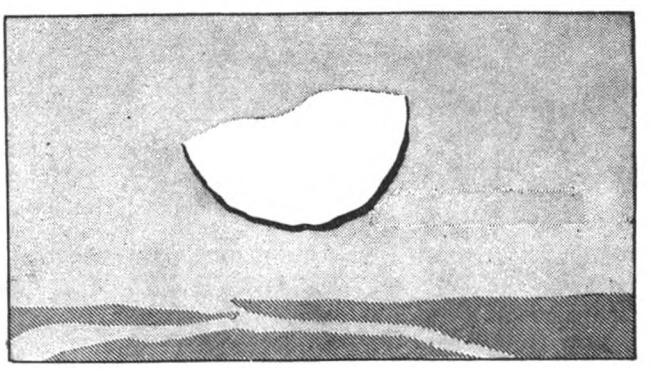
All round the horizon there was a band of what looked like fog or mist but, on approaching the land, this mistiness disappeared. At one stage, two distinct upright images of one mountain were seen and the mirage effects shown in the sketches were observed. When the vessel was at a distance from the land greater than 25 miles, at the end of the period, the vertical elongation of the coastline still persisted. Throughout the afternoon the mountains in the background were extremely clear and undistorted. Air temp. 60°F, wet bulb 55°, sea 66°; M.S.L. pressure 1026 mb (falling rapidly); wind NNE., force 2; sea slight; swell low from E'S; 2/8 Cu and Ac. Height of eye, 48 ft. Course 243°, speed 14½ kt.

Position of ship at 0315: 38° 37′S., 147° 46′E.

Southern Ocean

S.S. *Devon*. Captain D. B. Brittain. Fremantle to Melbourne. Observers, Mr. A. E. Robinson, 3rd officer and the Quartermaster.

24th August, 1959. At 2200 S.M.T. the side light and poop lights of a vessel were seen plainly, its distance away being estimated at about 5 miles: radar, however, gave the distance as 12½ miles. An unusual degree of scintillation was observed in the case of stars, which became visible at ½° altitude. In these conditions of abnormal refraction, it was hoped to see the green flash at moonrise, but a cloud bank low on the horizon prevented an observation being made. However, when the moon



had risen to 15 min altitude and was clear of the cloud, its lower limb was seen to scintillate with a brilliant scarlet colour. The coloured rim gradually contracted in length and the last of the scarlet disappeared when the moon was at an altitude of about 1°. Air temp. 53°F, sea 56°; wind, light and variable; low swell.

Position of ship: 37° 22′S., 132° 32′E.

Note. Phenomena similar to this have been reported by aircraft crews, usually at sunrise, and have been found to be associated with low level temperature inversions, probably at about 1,000 ft.

AURORA

[In place of the usual selection of reports this section of the Log contains a list of the observations for the period July to September 1959, with some comments on the outstanding auroral displays. It has been prepared at the Balfour Stewart Auroral Laboratory of Edinburgh University by Mr. B. McInnes and Mr. K. A. Robertson.]

As mentioned in the article on page 145, auroral observations made anywhere over the globe are of value to us in the Aurora Survey. We are glad to have this opportunity of expressing our thanks for the reports considered here and of making some comments on them. Our main use of the reports is in conjunction with the many other reports received from other sources, but it is of interest to consider them here on their own.

The observations for the period covered by the present Log which we believe to be truly auroral are sumarized in the list below. (A few of the observations received were almost certainly of luminous phenomena other than aurora. One at least of these was an interesting observation of the comparatively rare noctilucent clouds.) The observations are listed in date order.

The position of the ship at the time of the observation is followed by three columns, headed Λ (geomagnetic longitude), Φ (geomagnetic latitude), and I (inclination). The meaning and significance of these are given briefly in the article on page 147. In these columns, + indicates north and − indicates south. The period of time covered by the observation is given in G.M.T., and then the auroral forms and types of activity observed are listed, using the standard abbreviations: G = glow, HA = homogeneous arc, HB = homogeneous band, RA = rayed arc, RB = rayed band, R = rays, S = surfaces; P = pulsating, F = flaming; L = auroral light seen but no other details available.

Date	Ship	Geographic Position				Λ	Φ	I	Time (G.M.T.)	Forms
2nd July	*Rookwood*	47° 13′N.		60° 33′W.		010	+59	+74	0230–0245	RA
11th	*Lalande*	46 40 N.		7 48 W.		070	+51	+63	0100–0220	L
15th	*Rialto*	49 26 N.		66 07 W.		010	+61	+76	0115–0700	R, S
	Eastern City	23 48 S.		154 27 E.		230	−32	−50	1730–1850	L
	Great City	23 58 S.		112 58 E.		180	−35	−58	1530–1735	R
	Cumberland	34 09 S.		174 52 W.		260	−36	−58	1350–1540	L
	Houston City	34 40 S.		173 42 E.		250	−39	−61	1230–1845	G. R
	Orontes	34 54 S.		151 09 E.		227	−44	−65	1530	HB
	Jason	36 30 S.		150 28 E.		226	−45	−66	1700–1745	G, HA, R
	Dominion Monarch	37 40 S.		133 55 E.		208	−48	−69	1530–1920	R, G
	Ruahine	44 15 S.		172 40 E.		250	−49	−69	1000–1400	G, R, F
	Port Jackson	38 40 S.		141 40 E.		220	−48	−70	1730–1800	S, RB, R
	Port Pirie	41 29 S.		95 08 E.		160	−52	−72	1530–2002	R, S, P
16th	*Laurentia*	off Orleans Island				360	+59	+76	0140–0150	R
	Rialto	50 54 N.		57 52 W.		020	+62	+73	0015–dawn	S. R
	Northia	29 00 S.		153 40 E.		230	−37	−59	1600–1800	S
17th	*Gloucester City*	49 36 N.		32 42 W.		050	+58	+69	0100	HB
	Caltex Canberra	29 27 S.		153 35 E.		230	−38	−59	0930–1220	G, R
	Northia	38 10 S.		149 00 E.		230	−46	−68	1900–2000	G, R
	Port Hardy	37 10 S.		139 18 E.		210	−47	−68	1930–2020	G
	Port Pirie	41 01 S.		107 50 E.		180	−52	−75	1937–2012	G, S
18th	*Weather Reporter*	57 17 N.		11 25 W.		070	+62	+70	0055	L
21st	*Port Brisbane*	47 55 N.		61 29 W.		010	+59	+74	0225–0230	RB
22nd	*Arabia*	53 45 N.		47 35 W.		030	+64	+74	0330–0500	HA
23rd	*Arabia*	50 30 N.		58 00 W.		010	+62	+75	0400–0530	RA
25th	*Port Brisbane*	50 00 N.		62 40 W.		010	+61	+76	0120–0640	HA, RB
27th	*Torr Head*								0030–0130	R
31st	*River Afton*	48 55 N.		50 45 W.		020	+59	+73	0330–0530	RA, R, P
2nd Aug.	*Montreal City*	Gulf of St. Lawrence				010	+61	+76	0100–0400	HA, RB, S
	Cairngowan	46 20 N.		72 30 W.		360	+58	+76	0500	HA
4th	*Montreal City*	52 02 N.		53 34 W.		020	+63	+75	0230–0330	RA
	Rookwood	47 49 N.		61 05 W.		010	+59	+74	0200–dawn	HA, RA
5th	*Weather Reporter*	62 00 N.		33 00 W.		050	+70	+76	0154	R
	Rookwood	48 55 N.		67 41 W.		360	+60	+76	0325–0350	HB
7th	*Lismoria*	Belle Isle Strait				020	+63	+75	0330	R, PB
	Birmingham City	Gulf of St. Lawrence				010	+60	+75	0430–0700	R
	Rookwood	River St. Lawrence				360	+58	+76	0230–0530	HA, G
11th	*Ivernia*	53 20 N.		34 50 W.		050	+62	+71	0200–0300	HA, RA
14th	*Weather Reporter*	61 00 N.		31 00 W.		060	+69	+76	0010–0252	R, RA
16th	*Argyllshire*	36 46 S.		128 50 E.		200	−48	−69	1215–1235	S
17th	*Birmingham City*	Anticosti Island				010	+61	+76	0300–0335	RA
	Rookwood	48 33 N.		63 00 W.		010	+60	+75	0300–0600	R, RB, F
22nd	*Rialto*	Gulf of St. Lawrence				010	+60	+75	0030–0100	RA
23rd	*Ramore Head*	55 40 N.		36 10 W.		050	+65	+73	0400–0500	RA
24th	*Rookwood*	49 07 N.		67 00 W.		360	+61	+76	0145–0500	RB, HB, S
27th	*Manchester Faith*	55 48 N.		37 00 W.		040	+65	+73	2330–0015	R
31st	*Bamburgh Castle*	54 20 N.		45 40 W.		020	+57	+74	0305–0309	R
1st Sep.	*Bamburgh Castle*	55 03 N.		38 40 W.		040	+64	+73	0100	RA
2nd	*Rialto*	Belle Isle Strait				020	+63	+75	(none)	R
	Gloucester City	54 36 N.		22 12 W.		060	+61	+71	0100	G
3rd	*Bamburgh Castle*	55 30 N.		12 24 W.		070	+60	+70	2330–0340	R, RB, F
	Hauraki	45 43 N.		18 02 W.		060	+52	+64	2320–0200	G, R
	Orion	43 18 S.		148 42 E.		230	−52	−72	1500–1800	R. G
4th	*Cairngowan*	58 42 N.		7 06 W.		080	+62	+72	0001	R
	Port Townsville	35 33 S.		134 30 E.		210	−46	−67	1115–1130	L
	Norfolk	38 25 S.		144 40 E.		220	−47	−69	1110–1130	RB
	Lakemba	38 50 S.		143 30 E.		220	−49	−69	0900–1120	R, G, RA
5th	*Cairngowan*	58 42 N.		16 12 W.		070	+64	+73	0200	RA
	Kirkham Abbey	off River Humber				080	+56	+68	2230–2400	RA, RB
6th	*Manchester Faith*	42 30 N.		79 36 W.		350	+54	+74	0100–0215	R
	New York City	42 45 N.		62 30 W.		010	+54	+72	0100–0320	G, R
11th	*Lismoria*	49 13 N.		64 24 W.		010	+61	+76	0045–dawn	HA, RA
12th	*Sandhoe*	70 05 N.		51 15 E.		130	+64	+80	1915–1925	R
14th	*Laurentia*	50 00 N.		61 29 W.		010	+61	+76	0730–0745	R, P
16th	*Birmingham City*	53 18 N.		45 38 W.		030	+63	+73	0200–0355	R, RB
18th	*Birmingham City*	51 00 N.		57 42 W.		020	+62	+76	0010–0040	RB, R
20th	*Port Vindex*	50 02 N.		63 34 W.		010	+61	+76	0430–0450	RB
	Port Vindex	51 54 N.		54 24 W.		020	+63	+75	2345–0220	RB, S
21st	*Port Vindex*	52 50 N.		44 54 W.		030	+63	+73	2330–0100	HA, R
	City of Winchester	41 12 N.		69 12 W.		360	+53	+72	0001	RB
23rd	*Manchester Venture*	56 15 N.		34 00 W.		050	+65	+73	2015–2038	R
25th	*Rookwood*	49 10 N.		66 40 W.		360	+61	+76	0045–0630	R, F, FB
26th	*Zena*	62 00 N.		00 25 W.		090	+64	+74	2030–2245	RB, P
27th	*Zena*	65 25 N.		05 00 E.		100	+63	+75	2130–dawn	RB, P
	Weather Recorder	61 44 N.		19 29 W.		070	+68	+74	2330–0330	G, HA
28th	*Weather Recorder*	63 20 N.		21 30 W.		070	+69	+76	2045–0330	HB, HA
	Rialto	58 05 N.		22 30 W.		060	+65	+73	1945–0130	R, HA
29th	*Weather Recorder*	63 40 N.		23 00 W.		070	+70	+76	2235–0020	RA, HA

Displays of 15th to 18th July

As will be seen from the list, the most outstanding auroral activity of the period occurred during 15th to 18th July. The great displays of these nights were of course only one of the many aspects of the general geophysical activity. Because the methods of measuring geomagnetic disturbance are well standardized, and

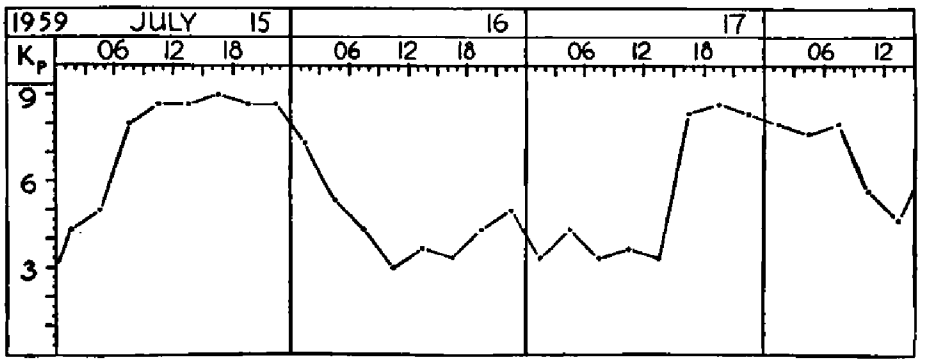


FIG. 1.

because there are many geomagnetic observatories widely distributed over the globe, making continuous measurements of the elements of the geomagnetic field, it is usual to take the results of these geomagnetic observations as a suitable measure of the world-wide geophysical activity which is manifested by auroral displays, disturbance of radio propagation, and so on. A plot against time of the geomagnetic disturbance index known as Kp is given in Fig. 1 for the relevant period. The peak of intensity occurred during the three-hour period 1500 to 1800 on 15th July and the index then reached its maximum possible value (the only time during the year 1959 when it did so).

The geomagnetic storm on this occasion was great enough to have an observable effect on ships' compasses. The report from M.V. *Dominion Monarch* includes a reference to this: "Compasses were checked regularly throughout and a deflection of up to 2° westerly magnetic abnormality was noted when the aurora was at its maximum brightness." This ship's report also mentions the related disturbance of radio propagation: "Radio reception during this period was very poor."

A collation of the various reports yields the following outline of the display observed on 15th July from southern waters. The two-figure angles are elevations,

DATE	TIME (G.M.T.)	SHIP	GEOMAGNETIC LONGITUDE Λ	GEOMAGNETIC LATITUDE Φ	INCLINATION I	DESCRIPTION OF AURORA
15th July	1000–1240	*Ruahine*	253	−49	−69	red G↗50°, 160°–230°
	1230–1310	*Houston City*	252	−39	−61	red G↗20°, 160°–220°
	1340	*Houston City*	252	−39	−61	active R
	1350–1400	*Cumberland*	262	−36	−58	red L↗14°, 170°–210°
	1355–1425	*Houston City*	252	−39	−61	yellow tint in R
	1400	*Ruahine*	253	−49	−69	R very bright, RB, F
	1438–1845	*Houston City*	252	−39	−61	white R, red S
	1455	*Cumberland*	262	−36	−58	L↗10°, 230°–240°
	1525	*Cumberland*	262	−36	−58	very deep red at 170°
	1530	*Orontes*	222	−44	−65	deep red bands ↗40°
	1530–1538	*Port Pirie*	160	−52	−72	red S 25°↗90°, 010–180°
	1530–1555	*Great City*	180	−35	−58	red S↗25°, 135°–225°
	1540–1550	*Cumberland*	262	−36	−58	pale red at 240°
	1550	*Dominion Monarch*	208	−48	−69	red S, R↗30°
	1600	*Dominion Monarch*	208	−48	−69	L fading, from 270° round
	1615	*Dominion Monarch*	208	−48	−69	red G 1 at 135°
	1650–1723	*Port Jackson*	217	−48	−70	red S at 270°, 28°; R bec. RB; red at 090°; at peak ↗90°
	1700	*Jason*	226	−45	−66	red S 10°↗15° at 130°; red G at 255°
	1715–1735	*Great City*	180	−35	−58	R and RB
	1720	*Dominion Monarch*	208	−48	−69	peak of activity
	1720–1725	*Jason*	226	−45	−66	more intense red 130°–255° white R at 160°
	1730–1735	*Eastern City*	227	−32	−50	red L↗30° at 180°
	1745	*Jason*	226	−45	−66	faint pink
	1800–1820	*Port Pirie*	160	−52	−72	white PA↗C, 175°–205°
	1810–1850	*Eastern City*	227	−32	−50	varying pale pink G
	1915	*Port Pirie*	160	−52	−72	sky clearing; L present
	1920	*Dominion Monarch*	208	−48	−69	peak of activity again
	1935	*Port Pirie*	160	−52	−72	red L 20°↗90°, 340°–190°
	1945–2002	*Port Pirie*	160	−52	−72	able to read by red light
	2015	*Dominion Monarch*	208	−48	−69	last sign of L

and the three-figure angles are azimuths. The ↗ sign indicates 'up to'. The symbol C stands for 'corona' (a term explained in the article on page 149).

That group of ships in southern waters were observing what was probably the greatest auroral display of the year. They all mention the red coloration, which is a common feature of such great displays. As often happens, there were times when no definite form could be distinguished in the areas of red emission. The brightness was remarkable. From the ship which was farthest south in terms of magnetic co-ordinates, M.V. *Port Pirie*, comes this report: "At 1945 it was possible to read print without the aid of artifical light. At the same time the ship's side, super-structure, wave crests and bow wave assumed a red colour." It is not often that auroral light is of such a high intensity as this.

The lowest latitude of *overhead* occurrence reported is that of M.V. *Port Jackson*, at geomagnetic latitude 48°, inclination 70°. (In British waters, inclination 70° occurs at much higher geomagnetic latitudes: 58° off the Tyne and 59° in North Channel.) The display was of course seen from much nearer the equator: the M.V. *Eastern City* observer saw it as a glow on the southern horizon from as low as geo-magnetic latitude 32°, inclination 50°.

The forms reported were mainly rays and surfaces. (Although one report used the word 'arcs' this almost certainly referred to what are properly called rays.) There did not appear to be any conspicuous arcs at the times of these reports. As regards types of activity, both 'flaming' and 'pulsating' are mentioned.

There are no reports from British ships in northern waters for 15th July, no doubt because the long summer twilight reduced observing time so drastically. There are a few reports, however, for the early hours of 16th July by which time the display was weakening. (It should perhaps be said that displays do occur simultaneously in the northern and southern hemispheres, though it is not yet known how closely the details of the northern display conform to those of the southern.) The northern marine reports for 16th July are as follows:

Time (G.M.T.)	Ship	Λ	Φ	I	Description of Aurora
0015	*Rialto*	020	+62	+73	a few light R and S
0140–0150	*Laurentia*	260	+59	+76	active green R 15°↗90°
0145–0155	*Rialto*	020	+62	+73	yellow and pink R↗C
0205–0220	*Rialto*	020	+62	+73	R↗C
till dawn	*Rialto*	020	+62	+73	flickering white patches

The report from southern waters for 16th July from M.V. *Northia* may well be for 15th July: we suspect a mistake in the date.

For 17th July there are a few reports from southern waters. From the *Caltex Canberra* comes a report of what was possibly a brief burst of activity: "At 1200 the sky cleared for about 20 min, during which the aurora was observed as two deep red searchlight beams." (These were of course rays, to use the recognised term.) Later there was more activity, reported as follows:

Time (G.M.T.)	Ship	Λ	Φ	I	Description of Aurora
1900–2000	*Northia*	230	−46	−68	G and R↗20°
1930–2020	*Port Hardy*	210	−47	−68	faint pink G spreading to deep red G↗30°, 150°–220°
1937	*Port Pirie*	180	−52	−75	green G↗12°
1937–2012					patches of red ↗20°

As night came round again in the northern Atlantic auroral light was seen again through cloud from the *Weather Reporter*.

Displays of 3rd September

For 3rd September there are interesting reports from *Orion* in Australian waters and from *Bamburgh Castle* in the Atlantic. The report from *Orion*, at geomagnetic

latitude 52°, inclination 72°, gives a good outline of what was a fairly typical display. (The use of the word 'arc' in this report is not the standard use of that word in this context: it is here applied to what was almost certainly a glow.) "At 1500 a faint paling of the southern sky was observed, gradually brightening to cover an arc of about 90° and fading out at an altitude of 10° to 15°. As the sky grew brighter, vertical shafts of light varying in intensity appeared at uniform intervals across the arc of the aurora; as these gradually faded in one place they would be observed in another. The more active displays seemed to be concentrated at the extremes of the aurora. It was at its brightest at about 1700, when the more brilliant shafts of light were occasionally reflected on the surface of the sea. After this time the shafts of light became less numerous and indistinct. By 1800 they had ceased and the aurora slowly faded, becoming negligible at about 1900." The report from *Bamburgh Castle* describes the northern display as it appeared later, from 2330 till 0340. It contains a rather good description of the form of activity called flaming: "The light . . . moved outwards from the horizon to the zenith like ripples on a pond."

Other displays

There is not space here to quote from the many other reports of the displays observed during the period, but the observers can rest assured that their work is contributing to the elucidation of the many unsolved problems associated with these magnificent auroral displays which brightened their night watches.

Weather Routing of Ships

By J. J. SCHULE
(U.S. Navy Hydrographic Office)

This article is based on a lecture given at the second session of the Commission for Maritime Meteorology (World Meteorological Organisation) at Hamburg in 1956. (The text of one of the other lectures given at that time appeared in the July 1959 number of *The Marine Observer*.)

During the past two years there has been considerable interest generated in the United States in the weather routing of ships. The primary aim of this programme is to effect economies in time or money and to increase the safety and comfort of the voyage by using principles of meteorological and oceanographic forecasting to determine the most advantageous route for the vessel. Much of this interest has been the result of the activities of private consulting meteorologists, who have conducted experimental routings on a trial basis for various shipping organisations. Since, however, these experiments are relatively small in scope, and since such information is generally considered private, it was considered desirable that the U.S. Navy conduct a fairly extensive programme of ship routing in order to evaluate the scientific basis for such routings. It might be said that such a programme would have two major aims. The first would be to find out if it is scientifically possible to effect these economies by use of weather and oceanographic forecasting. The second is, assuming the routing to be scientifically possible, to devise an operational method whereby all activities interested in taking advantage of such a programme could do so.

In establishing such a programme, the Navy has an organisation, which, by virtue of its shipping operations, is well equipped to provide the vessels for such a testing programme. This organisation is the Military Sea Transportation Service of the U.S. Navy.

This organisation operates many vessels so that two vessels of each type, one a 'control', the other a routed vessel, can be utilised for comparison in each test. The control vessel follows the standard track while the routed vessel is directed along the track of optimum time for the present weather situation. It was decided that the actual routings should be made by the Oceanographic Forecasting Central of the U.S. Navy Hydrographic Office, acting on information received from the various weather forecasting activities in Washington. These activities would

include the Navy Fleet Weather Central and the extended Forecasting Section of the U.S. Weather Bureau.

Before attempting to describe the programme, one or two points should be discussed. The first has to do with the overall objective of the programme. It is not the aim of this programme to attempt to add to the rated speed of the ship, or to attempt spectacular but risky routings by diverting the ship well off the normal path to circumnavigate large intense storms. It is rather the purpose to keep the ship out of any appreciable trouble, and to insure that the speed of the ship is as close to its maximum speed as possible. Reduction in weather damage and the safety of cargo and crew are at least as important as spectacular savings of time.

The second point has to do with the utilisation of weather forecasts. It is agreed that the problem posed by the routing of ships is more difficult than that of routing aircraft because of the long initial weather forecast involved. It is intended to make regular use of the five-day forecasts issued by the U.S. Weather Bureau for this purpose. It is admitted, however, that these forecasts will be only a first approximation, especially in the latter portion of the forecast period. The track must be modified at regular intervals during the actual voyage, and this will entail maintenance of a careful weather watch on the routed ship so that revisions can be made at the earliest possible moment. Moreover, it is believed that, even with the disadvantage of the forecast becoming less reliable as the period gets longer, it will still be possible to anticipate unusual situations far enough in advance to keep the ship out of the more dangerous weather situations.

The first step in computing a least time track is to ascertain the distribution of waves for as long as possible into the future along the great circle track from point of departure to destination. Normally the five-day long-range forecast is used for this step. The emphasis on wave conditions is based on the fact that wave action is the major deterrent to ship propulsion. Part of this speed loss is due to the direct physical action of the waves, but an even greater portion is due to the master's wishes to ease his ship under conditions of heavy pitching and rolling. Fig. 1 illustrates the decrease of speed evidenced by various types of commercial vessels when encountering various wave heights, as recorded from the logs of a number of these ships operating in the Atlantic. The wide range of speeds recorded at a given wave height is primarily due to the difference in each master's ship handling, but partially due to the variety of wave lengths possible at each wave height.

Wave conditions over a large area, such as represented by the North Atlantic, are best represented by wave charts. Figs. 2 and 3 are examples of a synoptic and prognostic wave chart as prepared at the Hydrographic Office. Both charts give isopleths of the significant wave height,* but the synoptic chart is based on the ship-observed wave heights while the prognostic chart utilises theoretical wave heights, computed by standard wave forecasting techniques. Directions of the major wave trains are indicated on both charts.

Once the distribution of wave heights is known for the first five days of the voyage, it is possible to construct a series of ship speed charts. This is done by utilising graphs similar to Fig. 1, which relate ship speed to wave height for directions of head seas, beam seas and following seas. By using these graphs, each isopleth of wave height can be transformed into an isopleth of ship speed depending upon the ship's heading. This transformation is illustrated in Figs. 4 and 5.

Once the distribution of ship's speed along the area of interest is known, the next step is to determine the track through this velocity field which gives the least travel time. There are several methods for computing such a track, all of which assume a quasi-stationary meteorological system for periods of 6, 12 or 24 hours. The

* Oceanographers have always considered the significant wave height to be the average of the highest $\frac{1}{3}$ waves. This is an arbitrary definition dictated by necessity. The sea being a random function in both amplitude and period, a rather broad description of wave heights is observed. It was decided that when an observer makes a visual observation of wave conditions at sea he tends to estimate the highest waves and to disregard the smaller ones. Thus it was decided to use only the mean height of the highest third of the waves.

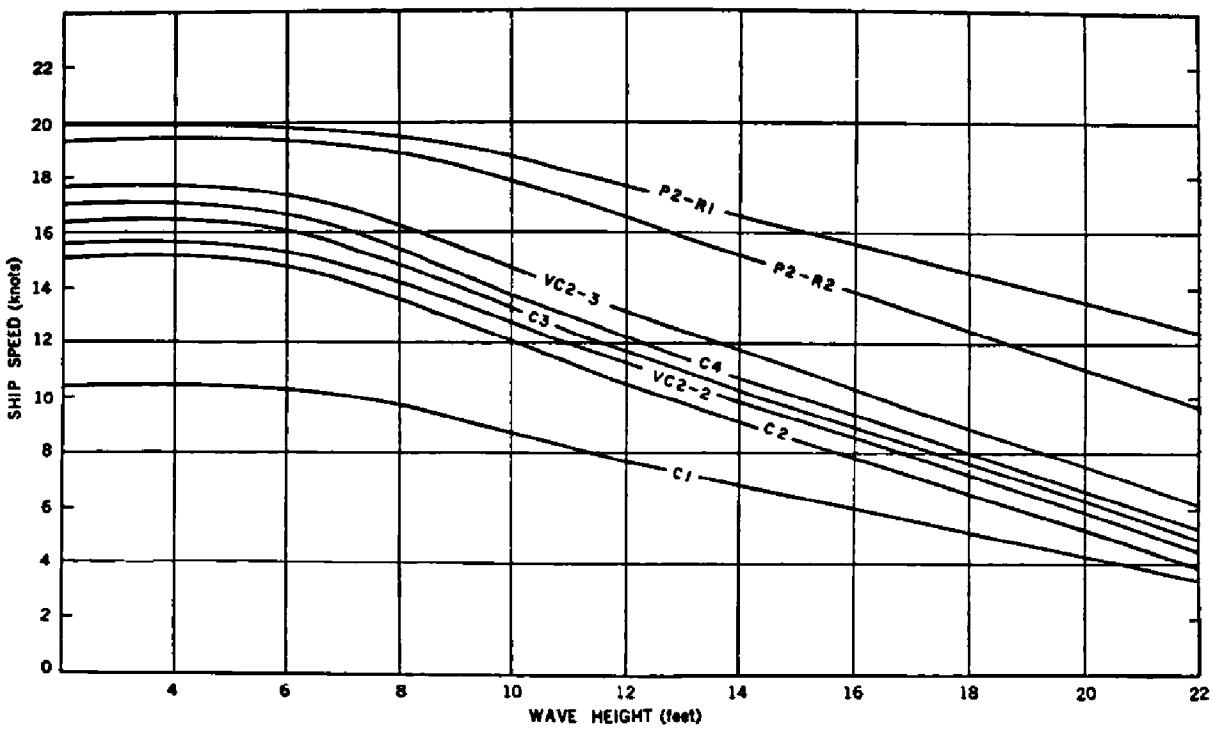


Fig. 1. Relationship between ship's speed and head waves.

