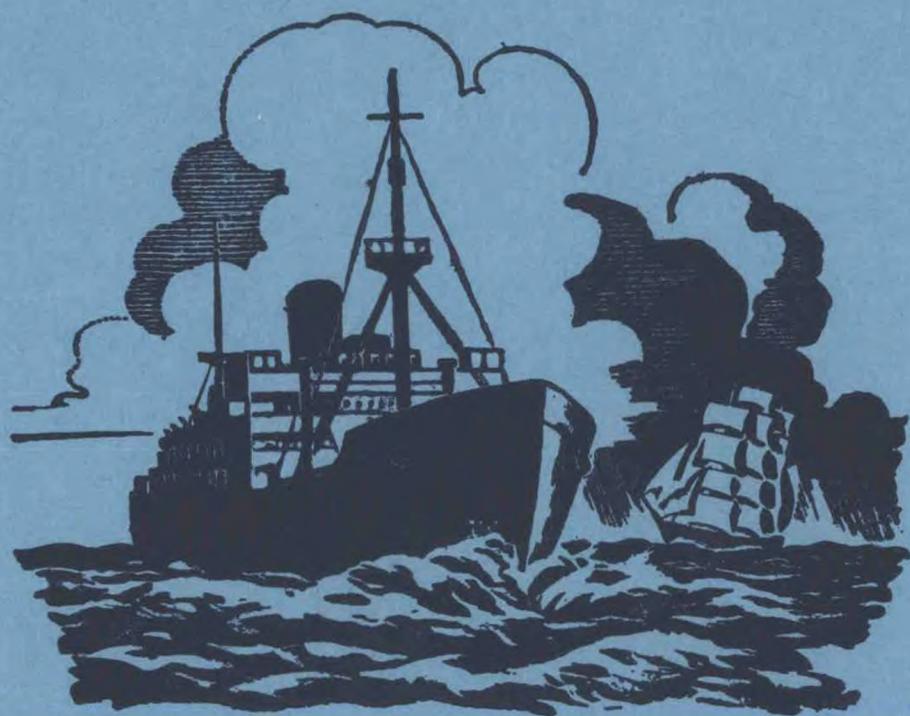


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# The Marine Observer

*A quarterly journal of Maritime  
Meteorology*



Volume XXIX No. 185

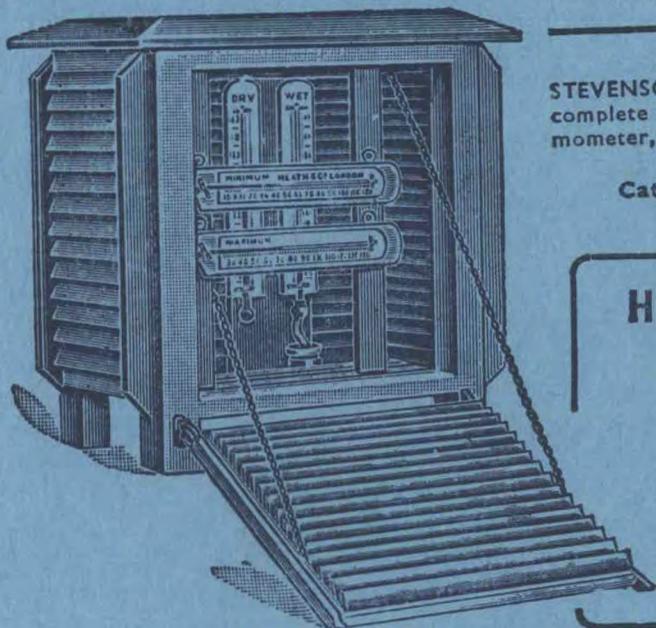
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A QUARTERLY JOURNAL OF MARITIME  
METEOROLOGY PREPARED BY THE MARINE  
DIVISION OF THE METEOROLOGICAL OFFICE

VOL. XXIX

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JULY, 1959

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## Editorial

At a conference in London in January 1959, a new international organisation, being a specialised agency of United Nations, was formed. With the ponderous title of "The Inter-Governmental Maritime Consultative Organisation", this newest member of the United Nations "family" is, curiously enough, the first permanent international organisation, on a governmental level, to deal solely with shipping questions. It is a remarkable tribute to the efficiency and broad-mindedness of the shipping industry, not only in the United Kingdom but in all maritime countries, that, despite its essentially international nature and the various complicated problems and ramifications that arise in the world of shipping, no such permanent international body has been needed up to the present. Perhaps it is a reflection of the jungle in which we live that it becomes necessary to establish such a body now. On the other hand, it is true that international co-operation, through the good offices of United Nations, is an essential feature of our modern world and does much to solve practical as well as political problems—so it is, perhaps, for the eventual good of all concerned that I.M.C.O. has been formed.

The reader may feel that it is a long way from this new maritime organisation to the world of meteorology. The terms of reference of "I.M.C.O.", as it is called, which were drawn up at a preliminary United Nations maritime conference at Geneva in 1948, read as follows:

(a) To provide machinery for co-operation among governments in the field of governmental regulation and practices relating to technical matters of all kinds affecting shipping engaged in international trade, and to encourage the general adoption of the highest practicable standards in matters concerning maritime safety and efficiency of navigation.

(b) To encourage the removal of discriminatory action and unnecessary restrictions by Governments affecting shipping engaged in international trade so as to promote the availability of shipping services to the commerce of the world without discrimination; . . .

(c) To provide for the consideration by the Organisation of matters concerning unfair restrictive practices by shipping concerns.