Key to ship types plotted in Fig. 1

(The figures are representative averages and not official statistics for all ships within each particular group.)

Ship Type	Length Overall (ft)	Beam (ft)	Speed (kt)	Propellers	Engines
C1	339	50	10·5	1	Diesel
C2*	459	63	15·5	1	Steam turbine
C3	499	78	18	2	Steam turbine
C3 †	492	69·5	16·5	1	Steam turbine
C3 †	489	69·5	16·5	1	Steam turbine
C4 ‡	520	71·5	17	1	Steam turbine
C4 †	523	71·5	17	1	Steam turbine
P2–R1	609	75·5	19	2	Steam turbine
P2–R2	622	75·5	19	2	Steam turbine
VC2–2	455	62	15·5	1	Steam turbine
VC2–3	455	62	17	1	Steam turbine

* Reefer † Transport ‡ Heavy Lift

method to be used by the Hydrographic Office is similar to the procedures used when one calculates the path of a light ray through a medium of varying refractive index. Such a ray follows a path of least resistance which also turns out to be a least time track.

The construction for a maritime least time track is as follows: a series of tracks is laid out on the ship speed chart, originating at the departure port (Fig. 5), and lying to the right and left of the great circle track. The 24-hour ship travel is then computed for each of the tracks, and their end points connected to form a line of possible ship's positions after 24 hours' steaming. These computations are now continued for a second 24-hour travel, using the predicted ship-speed chart for the second day. By continuing these steps for a five-day period, it is possible to determine the track that brings the ship closest to the destination after five days' steaming. Long range outlooks and climatological data are then utilised to extend the track to the destination. Constant surveillance of the ship's progress and the oceanic weather situation allows for revision of the original track before time is lost due to heavy seas.

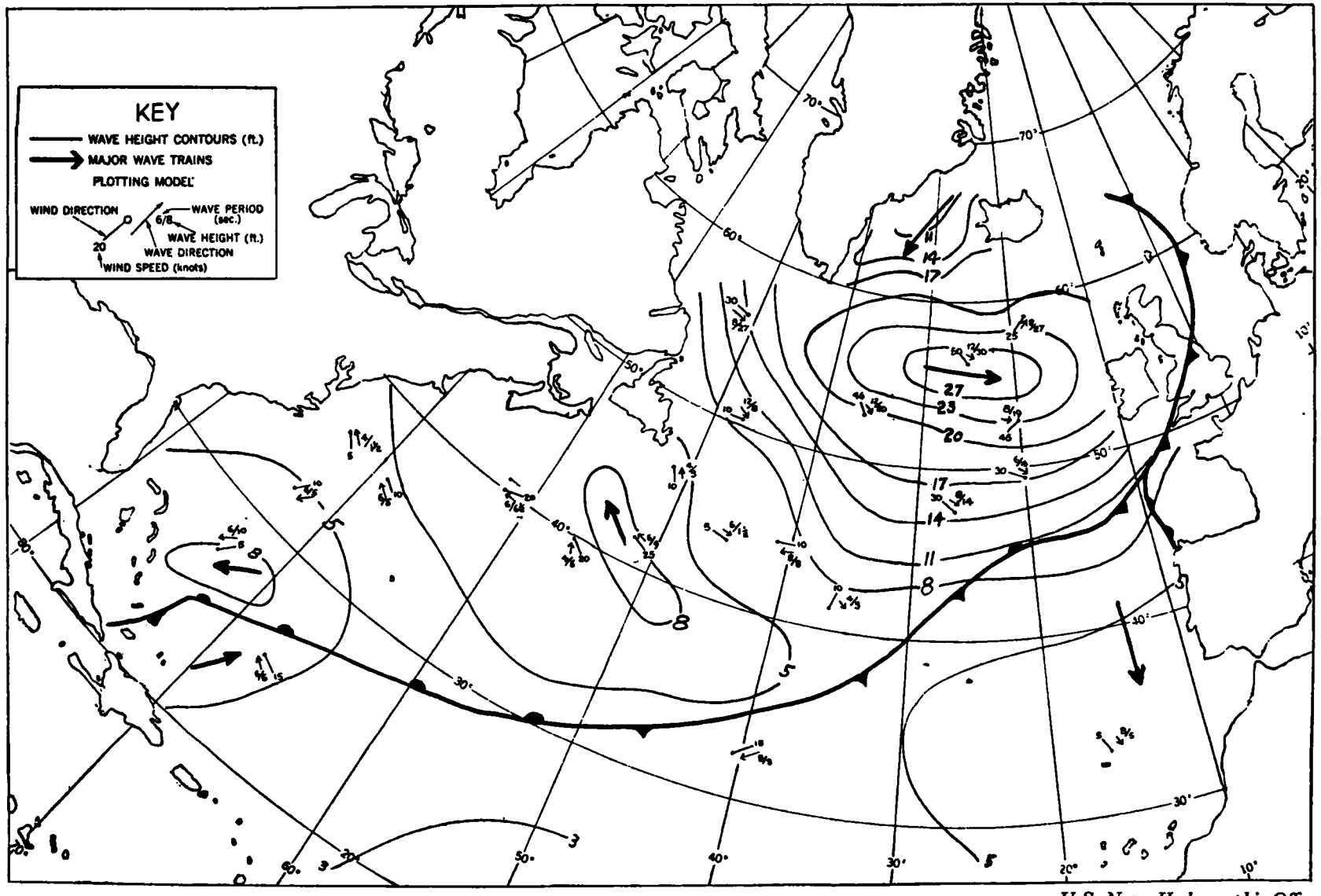


Fig. 2. Synoptic wave chart for 0630 G.M.T. on 31st October, 1957.

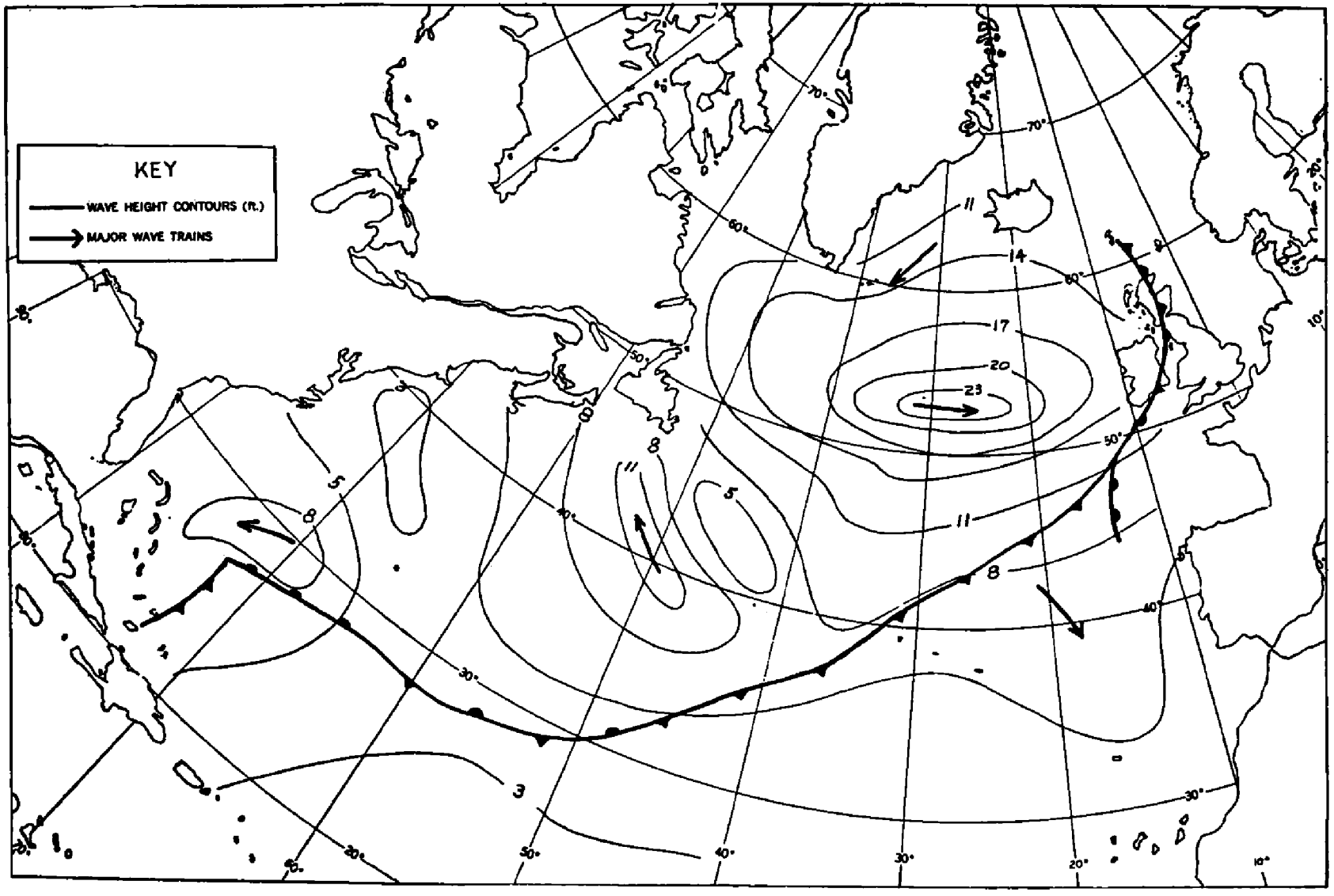
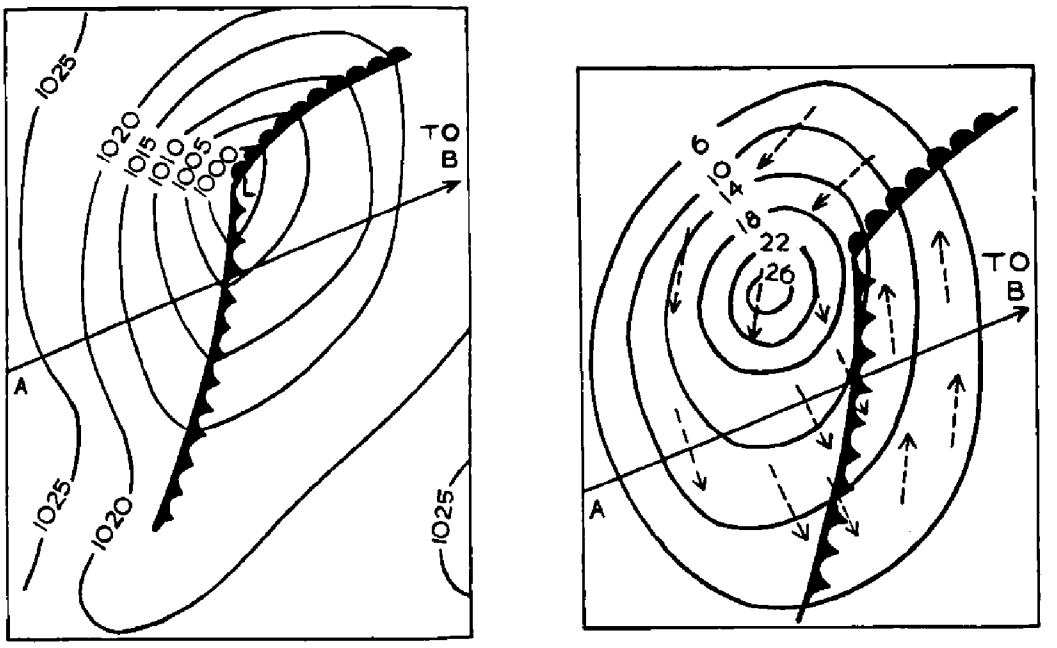


Fig. 3. Prognostic wave chart for 0630 G.M.T. on 31st October, 1957.



(a) Surface weather along track AB.

(b) Wave heights (isopleths in feet) along track AB.

Fig. 4.

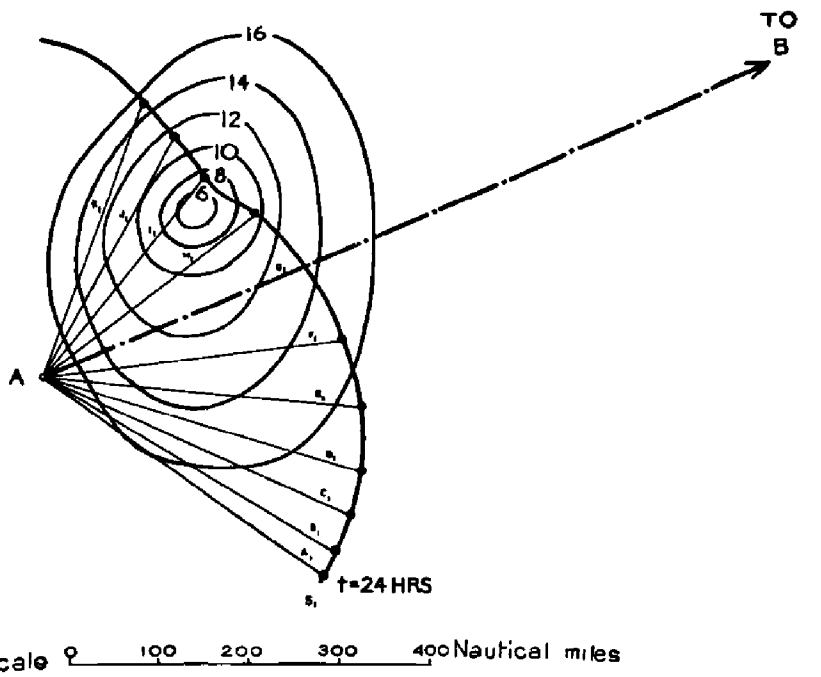


Fig. 5. Example of least time track, first day's travel. (Isopleths are ship's speed; straight lines are possible tracks.)

Although the five-day weather forecast is used as a basis for calculating a least time track, the shorter range forecasts such as 30 and 48 hour prognosis charts and the longer range forecasts of 30 days and even climatic charts are important to the final selection. The shorter range forecasts are used to modify the five-day forecast through adjustment of the movement and intensity of the pressure systems, while the long range forecasts and the climatic probabilities are utilised to extend the forecasted track to the destination.

With completion of the test periods it is planned that the ship routing procedure will be placed on an operational basis for routine use by the Military Sea Transportation Service. Research and development of ship routing procedures will continue, however, in the hope that methods can be developed to permit the master of a ship to ascertain his own best course under stormy conditions.

Auroral Observations made in Ships

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Introduction

For some time now, the note introducing the Aurora section of "The Marine Observers' Log" has included a statement to the effect that copies of the auroral observations have been sent to the Aurora Survey, towards which ships' observations have been making a very valuable contribution. This article gives some details about the Aurora Survey and shows how valuable marine observations are.

History of Aurora Survey

The Survey began to take shape in 1952, as a development of the work of the Aurora and Zodiacal Light Section of the British Astronomical Association and of independent work done at certain stations of the Meteorological Office. In *The Marine Observer* for July 1953 there appeared an article on "Aurora Borealis" by Mr. James Paton, Director of that Section. He summarised present knowledge of the aurora and made an appeal for observers. He wrote again in the issue for July 1958, giving some information about the progress of the Survey. As a result of advances made in connection with the International Geophysical Year (I.G.Y.) of 1957–1958, more progress can now be reported.

At first the work was concerned mainly with what may be called the Aurora Survey area, the area shown in the map of Fig. 1 (opposite p. 116). Outside this area, some attention was paid to the Atlantic areas from which most of the observations made in ships and aircraft came. Similar networks of observers were operating in New Zealand and in the U.S.A. (and also to a very limited extent elsewhere). Correspondence with the scientists concerned in these other surveys was at the purely personal level: there was no overall scheme for co-ordination of the observations.

With the approach of the I.G.Y. a broader outlook became necessary. Mr. Paton was appointed National Auroral Reporter for the United Kingdom and his laboratory in Edinburgh was designated as World Data Centre C for Aurora (Visual Observations). The University made a new room available for this work and it was named after Balfour Stewart, a pioneer of the interpretation of auroral phenomena who had been a student and staff member of the University. There are two other World Data Centres for Visual Auroral Observations, WDC A in the U.S.A. and WDC B in the U.S.S.R.

In connection with its function as WDC C, the Balfour Stewart Auroral Laboratory also acted as Regional Collecting Centre for visual auroral observations made in the countries of Europe and North Africa. (The present writer inherited the title of Regional Auroral Reporter for Europe!) This meant a very considerable increase in the amount of data collected. When the month of September 1957 turned out to be an exceptionally active period, with many great auroral displays well observed and reported in voluminous detail, things began to look almost too encouraging! It has indeed taken till recently to reduce the data to order and to begin the analysis and investigation that are leading to a new understanding of aurora in its connections with related types of geophysical activity.

During the I.G.Y., discussions were held between the workers at the WDCs and other scientists with an interest in synoptic study of the aurora. These discussions, conducted at conferences and by correspondence, have led to certain agreements about the publication of auroral data for the whole globe. In this connection the Aurora Survey is of course contributing a considerable quantity of the data which will be used, and in addition the Balfour Stewart Auroral Laboratory has particular responsibilities for certain of the publications.

The Aurora Survey staff have therefore two main tasks at present: (1) analysis of the data collected since 1952 and especially during 1957 and 1958; (2) continuation

and improvement of the present data collection. The plan is to maintain the data collection scheme till 1964 at least.

Special value of observations made in ships

Observations made in ships are valuable for several reasons. They usually relate to auroral activity taking place over uninhabited areas, about which information is available only from observers in ships or aircraft. They are made under rather better observing conditions than those which affect observers on land, where there are nearly always artificial lights to interfere with dark adaptation. The observers are usually well accustomed to observation of natural phenomena and not likely to confuse other night sky lights with aurora. (Misinterpretations do occur, however, even with experienced observers. These can nearly always be detected during analysis, by consideration of related types of geophysical activity such as geomagnetic disturbance, by comparison of observations with one other, and so on.)

Regular auroral observations are also made in the ocean weather ships maintained by various countries in the Atlantic. The original report sheets are forwarded by the various authorities concerned to Edinburgh.

As mentioned at the beginning of this article, copies of auroral observations, including sketches, sent to the Marine Division of the Meteorological Office are forwarded to us at Edinburgh. Observations are made also in Danish, Dutch, French and German ships, and reports of these arrive regularly. Occasional marine observations from other countries are received too.

During the I.G.Y., a new arrangement was made for British voluntary observing ships: there is now a special column for auroral observations in the meteorological logbook used by Selected Ships. Many of the entries are of course to the effect that aurora was absent or could not be seen, even if present, because of bad observing conditions. But positive observations are recorded too. The information given by these entries is at present being plotted on a graph showing the hour by hour occurrences of aurora in different geomagnetic latitudes: this is one of the I.G.Y. publications for which the Balfour Stewart Auroral Laboratory is responsible.

In the July 1958 issue Mr. Paton described how the positive auroral reports are put together and he gave an example of the kind of account that can be prepared of each display. Another example is given in the Aurora section of "The Marine Observers' Log" in this issue (page 135). Such accounts are obviously necessary to those who are studying the aurora itself. They are also required by scientists working on other phenomena which have relations with auroral displays.

Since marine auroral observations clearly play an important part in the construction of a world-wide picture of auroral activity, it is desirable that they should be made in such a way as to be of maximum use to those who are constructing this picture. Some remarks about the features which should be noted are made later in this article.

Distribution of Aurora

In his 1953 article, Mr. Paton reproduced the northern hemisphere chart compiled some eighty years ago by Hermann Fritz, giving lines of equal auroral frequency. The chart was produced after a calculation of the average number of nights per year on which aurora was observed from many different places. Fritz considered the period 1700 to 1872, and in the absence of anything comparable to the Aurora Survey he was able to use only what happened to be available in the way of reports of displays in newspapers and magazines, along with a few results from special observing programmes. His conclusions for the Aurora Survey area are shown in Fig. 1.

Using Aurora Survey data for 1957 and 1958 and making some allowance for the effects of cloud and twilight gives the results shown in Fig. 2. These two years were of course exceptionally active from an auroral point of view, but even allowing for this it seems clear that Fritz's figures were too low (as was of course to be expected).

Mr. Paton also mentioned the value of a chart giving the numbers of nights with aurora *overhead*, as distinct from aurora visible anywhere in the sky. Such charts are now being prepared: they will be of great value to workers in many branches of geophysics. Fig. 3 shows such a chart for the Aurora Survey area for the years 1957 and 1958. [In this diagram, the figures down the left (west) side are values of geomagnetic latitude and those down the right (east) side are values of inclination: these are described and their significance explained in the next section of this article.] The construction of such charts as Fig. 3 for the whole world depends on the collection of accurate visual auroral observations from all areas. Since so much of the surface of the globe is sea, the value of marine observations is obvious.

Distribution of aurora with respect to magnetic co-ordinates

To a first approximation, the earth's magnetic field (usually called the geomagnetic field) is the same as that of a magnetic dipole. (The magnetized needle of a compass is a dipole.) In an analysis of the geomagnetic field for the year 1922, it was found that the axis of this dipole was inclined to the earth's rotation axis at an angle of about 11·5° and cut the surface at the two points (known as the geomagnetic axis poles): 78·5°N., 69°W. and 78·5°S., 111°E. (These are different from the magnetic poles familiar to users of magnetic variation charts.) A repetition of this calculation for the year 1945 gave values very little different: 78·6°N. 70·1°W. and 78·6°S., 109·9°E. It is customary to continue using the 1922 values for most purposes, and in particular for that described in the next paragraph.

The geomagnetic axis poles are used as the north and south poles of a latitude-longitude system so that the co-ordinates of any place on the earth's surface may be given in terms of the resulting geomagnetic latitude and geomagnetic longitude. The 69°W. line of geographic longitude lies along a great circle of the geomagnetic system and it is taken as the zero meridian of geomagnetic longitude. It is usual to give geomagnetic longitude only in degrees east, continuing through 180°E. (which is the same as 111°E. on the geographic system) to 359°E. The symbol Λ is used for geomagnetic longitude and the symbol Φ for geomagnetic latitude. (Λ is the capital form of the Greek letter 'lambda', and Φ is the capital form of the Greek letter 'phi'.) Because the position of aurora over the earth is largely controlled by the geomagnetic field, it is better to use geomagnetic co-ordinates than geographic ones. When an auroral observation is received at Edinburgh, the geographic co-ordinates of the observer are used to calculate his geomagnetic co-ordinates. The geomagnetic co-ordinates of the ships listed in the Aurora section of the present issue of "The Marine Observers' Log" are given under Λ and Φ.

As mentioned above, the dipole form of the field is only a first approximation; the geomagnetic field does not have the completely regular form of a simple dipole. Some other measure of it must be considered in order to take account of this. A convenient one for auroral studies is the inclination value at the place concerned. Compass needles are normally suspended so that they can move only in a horizontal plane, swinging to left or right. In the instrument called the dip-circle a compass needle is suspended so that it can move only in a vertical plane, swinging up or down. The angle between the horizontal and the position taken by a dip-circle needle is called the inclination (or dip). It varies over the surface of the earth: at the magnetic poles, where the needle 'stands on its head', the inclination is 90°; at the magnetic equator the inclination is 0°. North of the magnetic equator the inclination angle or 'dip' is counted as positive; in the south it is counted as negative. If the geomagnetic field were a simple dipole with its centre exactly at the geographic centre of the earth, all places with the same geomagnetic latitude would have the same inclination. It is not so, however, and the actual values of the inclination may be used as indications of the true magnetic position (as compared with the approximate magnetic position given by geomagnetic latitude and longitude). The symbol I is used for inclination.

In Fig. 3, the area is divided up into geomagnetic latitude zones, which are 1°-wide

strips centred on the integral geomagnetic latitude lines: zone 55 covers the area between geomagnetic latitudes 54·5° and 55·5°N. The lines joining up places with equal inclination are also drawn on this diagram and it is easily seen that they do not run parallel to the geomagnetic latitude lines.

It is found that places with the same geographic latitude have widely different frequencies of auroral occurrence: for example, take 50°N. At 65°W. (in the Gulf of St. Lawence) aurora occurs overhead on most nights, but at 0° (in the English Channel) aurora occurs overhead only during very exceptional displays, less than once a year on average. But places with the same geomagnetic latitude are much more similar from an auroral point of view: the geomagnetic latitude of the Gulf of St. Lawrence is 61°, which is the same as that of the Moray Firth. There are still some discrepancies, however, and it is becoming clear that inclination is a better measure to use. The inclination in the Gulf of St. Lawrence is nearly 76°, which is the same as for the neighbourhood of Iceland, where aurora does occur overhead on most nights.

It is of interest to plot the statistical data for the Aurora Survey area against inclination. When this is done, a surprisingly smooth curve is obtained, as in Fig. 4. This is another indication that we are on the right lines to use inclination as a guide to what we might expect in aurora.

List of auroral observations in "The Marine Observers' Log"

In this issue, the Aurora section of "The Marine Observers' Log" is arranged in a new way. All the auroral observations for the quarter under consideration are listed. After the geographic co-ordinates of the ship at the time of the observation, there appear the values of Λ, Φ and I. The comments that follow indicate the more generally interesting features of the reports. Needless to say, much more can be taken from them than these brief comments indicate, and this will be done in the various studies which will be made using the complete data.

Remarks about the making of observations

It is not immediately obvious which of the many features of an auroral display are of most value and interest to those engaged in the auroral studies mentioned above. In order to help observers to make the most of their observations, from a scientific point of view, some comments on the technique of making and reporting an auroral observation are given here.

DATE AND TIME. Correct dating of an observation is very important. One or two otherwise very good reports have been rendered useless to the Aurora Survey by their not being dated at all, and not infrequently reports are received in which there is some doubt as to the day of the observation. The ultimate requirement is date and time on the G.M.T. standard. But if it is easier for the observer to use ship's time, this should be done, with a note of the difference between ship's time and G.M.T. Special care with the date is required for observations made around midnight: where there is any chance of misinterpretation it is best to give the date with the time—7/2330, 8/0010, etc. It is obvious that comparison of one report with another is possible only if accurate dates and times are given for the various stages of the observation in each case. The standard of accuracy to be aimed for in timing is the recording of outstanding events in the display to the nearest minute.

SHIP'S POSITION. Latitude and longitude (to the nearest 10′ or so) are preferable to geographic locations such as 'off the Humber'.

ACTIVITY. Such a wide range of activity can be exhibited during a great display that a complete record of it is well-nigh impossible for a visual observer. But this is in fact not a great disadvantage for present auroral studies: it is sufficient to make a general classification into *quiet* and *active*. But there are two characteristic types of activity with special names and their occurrence is of interest: when the light from a particular auroral form waxes and wanes fairly regularly (with a period

of between ten and a hundred seconds) it is said to be *pulsating*; when the auroral light appears to sweep across the forms from the horizon to the zenith in regular waves it is said to be *flaming*. The times of occurrence of these two types of activity should be noted.

FORMS. Certain standard names for the commonly occurring forms have been defined by international agreement, the initials being used as symbols for them. Distant aurora appears on the poleward horizon, usually in the direction of the magnetic meridian; if no structure is detectable, this is called a *glow* (G). Quiet aurora often takes the form of an arc extending east-west across the sky, with an area of dark sky below the lower edge. The lower edge is usually more clearly defined than the upper edge. When an arc has no vertical striations it is called a *homogeneous arc* (HA); when it has vertical ray-structure it is called a *rayed arc* (RA). When the form has not the regular shape of an arc but has one or more folds along its length it is called a *homogeneous band* (HB) or a *rayed band* (RB). It frequently happens that *rays* (R) occur either singly or in groups, with no sign of an arc or band linking them together. These rays lie along the 'lines of force' of the geomagnetic field and thus show up the direction of the inclination. They are very nearly parallel to each other, but perspective causes convergence and produces fan-like formations. Rays overhead always appear to converge on the point called the magnetic zenith, whose position depends on the inclination: if the inclination is 70°, the magnetic zenith is 20° on the equatorward side of the true zenith. During a great magnetic storm (which is always accompanied by aurora) the position of the magnetic zenith at any place may be displaced by a degree or two from its usual position. When auroral rays surround this point, the form produced is called a *corona* (C). Patches of auroral light, without arc or ray structure, are called *surfaces* (S). (The symbols PA, PB, and so on are used for pulsating forms, and F for flaming.)

BRIGHTNESS. Four grades of brightness are recognized. They are specified as follows: (1) *weak*, when the light is similar in brightness to that of the Milky Way; (2) *moderate*, like cirrus cloud in full moonlight; (3) *bright*, like cumulus cloud in full moonlight; (4) *brilliant*, when the auroral forms appear brighter than any moonlit cloud. The numbers 1, 2, 3 and 4 are used as abbreviations for these grades of brightness, being placed after the form symbols: G 1, RA 3, etc.

ELEVATION. The measurement of elevation is usually given very satisfactorily in marine reports. It is perhaps worth mentioning, however, that eye estimates are affected by the well-known illusion which makes distances near the horizon appear much greater than equal distances near the zenith. The most important measurement of elevation is that of the summit of the lower edge of an arc or band: the letter 'h' is internationally used to indicate this; $h=25°$ means that the highest point of the sharply defined base of an arc is at an altitude of 25° above the true horizon. It is also of interest to know the highest elevation reached by long rays and other forms. They should be said to reach the zenith only if they rise to fully 90° elevation.

DIRECTION. To those familiar with the measurement of azimuth in degrees from 000° at true north, through 090° east, 180° south and 270° west, it is probably fairly easy to make good angular measures: these are of particular value where isolated rays are concerned. A sketch with angles marked on it is often easier to make and to read than a description in words.

COLOUR. Although much can be learned from the colours of auroral light, this study requires more accurate measurements of the colours than can be made by eye. It is of some interest, however, to know the colours present, even if only approximately. Very often the intensity of the light is too low to stimulate the colour-sensitive part of the eye and all the forms appear pale and grey, like clouds illuminated by weak moonlight. But when the intensity increases, a variety of colours is seen. The commonest is yellow-green, with red coming a close second. Blue and violet shades are sometimes seen.

Conclusion

Auroral observations made in ships form a valuable part of the world-wide collection of auroral data which is required to answer the many questions about auroral distribution and variation with time which are still unsolved. The marine observations which have been made in past years are being carefully studied at present; it is very desirable that observations should continue to be made. The usefulness of an observation depends on the details it contains and many observers could improve their own work by following the advice given above. Visual auroral observation may well involve the observer in uncomfortable circumstances and we who are privileged to use the many reports which reach us are extremely grateful to observers for their efforts.

NOTES ON ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN

At end of January 1960

Relevant Weather Factors

The Icelandic low was well south of its normal position (see the map on page 78 of *The Marine Observer*, April 1960, which gives the mean position of this area of low pressure) and it was less intense, because depression activity was concentrated mainly in the western Atlantic and in a more southerly latitude than normal, Arctic air from east Greenland having penetrated further south than normal over the western Atlantic. [This was deduced from upper air ascents carried out by ocean weather ships.]

Pressure was above normal in the Arctic, Greenland and over Scandinavia. Anticyclones formed frequently over north-west Europe.

The abnormal position of the Icelandic low, and high pressure in the Arctic, cut off Arctic air from eastern Canada and Greenland, but caused very cold air to flow into north-west Canada. Anticyclonic weather over Scandinavia caused Arctic and polar air masses to be drawn frequently over the north and east Baltic, but depressions in the eastern Atlantic brought warm maritime air to the southern Baltic, causing warm air aloft, occasionally over the whole Baltic area. Temperatures in the Gulf of Bothnia and Gulf of Finland were well below normal.

Baffin Bay, Davis Strait and the Canadian Archipelago

During this time of the year, few reports are received because of the difficulties of observation. However, it appears that the Davis Strait and western Greenland had less field-ice at the end of January than normal. The west coast of Greenland experienced much fog but appeared to be almost free of field-ice and icebergs to well north of the Arctic circle. There was, however, a considerable amount of fast- and pack-ice and icebergs to the west of Cape Farewell.

Eastern Greenland

North of 70°N., landfast ice only was reported, which filled bays and inlets. Pack-ice with local landfast ice and extensive shore leads were reported south of 70°N. However, amounts of field ice were in general much below normal. Moderate numbers of icebergs moved southwards along the coast towards Cape Farewell, but there was a decrease in their numbers from those reported in December 1959.

Spitsbergen and Bear Island and areas north of Iceland

Ice floes and pack-ice were reported from Bear Island and Spitsbergen towards the end of January, but no ice was reported from Jan Mayen. There was apparently little or no ice in the areas between the Norwegian coast and the field-ice of eastern Greenland. This fact must be viewed with reservation, especially as it appears that there was more field-ice than normal at Bear Island and possibly at Spitsbergen.

Grand Banks

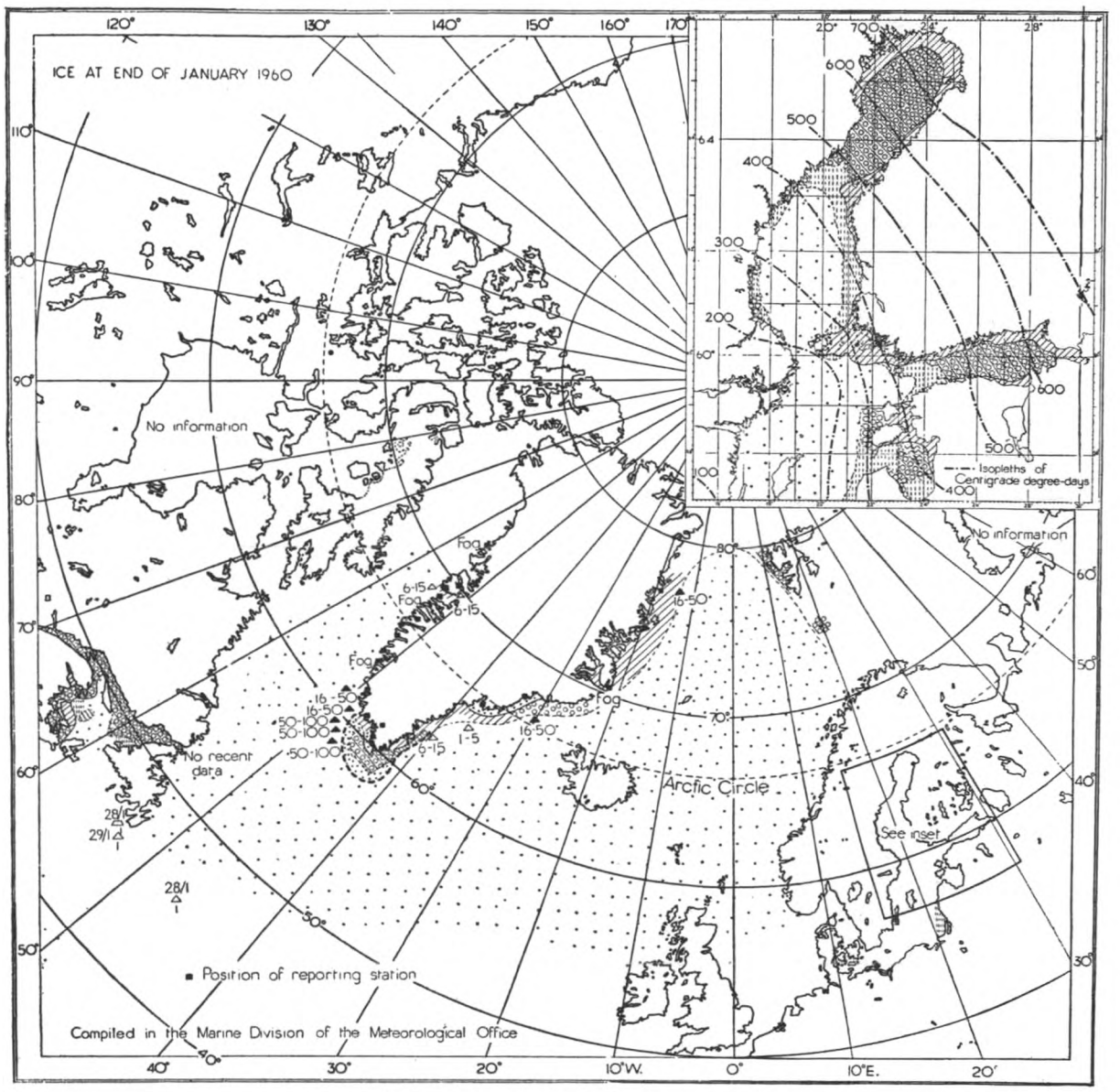
An abnormally large number of icebergs was reported off Newfoundland during January 1960, while there were no reports of field-ice. The large incidence of icebergs is probably associated with the large numbers moving southwards along the coast of eastern Greenland during December 1959. Details of the sightings of icebergs are given in Table 2.

Gulf of St. Lawrence and St. Lawrence River

Throughout January, which was a month of moderate or light ice conditions, British ships were making their way regularly and successfully to Quebec and Chaleur Bay. Very occasionally, ships required icebreaker assistance to free them in Chaleur Bay, and in the St. Lawrence River mainly towards 70°W. In the central part of the Gulf of St. Lawrence there was much open water, and shipping routes via Cabot Strait south of Anticosti on

Table 1. Summary of Ice Conditions reported from a selection of places in the Baltic Sea

		Aarhus	Copenhagen	Kiel	Stettin	Gdansk	Klaipeda	Riga	Pyarnu	Leningrad	Viborg	Helsinki	Turku	Mariehamn	Mantyluoto	Vaasa	W. Norrskar	Oulu	Lulea	Bredskar (Umea)	Alnosund	Stockholm	Norrkoping	Visby	Kalmar	Goteborg	Oslo	Kristiansand
January 1960																												
LENGTH OF SEASON	First day	—	—	—	15	11	11	9	1	1	1	1	1	13	1	1	13	1	1	1	1	15	14	—	12	—	—	—
	Last day	—	—	—	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	—	31	—	—	—
NO. OF ICE DAYS	Any ice type	0	0	0	5	4	14	20	31	31	31	31	25	16	25	31	19	31	31	30	31	17	18	0	18	0	0	0
	Continuous landfast ice	0	0	0	0	0	4	17	31	31	31	31	21	1	4	31	0	31	31	8	31	14	14	0	1	0	0	0
	Pack-ice	0	0	0	0	2	3	0	0	0	0	0	0	0	1	0	7	0	0	2	0	0	0	0	11	0	0	0
	Shore lead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NAVIGATION CONDITIONS, NO. OF DAYS	'Dangerous to navigation', but assistance not required	0	0	0	4	0	6	10	0	0	0	10	5	3	16	0	4	0	0	29	31	15	7	0	16	0	0	0
	Assistance required	0	0	0	0	0	0	9	19	31	31	21	17	0	0	15	1	9	0	0	0	1	11	0	0	0	0	0
	Closed to navigation	0	0	0	0	0	0	0	12	0	0	0	0	0	0	16	12	22	31	0	0	0	0	0	0	0	0	0
February 1960																												
LENGTH OF SEASON	First day	—	—	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	—	1	—	27	—
	Last day	—	—	8	23	27	28	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	—	29	—	27	—
NO. OF ICE DAYS	Any ice type	0	0	1	19	22	28	29	29	29	29	29	29	20	29	29	29	29	29	29	29	29	29	0	29	0	1	0
	Continuous landfast ice	0	0	0	8	0	0	29	29	29	29	29	29	17	15	29	0	29	29	26	29	29	20	0	4	0	1	0
	Pack-ice	0	0	0	6	21	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	1	0	0	0	0	0
	Shore lead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NAVIGATION CONDITIONS, NO. OF DAYS	'Dangerous to navigation', but assistance not required	0	0	0	16	14	14	0	0	0	0	0	0	13	5	0	0	0	0	1	19	8	0	0	4	0	0	0
	Assistance required	0	0	0	0	0	0	29	0	28	29	29	29	6	24	0	0	0	0	20	10	21	29	0	16	0	0	0
	Closed to navigation	0	0	0	0	0	0	0	29	1	0	0	0	0	0	29	29	29	29	7	0	0	0	0	9	0	0	0
March 1960																												
LENGTH OF SEASON	First day	—	—	—	4	5	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	—	1	—	—	—
	Last day	—	—	—	6	15	25	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	—	31	—	—	—
NO. OF ICE DAYS	Any ice type	0	0	0	3	9	15	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	0	31	—	—	—
	Continuous landfast ice	0	0	0	0	0	0	25	31	31	31	31	31	31	31	31	0	31	31	31	31	31	31	0	0	0	0	0
	Pack-ice	0	0	0	3	6	0	6	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
	Shore lead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0
NAVIGATION CONDITIONS, NO. OF DAYS	'Dangerous to navigation', but assistance not required	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	15	0	0	0
	Assistance required	0	0	0	0	0	0	27	0	31	31	31	31	31	31	0	0	0	0	0	2	11	31	0	16	0	0	0
	Closed to navigation	0	0	0	0	0	0	0	31	0	0	0	0	0	0	31	31	31	31	31	29	15	0	0	0	0	0	0



Distribution of sea ice at end of January 1960.

Note.—In the Baltic Sea inset, isopleths of Centigrade degree-days are included to indicate the progress of the seasonal cooling of seawater and ice. These give a rough measure of first the probability of the formation of sea ice and later the progress of the growth of the thickness of the ice. They are derived from observations taken at 0600 G.M.T., and are the sum of the number of degrees Centigrade below zero experienced at this time for each day during the period of sustained frost.

KEY

Open water
New or degenerate ice
Very open pack-ice [1/10-3/10 inc.]
Open pack-ice [4/10-6/10 inc.]
Close pack-ice [7/10-9/10 inc.]
Land-fast or 'field-ice' [10/10] [no open water]
Ridged ice
Hummocked ice
Lead
Polynya
Y Young ice [2"-6" thick]
W Winter ice [6"-6½ thick]
P Polar ice [>6½' thick]
— Known boundary
Radar boundary
----Assumed boundary
--- Limit of observed data
Undercast
Few bergs [< 20]
Many bergs [> 20]
Few growlers [< 100]
Many growlers [> 100]

towards the approaches to the St. Lawrence River were completely unimpeded. At the end of January the St. Lawrence River was filled with variable types of field-ice interspersed with localised areas of open water. There was much pack-ice and nondescript ice in the south-west of the Gulf at the entrance to and in Chaleur Bay, off the Gaspe Peninsula and around and south and west of Prince Edward Island. Belle Isle Strait was filled with 8–9/10ths of ridged and rafted pack-ice composed mainly of moderate or small ice floes. Further to the

Table 2. Icebergs reported by merchant ships in the north-west Atlantic during January 1960

LIMITS OF LATITUDE AND LONGITUDE	DEGREES NORTH AND WEST					
	54	52	50	48	46	44
Number of bergs reported south of limit	32	32	32	30	19	0
Number of bergs reported east of limit	32	18	17	7	0	
Extreme southern limit	45°03′N., 46°47′W. on 11.1.60					
Extreme eastern limit	47°08′N., 46°30′W. on 14.1.60					

west off the north coast of the Gulf, and further to the south off the north-west coast of Newfoundland, there was less field-ice, but of a nondescript character (i.e., new or degenerate).

BALTIC SEA

January 1960 was a very heavy ice month in the Baltic, particularly in the Gulfs of Finland and Bothnia, where ice increased and consolidated steadily. The southern Baltic remained generally free of ice apart from occasional increases in landfast and new ice along eastern coastal areas, and in shallow bays and channels on the southern Swedish coast.

Lulea was closed for the whole month and a number of places north and east of the Gulf of Bothnia were closed for periods of many days. Most places remained open throughout the month in the Gulf of Finland but ice-breakers were in continuous use. Areas east of the Aland Islands were almost completely icebound although much open water remained to the north in the Gulf of Bothnia. Access to ports in south-west Finland was difficult. In spite of the great amounts of ice in areas to the north and east there was little or no tendency for pack-ice to move out southwards into the open sea of the southern Baltic. Shipping routes from the North Sea into the Baltic remained completely unimpeded.

A summary of ice conditions in the Baltic for the months of January to March is given in Table 1.

At end of February 1960

RELEVANT WEATHER FACTORS

The characteristics of the weather situation over the Atlantic and adjacent sea areas to the north differed little from that of January, the outstanding feature being the long period of homogeneous weather. Temperatures over the Canadian Arctic and Greenland were above normal, while very low temperatures continued to be experienced in the Siberian Arctic and the Baltic. These appeared to be the result of Arctic air flowing less frequently than normal into the Canadian Arctic areas and more frequently than normal into the north Russian Arctic areas.

BAFFIN BAY, DAVIS STRAIT AND THE CANADIAN ARCHIPELAGO

Again information from these areas was very limited but reports were received of considerable numbers of icebergs off the west of Greenland. However, from the information available it is clear that the area of field-ice was lower than normal.

EASTERN GREENLAND

The ice situation appears to have changed very little during February off eastern Greenland. Amounts of field-ice and the number of icebergs off Cape Farewell decreased slightly.

SPITSBERGEN AND BEAR ISLAND AND AREAS NORTH OF ICELAND

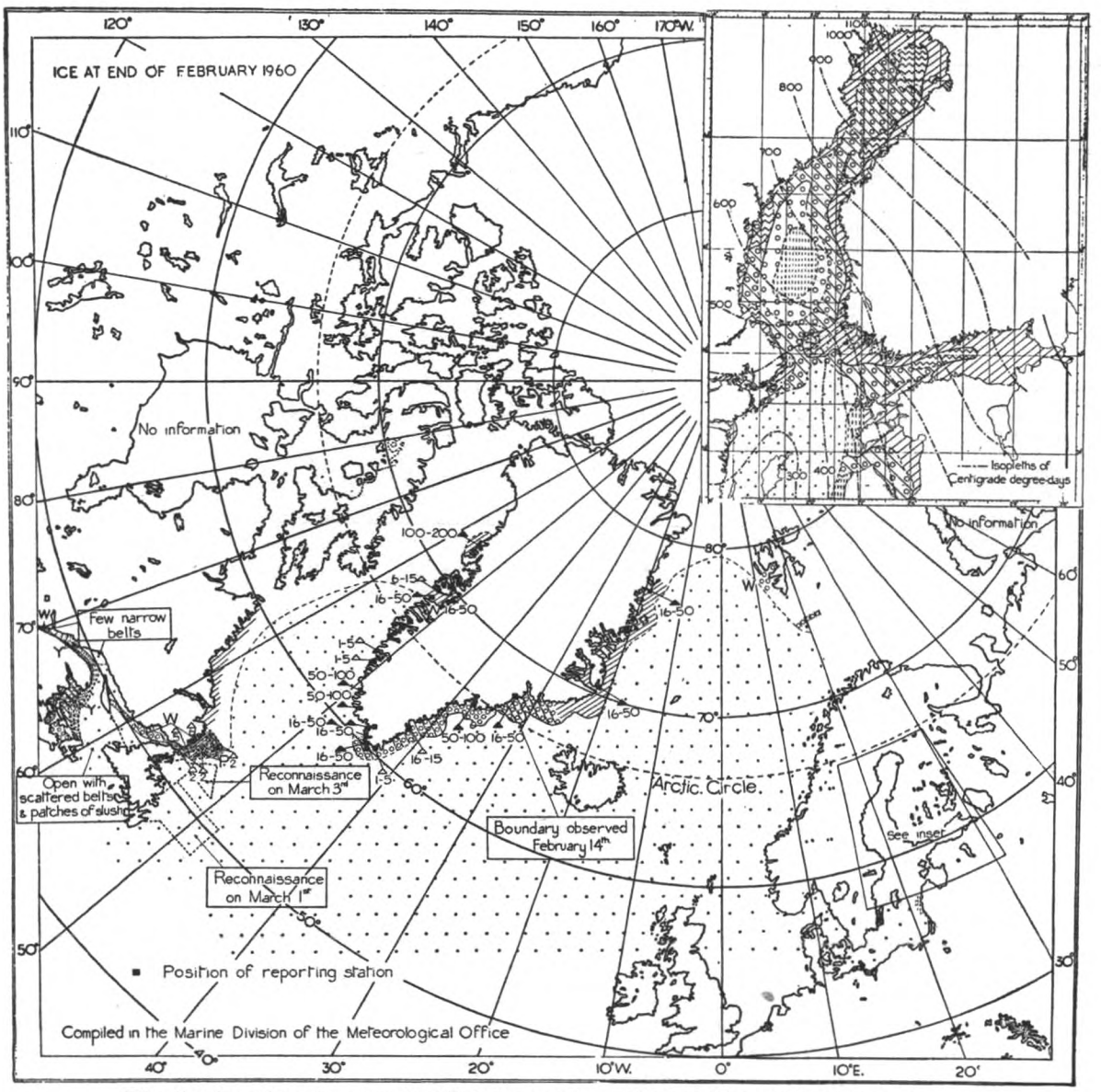
The high incidence of Arctic air to the east appears to have caused above-average ice towards Spitsbergen and Bear Island, but in general the season continued to be one of sub-normal ice in the Denmark Strait and Greenland Sea.

GRAND BANKS

No icebergs or field-ice were reported during February.

GULF OF ST. LAWRENCE AND ST. LAWRENCE RIVER

Much open water remained in the Gulf of St. Lawrence and in the approaches to the St. Lawrence River, and the season continued to be one of sub-normal ice. Navigation to most ports was possible with only limited difficulties. Isolated reports were received of ships requiring icebreaker assistance. Belle Isle Strait contained a great deal of various types of field-ice but there were extensive leads and a slow movement of small numbers of icebergs through the Straits into the Gulf of St. Lawrence.



Distribution of sea ice at end of February 1960. (Note and key as for January map.)

Baltic Sea

Ice developed and intensified, producing very severe conditions in the Gulf of Bothnia, Gulf of Finland and Gulf of Riga. Ports in the Gulf of Finland were kept open by ice-breakers but there were a number of ports in the north of the Gulf of Bothnia closed throughout most of February. Hazards to navigation developed in all Swedish ports, except those in the extreme south where conditions were somewhat variable. The southern Baltic Sea and the approaches from the North Sea remained clear for navigation with negligible hazards.

At end of March 1960

Relevant Weather Factors

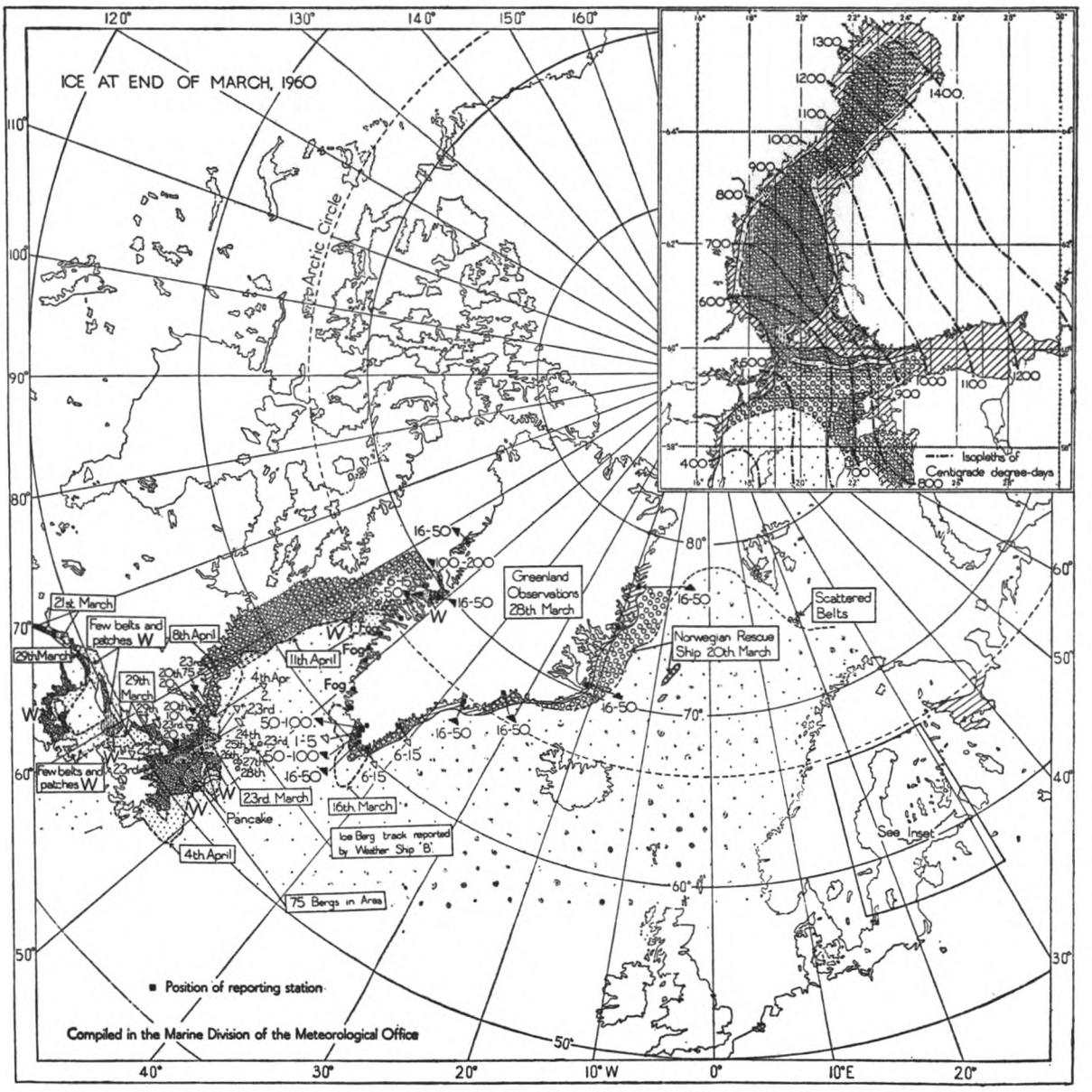
Depressions were frequent during March over the North Atlantic between the British Isles and eastern Canada, particularly off southern Greenland in the latter half of the month. Elsewhere anticyclones predominated. Much warm air was advected by depressions into the Arctic east of Greenland, while air masses over the Canadian Archipelago and north Russia were colder than normal.

Baffin Bay, Davis Strait and the Canadian Archipelago

Pack-ice appeared to be again below normal. There were also reports of breaks in the landfast ice off western Greenland north of 70°N., with moderate to large numbers of icebergs. There were, however, few signs of any largescale southward movement of pack-ice along the Labrador coast.

Eastern Greenland

Field-ice of all types was well below normal, with moderate numbers of icebergs.



Distribution of sea ice at end of March 1960. (Note and key as for January map.)

Spitsbergen, Bear Island and areas north of Iceland

Field-ice appeared to be well below normal north of Iceland, but approximately normal towards Spitsbergen and Bear Island

Grand Banks

The southward movement of pack-ice from the Davis Strait was later and less extensive than normal during March. Table 3 gives the numbers of icebergs sighted by merchant ships and the International Ice Patrol. No ice of any kind was reported actually over the Banks, but reports from areas to the north clearly showed that pack-ice and numerous bergs were approaching the area. This contrasted with the end of March 1959, when large amounts of pack-ice and numerous icebergs had moved extensively over the northern edge of the Grand Banks.

Gulf of St. Lawrence and St. Lawrence River

At the end of March, field-ice was clearing everywhere except in the Strait of Belle Isle and it was evident that this was to be a very light ice year with only a few obstructions in the Cabot Strait. The Canadian M.V. *Eskimo* docked at Montreal on 21st March, nine days earlier than the port's earliest time of opening in previous years.

Baltic Sea

Ice continued to be consolidated in the Gulf of Bothnia and the Gulf of Finland with pack-ice spreading into the South Baltic. At the end of the month there were signs of the ' turn ' in the ice season, with a decrease and a slight break-up of ice in the Gulf of Riga.

Table 3. Icebergs reported by merchant ships and the International Ice Patrol in the north-west Atlantic during March 1960

LIMITS OF LATITUDE AND LONGITUDE	DEGREES NORTH AND WEST										
	58	56	54	52	50	48	46	44	42	40	38
Number of bergs reported south of limit	247	239	147	50	0						
Number of bergs reported east of limit	247	200	100	25	6	6	6	6	6	5	1
Extreme southern limit ..	50°44'N., 54°44'W. on 16.3.60										
Extreme eastern limit ..	56°39'N., 35°57'W. on 21.3.60										

Sources of data

The information contained in these notes is compiled from maps and broadcasts kindly provided by the Canadian Meteorological Service, the United States Hydrographic Office and Coast Guard, and the ice reporting services of the countries of the Baltic sea. Reports from Greenland stations and special ice reconnaissances are obtained from Angmagssalik Radio. The Norwegian Meteorological Service and Fisheries Research Institute provide special reports from Spitsbergen, Bear Island and the ice limit north of Iceland. We receive reports from a world-wide distribution of ports via the Special Circular of the Baltic and International Maritime Conference.

G. A. T.

Book Reviews

Radar and Collision: A Handbook for Mariners, by L. Oudet, Capitaine de Frégate, French Navy. $8\frac{3}{4} \times 5\frac{3}{4}$ in. pp. xii + 89. *Illus.* Hollis & Carter, London, 1960. 15s.

Although this book makes no specific reference to meteorology, the risks and problems with which it is concerned occur almost exclusively when unfavourable meteorological conditions are present in the form of low visibility. No excuse is needed for reviewing it in *The Marine Observer*.

The author is a practical and modern seaman and in the Preface he points out that prior to reading *The Use of Radar at Sea*, when he was in command of a ship fitted with radar, "the radar, without my realising it, had become a sort of mascot and I used to press on through fog with perfect confidence in its powers". He goes on to confess that his immunity from accident was simply his good luck and that this book is an attempt in some way to pay for this.

Captain Oudet does not waste any words. The main body of the book is covered in 70 pages and he manages therein to convey to the reader an enormous amount of practical and seamanlike advice in simple straightforward terms.

The book is divided into 9 chapters and their titles indicate broadly the contents, as follows: The initial disappointment; Some explanations; Instruments of observation—Radar and the human eye; Radar and ocular vision in the light of the regulations; Observation; Principles of manoeuvre with radar; Disengagement or reduction of speed; Close quarters; Forethought in navigation.

Most chapters are illustrated with useful little diagrams which are easy to understand.

The general philosophy of the author throughout is a simple one—that radar is merely a very convenient and excellent aid to navigation that gives the navigator, in low visibility, advance warning of an approaching danger. It gives him the opportunity, if circumstances (sea room, etc.) permit, of taking some early and decisive action in order to avoid the danger. But throughout the book the author emphasises the necessity of abiding by the Rules of the Road, particularly Rule 16, and of not hesitating to stop the ship if the radar picture indicates that a close-quarter situation seems likely to develop. The reader is repeatedly warned that if the need to reduce speed or alter course arises, it should be done boldly and early. Chapter 9 contains some provocative thoughts about the use of radar in the Straits of Dover and Gibraltar.

By way of a conclusion the author gives a useful and practical summary of the problem and likens the navigator in fog to a blind man, "the fog signal being his stick and radar his dog—a resourceful animal but still an animal". In an Appendix he gives some typical examples of collisions between radar-fitted ships and the moral to be learnt from them.

Any mariner who reads this book would gain some benefit from it.

C. E. N. F.

Seamanship and Navigation, by E. C. Goldsworthy. 9¼ in. × 6½ in. pp. xii + 163. *Illus.* Thos. Nelson & Sons, Ltd., London, 1959. 25s.

Written primarily for those without specialised knowledge, and printed in clear type, this authoritative and readable little book in two Parts is the latest edition in the NELSON'S NAUTICS series.

The six chapters of seamanship in Part 1 are packed with practical information explained in simple non-technical language for the benefit of the layman. Chapters 1, 2 and 3 describe the ship, her construction, propulsion and equipment. Control of the ship, cordage, blocks and tackles, safety and communications are explained in Chapters 4, 5 and 6. With the limitation in space necessary for the book to conform in size to the rest of the series the author has been remarkably successful in his choice of what to include about the subject of seamanship, which, without such restriction, could easily fill a large volume as most readers of this review will be well aware. The reviewer would have welcomed some mention of the practical use of meteorology—including weather maps—to the seaman. This might have been achieved without enlarging the book, by filling the vacant space on the last page of each chapter.

Part 2. Navigation. The subject has been well presented in 5 chapters from which anyone with no more than a schoolboy's knowledge of mathematics can acquire all the theory required to give him a clear understanding of the art of fixing a vessel's position on the earth's surface by terrestrial or celestial observations, or by hyperbolic and radio position fixing systems. Chapter 7 introduces the subject with a lucid description of the earth and its place in the solar system, also simple definitions of the terms used in the day-to-day practice of navigation which must be clearly understood by the would-be navigator before much progress can be made. Chapter 8 provides a simple explanation of the trigometrical ratios of the right-angled plane triangle and their application to dead-reckoning, parallel and Mercator's sailing. The celestial sphere and celestial navigation, including the latitude by meridian altitude, longitude by chronometer and the Marcq St. Hilaire intercept method of fixing the ship's position are well explained in Chapters 9 and 10. Chapter 11 gives a brief explanation of fixing the ship's position by wireless signals and hyperbolic position fixing systems.

Candidates preparing for the M.O.T. 2nd Mate's Examination will find in this book much of the knowledge required of them in the examination room.

For the benefit of those who wish to extend their knowledge beyond the scope of this book, some advice by the author on the best books of reference on both subjects would have been helpful. There is no doubt in the reviewer's mind that this work will be well received by those for whom it is primarily written and would be a useful addition to the library of the professional mariner.

A. D. W.

Personalities

RETIREMENT.—CAPTAIN D. W. HUTCHISON made his last voyage with the Pacific Steam Navigation Company in the *Cuzco*, when he retired on 30th April last after 45 years at sea, all of which was spent in the service of the P.S.N. Co.

Making his first voyage in the *Quillota* as cadet in 1915, David Wilkie Hutchison passed for second mate in September 1919, and was appointed to the *Orbita* as 5th officer. Captain Hutchison's first command was the *Losada* in 1942. He

subsequently commanded many of the company's ships, including the *Reina del Pacifico*, well known on the South American trade.

Captain Hutchison commenced observing for the Meteorological Office in 1938, and over 11 years sent in 19 logbooks.

We wish him health and happiness in his retirement.

J. R. R.

RETIREMENT.—COMMODORE A. G. LITHERLAND retired from the Pacific Steam Navigation Company on 1st April last, making his last voyage as Commodore of the company in the *Reina del Mar*.

The whole of Arthur George Litherland's sea service was spent with the P.S.N. Co., as after serving his apprenticeship with them he was appointed 4th officer in December 1919.

Commodore Litherland was appointed to his first command, the *Loriga*, in 1944. He subsequently commanded a number of the company's vessels and in 1956 was appointed in command of the *Reina del Mar*, being promoted to Commodore in 1958.

Commodore Litherland's record with the Meteorological Office dates back to 1924 when he was 3rd officer of the *Huanchanco*. During 15 years observing he has sent in 30 logbooks, six of which have been classed 'excellent'.

We wish him many happy years of retirement.

J. R. R.

RETIREMENT.—MR. ARTHUR MCCARTNEY, Senior Radio Officer, completed his last voyage at sea after 41 years as a radio officer in the Merchant Navy, when the S.S. *Beaverglen* docked in London on 18th March last. Last year, on his completion of 40 years' service with the Marconi International Marine Communication Co., Ltd., he was presented by them with a gold watch. Just prior to his last arrival in London, the captain and officers of S.S. *Beaverglen* presented Mr. McCartney with a leather wallet and gas cigarette lighter.

Serving with many British shipping companies, Mr. McCartney's first weather observing ship was the *Runic*. He sailed in her from 1921 to 1926. Subsequently he was in *Kenbane Head*, and after the war in *Dunera*, *New Australia*, *Beavercove*, *Beaverlake*, and finally in *Beaverglen*, all of these being observing ships.

No personal records for radio officers were kept by the Meteorological Office before the end of the second world war, but since 1945 Mr. McCartney has contributed to 10 meteorological logbooks, four of which have been classed 'excellent'. We wish him health and happiness in his retirement from the sea.

J. C. M.

RETIREMENT.—COMMODORE G. H. G. MORRIS retired from the service of the Cunard Line at the end of February 1960, after 38 years with the Company. He was appointed Commodore on 1st October, 1958.

George Horace Guy Morris first went to sea as an apprentice in the *Helvetia*, owned by Messrs. Lowden and Company, in 1912, served in minesweepers during the first world war, and in 1920 joined the Elder Dempster Lines. He entered the Cunard service in June 1922 and served in many Cunarders between the wars. In 1941 he joined the *Scythia* as chief officer and was on board her when she was hit by an aerial torpedo at Algiers in November 1942.

Commodore Morris was appointed to his first command, the *Vasconia*, in 1947. From June 1956 to March 1957 he was relieving master in the Queen liners, and then became master of the *Queen Mary*. From September 1958 until his retirement he was in command of the *Queen Elizabeth*.

Commodore Morris has an admirable record with the Meteorological Office, dating back to 1923 when he was in the *Caronia*, and in 33 years he sent in 62 logbooks, 15 of which were classed as 'excellent'.

We wish him health and happiness in his retirement.

E. R. P.

RETIREMENT.—COMMODORE F. A. SMITH retired on 20th April, 1960, after 41 years' service with the Shaw Savill Line.

Francis Alexander Smith went to sea before the first world war, and served his apprenticeship with the Hogarth Line. He was torpedoed in the *Baron Erskine* in 1915. After passing for mate he joined Henderson, Macintosh of Leith and was 2nd mate of their *Dunedin* when she was mined on passage from Alexandria to Salonica, subsequently spending several months at Milos undergoing repairs.

Commodore Smith obtained his Master's Certificate in 1919 and joined Shaw Savill's as 3rd officer. At the outbreak of the second world war, he was serving as chief officer in the *Arawa* when she was commissioned as an armed merchant cruiser, and he was granted a temporary commission as Lieutenant Commander, R.N.R. In 1941 he was released from his Naval duties and appointed Staff Captain of the *Dominion Monarch*. This ship was in the dry dock at Singapore in January 1942 as the invading Japanese forces approached, but by extraordinary efforts she was made seaworthy and got away just before the Island fell. Commodore Smith was appointed to his first command, the *Waipawa*, in 1942 and later commanded the *Taranaki*, *Waipawa*, *Suevic* and, for the last eight years, the *Ceramic*. In November 1957 he was appointed Commodore of the company.

Commodore Smith's first meteorological logbook was received here in 1946 when he was in command of the *Waipawa* and since then, in 14 years, he has forwarded 29 logbooks, of which 23 have been classed 'excellent'. He received excellent awards in 1949, 1951, 1955, 1956 and 1960.

We wish him health and happiness in his retirement, which he is spending in New Zealand.

J. C. M.

OBITUARY.—We regret to record the death of CAPTAIN S. W. BROWN, which took place suddenly on board his ship, *Clan Mactavish*, in Durban at the end of March 1960.

Sydney William Brown was born in August 1905 and joined the Clan Line as 4th officer of the *Clan Macwhirter* in August 1927. He was appointed to his first command, the *Halizones* (Houston Line), in August 1951.

His first meteorological logbook was forwarded in 1928 from the *Clan Macwhirter* and in all, in nine years' observing, he has forwarded 19 logbooks, of which 14 were classed as 'excellent'.

Our condolences are extended to his widow.

J. C. M.

Notice to Marine Observers

SHIPS' RADIO WEATHER REPORTS

Radio officers are reminded that, in order to obtain priority for a weather message, ships should indicate this to coast stations in their initial call as follows—

W/T: QTC OBS

R/T: WEATHER MESSAGE

ERRATA

The Marine Observer, April 1960.

Page 57—

line 8: *for* river plankton *read* richer plankton

line 8 from foot of page: *for* mixed with river *read* mixed with richer

Page 65—

line 15: *for* stern *read* stem

Fleet Lists

GREAT BRITAIN (Information dated 23.3.60)

The following is a list of British ships which have been equipped with instruments and which voluntarily co-operate with the Marine Division 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 second 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 each July 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	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Accra	30.12.59	T. E. M. Jenkins	D. W. Cawkwell, G. Williams, R. C. Bairnsfather	J. Stuart	Elder Dempster Lines, Ltd.
Achilles	26.11.59	D. R. Jones	W. B. Bannerman, B. Edmonds	W. Young	A. Holt & Co.
Adelaide Star	29.9.58	H. Wylie	—. Rouse, R. Webb, M. Rigden	B. S. Green	Blue Star Line Ltd.
Aden	30.11.59	P. G. Lawrence, R.D.	I. R. Neil, W. B. Thomson, P. R. D. Cutmore	R. B. Ballantyne	Peninsular & Oriental S.N. Co.
Afghanistan	23.3.60	D. Calvert	B. Tyrer, C. M. Gibbs, A. Farquharson	—. Hodgeson	F. C. Strick & Co., Ltd.
Afric	6.1.60	A. E. Smith, R.D.	R. Adams, K. Wallace, D. Gardner	J. Taylor	Shaw Savill & Albion Co., Ltd.
Ajana	7.3.60	J. D. Blake	P. Boyle, A. R. Fairley, R. S. Grubb	P. Gooding	Trinder Anderson & Co., Ltd.
Albany		R. D. Jones	D. W. H. Peirce, J. Barton, A. R. Hanily	G. Gannon	Royal Mail Lines, Ltd.
Albistan	4.2.60	E. C. Thompson	R. Barret, H. Cassidy, A. MacDonald	P. Howe	F. C. Strick & Co., Ltd.
Amazon		H. Sang	I. Hopkinson, A. J. Millward, G. Varney	T. Desboro, M.B.E.	Royal Mail Lines, Ltd.
Amber		T. Barry	W. Balmer, J. McKinley		Gem Line, Ltd.
Alsatia	5.11.59	J. W. Stamper, M.B.E.	M. Tisdale, R. Howard, D. J. Robertson	J. S. Bishop	Cunard S.S. Co., Ltd.
Alva Bay		K. Jones	T. Milles		Alva S.S. Co., Ltd.
Amakura	15.2.60	S. Armitage	D. L. Myerscough, F. Sanchez, J. R. Knott	T. Murdoch	Booker Line, Ltd.
Andria	11.8.59	L. K. Goodier	A. P. Tarbuck, B. Newcomb, H. L. Smith	D. P. Byrne	Cunard S.S. Co., Ltd.
Apapa	13.1.60	R. W. Philip	G. D. Pari-Huws, A. G. Maxwell, M. R. Evans	G. I. Gilling	Elder Dempster Lines, Ltd.
Arabia	31.12.59	W. B. Tanner, R.D.	I. Edwards, I. W. S. Dunn, I. K. Grindrod, D. C. Wareing, M. B. Milner	T. D. Sandman	Cunard S.S. Co., Ltd.
Arabistan	8.2.60	R. B. Arthur, M.B.E.	A. C. Robertson, J. Stevens, J. E. B. Belt	F. Kemmel	F. C. Strick & Co., Ltd.
Araby	7.3.60	J. Postill	A. F. Hawkins, L. P. Fenner, D. J. Williams	R. Steward	Royal Mail Lines, Ltd.
Arakaka	13.7.59	J. A. Carter	J. Williams, T. Jones, V. McColl	J. Bankers	Booker Line, Ltd.
Araluen	26.1.60	R. Willcocks	P. M. Butcher, G. Green, J. McWilliams	M. Sheriff	Trinder Anderson & Co., Ltd.
Aramaic	7.10.59	G. V. Conolly, D.S.C.	S. R. N. Alty, J. Mason, R. Fulford-Dobson, J. F. Wilson	F. Sterry	Shaw Savill & Albion Co., Ltd.
Argentina Star	6.1.60	E. Pearce, O.B.E.	R. Bilton, M. Pheby, B. Cox	A. Milligan	Blue Star Line, Ltd.
Argyllshire	24.2.60	T. N. Soane	C. A. Binks, J. H. Currie, A. G. Cruickshank, T. S. Aplin	G. Martyn	Clan Line Steamers, Ltd.
Armagh	2.3.60	J. F. Wood	W. Wright, G. Fishwick, H. Goulden	E. Hopkins	Trinder Anderson & Co., Ltd.
Ashburton	8.2.60	H. J. Jones	J. M. Brook, P. Guerrier	L. J. Douglas	Trinder Anderson & Co., Ltd.

Asia	2.6.59	D. J. Brinn, R.D.	M. Tidsdale, J. K. Finlay	A. Gandon	Cunard S.S. Co., Ltd.
Assyria	11.11.59	J. G. Bradley, R.D.	D. Longfellow, K. T. Jones, D. Gunn	B. A. Long	Cunard S.S. Co., Ltd.
Athelfoam	10.3.60	J. P. Coffey	T. M. Fairclough, K. Slingsby, E. Cheney	P. Driscoll	Athel Line, Ltd.
Athenic	7.3.60	G. H. Heywood	T. M. Ffowes Williams, B. Hammond, B. A. Hills, A. P. Herbert, L. J. Graham	H. Knight	Shaw Savill & Albion Co., Ltd.
Athlone Castle	21.3.60	A. G. V. Patey	N. T. Alford, A. J. Devine, D. S. Haynes	R. Brew	Union Castle Mail S.S. Co., Ltd.
Aureol	31.1.60	C. H. Sweeny	G. R. Merrill, B. P. Telfer, R. B. M. Fawcett	F. Bloomfield	Elder Dempster Lines, Ltd.
Australia Star	23.3.60	D. L. Mackinnon	J. A. H. Gray, B. D. C. Franklin, M. C. Greenwood	L. Cooper	Blue Star Line, Ltd.
Author		R. Thompson	J. MacDonald, A. H. Kinrade, G. Merrick	A. S. J. Broadbent	T. & J. Harrison, Ltd.
Ayrshire	18.1.60	P. MacMillan	M. G. Chambers, M. Ure, E. Harvey	D. Allen	Clan Line Steamers, Ltd.
Balaena	*	P. Virik	A. L. Jensen, R. Pettersen, G. Johansen	J. Dahl	Hector Whaling, Ltd.
Bamburgh Castle	4.12.59	M. Doherty	E. T. Lakin, M. Malik	D. Alder	W. A. Souter & Co., Ltd.
Bankura	16.3.60	D. C. Murison	R. Noel, H. B. Chambers, R. J. Major	J. Rigg	British India S.N. Co., Ltd.
Baron Ardrossan	8.2.60	G. Harris	D. L. Innes, W. G. Todd, S. C. Gordon	T. Tuson	H. Hogarth & Sons, Ltd.
Baron Glenconner	11.8.58	R. Reid	G. Downie, J. Morrison, P. R. Warburton	D. C. Bullard	H. Hogarth & Sons, Ltd.
Barrister	29.7.59	J. F. W. Wallis	J. Dwyer, F. Martin	S. Fletcher	T. & J. Harrison, Ltd.
Baskerville	9.2.60	R. J. Lungley			Runciman (London), Ltd.
Bassano	7.3.60	B. Waldie	A. M. Robertson, D. Clough, D. A. Ellersby	A. Leary	Ellerman's Wilson Line, Ltd.
Beavercove	11.11.59	N. W. Duck, D.S.C., R.D.	P. H. Prankerd, M. Pouncey, —. Hebden	P. Finch	Canadian Pacific S.S., Ltd.
Beaverdell	14.8.59	N. C. H. Scallan, R.D.	P. Prankerd, B. G. Roberts, G. Coton	J. N. Coutts	Canadian Pacific S.S., Ltd.
Beaverford	31.12.59	L. H. Johnston, M.B.E.	G. H. L. Backwell, R. P. Wilman, A. H. Thompson, P. Hansell	K. Pearce	Canadian Pacific S.S., Ltd.
Beaverglen	19.1.59	W. J. P. Roberts	R. P. Wilman, J. A. Griffin, J. Bruce, R. P. Blyth	A. McCartney	Canadian Pacific S.S., Ltd.
Beaverlake	11.11.59	W. J. P. Roberts	J. Churchill, H. A. Jones, D. C. Lumbard	G. Evans	Canadian Pacific S.S., Ltd.
Benvannoch	11.3.60	J. P. Robertson	G. B. Goldie, J. Mitchell, E. Johnstone	E. Fitzgerald	W. Thomson & Co.
Birmingham City	19.10.59	E. Irish	P. J. Wright, M. J. Winter, D. M. Wilton	A. Pilkington	Charles Hill & Sons
Braemar Castle		H. L. Holland	D. Joyce, J. Wood, K. Parker	D. Bristow	Union Castle Mail S.S. Co., Ltd.
Brasil Star	21.10.59	L. Vernon, M.B.E.	C. R. E. S. Grant, J. Noyon, M. Woodhouse	H. Pennington	Blue Star Line, Ltd.
Bravo	8.9.59	J. A. Etches	J. Garroway, T. A. Wren, R. A. Jones	P. Hawkins	Ellerman's Wilson Line, Ltd.
Brisbane Star	22.7.59	A. H. Dare	M. Dunn, R. Westrip, B. Hayes	W. Wade	Blue Star Line, Ltd.
Bristol City		J. N. Ramsay	M. J. Winter, D. Simpson	T. M. Jenkins, M.B.E.	Charles Hill & Sons
Britannic	7.1.60	J. C. Dawson, D.S.C., R.D.	A. J. Foster, P. Kendall, T. R. Lawley	J. Kidson	Cunard S.S. Co., Ltd.
British Consul	30.12.59	J. Mason	W. G. Bothwell, W. Mackenzie, R. Longhorn	J. Brevitt	B.P. Tanker Co., Ltd.
British Endeavour	10.4.59	J. H. Lomas	M. Hardman, P. A. P. Donegan	K. R. Tite	B.P. Tanker Co., Ltd.
British General	30.10.59	W. O. Armstrong	J. G. Harrison, J. A. Potter, R. Haworth	K. C. Mackay	B.P. Tanker Co., Ltd.
British Patience	18.12.59	J. B. Hunter	D. R. Yorke, J. L. Gillan, W. A. Whelpton	P. D. Guildford	B.P. Tanker Co., Ltd.
British Resource	22.10.59	J. R. Robinson, M.B.E.	K. Warner, J. H. Morgan, W. K. Astley	D. Maclaughan	B.P. Tanker Co., Ltd.
British Sailor	14.12.59	S. W. Masters	J. McMillen, J. Guy, N. Tuckett	J. Dunne	B.P. Tanker Co., Ltd.
British Splendour	28.1.60	K. Bruce	F. T. Lamb, R. O. Burns, P. J. Cross	P. Williams	B.P. Tanker Co., Ltd.
Brittany	23.6.59	M. B. Wingate	F. G. Nickson, G. B. Panes, P. Bracher	P. R. Kelly	Royal Mail Lines, Ltd.
Bulimba		W. E. Davies	M. C. S. Ranson, D. P. Whitton, N. K. Fogley	J. D. G. S. Gallagher	British India S.N. Co., Ltd.
Cairnavon	9.7.59	J. Hogg	J. Liston, M. Buchanan, L. Andrews	D. Leeson	Cairns, Noble & Co.
Cairndhu	15.6.59	G. H. Percy	J. Blanks, D. Aitchison, D. Curry	W. Greaves	Cairns, Noble & Co.
Cairnforth	15.3.60	J. W. Scott	J. Lobban, R. W. Gray, D. Farmer	R. Haig	Cairns, Noble & Co.
Cairngowan	6.1.60	I. G. Foster	R. H. Sinclair, J. Lobban, J. Campbell	E. Johnston	Cairns, Noble & Co.
Calabar	9.12.59	D. H. Coughlan, D.S.C., R.D.	M. J. Upstone, P. J. Houghton, H. A. Ross, J. A. Stott	M. Conway	Elder Dempster Lines, Ltd.
Caledonia	10.3.60	D. Blair	D. Barclay, S. Connor, J. Coulter	J. McConnell	Anchor Line, Ltd.
Calgaria	12.8.59	J. H. Clinton	H. D. McDiarmid, N. Dalziel, W. M. Shield	J. Moody	Donaldson Line, Ltd.
Caltex Canberra	22.1.60	P. J. Davies	P. H. Jones, B. V. Campbell, J. J. Purchall	K. P. Tyrrell	Overseas Tankship (U.K.), Ltd.
Caltex Edinburgh	29.2.60	E. H. Bushell	K. D. Macallum, J. Millwater, M. F. Windows, J. Watton	C. B. Parris	Overseas Tankship (U.K.), Ltd.
Caltex London	15.6.59	J. A. Mackenzie	W. P. Bilton, D. Williams, R. Blackmore	N. A. Grice	Overseas Tankship (U.K.), Ltd.
Cambridge	16.4.59	P. P. O. Harrison	F. F. Michael, J. Weston, L. Howell, R. Jones	N. Fancett	Federal S.N. Co., Ltd.

* Radio messages only have been received: no written records.

Name of Vessel	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Canopic	29.10.59	T. H. Davies	B. Pittar, B. Roberts, M. Hollyoak	H. Foster	Shaw Savill & Albion Co., Ltd.
Canton	10.8.59	L. A. Hill	J. W. Perry, D. Bradley, D. Blackmore, A. Christey	G. Chadwick	Peninsular & Oriental S.N. Co.
Cape Clear	18.1.60	T. P. Edge	D. Cormack, E. Wellburn, W. Thomson	S. McNally	Lyle Shipping Co., Ltd.
Cape Franklin	29.1.60	A. Bankier	G. Robertson, J. McPhedran, H. Quigley	K. Bennett	Lyle Shipping Co., Ltd.
Cape Grafton	6.5.59	P. Smith	J. C. Carr, A. McLeod, E. J. Baines	J. Robson	Lyle Shipping Co., Ltd.
Captetown Castle	6.10.58	J. Trayner	—. Tidswell, —. Beale, —. Kelly	—. Brew	Union Castle Mail S.S. Co., Ltd.
Cardiganshire	9.12.59	R. T. Harries	F. Westhoff, J. Curtis, C. Fish	C. Bent	Glen Line, Ltd.
Carinthia	22.7.59	F. G. Watts, R.D.	F. Sargent, T. Whitehead, M. Bell	G. Parson	Cunard S.S. Co., Ltd.
Carnarvon Castle	4.2.60	W. S. Byles, R.D.	M. J. F. Fazakerley, R. J. Blythe, B. Buddle	H. Liggins	Union Castle Mail S.S. Co., Ltd.
Caronia	24.6.59	D. M. MacLean, D.S.C., R.D.	D. A. Williams, P. Brush, C. Burtinshaw, R. Southern	J. Williams	Cunard S.S. Co., Ltd.
Carrigan Head	18.1.60	W. A. Haddock, O.B.E.	W. Dallas, J. Roberts, R. Crawford	J. McDonnell	Ulster S.S. Co., Ltd.
Carronpark		M. Maclellan			J. & J. Denholm, Ltd.
Carthage	8.7.59	C. Mayne	J. M. Barnes, H. Hossill, M. Borland, G. Yeatman	F. Arthurs	Peninsular & Oriental S.N. Co.
Caslon	2.3.60	C. A. Smith	R. L. MacKenzie, P. Kelman, D. M. A. Looker	W. D. Brown	Runicman (London), Ltd.
Catalina Star	8.2.60	G. J. R. Bowden	A. B. Neish, D. N. Murray, J. R. Rawding	D. Edmunds	Blue Star Line, Ltd.
Ceramic	9.12.59	F. A. Smith	N. J. Case-Green, R. Welch, T. T. Salmon, J. W. Brew	R. O'Shaughnessy	Shaw Savill & Albion Co., Ltd.
Chantala	18.12.59	D. W. Spiers, G.M., R.D.	G. C. Ruaux, B. Hatton, D. Laverick	J. W. Field	British India S.N. Co., Ltd.
Cheshire	11.2.60	A. N. Williamson	M. Wood, E. T. M. Chambers, J. Goodchild	R. Ferry	Bibby Bros. & Co.
Chindwara	3.12.59	M. H. Vincent	A. D. Methven, J. B. Raglan, P. E. Humphrys	A. Nixon	British India S.N. Co., Ltd.
Cilicia	28.9.59	A. C. Johnston	A. T. McKendrick, R. W. L. Crawford, E. P. Willson, S. Bryant	J. Williams	Anchor Line, Ltd.
Cingalese Prince	18.1.60	H. Pirie	G. Hughes-Jones, G. Smith, L. Stephenson	C. Page	Prince Line, Ltd.
City of Birmingham	2.3.60	G. R. Jackson	B. C. Crombie, A. A. Ramsden, C. Baxter	E. Cohig	Ellerman Lines, Ltd.
City of Brisbane	2.11.59	E. G. Chapman	A. J. Evans, M. J. Swan, D. O. Dutfield	G. Barlow	Ellerman Lines, Ltd.
City of Bristol	25.8.58	W. G. McCulloch	J. C. Palmer, L. W. Roberts, D. W. Anderson	J. B. Staniforth	Ellerman Lines, Ltd.
City of Capetown	11.11.59	R. A. Jones	J. Hawthorne, T. Mallory, D. T. Davies	J. Dent	Ellerman Lines, Ltd.
City of Carlisle	13.11.59	T. Symons	D. T. Lamb, G. A. Burnham, D. McKinnon, R. Redding	K. Wiles	Ellerman Lines, Ltd.
City of Chester	17.12.58	T. S. Dennis	R. J. Smith, J. Campbell, A. A. Ramsden	S. D. Sutherland	Ellerman Lines, Ltd.
City of Coventry	21.10.59	W. S. Doidge	J. F. Blackie, W. S. Paton, D. D. Turner	R. J. Halpin	Ellerman Lines, Ltd.
City of Durham	19.11.58	H. G. White	J. Craig, J. B. Somerville, D. C. Howe	E. N. Cameron	Ellerman Lines, Ltd.
City of Edinburgh	9.12.59	W. G. McCulloch	J. K. Ashby, D. B. Williams, J. D. Gray	H. H. E. Hopkins	Ellerman Lines, Ltd.
City of Johannesburg	22.2.60	A. L. Beckett	J. D. Coles, D. J. Hazelby, I. E. Cribb	L. Cuthbert	Ellerman Lines, Ltd.
City of Khartoum	14.12.59	A. Brocklebank	R. C. Edwards, —. Owen, —. Cowap	I. Duthie	Ellerman Lines, Ltd.
City of Liverpool	18.12.59	J. L. Robertson	D. J. Tunnicliffe, R. G. MacMahon, A. S. Conyers	D. Hodgson	Ellerman Lines, Ltd.
City of Lucknow	10.3.60	B. T. Wortley			Ellerman Lines, Ltd.
City of Manchester	4.12.58	I. R. Pulford	R. B. Meikle, G. Greenhow, M. P. Lamble	R. Kerr	Ellerman Lines, Ltd.
City of Melbourne		E. G. Chapman	J. A. Anderson, W. M. McGregor, C. G. K. Swift	D. H. Sinclair	Ellerman Lines, Ltd.
City of New York	15.3.60	B. E. Hooper	G. B. Hughes, R. B. Butler, J. G. Hill, M. Smith	J. Sweeney	Ellerman Lines, Ltd.
City of Pretoria	17.11.59	A. G. Freeman	J. M. Longstaff, —. Rollinson, B. E. Torrence	K. G. Arthur	Ellerman Lines, Ltd.
City of Swansea	19.2.60	A. R. Horan	H. M. Townsend, W. A. King, B. Norwell	W. Gittens	Ellerman Lines, Ltd.
City of Winchester	9.3.60	J. W. Wotherspoon, M.B.E.	I. G. Lumley, J. C. Lee, C. J. Pickering	W. H. Carmichael	Ellerman Lines, Ltd.
Clan Brodie	7.3.60	W. H. Dalley	K. S. Burton, B. Grigor, D. T. Ross	W. Johnson	Clan Line Steamers, Ltd.
Clan Buchanan	20.4.59	J. Jones	P. D. Penn, A. G. Allson, D. J. A. Taylor, G. R. Spittal	J. Lamb	Clan Line Steamers, Ltd.
Clan Campbell	21.3.60	K. C. Simpson	G. B. Charleson, S. M. Grant, J. W. Wilcox	R. F. Cole	Clan Line Steamers, Ltd.
Clan Chattan	4.1.60	T. A. Watkinson	R. A. Robertson, J. B. Caley, D. Wright	E. J. Shillabeer	Clan Line Steamers, Ltd.
Clan Chisholm	8.1.60	J. V. Findlay	H. A. Mackenzie, N. F. Wray-Cook, C. F. Irvine	C. E. C. Crew	Clan Line Steamers, Ltd.
Clan Davidson	27.1.60	G. W. Spiller	D. W. Johnston, W. T. Maltman, G. R. Stokes	J. E. Vaughan	Clan Line Steamers, Ltd.

Clan Macaulay	30.11.59	A. F. Banks	I. F. Miles, —. MacInnes, —. Currie	W. S. Joice — Clan Line Steamers, Ltd.
Clan Macbrayne	2.3.60	C. H. A. Thomas	D. Finlayson, K. Morton, G. A. Findlay	G. Finlay — Clan Line Steamers, Ltd.
Clan Macdonald	14.10.59	H. D. Lockyer	M. Dominy, D. H. Macmillan, A. Ewing, R. S. Grant	D. McNeil — Clan Line Steamers, Ltd.
Clan Macdougall	27.1.60	L. Pogson	J. S. Crawshaw, F. G. King, I. Dalziel	G. Randall — Clan Line Steamers, Ltd.
Clan Macindoe		S. S. Davidson	B. H. Bowen, J. K. Robinson, D. J. Stonehouse	W. Joice — Clan Line Steamers, Ltd.
Clan Mackinnon	14.9.59	F. Harris	A. M. Miller, K. Morton, M. D. Cooper	J. Cox — Clan Line Steamers, Ltd.
Clan Maclaren	3.3.60	J. de Garis	C. F. Knott, P. W. Kidd, B. C. Peat	R. W. Moore — Clan Line Steamers, Ltd.
Clan Maclay	23.2.60	J. West	J. Sutherland, I. A. W. Williamson, D. Bell	D. Gray — Clan Line Steamers, Ltd.
Clan Maclean	9.12.59	H. Whitehead	J. J. Myles, T. E. Jackson, G. S. Rowland	C. Bridgeman — Clan Line Steamers, Ltd.
Clan Macleod	12.3.59	W. W. Simpson	P. M. Gurnell, J. Curwen, D. Richards	J. A. Gray — Clan Line Steamers, Ltd.
Clan Mactavish	4.11.59	S. W. Brown	H. Bryson, G. L. Bremner, F. Moss	—. Elmers — Clan Line Steamers, Ltd.
Clan Sutherland	23.3.60	F. H. Turton	J. A. Cowie, M. P. R. Turner, —. Fox, H. Edwards	W. Gay — Clan Line Steamers, Ltd.
Clan Urquhart	18.6.59	L. Pogson	W. Dancer, T. L. Kerby, A. R. Irvine	J. Carroll — Clan Line Steamers, Ltd.
Columbia Star		M. Brembergh	A. C. Bartram, D. Newlin, E. C. Smith	B. Foley — Lamport & Holt Line, Ltd.
Condesa	11.3.60	E. J. Lougheed	B. P. Young, N. Oddy, T. E. Thomas	Houlder Bros. & Co., Ltd.
Consuelo	28.1.60	R. Cudbertson	I. Watts, B. Gash, R. Neesham	F. Nicholl — Ellerman's Wilson Line, Ltd.
Corfu	18.2.60	W. T. Banks	J. R. Harrison, A. J. Foot, A. D. Ironside	J. Brown — Peninsular & Oriental S.N. Co.
Corinaldo	23.11.59	J. L. McQueen	D. Campbell, J. MacDonald, E. Smith	J. Lamb — Donaldson Bros. & Black, Ltd.
Corinthic	23.3.60	A. C. Jones	K. M. McKenzie, A. T. MacDougall, A. S. Henderson	T. Lillis — Shaw Savill & Albion Co., Ltd.
Cornwall	13.1.60	I. Y. Batley	D. W. Watt, D. Jamison, P. Hornby	R. Lockwood — Federal S.N. Co., Ltd.
Corrales	27.1.60	D. J. Morris	P. A. Best, A. Ditchfield, W. H. Ross	A. Brown — Elders & Fyffes, Ltd.
Cortona	26.11.59	J. H. Clinton	R. S. McLundie, A. Johnston, T. Cullen	L. Phillips — Donaldson Line, Ltd.
Cotopaxi	3.9.59	E. C. Hicks	R. G. Boulding, D. Houghson, C. Rawntree	M. Garrett — Pacific S.N. Co.
Cretic	22.10.59	J. W. Hart	R. Hetherington, A. H. Thompson	H. M. Burson — Shaw Savill & Albion Co., Ltd.
Crofter	27.10.59	W. E. Williams	J. M. Connolly, A. T. Creer, J. B. Dawson, R. F. Lindley	A. D. Fraser — T. & J. Harrison, Ltd.
Crystal Bell	8.1.60	K. Mackenzie	J. D. Mercer, D. Patrickson, R. Hunt	G. Heywood — Sugar Line, Ltd.
Cumberland	16.11.59	P. P. O. Harrison	E. Fawcett, B. A. Smith, P. A. Plumley, G. Cherney	J. Bilton — Federal S.N. Co., Ltd.
Cuzco	10.11.59	D. W. Hutchison	B. D. Cook, E. Gowland, K. L. Crowther	V. Dalton — Pacific S.N. Co.
Cymric	28.10.59	H. C. Smith	J. A. M. Gillies, R. L. Reid, D. G. Gomer	W. Charlton — Shaw Savill & Albion Co., Ltd.
Daleby	19.11.58	F. D. Lloyd	D. W. Clarke, J. A. Constantine, G. Grant	W. Stevenson — Ropner Shipping Co., Ltd.
Darro	16.10.59	L. T. Peterson	M. H. Osborn, R. E. Forrester, —. MacGregor	M. Carney — Royal Mail Lines, Ltd.
Debrett		C. E. Legg	M. B. Bradley, R. R. Grimer, J. F. O'Dowd	J. B. Christian — Lamport & Holt Line, Ltd.
Deerpool		J. R. Copping	D. Nicolson, H. Carlisle	W. M. Allinson — Ropner Shipping Co., Ltd.
Delphic	2.3.60	C. Carroll, D.S.C., R.D.	R. Hetherington, P. Hogg, G. Graham	S. Williamson — Shaw Savill & Albion Co., Ltd.
Deseado	21.3.60	F. A. C. Thacker	G. N. Kemp, J. T. Jones, J. McCaughrean, H. Messenger	P. Boulton — Royal Mail Lines, Ltd.
Devon	16.11.59	A. C. Rollinson	A. E. Robinson, T. Whyatt, A. Batt	N. A. Wheeler — Federal S.N. Co., Ltd.
Devonshire	19.1.60	G. W. Dobson, R.D.	D. Millhouse, P. R. Carling, A. J. Fairclough	A. Jones — Bibby Bros. & Co.
Dilwara	13.1.60	B. A. Rogers, D.S.C., R.D.	J. M. Cooley, P. L. Miller, W. Brown, G. M. Warren	G. Syer — British India S.N. Co., Ltd.
Diomed	11.1.60	W. J. Moore, D.S.C., R.D.	L. A. Holder, A. J. Palmer, R. M. L. Samuel	A. J. Bourne — A. Holt & Co.
Discovery II	6.10.58	J. D. Gray	M. Corner, G. L. Swanson, J. Kempton	L. A. Miller — National Institute of Oceanography
Dominion Monarch	1.2.60	R. J. Hopkins	G. R. Barton, D. M. Mortimer, J. Haberfield, —. Cairs, —. Downing	—. Clark — Shaw Savill & Albion, Co., Ltd.
Donegal	29.9.59	R. F. Hellings	B. T. Lindley, R. Brown, T. M. Deme	J. Ryan — Trinder Anderson & Co., Ltd.
Dorset	27.1.60	J. E. Bury	R. Jones, L. E. Howell, R. A. Date	K. Ormerod — Federal S.N. Co., Ltd.
Drina	2.3.60	R. C. S. Woolley, R.D.	C. A. Hunter, J. Arnott, W. A. Carver	J. Kenny — Royal Mail Lines, Ltd.
Duke of Athens	7.3.60	P. A. A. James	W. F. R. Whiting, A. M. Crossley, J. F. McGrath	A. McLean — Trent Maritime Co., Ltd.
Duncraig	16.11.59	A. McKay	D. Keith, D. MacNeil, I. Ramsay	D. Keith — J. & J. Denholm & Co.
Dunedin Star	4.1.60	R. H. Stark	P. V. Sanders, F. E. Thomas, J. R. Massey	A. Baker — Blue Star Line, Ltd.
Dunera	14.8.59	L. W. Scott	D. M. Martin, D. Cherry, B. Sanderson	H. M. O'Gorman — British India S.N. Co., Ltd.
Durango	26.2.60	E. N. Giller, M.B.E.	R. N. Miller, B. G. Evans, V. F. R. Moorman, J. J. Rutter	L. J. S. Cohn — Royal Mail Lines, Ltd.

Name of Vessel	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Durban Castle	29.1.60	N. M. Lloyd	—. Robson, —. Lee, —. Chalmers	—. Peake	Union Castle Mail S.S. Co., Ltd.
Durham	20.11.59	K. Barnett, R.D.	J. Crowder, T. Gibson, G. Morris	R. Miller	Federal S.N. Co., Ltd.
Eden	11.2.60	E. Card	R. F. Wise, A. K. Quilvie, D. S. Guinness	J. Duignan	Royal Mail Lines, Ltd.
Edenmore	19.1.60	N. Coubrough	W. J. Brown, B. Wallace, J. S. Rutherford	R. Sadler	Furness, Withy & Co., Ltd.
Edinburgh Castle	2.3.60	H. A. Deller	G. J. Oakley, W. Dean, S. Ramsey, C. A. Brown	—. Hodgson	Union Castle Mail S.S. Co., Ltd.
Egidia	29.7.59	W. MacVicar, M.B.E.	G. Watson, A. Hatcheon, W. Woodger, D. Maggs	W. Oliphant	Anchor Line, Ltd.
Elysia	20.5.59	J. L. Gibson, O.B.E.	W. Stockley, R. Muir, A. Stoddart, J. Murray	R. Drake	Anchor Line, Ltd.
Empire Star	11.3.60	G. T. King	I. C. Wood, G. L. Dennison, T. Clark	D. R. Clark	Lamport & Holt Line, Ltd.
Empress of Britain	13.1.60	J. P. Dobson, D.S.C., R.D.	P. Hansell, B. Brown, B. Roberts, S. St. C. Shaw	J. Mann	Canadian Pacific S.S. Co., Ltd.
Empress of England	7.1.60	C. L. de H. Bell, D.S.C., R.D.	F. R. Barry, A. G. Pound, G. Forrester, W. F. P. Cannell	P. B. McNab	Canadian Pacific S.S. Co., Ltd.
Empress of France	26.5.59	J. Soame	P. Hold, J. Walker, J. Richardson	—. McClellan	Canadian Pacific S.S. Co., Ltd.
Enderby	8.6.59	F. Holst	A. Giblin, S. Sorensen, L. Jonassen	B. Holtan	Hector Whaling Ltd.
English Star	23.2.60	C. H. Watson	A. E. Jacobs, R. A. Young, J. B. Shanley	J. F. G. Thomas	Blue Star Line, Ltd.
Ernest Holt		H. J. Aldiss, R.D.		R. W. J. Gregory	Ministry of Agriculture & Fisheries
Essequibo	4.5.59	A. J. G. Barff, R.D.	—. Brook, —. Campbell, F. Morton	B. Johnson	Royal Mail Lines, Ltd.
Essex	17.2.60	S. W. Andrews	K. Banks, D. Moran, G. Dick, D. McNeil	L. Sutton	Federal S.N. Co., Ltd.
Esso Cambridge	19.1.60	L. J. Smith, D.S.O.	W. Whyte, T. Hartley, M. Berryman	A. Higginbottom	Esso Petroleum Co., Ltd.
Esso Canterbury	20.5.59	S. R. Dance	T. P. E. Hughes, C. J. Welch, R. T. Harvey	C. Julius	Esso Petroleum Co., Ltd.
Esso Exeter	22.10 59	B. Bater	R. A. Harvey, P. Radcliff, T. Harrower	D. Dooling	Esso Petroleum Co., Ltd.
Esso Manchester	30.12.59	J. Brown	W. McCormick, R. Hutt, P. O'Connor	P. Walsh	Esso Petroleum Co., Ltd.
Eucadia	17.7.59	A. J. F. Colquhoun	J. A. Scrimgeour, A. Johnson, H. Scott	A. G. H. McPhail	Anchor Line, Ltd.
Eumaeus	8.3.60	R. G. Rippon	J. R. D. Hall, J. Bettle, A. E. J. Coates	E. Roberts	A. Holt & Co.
Explorer	15.2.60	E. A. Bruce	P. S. Burn, J. Craig	J. Steven	Dept. of Agric. & Fisheries for Scotland
Fanad Head	12.11.59	J. Alexander	J. S. Hanna, T. McI. Hamill, J. Hunter	R. Shepperd	Ulster S.S. Co., Ltd.
Farsistan	29.1.60	R. Connacher	I. L. C. Thomas, W. MacKenzie, R. C. Beck	K. Ducher	F. C. Strick & Co., Ltd
Fidra	23.3.60	M. B. Scott	D. Christie, P. Thomas, A. McDonald, C. Nicholson, M. Anderson		Chr. Salvesen & Co.
Flamenco	25.9.59	J. H. Allenby	D. Peachan, P. Barry, D. J. Bishop	J. G. Sherwood	Pacific S.N. Co.
Fresno City	4.9.59	D. Beynon	B. Boyer, D. Jack, K. Rutherford	P. J. White	Sir William Reardon Smith & Sons, Ltd.
Galway	6.1.60	E. J. Ridout	J. F. Holder, H. G. Chafer, J. Woodard	J. McNamara	Trinder Anderson & Co., Ltd.
Glenartney	30.12.59	D. C. Evans	D. H. Thomas, H. Watterson, J. Cairns	J. R. Binding	Glen Line, Ltd.
Glenfinlas	18.12.59	M. A. Rae, M.B.E., R.D.	R. Smith, D. H. Hammond, T. A. H. Dick	J. B. Carr	Glen Line, Ltd.
Glenorchy	9.3.60	J. B. Anderson	I. de C. Baird, E. I. Grant, G. A. Motte	C. F. Morgan	Glen Line, Ltd.
Glenpark		D. McKelvin	H. McDonald, J. J. Johnstone	M. J. Southern	J. & J. Denholm, Ltd.
Gloucester	26.5.59	S. G. Robinson, M.B.E.	M. J. Collins, C. M. Hill, J. Whittington	P. Leigh	Federal S.N. Co., Ltd.
Gloucester City	13.11.59	F. R. Neil	M. F. Williams, A. Couch, J. Eames, J. H. Dawson	J. Bullock	Charles Hill & Sons
Golfito	15.10.59	W. F. Young	L. Eades, A. G. Bateley, J. Wright	P. J. Kelly	Elders & Fyffes, Ltd.
Gothic	15.2.60	G. Campbell	A. J. Worricker, T. I. Oliver, M. J. Jenkins	B. McGovern	Shaw Savill & Albion Co., Ltd.
Graig	1.7.59	R. Dodds	G. Preston, L. Jarret, —. Roderick	R. Cahill	Idwal Williams & Co., Ltd.
Great City	11.3.60	J. H. Thornhill	A. C. Thomas, E. A. Tickner, R. Croft	H. James	Sir William Reardon Smith & Sons, Ltd.
Haparangi	7.10.59	W. T. J. Stevens	W. Fleming, R. Cooper, J. W. Gill	P. Stephenson	New Zealand Shipping Co., Ltd.
Harpalion	17.2.60	G. Freeman-Pannett	S. Mallory, N. Jessop	C. H. R. Moeliker-Twigg	J. & C. Harrison & Co., Ltd.
Hartington	18.1.60	J. B. Steele	S. K. Middleton, J. H. Brown, G. Gregory	A. R. King	J. & C. Harrison & Co., Ltd.
Hauraki	8.2.60	R. G. Hollingdale	R. S. Hall, M. O. Piner, R. Bayliss, A. W. S. Cripps	M. B. Wood	New Zealand Shipping Co., Ltd.
Hector	13.10.59	C. F. Lock	M. J. Godbehear, —. Wood, A. R. Pope	A. Torrance	A. Holt & Co.
Helenus	10.3.60	M. J. Case, M.B.E.	D. McDonald, C. M. W. Roberts, J. Howarth	A. Holman	A. Holt & Co.

Hemiglypta	15.1.60	M. A. Neeves	J. M. Connolly, M. T. John, W. R. Smith	J. P. Connolly — Shell Tankers, Ltd.
Hertford	8.1.60	H. C. R. Dell	J. Thomson, R. Williams, M. Eglon	W. Kay — Federal S.N. Co., Ltd.
Highland Monarch	8.1.60	T. W. Stevens, R.D.	B. A. Darling, J. T. Duff, P. Jowers	F. R. Dunk — Royal Mail Lines, Ltd.
Himalaya		H. C. Slinn	R. D. Champness, J. Page, T. Reeve	R. D. Hawkins — Peninsular & Oriental S.N. Co.
Hinakura	7.3.60	N. L. Warren	J. Hume, B. Anstey, D. Hyde, J. Bulkeley	R. F. Jay — New Zealand Shipping Co., Ltd.
Hororata	28.4.59	H. R. M. Smith	W. Macrae, J. Piner, M. Williams	A. Harris — New Zealand Shipping Co., Ltd.
Hubert	26.11.59	J. Whayman, D.S.C., R.D.	J. P. McClelland, J. Dunn, J. McBride	F. Fitzgerald — Booth S.S. Co., Ltd.
Huntingdon	7.9.59	J. Guyler	R. J. Bayliss, J. Weston, D. Standing, J. Lewis	N. Fawcett — Federal S.N. Co., Ltd.
Hurunui	11.3.60	F. Pover	W. G. Chaplin, O. B. Embleton, G. H. Webber	A. Titley — New Zealand Shipping Co., Ltd.
Hyrcania	11.2.60	G. D. Clarke	F. Evans, E. Zalitis, A. G. Johnston	W. Tobin — Baltic Trading Co., Ltd.
Imperial Star	18.12.59	G. L. Evans, O.B.E.	R. A. Colebrook, D. Mackerrow, D. Hulme	D. Whitehead — Blue Star Line, Ltd.
Inishowen Head	18.11.59	H. N. Clarke	H. Thompson, E. Seaton, R. Martin	A. E. Adams — Ulster S.S. Co., Ltd.
Innesmoor	6.11.59	T. H. Matthews	J. K. Schofield, R. D. Davidson, I. McLeod	G. Turner — Walter Runciman & Co., Ltd.
Interpreter	7.9.59	W. Weatherall	J. R. Kaighen, B. Crook, J. Pearson	J. Emerson — T. & J. Harrison, Ltd.
Ivernia	22.12.59	S. A. Jones, R.D.	J. G. Parry, J. King, M. W. Roberts	L. Harvey — Cunard S.S. Co., Ltd.
Ixion	30.12.59	G. Edge	P. A. Rothery, P. G. Young, N. Aiton	W. W. Beebee — A. Holt & Co.
Jamaica Planter		G. E. M. Jenkins	B. Harman, J. Maclean, M. Phelps	A. F. Sheen — Kaye, Son & Co., Ltd.
Jamaica Producer	11.2.60	T. A. Kidd	M. Hennessy, N. Caris, M. J. Belcher	D. W. James — Kaye, Son & Co., Ltd.
Jason	28.1.60	J. Gould	D. L. Cockin, P. B. Beckett, T. Whalley	J. R. Brockbank — A. Holt & Co.
John Biscoe	15.6.59	W. Johnston	B. G. Turner, J. P. Morley, D. Turnbull	I. Williams — Falkland Islands Govt.
John Holt	14.9.59	R. A. Simpson	O. M. Deignan, M. de Lacy, K. Bridson	M. W. Guy — Guinea Gulf Line, Ltd.
Journalist	2.3.60	D. Wolstenholme	B. C. Roberts, F. Curry, D. Potter, D. Cameron, P. G. Rylands	W. Stirling — T. & J. Harrison, Ltd.
Kenilworth Castle	2.3.60	A. C. M. Black, O.B.E.	—. Bell, —. Foulkes, —. Taylor	—. Kneeshaw — Union Castle Mail S.S. Co., Ltd.
Kenuta	1.1.59	E. C. Hicks	T. Robbins, A. Powell, E. Gowland	N. Roberts — Pacific S.N. Co.
Kenya	19.2.60	H. B. W. Cray, M.B.E.	C. J. Bee, A. J. Hughes, A. R. Isard	J. Masterman — British India S.N. Co., Ltd.
King Arthur		J. L. Ritch	M. J. Woodhead, D. I. McMinn	R. Fullarton — King Line, Ltd.
King Robert	31.8.59	—. Crawford	D. I. McElvogue, C. McCarthy, D. McCaoll	B. A. Carr — King Line, Ltd.
Koyan	27.8.59	M. F. M. Fair	A. R. Pilliner, D. Montgomery, S. Fox	J. B. Jardine — P. Henderson & Co.
Lalande	3.12.59	J. S. Peterkin	R. C. Green, R. P. Willis, J. M. Boyd	H. L. Lucas — Lamport & Holt Line, Ltd.
Laurentia	31.7.59	T. S. Graham	R. Dootson, H. Grant, R. McLundie	D. Murray — Donaldson Bros. & Black, Ltd.
Leicestershire	16.12.59	E. D. Brand	J. Pettitt, A. G. Broadwith, A. Bath	J. E. Unsworth — Bibby Bros. & Co.
Limerick	15.1.60	C. Parry, O.B.E.	B. M. Gardner, A. G. McGill, J. A. Cross	E. Eaton — Trinder Anderson & Co., Ltd.
Lismoria	5.11.59	R. McNie	R. Brewster, H. Macdermid, M. Buchanan	J. Limpitlaw — Donaldson Line, Ltd.
Livorno	5.1.60	N. Cook	D. J. Train, J. Holmes, B. Scarbrough	M. Reilly — Ellerman's Wilson Line, Ltd.
Loch Avon	14.8.59	T. W. F. Bolland	G. A. Hunter, H. J. Perkins, J. Williams	J. Greenhalgh — Royal Mail Lines, Ltd.
Loch Garth	21.7.59	C. C. Dingle	B. J. Hotter, J. Hunt, J. McCaughrean	F. E. Page — Royal Mail Lines, Ltd.
Loch Gowan	18.1.60	G. S. Grant, R.D.	B. Wilson, P. Hunter, M. G. Rogers	D. Stevenson — Royal Mail Lines, Ltd.
Loch Loyal	21.3.60	F. J. Swallow	S. H. Lewis, M. Hobbs, P. Barker	J. S. Berter — Royal Mail Lines, Ltd.
Lotorium	13.1.56	N. Clarke	A. Rossouw, B. Lloyd, D. H. White	B. I. D. Mellors — Shell Tankers, Ltd.
Logna	14.7.59	L. B. Anderson	T. W. Lawrence, G. Reid	Chr. Salvesen & Co.
London Pride	10.3.60	J. Wallace	R. J. Smith	B. R. Harvey — London & Overseas Freighters, Ltd.
Macharda	18.1.60	I. A. Maclaren	R. P. D. Williamson, G. W. Sinclair, G. Hunter	J. H. S. Watson — T. & J. Brocklebank, Ltd.
Magdapur	19.10.59	J. Richardson	—. Maclachlan, —. Millichap, —. Lewis	D. F. Lawrence — T. & J. Brocklebank, Ltd.
Mahanada	30.12.59	G. A. Jackson	T. D. Willey, R. Holland, W. Lloyd-Williams	J. Sheppard — T. & J. Brocklebank, Ltd.
Mahseer	1.1.60	T. C. Eddy	L. M. S. Norris, P. Slade, J. P. Fillingham, J. Churchill	B. J. Smith, M.B.E. — T. & J. Brocklebank, Ltd.
Makalla	23.3.60	G. J. Kenyon	P. J. McKiernan, R. E. Roberts, M. C. Tait	E. MacKinnon — T. & J. Brocklebank, Ltd.
Malancha	26.10.59	W. Couling	K. J. G. Bell, B. P. Ross, R. C. Floyd, D. Hammond	J. E. McVicar — T. & J. Brocklebank, Ltd.
Manchester City	6.3.59	A. Starmer	W. R. Donaldson, J. S. Watson, D. Gregson	W. K. Wilson — Manchester Liners, Ltd.
Manchester Faith	4.2.60	J. E. Jones	D. N. Wells, D. Barlow, D. Gregson	W. McPherson — Manchester Liners, Ltd.
Manchester Fame		W. Hine	—. Birkenhead, P. Boniface, J. Illingworth	J. Buchanan — Manchester Liners, Ltd.
Manchester Mariner	16.3.60	F. L. Osborne	P. D. Owen, T. H. Lynn, J. M. Rimmer, M. Barnes	M. Doran — Manchester Liners, Ltd.
Manchester Merchant	10.7.59	F. Downing	J. M. Rimmer, T. H. Lynn, J. A. McKay	A. S. J. Broadbent — Manchester Liners, Ltd.
Manchester Miller		E. W. Raper	A. S. Bashford, A. O. Copeland, D. Thomas	A. S. J. Broadbent — Manchester Liners, Ltd.
Manchester Pioneer	17.12.59	D. S. Millard	W. Glanville, K. Rourke, G. B. Rapp	K. J. McGuire — Manchester Liners, Ltd.

Name of Vessel	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Manchester Port	28.9.59	F. Lewis	A. N. Gow, P. A. Boniface, D. P. Humphrey	D. P. Reddy	Manchester Liners, Ltd.
Manchester Progress	29.7.59	W. E. G. Oliver	A. N. Gow, J. Illingworth, M. W. Kipling	T. Berry	Manchester Liners, Ltd.
Manchester Regiment	27.10.58	W. E. Quirk, R.D.	A. L. Morris, P. Cullen, K. Leapug	T. Berry	Manchester Liners, Ltd.
Manchester Shipper	20.4.59	W. E. Espley			Manchester Liners, Ltd.
Manchester Spinner	10.11.59	L. Taylor	A. L. Morris, A. Tester, D. Nutton, P. Covell	J. Reid	Manchester Liners, Ltd.
Manchester Trader	10.6.59	W. E. G. Oliver	A. W. Wilford, N. N. Cockshoot, J. Baker	D. Hodgson	Manchester Liners, Ltd.
Manchester Vanguard	16.3.59	G. R. Thompson	C. Bishop, R. M. Bertenshaw, D. Whitworth, G. A. Cowell	F. Mullen	Manchester Liners, Ltd.
Manchester Venture	7.7.59	J. E. Jones	P. J. Stow, D. P. Humphrey, D. M. Oliver	W. V. Wilson	Manchester Liners, Ltd.
Mandasor	10.12.58	S. E. Turner	D. A. Evans, G. A. Jenkins, D. F. Barratt	N. Brecknock	T. & J. Brocklebank, Ltd.
Manistee	29.6.59	W. Young	G. H. N. Keyzar, K. J. Leslie, S. T. Robinson	P. Prole	Elders & Fyffes, Ltd.
Marabank	24.9.58	C. G. Watterson	W. Mottram, J. K. Mathias, R. C. Lescombe	J. Fahy	Andrew Weir Shipping & Trading Co., Ltd.
Marengo	4.2.60	J. K. Marrow	B. Ellison, J. Bell, E. Tushingham	G. Shilson	Ellerman's Wilson Line, Ltd.
Markhor	7.5.59	I. A. Maclaren	B. Shawcross, G. Kay, P. Swift	P. Connell	T. & J. Brocklebank, Ltd.
Martand	25.6.59	P. J. Pembridge	P. G. Whitmore, L. des Landes, J. Cayzer, J. Dovell	P. Y. Wright	T. & J. Brocklebank, Ltd.
Matheran	30.12.59	J. P. Jackson	J. Egan, A. Wood, D. Wild	J. Bentley	T. & J. Brocklebank, Ltd.
Matina	10.3.60	B. Hodges	A. Miller, W. Ross, G. Mackie	A. E. Campbell	Elders and Fyffes, Ltd.
Mauretania	15.12.59	E. A. Divers, C.B.E., R.D.	B. Pennington, T. A. Nicholson, J. King, A. T. Cant, P. Walton	J. Connock	Cunard S.S. Co., Ltd.
Media	30.11.59	W. E. Warwick, D.S.C., R.D.	R. G. Southern, J. T. Morban, D. J. McManus	A. Hopkin	Cunard S.S. Co., Ltd.
Melbourne Star	30.12.59	A. Penrise	W. Macintosh, E. Dyer, J. Stannard	W. Morrison	Blue Star Line, Ltd.
Merchant Duke	29.6.59	S. E. Hooper	F. E. Lovern, G. Gurnom, H. Harrison	D. Hambleton	Drake S.S. Co., Ltd.
Meta	26.8.59	A. D. Macnab	A. Wood, A. McIntyre	A. M. Cherry	Glen & Co., Ltd.
Middlesex	23.2.60	I. C. Davison	J. M. Knight, H. Hynard, L. Money, B. Lee	R. G. Heath	Federal S.N. Co., Ltd.
Monarch	2.3.60	J. P. F. Betson, O.B.E.	I. J. L. Lang, D. W. Alford, J. Lofts, P. J. V. Paget	R. Pharo	H.M. Postmaster-General
Monmouthshire	11.3.60	A. K. Sanderson	J. I. McCrindle, H. T. Reid, M. H. Day	C. W. Knibb	Glen Line, Ltd.
Muristan	17.7.59	E. E. Dunn	W. D. Hill, D. Robinson, N. Wray	R. Kimberley	F. C. Strick & Co., Ltd.
Napier Star	1.7.59	W. L. Murphy	C. R. Grant, J. Hutton, F. Coulson	—. Murray	Booth S.S. Co., Ltd.
Naticina	8.10.59	F. W. Philpott	G. G. Saunders, R. Ferguson, R. S. Murchie	R. Durston	Shell Tankers, Ltd.
Nestor	2.3.60	A. Macdonald	J. White, D. Clark, J. Beasant	J. Hardyng	A. Holt & Co.
Newfoundland	1.1.60	J. Wilson	R. W. Holmes, W. Basham, P. Atkinson	J. Keegan	Furness Withy & Co., Ltd.
New York City	25.11.59	F. W. Harris	W. Coombes, C. Bishop, E. Mace	J. Cox	Charles Hill & Sons
New Zealand Star	16.11.59	E. L. Jermyn, O.B.E.	J. Suddes, R. Burns, A. Milligam, P. Entwistle	T. Morrison	Booth SS. Co., Ltd.
Nordic	8.1.60	B. R. Simons, M.B.E.	D. Milburn, R. B. Sturgess, J. Lawn	A. Ahearne	Prince Line, Ltd.
Norfolk	2.12.59	S. G. Robinson	R. G. J. Davis, E. T. Rowland, S. R. Shannon, J. S. Dickie	M. W. Hartson	Federal S.N. Co., Ltd.
Norseman	10.11.59	I. G. Dryburgh	B. Hyatt, J. M. Watson, V. G. Worth	A. Greenwood	Cable & Wireless, Ltd.
Northumberland	10.6.59	T. Alderman	A. Aston, G. Pool, G. Lott, J. Stacey	R. Waters	Federal S.N. Co., Ltd.
Nottingham	3.6.59	H. D. Sladen	J. Rice, P. J. Sedgwick, E. Gale, A. McNeill	R. Birkenshaw	Federal S.N. Co., Ltd.
Nova Scotia	26.3.59	J. E. Wilson, O.B.E.	R. Benson, J. H. Owens, E. A. Jones	P. Finn	Furness Withy & Co., Ltd.
Novelist	26.11.59	C. C. Heaton	B. W. Jones, J. A. Fletcher, N. T. Davies	R. L'Estrange	T. & J. Harrison, Ltd.
Obuasi	29.9.59	N. Taylor	C. E. Woodward, G. A. Everitt	T. McGrath	Elder Dempster Lines, Ltd.
Orcades	25.1.60	R. W. Roberts, O.B.E., D.S.C.	J. S. Fitzwalter, N. I. Collett, G. Robinson	D. Macrae	Orient S.N. Co., Ltd.
Orion	19.2.60	S. Ayles, R.D.	W. R. Womersley, D. Hughes, B. Wells	F. Harrop	Orient S.N. Co., Ltd.
Oronsay	8.9.59	A. E. Coles, R.D.	J. Stringfellow, E. Pickles, E. Robinson, R. Ellingham, J. Wells	D. Macrae	Orient S.N. Co., Ltd.
Orontes	15.3.60	R. J. Craddock, O.B.E.	H. F. Roper, J. B. Jones, M. Rushan	M. Palmer	Orient Line, Ltd.
Orsova		N. W. Smith, C.B.E.	P. J. V. Paget, J. B. Wells, W. J. Denley	P. Parish	Orient Line, Ltd.
Otaio	1.10.59	H. N. Lawson, R.D.	R. C. Ford, J. Needham, M. Elsam	P. H. Broome	New Zealand Shipping Co., Ltd.
Otaki	21.3.60	J. D. Bennett	D. G. Watson, W. Dan, D. Standing, W. Lewis	A. MacInnes	New Zealand Shipping Co., Ltd.

Otra		W. Scott	H. Mackay, R. Hare		Chr. Salvesen & Co.
Oxfordshire	1.1.60	N. F. Fitch, M.B.E.	C. M. Donnell, G. Waugh, M. Ford	A. Rodger	Bibby Bros. & Co.
Pacific Envoy	6.1.59	P. F. Owens	D. Milliken, B. Roberts, J. Heathcote		Furness, Withy & Co., Ltd.
Pacific Fortune	19.10.59	G. Brown	B. E. Pritchard, G. H. Deere, J. G. Usher	D. Bullard	Furness, Withy & Co., Ltd.
Pacific Northwest	17.12.59	L. W. Cooper, O.B.E.	D. Hanks, M. Brown, M. Jones, V. Kinley	R. Doyle	Furness, Withy & Co., Ltd.
Pacific Reliance	22.2.60	J. B. Stewart	D. J. Bremner, G. Poole, J. Croucher	W. Peddie	Furness, Withy & Co., Ltd.
Pacific Unity	7.3.60	J. Sims	S. G. Vass, A. Collop, N. F. Phillips	R. Barker	Furness, Withy & Co., Ltd.
Pacific Stronghold	9.12.59	H. A. Shaw, O.B.E.	S. N. Simpson, S. J. Lavis, A. Lawlor, O. Pascoe	A. R. Murray	Furness, Withy & Co., Ltd.
Pampas	25.9.59	G. G. Chatterley	M. C. Martin, J. Race, T. S. B. Challis	D. Cowhig	Royal Mail Lines, Ltd.
Papanui	31.12.59	M. J. Heron	N. M. Crone, J. Burn, G. Dixon, W. Harris	D. Gerrard	New Zealand Shipping Co., Ltd.
Paparoa	8.12.59	D. A. G. Dickens	M. A. Hill, P. W. Bower, A. C. Anson, A. S. Jackson	F. Wilson	New Zealand Shipping Co., Ltd.
Paraguay	4.11.58	G. C. W. Meldrum, M.B.E., R.D.	D. Bell, M. Mortimer, M. R. Simon	T. Slattery	Royal Mail Lines, Ltd.
Paraguay Star	23.2.60	D. R. Macfarlane, O.B.E., D.S.O.	J. Goodland, D. Mackillop, D. Westgate	J. MacDonald	Blue Star Line, Ltd.
Pardo	7.3.60	C. Robertson		F. Baker	Royal Mail Lines, Ltd.
Parima	10.3.60	C. D. Ratcliff	P. J. Troy, H. N. Lloyd, W. Carver		Royal Mail Lines, Ltd.
Parthia	8.2.60	P. A. Read, D.S.C., R.D.	J. G. N. Cosnett, F. E. Pollit, P. Seymour, A. S. Black	—. O'Sullivan	Cunard S.S. Co., Ltd.
Pendennis Castle		G. H. Mayhew	P. Eckford, J. Hobbs, J. Taylor	P. P. Williams	Union Castle Mail S.S. Co., Ltd.
Pennyworth	8.12.59	N. Thompson, M.B.E.	J. Bertram, C. Bridgewood, J. McLean	B. Palmer	R. S. Dalgleish, Ltd.
Perim	16.11.59	G. Randall	J. W. Fisher		Peninsular & Oriental S.N. Co.
Perseus	2.3.60	W. K. Hole	D. K. Troup, C. H. F. Hill, P. A. Smith, G. Collins, J. Bell	R. Hinchcliffe	A. Holt & Co.
Perthshire	27.10.59	E. W. Jenkin	R. Toogood, G. Carmichael, D. Ellis, J. Nutt	J. Pattie	Scottish Shire Line, Ltd.
Pilcomayo	16.11.59	J. Chester	R. Bland, G. S. Vale, J. Clark	J. Begg	Royal Mail Lines, Ltd.
Pipiriki	24.9.59	J. T. Peattie	A. M. Watt, M. J. Charlesworth, E. J. Norman, D. J. Riley	A. M. Watt	New Zealand Shipping Co., Ltd.
Pizarro	9.11.59	J. E. Evans, D.S.C., R.D.	B. J. Angel, W. M. Jenkins, R. Riley	J. Newman	Pacific S.N. Co.
Port Adelaide	30.10.59	E. W. Dingle, M.B.E.	K. M. Curnow, M. J. Foden, D. J. Packman	W. Beverley	Port Line, Ltd.
Port Auckland	16.2.60	C. R. Townshend	D. C. Hebden, D. J. North, G. A. Botterill	H. Horrocks	Port Line, Ltd.
Port Brisbane	22.1.60	E. E. Roswell	P. R. R. Ramsay, J. Hart, S. N. Hurst	A. Hudson	Port Line, Ltd.
Port Dunedin	11.1.60	G. Carling	R. P. Center, M. Read, S. Clough	F. Laurence	Port Line, Ltd.
Port Hardy	6.10.59	R. L. Hagley	E. H. Jones, J. W. Waldie, S. J. Goodchild	G. C. Talbot	Bibby Bros. & Co.
Port Hobart	9.12.59	W. B. Craig	P. H. Goldberg, M. J. O'Byrne, K. S. Cruden	C. McGill	Port Line, Ltd.
Port Invercargill	20.1.60	A. Brown	J. A. Cullen, D. Hart, M. P. Luce	S. A. White	Port Line, Ltd.
Port Jackson	18.1.60	W. Clough	A. Roberts, N. Davis, R. Clarkson	T. Flinders	Port Line, Ltd.
Port Launceston	11.2.60	V. G. Battle	R. D. Henderson, J. D. C. Tainsh, R. D. Bisacre	F. V. Harford	Port Line, Ltd.
Port Lincoln	30.12.59	E. J. Arnold	J. F. Sheldrake, D. J. Turner, D. E. Shearsmith	W. Cowie	Port Line, Ltd.
Port Macquarie	20.4.59	J. S. Moate	B. M. Le Lièvre, A. E. Hoggarth, R. R. McMurray	B. Cousins	Port Line, Ltd.
Port Napier	21.3.60	F. J. Lavers	L. A. Taylor, D. H. Kilner	T. Hargrave	Port Line, Ltd.
Port Phillip	14.3.60	A. S. McClounan	R. R. McMurray, E. Walshaw, A. M. G. Spence, I. M. Borman	U. Waddington	Port Line, Ltd.
Port Pirie	29.10.59	L. J. Skailes	R. J. Gollogly, B. M. Le Lièvre, R. H. Mitchell	J. Barney	Port Line, Ltd.
Port Townsville	9.12.59	J. S. Moate	J. W. Gunn, R. Asplet, E. Byorkstrand	E. Loft	Port Line, Ltd.
Port Victor	21.3.60	J. A. Fairbairn	G. D. B. Thomas, M. F. Morris, G. M. R. Squires	U. C. Knuckle	Port Line, Ltd.
Port Vindex	2.10.59	E. W. R. Young	J. Burtt, M. Mortimore, J. Whitcher	N. Hodgson	Port Line, Ltd.
Port Wanstead	7.1.60	I. Jackson			Watts, Watts & Co., Ltd.
Port Wellington	18.12.59	C. A. Hodson	P. E. M. Kelway, J. Bramley, M. Hughes	J. S. MacPherson	Port Line, Ltd.
Port Wyndham	16.11.59	R. H. Finch	M. Bennett, C. Baldham, —. Hourston	T. McMinn	Port Line, Ltd.
Potaro	18.12.59	R. Phillips	B. J. Hotter, C. L. Earl, J. McCaughrean	W. E. Chapman	Royal Mail Lines, Ltd.
Potosi	10.3.60	R. D. S. Eckford	T. Wake, J. K. Spencer, P. L. Whitaker	C. D. McCarthy	Pacific S.N. Co.
Pretoria Castle	21.9.59	J. D. B. Fisher	T. Bewley, K. Parker, N. Alford	E. Pitt, D.S.C.	Union Castle Mail S.S. Co., Ltd.
Prospector	4.1.60	E. Whitehouse	R. Taylor, J. Dickenson, F. T. Humble	M. Murphy	T. & J. Harrison, Ltd.
Queensland Star	6.1.60	R. White, D.S.C.	D. G. McNeil, D. Greenland, J. Halliday	T. Maddrell	Blue Star Line, Ltd.
Rakaia	19.1.60	F. G. Bevis	M. Irish, W. Hooley, H. Crane	T. Battye	New Zealand Shipping Co., Ltd.
Ramillies	11.1.60	W. J. Thomas	C. Thomas, D. Harris, D. Miller	I. Austin	Joh Cory & Sons, Ltd.

Name of Vessel	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Ramore Head	8.2.60	W. Baird	D. A. Chinn, N. Walsh, A. Frizell	H. McGurk	Ulster S.S. Co., Ltd.
Ramsay	9.2.60	W. Kyne	W. L. Davies, P. Thompson, P. B. Jordan	R. Lucas	Bolton S.S. Co., Ltd.
Rangitane	15.1.60	R. G. Rees	J. N. Jackson, G. MacIver, M. Rabbetts	L. Whittington	New Zealand Shipping Co., Ltd.
Rangitata	13.1.60	A. Hocken	B. J. C. Jones, R. Hood, C. P. Jones, C. C. Hufflett	F. Fowler	New Zealand Shipping Co., Ltd.
Rangitiki	11.3.60	P. S. Calcutt	W. Davidson, J. J. Evans, R. E. Barnard, A. Course	C. L. Lambe	New Zealand Shipping Co., Ltd.
Rangitoto	26.11.59	L. W. Fulcher	R. Box, G. Lowery, J. Evans, F. Ashworth	W. Shepherd	New Zealand Shipping Co., Ltd.
Rathlin Head	17.12.59	M. Kennedy	W. B. Niblock, C. E. Pringle, J. Auld	E. Heywood	Ulster S.S. Co., Ltd.
Regent Falcon		J. A. Cresswell	J. Taylor, W. D. Cook, N. Baird	S. A. Kissack	Regent Petroleum Tankship Co., Ltd.
Regent Hawk	18.12.59	P. S. L. Nobes	E. Hughes, R. J. Peters, E. Turner	J. Downey	Regent Petroleum Tankship Co., Ltd.
Regent Royal	18.8.59	S. S. Jenkins	J. R. Ball, J. Beard, N. Mappas	R. Crone	Regent Petroleum Tankship Co., Ltd.
Reina de Mar	23.12.59	A. G. Litherland	D. Pugh, J. Smith, J. Pringle, P. Chadwick	T. Hurley	Pacific S.N. Co.
Restormel		K. Janes	D. Stratford, L. Gresle, L. Fordyce	C. B. Plomer	J. Cory & Sons, Ltd.
Retriever	18.3.57	J. G. West	D. Silwood, P. Watts, M. Simmons	—. Fitzsimmons	Cable & Wireless, Ltd.
Reynolds	19.11.59	A. Mathison	E. Dix, J. Parsloe, S. Peters	R. Parker	Bolton S.S. Co., Ltd.
Rhodesia Castle		J. James	D. Howell, P. Redford	P. Cullen	Union Castle Mail S.S. Co., Ltd.
Rialto	5.1.60	W. White	B. H. Potter, P. Ramsay, J. Drinkall	G. J. Stephenson	Ellerman's Wilson Line, Ltd.
Ribblehead	15.2.60	G. D. Leith	D. F. Brewer, G. W. Brown, W. McLaughlin	K. A. McKenzie	Bolton S.S. Co., Ltd.
Richard de Larrinaga	17.11.59	A. Wilson	R. D. Parry, J. Wood, R. K. T. Elliot	J. Hunter	Larrinaga S.S. Co., Ltd.
Richmond Castle	30.12.59	G. Fowler, R.D.	C. W. Wood, F. Pigeon, D. Kennedy	T. Bury	Union Castle Mail S.S. Co., Ltd.
Ripon	30.12.59	J. B. Burns	A. Jones, D. Parry, T. Boulding	T. Horner	Bolton S.S. Co., Ltd.
Rippingham Grange	7.3.60	J. R. Faulkner	N. T. Trevethan, A. A. Abbott, J. Green	T. Regan	Houlder Bros & Co., Ltd.
River Afton	24.11.59	J. Evans	J. A. Shaw, J. Armstrong, J. G. W. Gray	G. N. Hutton	Hunting & Son, Ltd.
Rochester Castle	13.10.59	R. M. Wright	K. S. Garrett, B. O'Connor, S. Cazalet	I. Davies	Union Castle Mail S.S. Co., Ltd.
Romanby	16.12.59	E. A. Snaith	C. Dunling, R. Steel, G. J. McIntosh	J. Lewis	Sir R. Ropner (Management), Ltd.
Romanic	20.11.59	G. C. Murray	F. A. Karim, J. Riekstins, K. Norris	D. Nichols	Bolton S.S. Co., Ltd.
Roonagh Head	27.1.60	E. G. Davey	R. J. Pledge, F. Best, T. Meagher	G. M. Doran	Ulster S.S. Co., Ltd.
Rosocommon	6.11.59	M. R. Foster	W. H. Head, J. Kirbey, D. F. Orme	R. Holland	Trinder Anderson & Co., Ltd.
Rowallan Castle	31.12.59	N. E. Upham	R. Akerman, M. Zugg, A. Rea	C. C. Marston	Union Castle Mail S.S. Co., Ltd.
Ruahine	21.9.59	N. A. Thomas	A. L. R. McNeil, M. Hawkins, B. R. B. Blood, J. N. Barr	G. A. Parker	New Zealand Shipping Co., Ltd.
Runa	8.9.58	J. H. Gilfillan	T. Mitchell, R. Kennedy	T. Corless	Glen & Co., Ltd.
Runic	10.11.59	C. W. Sendall	D. A. Statham, A. Saunders, I. Cuthbertson	A. McMurray	Shaw Savill & Albion Co., Ltd.
Runswick	3.2.60	J. S. Pinkney, O.B.E.	S. McCudden, S. Ward, M. L. Morton	A. N. Marsden	Headlam & Son
Rushpool		C. Dixon	K. Harper, O. S. Ashcroft, J. E. Foreman		Sir R. Ropner (Management), Ltd.
Sacramento	16.11.59	H. Grunnill	J. C. Strachan, J. A. Pettinger, A. Burrell	I. Patrick	Ellerman's Wilson Line, Ltd.
St. John	16.9.59	C. Bradley, O.B.E.	A. Gwyther, G. Crellin, D. Chiswell	J. E. Conway	South America Saint Line, Ltd.
Salacia	25.5.59	J. Clinton	F. K. Davies, C. Sheppard, D. McGugan	M. Prior	Donaldson Bros. & Black, Ltd.
Salamanca	15.4.59	A. B. Powell	J. P. McDermott, J. J. Hurly, D. B. Jones	W. J. Kelly	Pacific S.N. Co.
Salaverry	28.9.59	R. B. Bryant	T. F. Hill, A. C. Perdy, D. Bird	R. Fenton	Pacific S.N. Co.
Salinas	1.10.59	P. D. O'Driscoll, R.D.	C. D. Outhwaite, A. M. Jestico, W. J. Turner, A. G. Litherland	K. J. Windle	Pacific S.N. Co.
Salween	24.8.59	K. S. Marsh	E. J. Maclean, J. Johnstone, T. Shwe, —. Macmillan	W. Allen	P. Henderson & Co.
Sansu	17.9.59	R. E. Dunne	J. Lees-Moffat, E. Woosey	J. Grayson	Elder Dempster Lines, Ltd.
Santander	1.2.60	A. S. Maclean	R. G. Boulder, D. Cook, R. Davies	W. L. M. Laing	Pacific S.N. Co.
San Velino	2.3.60	K. E. Spencer	—. Wallder, —. Shand	—. Connell	Shell Tankers, Ltd.
San Veronico	2.3.60	F. D. Smith	D. B. Longstaff, I. F. Boon, A. Andrews	D. W. Richards	Shell Tankers, Ltd.
Sarmiento	24.8.59	G. Pattison	J. Carmichael, G. Hunter, S. Ross	T. Melville	Pacific S.N. Co.

Saxonia	11.2.60	J. T. Jones, R.D.	C. J. Burtinshaw, M. Myers, R. Ibbotson	E. C. Bishop	Cunard S.S. Co., Ltd.
Saxon Star	14.8.59	L. W. Evans	A. B. Neish, G. Pigott, M. S. Bradshaw	G. Clarke	Booth S.S. Co., Ltd.
Scottish Eagle	8.2.60	D. L. Weston	J. A. Brown, G. Pow, J. Lee	R. Dolby	Scottish Tankers, Ltd.
Scottish Hawk		J. G. Smith	J. J. Ferguson, F. Moss, M. J. H. Gardner	J. Bolitho	Huntley, Cook & Co., Ltd.
Scottish Star	15.1.60	E. C. Laidlaw	C. A. Flavell, J. O. White, F. F. Hall	I. Lovie	Blue Star Line, Ltd.
Seatle Star		G. L. Evans	N. Roberts, H. Dyer, J. B. Kirkham	B. Williams	Blue Star Line, Ltd.
Selector	18.9.59	C. V. Watts	J. A. Billington, J. M. Doran, K. Jones	E. G. McKay	T. & J. Harrison, Ltd.
Shackleton		D. Turnbull	A. Bosher, J. Martin, K. Archibald	P. Reynolds	Falkland Islands Govt.
Shropshire	7.12.59	H. B. Peate, D.S.C., R.D.	K. Gowsell, D. F. T. Downard, J. F. Beckett	R. D. Brown	Bibby Bros. & Co.
Silverbrook	3.12.59	G. Chivers, M.B.E.	J. Wyness, J. Clarke, P. McCarthy, G. Taylor	S. Abel	Silver Line, Ltd.
Silverdale	10.2.60	P. L. Hopkins	N. Tuddenham, R. S. Pomphrey, D. V. Wood	N. R. Zarb	Silver Line, Ltd.
Silverlake		J. Tew	D. A. Hopkins, P. Fellows, A. Cattle	A. Evans	Silver Line, Ltd.
Silversand	2.3.60	A. A. Walker	G. E. Metcalf, E. Milford, E. Ward	A. M. M. McGillivray	Silver Line, Ltd.
Sir William Hardy	29.7.59	A. Whittleton	E. Rix	E. Rix	Torry Research Station
Socotra	15.1.60	R. B. Nowell	P. C. J. Broome, D. A. Dornom, B. Miles	R. J. E. Chapman	Peninsular & Oriental S.N. Co.
South Africa Star	21.1.60	R. Hopper, D.S.C.	D. M. Bindon, M. B. Foster, C. W. Carnes	E. Marks	Blue Star Line, Ltd.
Southern Cross	23.2.60	L. H. Edmeads	B. L. A. Jeffries, I. P. N. Cameron, S. C. Carr, J. M. Brain, M. Sandell, M. Dawling	H. Matthews	Shaw Savill & Albion Co., Ltd.
Southern Garden	21.4.59	J. W. Ross	S. Allan, G. A. Walterson, R. Stevinson, A. Smith		Chr. Salvesen & Co.
Southern Harvester	8.5.59	L. Bartho	W. Andersan, W. Holba, H. Henricksen,	D. Miller	Chr. Salvesen & Co.
Southern Opal	24.8.59	A. F. Baikie	H. I. Anson	G. Smethurst	Chr. Salvesen & Co.
Southern Venturer	7.5.59	H. Myhre	K. Snekkestad, O. Viklander, D. Jensen	J. McMorran	Chr. Salvesen & Co.
Stirling Castle	16.9.59	L. H. Farrow	R. Blythe, S. Ramsay, D. Bell, P. Marshall	J. H. Summers	Union Castle Mail S.S. Co., Ltd.
Stirlingshire	22.10.59	W. C. Rodger	N. K. Spawforth, D. M. Geddes, M. B. Fowkes	W. Latus	Scottish Shire Line, Ltd.
Strathaird	8.2.60	W. T. C. Lethbridge	A. M. Woolford, W. Jones, D. Ellies	T. Arthur	Peninsular & Oriental S.N. Co.
Stratheden	20.10.59	K. A. H. Cummins	R. M. Hurst, B. Mavity, J. Vint, J. Blackburne	D. Malony	Peninsular & Oriental S.N. Co.
Strathmore	20.10.59	H. J. M. Perry	J. D. S. Gell, J. E. Leggett, A. C. Johns, G. J. Pegg	B. C. McCorry	Peninsular & Oriental S.N. Co.
Suffolk	20.4.59	C. P. Robinson	A. L. R. McNeil, D. E. Moran, R. N. Jordan, N. J. Barr	R. D. Lockwood	Federal S.N. Co., Ltd.
Surrey	6.11.59	A. C. Davies	N. Coupland, B. Smith, M. Parry, R. Duff	T. Gallagher	Federal S.N. Co., Ltd.
Sussex	18.1.60	J. R. Ramsay	F. F. Michael, P. R. Moulton, M. J. Henson, M. J. Hodgkinson	T. D. Mason	Federal S.N. Co., Ltd.
Swiftpool	11.11.59	C. H. Churchill, O.B.E.	M. Macdonald, H. Kitching, E. C. Colin	D. Bee	Sir R. Ropner (Management), Ltd.
Sydney Star	21.10.59	W. T. Pitcher	B. Lipscombe, A. Kinghorn, J. Eden	B. R. Draisey	Blue Star Line, Ltd.
Sylvania	24.8.59	F. G. Watts, R.D.	D. A. Davies, H. M. Williams, T. P. Jones	A. F. Crosby	Cunard S.S. Co., Ltd.
Tabaristan	21.8.59	R. Mace	S. T. S. Household, D. Norman, W. Mackenzie	J. S. Kinnaird	F. C. Strick & Co., Ltd.
Tamele	10.3.60	J. A. Cleator	—. Greenwood, D. Allan, D. Irwin, P. Baker	T. Ainsworth	Elder Dempster Lines, Ltd.
Tantallon Castle	7.3.60	C. W. Armstrong, R.D.	—. Wilson, —. Francis, —. Atkinson	P. Bedwell	Union Castle Mail S.S. Co., Ltd.
Taranaki	15.10.59	C. Beck	M. F. Hughes, W. J. Gibson, J. Bain, D. Collman	G. S. Cavaye	Shaw Savill & Albion Co., Ltd.
Tarkwa	20.7.59	E. Kingan	D. H. Turner, I. Igoe, P. D. Young	W. Stirling	Elder Dempster Lines, Ltd.
Tasmania Star	22.12.59	F. N. Johnson	R. H. Hodder, S. Mathews, P. L. Stevens, J. G. Reeve	L. Hughes	Blue Star, Line, Ltd.
Tectus	13.1.60	R. Thorne	R. Coulson, J. Winsor, J. Boadle	B. W. Shone	Shell Tankers, Ltd.
Teviot	25.1.60	J. M. F. Anderson	B. Burch, T. Johnson, J. Escolme	R. Randle	Royal Mail Lines, Ltd.
Thistlemuir	30.11.59	L. H. Williams	J. C. Pigott, R. E. Harvey, C. Thompson	G. W. Jennings	Albyn Line, Ltd.
Tidecrest	10.3.60	A. Miller	P. A. Kelly, E. J. Best, R. Thompson	E. George	Crest Shipping Co., Ltd.
Tinto	21.5.59	S. H. Bennett	H. Blagdon, T. H. Lewis, J. Linsley	—. Kay	Ellerman's Wilson Line, Ltd.
Tongariro	17.6.59	I. Batley	D. E. le Cornu, R. Bayliss, M. Piner, B. Baggott	R. Holmes	New Zealand Shipping Co., Ltd.
Toronto City	11.2.60	W. Stoodley	A. Perrett, G. J. Harfoot, —. Childs	W. Read	Charles Hill & Sons
Torr Head	2.3.60	E. G. Davey	J. D. Savage, J. J. Gomez, J. M. Ronald, A. McMahon	B. P. O'Callaghan	Ulster S.S. Co., Ltd.
Trelawny		H. Gravell	G. R. Crease, E. Sprunks		Hain S.S. Co., Ltd.
Trelevan	18.2.60	I. M. Price	D. R. Mitchell, L. Antoszewicz, I. Sheales	W. H. James	Hain S.S. Co., Ltd.
Trelissick		G. A. McKay	A. V. Rowles, T. C. Jewell		Hain S.S. Co., Ltd.
Trelyon	29.10.59	F. G. Bolton	G. R. Crease, W. A. Wilson, D. J. Hunkin	J. Jenkins	Hain S.S. Co., Ltd.
Tremeadow	14.12.59	S. K. Hawken	J. H. B. Armstrong, E. F. Boyd, D. Wilkinson	A. R. Watt	Hain S.S. Co., Ltd.

Name of Vessel	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Tremorvah	9.10.59	C. E. Pratt	W. Dwelly, W. Dobson, H. Evans	W. Bell	Hain S.S. Co., Ltd.
Trevelyan	17.2.60	W. H. Whitaker	J. K. H. Munday, J. L. Hazell, A. P. Mackarel	L. Gallier	Hain S.S. Co., Ltd.
Treworlas	15.2.60	S. O. Watkins	J. Cotton, K. R. Cumming, A. Cobby	D. White	Hain S.S. Co., Ltd.
Tribulus	14.4.59	J. Carr	M. E. Tramontini, R. Thomas, P. Shawyer, R. Bridgewood	J. S. Kirwood-Hackett	Shell Tankers, Ltd.
Tyrone	9.7.59	H. T. Jones	I. C. Morrison, C. G. Milner, E. Docherty	J. Brierley	Trinder Anderson & Co., Ltd.
Velletia	11.12.59	J. H. J. Hamling	T. I. Davies, G. Griffith, L. T. Bewick, T. Arbuthnot	G. Barline	Shell Tankers, Ltd.
Venassa	9.2.60	J. C. Nettleship	T. D. Wood, W. Williams, P. Taylor, M. Dunn	S. J. Taylor	Shell Tankers, Ltd.
Volo	8.2.60	L. R. Stilwell	R. Wells, P. L. Willingham, R. Whittleton	W. McCarthy	Ellerman's Wilson Line, Ltd.
Wairangi	22.7.59	B. Forbes-Moffatt	—. Jenkins, —. Newton, —. Rees	D. Kay	Shaw Savill & Albion Co., Ltd.
Waiwera	1.2.60	J. O. Williams, R.D.	E. Buckle, B. N. Hinderwell, L. Mounsey, C. Wynne-Eyton	J. Downie	Shaw Savill & Albion Co., Ltd.
Welsh City	13.1.60	T. W. Picton-Davies	J. A. Berrie, P. L. Lewis, J. Vaughan	A. S. Ferguson	Sir William Reardon Smith & Sons, Ltd.
Welsh Trader	2.2.60	H. Neale	J. E. Davies	W. Walker	Trader Navigation Co., Ltd.
Wendover	17.2.60	F. W. Grist	J. M. Lang, D.S.C., D. Dickson, M. Macnair	P. Crawford	Watts, Watts & Co., Ltd.
Winchester Castle	10.7.59	G. W. B. Lloyd	M. J. Fazakerley, A. E. Parr-Morley, A. J. C. Millns	E. H. Pitt, D.S.C.	Union Castle Mail S.S. Co., Ltd.
Windsor	17.2.59	R. T. Mudd	M. G. Highley, J. E. Newby, G. C. Andoe	F. W. G. Elliott	Watts, Watts & Co., Ltd.
Wokingham	4.2.60	J. C. Lewis	T. L. Cook, D. J. Vincent, I. B. Gault	I. M. Rae	Watts, Watts & Co., Ltd.
Woodford	30.12.58	R. T. Mudd	S. G. Vass, R. Hall-Soloman, J. Tompson, J. German	G. Barling	Watts, Watts & Co., Ltd.
Woolwich	19.11.59	E. A. A. Peirce	D. H. Wells, J. Collister, T. Openshaw	A. True	Watts, Watts & Co., Ltd.
Worcestershire	10.11.59	H. Davies	K. J. Shaw, A. MacPherson, W. S. Rook	D. Alcock	Bibby Bros. & Co.
Yoma	14.3.60	W. Kendall	C. Sinclair, A. J. Milmine, J. Basarab	W. Thomson	P. Henderson & Co.
Zena	3.12.59	L. W. Loose	I. Chisholm, A. Livingstone, W. Steven	P. Driscoll	Glen & Co., Ltd.

Supplementary Ships

Name of Vessel	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Aaro		C. Gill	J. W. Campion, J. Bradley, N. Phillips	F. Nicoll	Ellerman's Wilson Line, Ltd.
Anno	18.3.60	J. C. Cowie			Mitchell & Rae, Ltd.
Apollo	16.12.59	G. V. Barnes	W. R. Kays, P. Howells, B. Burcher		Bristol S.N. Co., Ltd.
Borodino	26.1.60	A. T. Jardine	J. A. Deheer, B. S. Pick, G. Mitchell	P. Cagney	Ellerman's Wilson Line, Ltd.
British Reliance	15.3.60	A. J. Lawson	A. Jones, R. Hartley, L. Stevens, J. Clark	D. Molden	B.P. Tanker Co., Ltd.
Bylands Abbey	21.3.60	T. W. Westerdale	R. Bielly, W. Crisp, C. C. Wilkin		Associated Humber Lines, Ltd.
Cape Howe	30.12.59	R. O. Allen	R. Ferguson, T. R. Baker, R. Ratcliffe	H. B. Curwen	Lyle Shipping Co., Ltd.
Cara	24.1.58	A. McKay	J. P. Skinner, W. Taylor, A. Sage	J. McDonald	Glen & Co., Ltd.
Carlo	16.2.60	F. H. Firth	J. Garroway, S. A. Gallon, G. D. Atkinson	P. Argument	Ellerman's Wilson Line, Ltd.
Cato	28.7.59	H. G. Mowat	E. Powell, A. S. Phillips		Bristol S.N. Co., Ltd.
Cicero		E. Tyler	J. Watts, J. Wray	R. Newton	Ellerman's Wilson Line, Ltd.
Circassia	16.11.59	D. Barlcay	R. Watts, D. Weir, P. L. Barnett	A. Henderson	Anchor Line, Ltd.
Clan Alpine	11.3.60	L. G. W. Pitts	J. Brock, I. R. Grant, D. S. Williams	J. F. France	Clan Line Steamers, Ltd.
Clan Lamont	23.11.59	J. W. Charles-Auckland			Clan Line Steamers, Ltd.
Dartmoor	30.1.59	J. O. Roberts	L. Lathian, E. Hawlett, R. Leask	W. Stevenson	Walter Runciman & Co., Ltd.
Eastern City	21.9.59	I. Williams	P. A. H. Beckett, A. Redcliff, C. Davidson	E. Willcocks	Sir William Reardon Smith & Sons, Ltd.
Echo	18.12.59	E. H. Taylor	W. Traynor, J. Henderson, M. A. Salisbury		Bristol S.N. Co., Ltd.
Edward Wilshaw	30.4.59	R. Porter-Reynolds	P. B. Bushell, D. O. Ferrey, R. Valvona	L. J. S. Cohn	Cable & Wireless, Ltd.
Gardenia	13.11.59	J. J. Rose	D. Dobeson, J. Hawkins, E. Hutchinson	J. R. Mace	Stag Line, Ltd.
Glitra	20.10.58	S. Sutherland	D. Corbett, R. D. McGlashan		Chr. Salvesen & Co.
Greathope	19.11.59	R. Cook	W. Craig, G. Morris, M. Harrison	K. Blackmore	Newbigin S.S. Co., Ltd.
Hadrian Coast	14.3.60	W. G. M. Wyness, M.B.E.	A. Thain, P. M. Bowie		Aberdeen S.N. Co
Hawkinge		T. J. Lloyd	A. Ivanov, D. J. Salmon, B. J. Downing	R. D. Head	Constants, Ltd.
Hesione	28.1.59	R. Helme	Z. M. Patankar, G. Wilson, C. Houghton	J. D. Bolitho	Houston Line (London), Ltd.
Hudson Deep	18.2.58	J. Gibbons, D.S.C.	D. Lee, G. Cunningham, A. E. Ford	V. Smith	Hudson S.S. Co., Ltd.
Hudson Firth	20.1.60	A. Crosby	M. R. Uminski, D. Willey, A. Campbell	W. G. Campbell	Hudson S.S. Co., Ltd.
Kingsbury	14.4.59	A. H. Gibbs	D. Luff, F. Ferguson, P. Slatter	N. Slinger	Houlder Bros. & Co., Ltd.
Kirkham Abbey	11.3.60	J. Collier	R. Carmichael, M. E. Taylor, R. D. Dukes		Associated Humber Lines, Ltd.
Lingula	14.3.60	L. E. Grant	D. Richardson, M. Fender, J. S. McKenzie, M. S. Mothersole	C. Biddle	Shell Tankers, Ltd.
Lord Codrington	5.11.59	C. O. Caldcleugh	N. Munge, A. Kamdron, J. Beaumont	J. B. McGuire	Norships Ocean Carriers Co., Ltd.
Malmo	11.2.60	M. D. Evans	D. H. Fairfield, L. Gibson, G. M. Pearson	B. Carr	Ellerman's Wilson Line, Ltd.
Marie Louise Mackay	16.11.59	W. D. Harper	G. Nunns, D. O'Neill, S. Crowther, A. B. Davis	T. O'Neill	Commercial Cable Co.
Marna	23.3.60	W. Spence	J. Carnie, W. Watt		Chr. Salvesen & Co.
Menastone	16.12.59	S. F. Sheasby	G. Hogg, W. Greig, P. Rashley	T. Ballantine	Thos. Stone (Shipping), Ltd.
Milo	10.2.60	C. Knight	W. G. Sommerfield		Bristol S.N. Co., Ltd.,
Mirror		A. Garrett	M. R. Bonds, R. M. Wright, J. Duff	G. O'Brien	Cable & Wireless, Ltd.
Northia	30.12.59	J. E. Frankland	E. J. Bolton, G. Lomax, A. Sutherland	A. Reilly	Shell Tankers, Ltd.
Port Fairy	3.12.59	P. E. Packwood	A. Hodgson, D. Coombs, V. Bowe	M. Hannon	Port Line, Ltd.
Rookwood	15.2.60	A. Dover	B. C. Tyler, R. G. Johnson, C. R. Lycett	S. M. McFaul	F. Fenwick & Co., Ltd.
Sandhoe	26.11.59	J. Gillan	T. Waugh, J. H. Telfer, T. B. Fulthorpe	A. Reidy	Sharp S.S. Co., Ltd.
Shuna	11.3.60	T. Henry	J. B. Fyfe, J. D. Macintosh	R. Haig	Glen & Co., Ltd.
Soutra	15.2.60	J. W. Leask	A. Nicolson, J. Rendall		Chr. Salvesen & Co.
Tana	7.1.60	D. S. Archibald	C. J. Nicolson, A. Thomson, R. Hare	R. Hare	Chr. Salvesen & Co.
Tolsta		M. Polson	A. Macdonald, S. Allan		Chr. Salvesen & Co.
Tremayne	16.3.60	L. J. White	G. C. Blight, D. Loud, C. K. Newton	P. R. Day	Hain S.S. Co., Ltd.
Trevean	14.12.59	J. Williams	M. J. Brennan, D. Penberhy, B. Higgs	J. Barrington-Hines	Hain S.S. Co., Ltd.

Supplementary Ships—Contd.

Name of Vessel	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Tronda	9.12.58	S. Sutherland	W. Sinclair, S. Manson		Chr. Salvesen & Co.
Truro	5.1.60	—. Whitfield	G. F. Setterfield, N. A. Phillips	F. Petch	Ellerman's Wilson Line, Ltd.
Tweedbank	21.7.58	R. A. Brant	G. A. Palmer, R. I. Loads, T. Orford	K. Darwen	Andrew Weir & Co., Ltd.
Tynemouth	31.8.59	J. Barrass	L. Gibb, R. Lewer	S. Rice	Burnett S.S. Co., Ltd.
Uganda	23.3.60	A. E. Baber	—. Scott, —. White, —. Britton, —. MacDonald	—. Soulsay	British India S.N. Co., Ltd.
Warwick Castle	9.2.59	L. H. Farrow	G. H. Draysey, P. J. O. Sheridan, J. Spencer, W. G. McFarland	R. Cullen	Union Castle Mail S.S. Co., Ltd.
Winga	8.10.59	R. J. McNinch	A. Weir, J. Maclean	A. Corless	Glen & Co., Ltd.
Zinnia		W. R. Hunter	R. Phillips	D. R. Uglow	Stag Line, Ltd.

Coasting Vessels (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	Captain	Owner/Manager
Actuality	D. O'Leary	F. T. Everard & Sons, Ltd.
•*Adriatic Coast*	L. I. Stewart	Coast Lines, Ltd.
Amsterdam	A. W. Greenham	British Transport Commission
†*Anno*	J. Cowie	Mitchell & Rae, Ltd.
†*Apollo*	G. V. Barnes	Bristol S.N. Co., Ltd.
•*Ariosto*	G. G. Needham	Ellerman's Wilson Line, Ltd.
Atlantic Coast	H. J. Cowan	Coast Lines, Ltd.
Blisworth	W. R. Day	Grand Union (Shipping), Ltd.
Bolton Abbey	H. Aaron	Associated Humber Lines, Ltd.
Brenda	J. MacKinnon	Dept. of Agric. & Fisheries for Scotland
British Coast	P. A. Johnson	Coast Lines, Ltd.
Caledonian Coast	F. Mara	Coast Lines, Ltd.
Cambria	E. A. Bradshaw	British Transport Commission
†*Cara*	A. McKay	Glen & Co.
†*Cato*	N. J. Llewellyn	Bristol S.N. Co., Ltd.
Cheshire Coast	M. Leask	Coast Lines, Ltd.
•*Cicero*	E. Tyler	Ellerman's Wilson Line, Ltd.
Claymore	J. C. McKinnon	David MacBrayne, Ltd.
Clupea	J. Jappy	Fishery Board for Scotland
•*Corfen*	G. Galloway	Wm. Cory & Son, Ltd.
•*Cormead*	E. R. W. Allen	Wm. Cory & Son, Ltd.
•*Cormoat*	A. E. Pusy	Wm. Cory & Son, Ltd.
Corncrake	C. Johnston	General S.N. Co., Ltd.
Crane	J. Cullen	General S.N. Co., Ltd.
•*Darlington*	W. Brown	Associated Humber Lines, Ltd.
Drake	W. Lockhart	General S.N. Co., Ltd.
Dryburgh	G. Simpson	G. Gibson & Co., Ltd.
Duke of Argyll	W. N. Greenwood	British Transport Commission
Duke of Lancaster	J. I. Irwin	British Transport Commission
Duke of Rothesay	H. Thomson	British Transport Commission
Empire Cymric	R. Hockings	Atlantic S.N. Co., Ltd.
Empire Nordic	W. H. Laws	Atlantic S.N. Co., Ltd.
•*Fountains Abbey*	F. W. Wooller	Associated Humber Lines, Ltd.
Fruin	L. Lamont	Sloan & Co., Ltd.
•*Fulham X*	D. Battle	Central Electricity Authority
Golden Dawn	A. Adamson, M.B.E.	A. Adamson, M.B.E.
Grebe	J. S. Likis	General S.N. Co., Ltd.
Guernsey Coast	P. Meras	Coast Lines, Ltd.
†*Hadrian Coast*	W. G. M. Wyness, M.B.E.	Aberdeen S.N. Co.
Heron	E. C. Painter, D.S.C.	General S.N. Co., Ltd.
•*Hibernia*	E. A. Horspool	British Transport Commission
Hibernian Coast	G. Mearns	Coast Lines, Ltd.
•*Iberian Coast*	G. Croxford	Tyne Tees Shipping Co., Ltd.
Innisfallen	L. McVeigh	City of Cork Steam Packet Co.
Isle of Guernsey	F. E. Trout	British Transport Commission
Isle of Sark	C. E. Hatchley	British Transport Commission
Jersey Coast	H. G. Keilit	Coast Lines, Ltd.
Lairds Crest	H. Davidson	Burns Laird Line, Ltd.
•*Lancashire Coast*	C. A. Hopkins	Coast Lines, Ltd.
Leinster	W. P. Boylan	British & Irish Steam Packet Co.
Lochhearn	H. Campbell	David MacBrayne, Ltd.
Loch Seaforth	J. Smith	David MacBrayne, Ltd.
Milo	C. Knight	British S.N. Co., Ltd.
Munster	J. MacFarlane	Coast Lines, Ltd.
•*Netherlands Coast*	E. G. Fisher	Tyne Tees Shipping Co., Ltd.
Ocean Coast	G. H. Clark	Coast Lines, Ltd.
Olivian Coast	T. S. Stewart	Tyne Tees Shipping Co., Ltd.
Pluto	F. Dudgeon	Bristol S.N. Co., Ltd.
Princess Margaret	J. F. D. Hey	British Transport Commission
Princess Maud	W. J. Roberts	British Transport Commission
Rambler Rose	T. Foulkes	Hughes Holden Shipping, Ltd.
•*Rollo*	D. A. Stokes	Ellerman's Wilson Line, Ltd.
St. Andrew, *St. David*	H. H. Coney	British Transport Commission
St. Helier	C. C. Cartwright	British Transport Commission
St. Julien	V. Newton	British Transport Commission
•*St. Magnus*	L. Mainland	N. of Scotland & Ork. & Shet. S.N. Co., Ltd.
St. Ninian	A. Dundas	N. of Scotland & Ork. & Shet. S.N. Co., Ltd.
•*Scotia*	A. M. Finlayson	Dept. of Agric. & Fisheries for Scotland
†*Shuna*	T. Henry	Glen & Co., Ltd.
•*Silvio*	E. R. Corp	Ellerman's Wilson Line, Ltd.
Slieve Bawn	G. R. Gill	British Transport Commission
Slieve Bearnagh	E. Ashton	British Transport Commission
Slieve Bloom	G. Davey	British Transport Commission
Slieve League	I. Griffiths	British Transport Commission
Slieve More	R. Roberts	British Transport Commission
•*Suffolk Coast*	T. Tulloch	Coast Lines, Ltd.
•*Teano*	F. Barnard, M.B.E.	Ellerman's Wilson Line, Ltd.
Ulster Sportsman	T. Kane	Burns Laird Line, Ltd.
•*Vienna*	R. Good	British Railways (Eastern Region)
†*Winga*	R. J. McNinch	Glen & Co., Ltd.
•*Whitby Abbey*	H. J. R. Marlow	Associated Humber lines

• These ships also send in non-instrumental weather messages when in the North Sea.
† Ships also on the Supplementary list.

Trawlers

The following is a list of trawler skippers who voluntarily observe and report those elements of the weather which do not entail the use of any meteorological instruments (irrespective of the vessels in which they sail).

Skipper	Trawler Owner/Manager	Skipper	Trawler Owner/Manager
B. A. Ashcroft	Hellyer Bros., Ltd.	A. Kerrison ..	Hudson Bros. Trawlers, Ltd.
P. Booth ..	Northern Trawlers, Ltd.	J. A. Kersey ..	Charleson-Smith Trawlers, Ltd.
G. Casson ..	Kingston Steam Trawling Co., Ltd.	S. T. McBride	T. Hamling & Co., Ltd.
C. Coultas ..	Sir Thomas Robinson & Son	W. Marsh ..	Hellyer Bros., Ltd.
L. Coultas ..	Onward Steam Fishing Co., Ltd.	J. Miller ..	T. Hamling & Co., Ltd.
A. E. Crewdson	J. Marr & Son, Ltd.	J. Moran ..	J. Marr & Son, Ltd.
J. E. Dobson ..	T. Hamling & Co., Ltd.	J. Nunn ..	Northern Trawlers, Ltd.
P. Dunbar ..	Kingston Steam Trawling Co., Ltd.	H. Parkinson ..	T. Hamling & Co., Ltd.
F. Dunning ..	Kingston Steam Trawling Co., Ltd.	H. J. Self ..	Northern Trawlers, Ltd.
W. Fry ..	Kingston Steam Trawling Co., Ltd.	J. J. Smith ..	T. Hamling & Co., Ltd.
J. F. Gray ..	T. Hamling & Co., Ltd.	T. H. Spall ..	Atlas Steam Fishing Co., Ltd.
A. E. Hall ..	St. Andrew's Steam Fishing Co., Ltd.	G. Ward ..	Dominion Steam Fishing Co., Ltd.
		W. Watson ..	Kingston Steam Trawling Co., Ltd.
J. W. Hornby ..	Kingston Steam Trawling Co., Ltd.	S. Welch ..	J. Marr & Son, Ltd.
W. Jinks ..	Iago Steam Trawling Co., Ltd.	B. C. Wharam	St. Andrew's Steam Fishing Co., Ltd.
E. J. Johnson ..	T. Hamling & Co., Ltd.	G. Whur ..	Charleson-Smith Trawlers, Ltd.
G. Kent ..	Boyd Line, Ltd.	J. W. Wright ..	Northern Trawlers, Ltd.

Light-vessels

Name of Vessel	Masters
Bar	E. E. Abbott, N.S. Burns
Dowsing	H. Price, W. R. Nobbs
East Goodwin	G. A. Alp, J. J. Quinn
Galloper	E. J. Winterflood, W. G. Burroughs
Humber	D. A. Bacon, H. V. Fuller
Lynnwall	H. S. Quinton, F. D. Jarad
Newarp	W. E. Fenn, R. Middleton
Royal Sovereign	L. P. Dawson, S. G. Sharman
St. Gowan	W. Milsome, S. G. Lloyd
Seven Stones	D. J. Harries, J. Davies
Shambles	A. C. Edwards, C. N. Duff
Shipwash	J. Goldsmith, B. G. Simpson
Skulmartin	J. K. Carley, J. O'Neill
Smith's Knoll	B. E. Cunham, R. E. Say

Training Establishments

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

Establishment	Captain/Superintendent	Last Return Received
Conway, H.M.S.	E. Hewitt, R.D., Capt. R.N.R.	10.2.60
Pangbourne Nautical College	A. F. P. Lewis, C.B.E., Capt. R.N. (Retd.) ..	28.3.60
Reardon Smith Nautical College	J. N. Rose, R.D., Lt. Cdr. R.N.R. (Retd.) ..	13.1.60
Warsash, School of Navigation	G. W. Wakeford, M.B.E.	31.7.59
Worcester, H.M.S.	R. Gabbett-Mulhallen, Cdr. R.N. (Retd.) ..	21.12.59

BRITISH COMMONWEALTH

The following lists give the names of Selected and Supplementary Ships, and the number of Auxiliary Ships where known (i.e., those which only report when in 'sparse areas'), which voluntarily co-operate with meteorological services of the British Commonwealth.

AUSTRALIA (Information dated 1.4.60)

Name of Vessel	Call Sign	Owner
Selected Ships:		
Aros	SMPT	Australia West Pacific Line
Bulolo	VJPD	Burns Philp & Co.
Canara	MAGZ	B.I.S.N. Co.
Carpentaria	GQLB	B.I.S.N. Co.
Charon	GZJQ	A. Holt & Co.
Chupra	GDZV	B.I.S.N. Co.
Citos	SEDN	Australia West Pacific Line
Delos	SIGA	Australia West Pacific Line
Gorgon	MBKC	A. Holt & Co.
Idomeneus	GYKZ	A. Holt & Co.
Koojarra	VMXK	Western Australian State Steamships
Koorawatha	VLCW	McIlwraith McEacharn & Co., Ltd.
Kooringa	VLKR	McIlwraith McEacharn & Co., Ltd.
Malaita	VJYY	Burns Philp & Co., Ltd.
Malay	VSNW	Austasia Line
Malekula	VLWB	Burns Philp & Co., Ltd.
Mandamor	VSPA	Austasia Line
Mandowi	VSNY	Austasia Line
Milos	SIVA	Australia West Pacific Line
Montmo	GVKG	Burns Philp & Co., Ltd.
Nellore	GBLZ	Eastern and Australian S.S. Co., Ltd.
Orestes	GFPQ	A. Holt & Co.
Port Melbourne	GTFF	Port Line, Ltd.
Sarpedon	GJXM	A. Holt & Co.
Triadic	GDNM	British Phosphate Commission
Trienza	GJJZ	British Phosphate Commission
Triona	GDFJ	British Phosphate Commission
Tulagi	MSLQ	Burns Philp & Co., Ltd.
Wanganella	VJPQ	Huddart Parker & Co., Ltd.
Wangara	VMCS	Australian National Line
Supplementary Ships:		
Delamere	VNWL	Western Australian State Steamships
Dorrigo	VMWB	Western Australian State Steamships
Dulverton	VLVJ	Western Australian State Steamships
Kabbarli	VLXV	Western Australian State Steamships
Koolama	VLBY	Western Australian State Steamships
Sigli	PHMW	Royal Interocean Line
Sinabang	PHMJ	Royal Interocean Line

CANADA (Information dated 22.3.60)

Name of Vessel	Call Sign	Owner
Selected Ships:		
Arctic Rover		Arctic Shipping Co., Ltd.
Baffin	CGCL	Govt. of Canada
Bluenose	VDND	Govt. of Canada
Camsell		Govt. of Canada
C. D. Howe	CGSS	Govt. of Canada
Cyrus Field	GKQC	Western Union Telegraph Co.
D'Iberville	CGSM	Govt. of Canada
Edward Cornwallis	CGSW	Govt. of Canada
Fort Hearne	VCGX	Hudson's Bay Co., Ltd.
Imperial St. Lawrence	HOOX	Caribbean Oil and Transport Co.
Irvingbrook	HPBM	Carib Co., S.A. Nassau
Irving Glen	ELYJ	Carib Co., S.A. Nassau
John W. Mackay	GFXK	Commercial Cable Co.
Labrador	CGVM	Govt. of Canda
Lakemba	VPKP	Pacific Shipowners, Ltd., Suva, Fiji
Lakonia	GCDB	Donaldson Line, Ltd.
Lord Kelvin	GDMN	Western Union Telegraph Co.
Montcalm	CGBB	Govt. of Canada
N. B. McLean	CGSN	Govt. of Canada
Porte Dauphine	CGYL	Govt. of Canada
Rupertsland	VDXX	Hudson's Bay Co., Ltd.
Sir William Alexander		Govt. of Canada
Sungleam	LJSQ	Lorentz S. Lyngas, Tonsberg, Norway
Suva	VQWQ	Pacific Shipowners, Suva, Fiji
Thor I	LLWZ	A. S. Thor Dahl, Sandefjord, Norway
Thorscape	LARD	A. S. Thor Dahl, Sandefjord, Norway
Thorsgaard	LALK	A. S. Thor Dahl, Sandefjord, Norway
Waihemo	ZMJO	Union S.S. Co., of New Zealand
Waitomo	ZMKO	Union S.S. Co., of New Zealand
Wolfe		Govt. of Canada
Supplementary Ships:		
Anna Bakke	LHNK	Knutsen Line, Haugesund, Norway
Banksland	VGTF	Hudson's Bay Co., Ltd.
Bougainville	LMSQ	A. F. Klaveness & Co., Oslo
Bronxville	LFFM	A. F. Klaveness & Co., Oslo
Elisabeth Bakke	LJJX	Knutsen Line, Haugesund, Norway
Ellen Bakke	LDAA	Knutsen Line, Haugesund, Norway
Fort Severn	VDKN	Hudson's Bay Co., Ltd.
Gjertrud Bakke	LJZK	Knutsen Line, Haugesund, Norway
Hindanger		Westfal-Larsen & Co., Bergen, Norway
Indiana	IBIY	Ameritalia S.P.A.N., Trieste
Kristen Bakke	LATI	Knutsen Line, Haugesund, Norway
Lloyd Bakke		Knutsen Line, Haugesund, Norway
Marie Bakke	LCTC	Knutsen Line, Haugesund, Norway
Oshawa	CYZG	Govt. of Canada
Princess Helene	VGKL	Canadian Pacific Railways
Rincon Hills	VGGY	Shell Canadian Tankers, Ltd.
Stugard	LMIZ	Hjalmar Roed & Co., Tonsberg, Norway
Sunadele	HBFL	Zurich Shipping Co., Ltd.
Sunbeam	LMCE	Samulsen Falsen, Norway
Sunmoira	LLXO	Odd Owren Ltd., Oslo, Norway
Sunnyville	LNQZ	A. F. Klaveness & Co., Oslo
Sunprincess	ELUD	Princess Shipping Co., Monrovia, Liberia
Sunrose	LLLR	B. Holter Sorensen, Oslo
Thorshope		A. S. Thor Dahl, Sandefjord, Norway
Ventura	LAFS	H. Ditlev-Simonsen, Oslo
Vigan	LAGQ	H. Ditlev-Simonsen, Oslo
Whitethroat	CGQM	Govt. of Canada

Auxiliary Ships:
Canada has 3 ocean-going Auxiliary Ships, and 15 Auxiliary Ships which operate on the Great Lakes.

PAKISTAN (Information dated 1.4.60)

Name of Vessel	Call Sign	Owner
Selected and Supplementary Ships:		
Al-Hsan	AQAN	Muhammadi S.S. Co., Ltd.
Al-Husaini	AQAH	Muhammadi S.S. Co., Ltd.
Al-Sayyada	AQAS	Muhammadi S.S. Co., Ltd.
Anwarbaksh	AQAM	United Oriental S.S. Co., Ltd.
Fatehabad	AQEM	Pakistan S.N. Co., Ltd.
Kadarbaksh	AQBK	United Oriental S.S. Co., Ltd.
Maulabaksh	AQBP	United Oriental S.S. Co., Ltd.
Mustali	AQBU	Gulf S.S. Co., Ltd.
Ocean Endurance	AQBW	Trans-Oceanic S.S. Co., Ltd.
Pakistan Prosperity	AQAZ	Karachi S.N. Co., Ltd.

Auxiliary Ships:
Pakistan has 19 Auxiliary Ships.

HONG KONG (Information dated 2.4.60)

Name of Vessel	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Anking	G. Baxter	G. Cornforth, H. Leighton, W. B. Jones	P. K. Karkaria	China Navigation Co., Ltd.
Anshun	W. Pollock	I. M. Thomson, F. R. Neal, M. Irish	Wan Siu Hung	China Navigation Co., Ltd.
Belinda	P. V. Pattison	Tam Bing Sun, Chan Kwai Chung	Tan Chung Mo	Shun Cheong S.N. Co., Ltd.
Changsha	W. E. Hargrave	J. B. H. J. Aldiss, J. F. Morton, B. K. Bird	Lau Wan Leung	China Navigation Co., Ltd.
Changte	R. A. Smith	Thos. I. Robertson, J. W. Tinson, Anthony K. Wadey	H. G. Campbell	China Navigation Co., Ltd.
Chefoo	L. L. Watson	J. R. Kidd, D. C. Brockbank, G. W. P. George	Wo Shiu Ying	China Navigation Co., Ltd.
Chekiang	A. V. Harrison	J. Lough, A. A. Smith, J. H. Comersall	Shiu Ping Fan	China Navigation Co., Ltd.
Chengtu	J. M. Parker	B. J. Williams, J. R. D. Sandison, W. B. A. Blemings	Wat Kwan	China Navigation Co., Ltd.
Choy Sang	L. C. Cox	B. G. Cox, J. A. C. Hunter, M. G. Thompson	D. H. Stone	Indo-China S.N. Co., Ltd.
Chungking	H. Pilling	P. R. Crime, C. G. P. Ogg, D. A. Harper	Wai Pun Un	China Navigation Co., Ltd.
Clara Jebsen	R. A. D. Nielsen	T. M. Hansen, H. J. Laigaard, L. H. Nielsen	R. Leung	Jebsen & Co.
Eastern Argosy	G. Kinley	W. D. Skidmore, J. A. C. Tennant, G. A. Roddam	A. P. Burns	Indo-China S.N. Co., Ltd.
Eastern Glory	M. I. Groundwater	G. C. Taylor, G. A. Angus, S. J. Sansom	J. P. Cowman	Indo-China S.N. Co., Ltd.
Eastern Maid	W. E. Reeve	D. J. Hooper, P. Ferrar, R. D. Hodgkinson	S. G. Stringer	Indo-China S.N. Co., Ltd.
Eastern Muse	J. M. Marshall	J. R. Simpson, G. G. MacKay, Shih Hui Tang	A. O'Neill	Indo-China S.N. Co., Ltd.
Eastern Queen	D. G. R. Kinnear	F. G. Christie, G. W. S. Ison, H. F. Schack	R. O. Smith	Indo-China S.N. Co., Ltd.
Eastern Saga	R. G. G. Stanton	B. O. Jensen, J. D. Witschi, J. Knowles	T. J. Cleary	Indo-China S.N. Co., Ltd.
Eastern Star	W. J. Bartlett	D. Wilson, W. C. Gardiner, R. G. MacDonald	A. Smith	Indo-China S.N. Co., Ltd.
Eastern Trader	R. K. Learoyd	I. P. Skipp, D. M. Cauvin, D. Smith	R. B. Field	Indo-China S.N. Co., Ltd.
Elsbeth	R. E. Easley	Ko Keng Jen, Luk Sum	Wong Kong Hung	Shun Cheong S.N. Co., Ltd.
Fengning	K. D. Johnson	L. A. McGowan, J. B. P. Blamey, K. Y. Tso	Li San Kau	China Navigation Co., Ltd.
Fengtien	J. W. G. Wilby	A. T. Tugwell, M. S. Briant, W. Lee	Cheung H. Shu Ping	China Navigation Co., Ltd.
Foochow	C. E. Lingard	J. Bowden, C. R. Humphrey, C. Y. Zia	Li Hon Wah	China Navigation Co., Ltd.
Fukien	C. E. Bennett	P. J. Stock, C. C. L. Sims, C. T. Lu	J. P. Asome	China Navigation Co., Ltd.
Funing	K. A. Page	B. A. Owen, P. J. Mooney, S. M. Ho	Mak Yau	China Navigation Co., Ltd.
Hai Hing	H. Andersen	K. Jakobsen, F. Rosendahl, E. W. Olsen	Chung Yeuk	Norwegian Asia Line
Hai Lee	E. Nordendal	G. K. Forde, J. Rogler, R. Klingenberg	Chan Wuie Lu	Norwegian Asia Line
Hai Meng	O. Saltvold	E. I. Barane, R. Ness, Knut Dagsland	Chan Kam Tsun	Norwegian Asia Line
Halldor	N. Soelberg	E. O. Kvalheim, R. Pedersen, T. Eikeland	Magnar Haugen	Norwegian Asia Line
Hallvard	J. Eide	O. Holm Andersen, L. V. Skau, B. M. Mybakk	P. Eikeseth	Norwegian Asia Line
Hang Sang	T. H. Nichols	R. C. Hoggard, T. R. Hammod, A. Goodlad	F. J. Bateman	Indo-China S.N. Co., Ltd.
Hanyang	V. R. Woolfe	R. E. Brools, M. L. Block, Y. S. Loh	Lai Mou Wah	China Navigation Co., Ltd.
Heinrich Jessen	R. Feldtmann	S. H. Nielsen, T. Soerensen, E. Aabenhus	T. S. Leung	Jebsen & Co.
Helios	J. Mikkelsen	J. Aarem, P. Bøe, J. Jensen	Ip Yuk Fai	Norwegian Asia Line
Henrik	E. Eliassen	Oleg Olsen, A. Solbaak, O. Langva	Chiu Tze Kong	Norwegian Asia Line
Hermod	E. T. Sørensen	N. A. Klokk, B. Varhaug, J. H. Andersen	Poon Chee Pooi	Norwegian Asia Line
Hervar	A. Lerstang	Odd Andreassen, R. Andresen, J. Krakemo	Yen Soong Ling	Norwegian Asia Line
Hew Sang	P. J. Sullivan	J. D. McNeill, R. M. F. Bertram, Kwok Ping Ying	W. Bruce	Indo-China S.N. Co., Ltd.
Hin Sang	W. G. White	D. E. Wiles, P. R. Williamson, Hsu Chien Szu	Q. F. McLea	Indo-China S.N. Co., Ltd.
Hoi Wong	D. Bjerkenes	J. Ekrene, J. Samuelsen, A. Roenning	O. H. Rudi	H. M. Wrangell & Co., Hangsund
Hoi Ying	B. Maeland	A. Vespestad, S. J. Fjelland, I. Knudsen	O. Moen	H. M. Wrangell & Co., Hangsund
Hop Sang	T. C. W. Marr	R. N. Maund, R. Charter, Wong King Lok	A. P. MacIsaac	Indo-China S.N. Co., Ltd.
Ho Sang	C. Preston	I. D. Patterson, P. A. Donohoe, T. Y. Yuen	A. N. Butcher	Indo-China S.N. Co., Ltd.
Hunan	A. Atkin	N. C. Pearson, R. C. Willy, Y. Lin	Cheung Shau Wai	China Navigation Co., Ltd.
Hupeh	R. E. Selwyn Jones	R. Porter, C. G. Cocksedge, C. Yueh	Lo Kin Chek	China Navigation Co., Ltd.
Jacob Jebsen	U. Bahnsen	E. Andersen, J. Ewald, P. K. Ling	C. Leung	Jebsen & Co.
Johore Bahru	J. L. Baines	U. C. de Burgh, Lo Chin Liang, Cheung Cheuk Sui	Ho Tak Pong	Great Southern S.S. Co., Ltd.
Kwangsi	A. Harper	M. T. Anderson, D. R. Owens, R. J. McGregor	Choi Bong Cheung	China Navigation Co., Ltd.
Kwangtung	A. Watson	R. Kennett, J. R. Rayner, C. J. N. Darch	Cheng Yui Man	China Navigation Co., Ltd.
Kweichow	J. McKinlay	K. H. Nettleship, J. M. Wigham, J. F. Reilly	Tam Tin Yiu	China Navigation Co., Ltd.
Lao	B. G. Y. Gronwall	L. A. Andersson, J. E. Lindahl, H. Lundsbjerg	N. E. G. Nilsson	Everett S.S. Corporation
Lok Sang	M. J. K. Crichton	E. Dunbar, D. H. Mobberley, J. P. Rainbird	S. G. Clatworthy	Indo-China S.N. Co., Ltd.

Name of Vessel	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Michael Jebsen	H. P. Fallesen	G. Andersen, B. Ipsen, W. Fabricius	C. H. Lai	Jebsen & Co
Mui Hock	T. Hansen	O. Antonsen, A. Lervik	Chau Fuk Sze	Sveen Shipping Co., Ltd.
Pakhoi	F. Cunningham	B. D. G. Ward, P. J. K. Aynsley, G. J. H. Ennion	Robert Choy	China Navigation Co., Ltd.
Poyang	J. Hunter	M. R. M. Seale, T. C. Jo, T. F. Hung	Lum A. Gwan Ying	China Navigation Co., Ltd.
Produce	L. Hetland	T. Hetland, O. O. Gjerde, J. Vespestad	Wong Chi Hung	Jacob Odland S.S., Hangsund
Sangola	J. D. Sleigh	R. H. Phillips, D. M. Monro, B. D. Long	D. Dowie	British India S.N. Co., Ltd.
Shansi	W. J. Bunney	M. E. Barrett, W. D. Teal, G. A. Perkin	Ng Kai Chong	China Navigation Co., Ltd.
Sinkiang	J. A. McDonald	N. S. Palmer, M. H. A. Swift, G. Chell	Kwan Hok Wai	China Navigation Co., Ltd.
Soochow	F. Hindle	J. K. Davies, T. H. Connell, R. B. Jackson	Brian Liu	China Navigation Co., Ltd.
Star Alcyone	A. A. Olander	P. O. Granqvist, B. I. Mansen, N. Forsberg	L. A. Larson	Everett S.S. Corporation
Star Betelgeuse	H. O. A. Helike	S. G. Andersson, R. Reinik, E. M. Nielsen	E. B. Ostling	Everett S.S. Corporation
Szechuen	E. H. Histed	M. D. Burbridge, W. S. Sutcliffe-Hey, H. Sih	Tsang Kau	China Navigation Co., Ltd.
Tai Chung Shan	A. H. Bathurst	R. H. R. Hall, Yu Chi Tai, Yip Chi Wah	Poon Kwong Yee	Shun Cheong S.N. Co., Ltd.
Taiping	N. L. Hall	R. Cromb, B. P. White, R. W. MacRae	R. P. Emery	China Navigation Co., Ltd.
Tai Poo An	E. C. Thomson	P. McSweeney, Ng Chun Sing, Kwok Bing	Lee Hor Chung	Shun Cheong S.N. Co., Ltd.
Tai Yuan	E. Bruce	R. A. Taylor, M. J. C. Graham, T. R. Gilchrist	Ngu Chi Siang	China Navigation Co., Ltd.
Tak Sang	R. Tasker	E. E. Ewbank, A. J. W. Imlach, M. G. Bishop	D. Alexander	Indo-China S.N. Co., Ltd.
Waiwerang	F. Fleischer	R. E. J. Van Dyk, A. J. Treffers, J. E. Celosse	W. Verkuil	Royal Interocean Lines
Yochow	A. J. Keddie	M. D. O'Keeffe, J. Paisley, H. P. Liu	Tang Yuen	China Navigation Co., Ltd.

MALAYA (Information dated 11.4.60)

Name of Vessel	Call Sign	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Bentong	ZJIR	R. G. Ogden	R. H. Sidley	Felix Tan	Sarawak S.S. & Co., Ltd.
Benveg	GMWB	G. A. Nicol	J. R. Muir	T. J. Healy	Ben Line Steamers, Ltd.
Bidor	ZBBZ	E. E. Fenwick	T. G. O'Sullivan	Sheri R. Bharucha	Sarawak S.S. & Co., Ltd.
Kah Poh	ZBBJ	S. J. Harvey	Rex Howard		Ho Chiang Shipping Co., Ltd.
Kajang	VPQD	A. D. Watterson	J. C. Hammond	Low Loke Kwai	Straits S.S. & Co., Ltd.
Katong	ZBNR	R. E. Davis	R. G. Mallet	Finerty Evans	Straits S.S. & Co., Ltd.
Kimanis	VSND	W. Bradshaw	J. H. G. Tapscott	K. M. Pillay	Straits S.S. & Co., Ltd.
Kinabalu	ZQTI	H. W. Wilkinson	R. W. Cotter	K. A. Menon	Straits S.S. & Co., Ltd.
Larut	VPKO	J. Walls	A. C. Andrews	Edwin Tan	Straits S.S. & Co., Ltd.
Marudu	VPQB	B. S. Sprenger	K. G. Gough	Tay Kim Teck	Straits S.S. & Co., Ltd.
Matang	VSPB	M. L. Brown	D. F. Kesley	Yue Fook Wing	Straits S.S. & Co., Ltd.
Perak	VSPJ	J. H. Martin	B. W. Reeve	R. O. Ranganathan	Straits S.S. & Co., Ltd.
Perlis	VSRA	D. J. Evans	F. J. A. Scott	Bobby Pang Ping Kwai	Straits S.S. & Co., Ltd.
Recorder	GSFS	P. B. Henderson	C. J. Ayrton, T. Archer, C. Moyle	M. Edwards	Cable & Wireless Co., Ltd.

INDIA (Information dated 22.4.60)

NAME OF VESSEL	OWNER
Selected Ships:	
Amra	British India S.N. Co., Ltd.
Andamans	Eastern Shipping Corporation
Bahadur	Asiatic S.N. Co., Ltd.
Dara	British India S.N. Co., Ltd.
Daressa	British India S.N. Co., Ltd.
Dumra	British India S.N. Co., Ltd.
Dwarka	British India S.N. Co., Ltd.
Indian Exporter	India S.S. Co., Ltd.
Indian Merchant	India S.S. Co., Ltd.
Indian Pioneer	India S.S. Co., Ltd.
Indian Reliance	India S.S. Co., Ltd.
Indian Shipper	India S.S. Co., Ltd.
Indian Trader	India S.S. Co., Ltd.
Islami	Mogul Line, Ltd.
Jalazad	Scindia S.N. Co., Ltd.
Jalaketu	Scindia S.N. Co., Ltd.
Jalamanjari	Scindia S.N. Co., Ltd.
Jalaprakash	Scindia S.N. Co., Ltd.
Jalavihar	Scindia S.N. Co., Ltd.
Jaljawahar	Scindia S.N. Co., Ltd.
Kampala	British India S.N. Co., Ltd.
Karanja	British India S.N. Co., Ltd.
Mahadevi	Asiatic S.N. Co., Ltd.
Mohammedi	Mogul Line, Ltd.
Mozaffari	Mogul Line, Ltd.
Nadir	Asiatic S.N. Co., Ltd.
Nicobar	Eastern Shipping Corporation
Pradeep	Dept. of Lighthouses and Lightships, Govt. of India
Rajula	British India S.N. Co., Ltd.
Santhia	British India S.N. Co., Ltd.
Shahjehan	Asiatic S.N. Co., Ltd.
Sirdhana	British India S.N. Co., Ltd.
State of Bombay	Eastern Shipping Corporation
State of Kutch	Eastern Shipping Corporation
State of Madras	Eastern Shipping Corporation
State of Saurashtra	Eastern Shipping Corporation
State of Travancore Cochin	Eastern Shipping Corporation
Subadar	Asiatic S.N. Co., Ltd.
Umaria	British India S.N. Co., Ltd.
Supplementary Ships:	
Bharatbhushan	Bharat Line, Ltd.
Bharatdeepak	Bharat Line, Ltd.
Bharatmitra	Bharat Line, Ltd.
Bharatraja	Bharat Line, Ltd.
Bharatrani	Bharat Line, Ltd.
Bharatratna	Bharat Line, Ltd.
Bharatveer	Bharat Line, Ltd.
Bharatvijaya	Bharat Line, Ltd.
Indian Commerce	India S.S. Co., Ltd.
Indian Endeavour	India S.S. Co., Ltd.
Indian Renown	India S.S. Co., Ltd.
Indian Resolve	India S.S. Co., Ltd.
Indian Resource	India S.S. Co., Ltd.
Indian Security	India S.S. Co., Ltd.
Indian Strength	India S.S. Co., Ltd.
Indian Splendour	India S.S. Co., Ltd.
Jag Ganga	Great Eastern Shipping Co., Ltd.
Jag Janani	Great Eastern Shipping Co., Ltd.
Jag Rani	Great Eastern Shipping Co., Ltd.
Jag Tara	Great Eastern Shipping Co., Ltd.
Jaladhan	Scindia S.N. Co., Ltd.
Jaladharma	Scindia S.N. Co., Ltd.
Jaladhanya	Scindia S.N. Co., Ltd.
Jaladhruv	Scindia S.N. Co., Ltd.
Jalagovind	Scindia S.N. Co., Ltd.
Jalakendra	Scindia S.N. Co., Ltd.
Jalamani	Scindia S.N. Co., Ltd.
Jalamayur	Scindia S.N. Co., Ltd.
Jalamohan	Scindia S.N. Co., Ltd.
Jalamudra	Scindia S.N. Co., Ltd.
Jalapadma	Scindia S.N. Co., Ltd.
Jalaprabha	Scindia S.N. Co., Ltd.
Jalapushpa	Scindia S.N. Co., Ltd.
Jalaputra	Scindia S.N. Co., Ltd.
Jalarajendra	Scindia S.N. Co., Ltd.
Jalausha	Scindia S.N. Co., Ltd.
Jalavijaya	Scindia S.N. Co., Ltd.
Jalavishnu	Scindia S.N. Co., Ltd.
Jalvallabh	Scindia S.N. Co., Ltd.
Malika	Asiatic S.N. Co., Ltd.
Rajah	Asiatic S.N. Co., Ltd.
Ranee	Asiatic S.N. Co., Ltd.
Saudi	Mogul Line, Ltd.
State of Andhra	Eastern Shipping Corporation
State of Orissa	Eastern Shipping Corporation
State of West Bengal	Eastern Shipping Corporation

NEW ZEALAND (Information dated February, 1960)

Name of Vessel	Owner
Selected Ships:	
City of Auckland	Ellerman & Bucknall S.S. Co., Ltd.
Kaimanawa	Union S.S. Co. of New Zealand, Ltd.
Kaimiro	Union S.S. Co. of New Zealand, Ltd.
Kaitoa	Union S.S. Co. of New Zealand, Ltd.
Kaitoke	Union S.S. Co. of New Zealand, Ltd.
Kaituna	Union S.S. Co. of New Zealand, Ltd.
Karitane	Union S.S. Co. of New Zealand, Ltd.
Katea	Union S.S. Co. of New Zealand, Ltd.
Kauri	Union S.S. Co. of New Zealand, Ltd.
Kawaroa	Union S.S. Co. of New Zealand, Ltd.
Kawatiri	Union S.S. Co. of New Zealand, Ltd.
Kaweraw	Union S.S. Co. of New Zealand, Ltd.
Komata	Union S.S. Co. of New Zealand, Ltd.
Koraki	Union S.S. Co. of New Zealand, Ltd.
Koranui	Union S.S. Co. of New Zealand, Ltd.
Koromiko	Union S.S. Co. of New Zealand, Ltd.
Kowhai	Union S.S. Co. of New Zealand, Ltd.
Kurow	Union S.S. Co. of New Zealand, Ltd.
Kurutai	Union S.S. Co. of New Zealand, Ltd.
Matua	Union S.S. Co. of New Zealand, Ltd.
Maui Pomare	New Zealand Govt.
Monowai	Union S.S. Co. of New Zealand, Ltd.
Port Montreal	Port Line, Ltd.
Port Quebec	Port Line, Ltd.
Port Saint John	Port Line, Ltd.
Tarawera	Union S.S. Co. of New Zealand, Ltd.
Tofua	Union S.S. Co. of New Zealand, Ltd.
Waikare	Union S.S. Co. of New Zealand, Ltd.
Waimate	Union S.S. Co. of New Zealand, Ltd.
Waimea	Union S.S. Co. of New Zealand, Ltd.
Waipori	Union S.S. Co. of New Zealand, Ltd.
Wairata	Union S.S. Co. of New Zealand, Ltd.
Wairimu	Union S.S. Co. of New Zealand, Ltd.
Waitemata	Union S.S. Co. of New Zealand, Ltd.
Supplementary Ships:	
Coromel	Jurie Shipping Co.
Holmlea	Holm & Co.
Kaiapoi	Union S.S. Co. of New Zealand, Ltd.
Kaimai	Union S.S. Co. of New Zealand, Ltd.
Kaitangata	Union S.S. Co. of New Zealand, Ltd.
Kaitawa	Union S.S. Co. of New Zealand, Ltd.
Konui	Union S.S. Co. of New Zealand, Ltd.
Korowai	Union S.S. Co. of New Zealand, Ltd.
Navua	Union S.S. Co. of New Zealand, Ltd.
Viti	Tasman S.S. Co. of New Zealand, Ltd.
Waiana	Union S.S. Co. of New Zealand, Ltd.

SOUTH AFRICA (Information dated 9.4.60)

Name of Vessel	Owner
Selected Ships:	
Africana II	Division of Fisheries, Cape Town
Constantia	S.A. Marine Corp., Cape Town
Morgenster	S.A. Marine Corp., Cape Town
Sardinops	Division of Fisheries, Cape Town
South African Merchant	S.A. Marine Corp., Cape Town
South African Pioneer	S.A. Marine Corp., Cape Town
South African Trader	S.A. Marine Corp., Cape Town
South African Transporter	S.A. Marine Corp., Cape Town
Tristania	Tristan Development Co., Cape Town
Vergelegen	S.A. Marine Corp., Cape Town
Supplementary Ships:	
Frances Repetto	Tristan Development Co., Cape Town
Herero Coast	Thesen's S.S. Co., Cape Town

WEST INDIES (Information dated 1.1.59)

Name of Vessel	Owner
Electra	Cable & Wireless, Ltd.

Meteorological Office (Marine Division) Atlases

The following are published by the Marine Division of the Meteorological Office and may be purchased from the bookshops of Her Majesty's Stationery Office at any of the addresses on the title page. Copies are available for reference by shipmasters and shipowners in the offices of Port Meteorological Officers.

Meteorological Atlases

Monthly Meteorological Charts of the Atlantic Ocean. M.O.483, 1948, reprinted 1959. (60°S–70°N, 80°W–40°E) 180*s.* (post 3*s.* 3*d.*)

Monthly Meteorological Charts of the Western Pacific. M.O.484, 1948, reprinted 1956. (60°S–60°N, 100°E–155°W) (16¾″ × 23¾″) 105*s.* (post 2*s.* 9*d.*)

Monthly Meteorological Charts of the Eastern Pacific. M.O.518, 1950, reprinted 1958. (60°S–60°N, 160°W–60°W) (17½″ × 24½″) 147*s.* (post 3*s.* 3*d.*)

Monthly Meteorological Charts of the Indian Ocean. M.O.519, 1950, reprinted 1959. (50°S–30°N, 20°E–120°E) (16½″ × 22½″) 126*s.* (post 2*s.* 9*d.*)

The above four atlases contain monthly charts of wind, barometric pressure, air and sea temperature, and all meteorological elements including some typical tracks of tropical revolving storms.

Monthly Sea Surface Temperatures and Surface Current Circulation of the Japan Sea and Adjacent Waters. M.O.M.447, 1950. (20°N–47°N, 110°E–150°E) (20″ × 17″) 7*s.* 6*d.* (post 9*d.*)

Monthly Sea Surface Temperatures of Australian and New Zealand Waters. M.O.516, 1949. (50°S–10°S, 100°E–180°) (19¾″ × 12¼″) 10*s.* (post 7*d.*)

Monthly Sea Surface Temperature of the North Atlantic. M.O.527, 1949, reprinted 1950. (30°N–68°N, 80°W–15°E) (19¾″ × 12¼″) 10*s.* (post 7*d.*)

Monthly Meteorological Charts and Sea Surface Current Chart of the Greenland and Barents Seas. M.O.575, 1959. (60°N–80°N, 30°W–120°E) 126*s.* (post 2*s.*)
This atlas contains a generalised surface current chart for the area and monthly charts of wind, barometric pressure, air and sea temperature, and all meteorological elements.

Current Atlases

Currents of the Indian Ocean. M.O.392, 1939, reprinted 1949. (50°S–30°N, 20°E–140°E) (30″ × 20″) 10*s.* (post 7*d.*)

South Pacific Ocean Currents. M.O.435, 1938, reprinted 1959. (60°S–0°, 140°E–70°W) (22″ × 34″) 12*s.* 6*d.* (post 1*s.* 0*d.*)
The above two atlases contain quarterly "current arrow" and "current rose" charts.

Quarterly Surface Current Charts of the Atlantic Ocean. M.O.466, 1945, reprinted 1957. (60°S–70°N, 80°W–20°E) (22½″ × 18″) 32*s.* 6*d.* (post 1*s.* 6*d.*)

Quarterly Surface Current Charts of the Western North Pacific Ocean with monthly chartlets of the China Seas. M.O.485, 1949. (0°–60°N, 98°E–160°W) (21″ × 16″) 25*s.* (post 11*d.*)
The above two atlases contain current rose charts, predominant current charts, and vector mean current charts.

Ice Atlases

Monthly Ice Charts of the Arctic Seas. M.O.M.390a, 1944, reprinted 1950. (60°N–80°N, 80°W–110°E) (12″ × 7″) 3*s.* 6*d.* (post 5*d.*)
Polar ice, mean limits of sea ice, extreme limits of sea ice, extreme limits of bergs.

Monthly Ice Charts of Western North Atlantic. M.O.478, 1944. (37°N–53°N, 72°W–35°W) (12″ × 7½″) 4*s.* (post 7*d.*)
Mean limits of pack, extreme limits of pack, mean limits of bergs, extreme limits of bergs.

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