(d) To provide for the consideration by the Organisation of any matters concerning shipping that may be referred to it by any organ or specialised agency of the United Nations.

(e) To provide for the exchange of information among governments on matters under consideration by the Organisation.

Thus, apart from the question of "discrimination" and "restrictive practices", the activities of I.M.C.O. will be largely in the technical field and when one considers how much the weather affects almost every technical aspect of the shipping industry, the meteorological connection seems more evident. The specialised agency of United Nations, which is responsible for meteorology, is the World Meteorological Organisation. As is customary in United Nations organisations, it has been generally accepted that in order to avoid duplication of effort, I.M.C.O. and W.M.O. will consult each other and work together in matters concerning the safety and welfare of shipping. As an early token of this anticipated co-operation, the Marine Superintendent of the Meteorological Office, who is a member of the Commission for Maritime Meteorology, represented the W.M.O. at this conference. On behalf of the Secretary-General of W.M.O., he made a statement to the conference outlining the successful international association between the shipping industry and the meteorologists of the world which had prevailed since 1853, when the first international meteorological conference initiated the collection of weather information by ships at sea. The International Meteorological Organisation, predecessor of the W.M.O., had been established in 1873, and under their auspices through the medium of the Commission for Maritime Meteorology, the meteorological interests of the shipping industry had been safeguarded. As

examples of this, he made mention of the present international scheme for the supply of forecasts and warnings to ships in all oceans; the remarkable success of the "Selected Ship Scheme"; and the recent Technical Note which the W.M.O. had published about meteorological aspects of the care of cargo in a ship's hold.

The conference was attended by representatives of 30 member nations and observers from 23 other nations, and from various international organisations connected with the shipping industry, such as the International Hydrographic Bureau, International Telecommunications Union, and the International Labour Office.

Mr. Ove Neilson (Denmark), who is a Master Mariner and has had wide experience in shipping management and at various international conferences at which shipping problems have been discussed, was elected the Secretary-General of the new Organisation. The most important body of I.M.C.O. is the Maritime Safety Committee, the membership of which is drawn from 14 countries, eight of which are classified as "the largest ship-owning nations"; Captain Mullenberg (Netherlands), who is also a Master Mariner, was elected Chairman of this Committee.

The British Minister of Transport, who opened the conference, pointed out that I.M.C.O.'s task would be to "consider the problems affecting international shipping which did not come directly within the province of the existing specialised agencies of United Nations, and also matters that have hitherto been dealt with by special international conferences. In spite of the development of air travel and transport, ships are still the main carriers of passengers and goods across the ocean."

Up to the present, questions of marine safety at the international level have been covered by two International Conventions for Safety of Life at Sea—those of 1929 and 1948. As far as British shipping is concerned, the first comprehensive legislation concerning this subject was contained in the famous Merchant Shipping Act of 1894, but no specific international regulations were in existence prior to 1929.

The question of load-line, which is, after all, a fundamental approach to the question of marine safety, is perpetually linked with the name of Samuel Plimsoll. The first legislation on this subject in the United Kingdom is contained in the 1894 Act, which was amended and brought up to date by the 1906 Merchant Shipping Act. It was not until 1930 that the first International Load-line Convention was established, upon which the existing load-line rules are based, but prior to this certain foreign countries had, in fact, adopted load-line rules—similar to those in force aboard British ships.

Both the International Convention for Safety at Sea and the International Load-line Convention contain specific references to meteorology in one way or another and representatives of meteorological services attended each of the relevant conferences. Both Safety at Sea Conventions include, for example, regulations for the issue of danger messages by ships when storm conditions prevail or ice is encountered, and for the issue of storm warnings and other meteorological information to shipping. In the Load-line Convention, the limits of the zones are governed by climatological information provided by meteorological services. This information was based upon observations provided by merchant ships during the years 1855 to 1930—a good example of the value to the mariner of this voluntary meteorological work done at sea.

In between the conferences referred to above, the United Kingdom Government has had the responsibility of dealing with any international problems concerning the safety of ships and has been responsible for organising the conferences when they occurred.

Now that I.M.C.O. has been formed, all international maritime safety questions will become the responsibility of that organisation. An international conference to revise the 1948 Convention for Safety of Life at Sea is to be held in London in 1960, and a further conference to consider revision of the 1930 International Load-line Convention will be held, also in London, in 1961. At both these conferences

the discussions will be strictly on a technical level and representatives of some meteorological services will undoubtedly be present in order to advise when required.

Nowadays the sea is generally a very safe environment on which to venture. But serious casualties to ships do still occur—many of them being related in some way or other to the weather. We have in mind the tragic case of the Danish *Hands Hedtoft* which sank with all hands in January 1959, after colliding with an iceberg off Greenland in conditions of low visibility associated with a gale, and the collision between the *Andrea Doria* and the *Stockholm* off Nantucket light-vessel during thick fog with the loss of several lives. In both these cases, the ships concerned were modern and of strong construction and well found and were fitted with every modern aid for safety and for navigation, including radar. In 1953 the *Princess Victoria* foundered during a storm in the Irish Sea with the loss of 133 lives, and when the *Tresillian* foundered in a gale off the south coast of Ireland in November 1954, 24 lives were lost.

There is, of course, for practical and economic reasons, a limit to which one can go with safety precautions and regulations and there must always be some element of danger in travel. But there is always room for improvement and it is the duty of the authorities concerned to make every endeavour to improve safety at sea. There are a number of new problems that have arisen and new equipment that has been introduced since the 1949 Safety at Sea Convention was signed. For example, collisions between radar-fitted ships still occur, and this would seem to call for some further international discussion on that subject; the advent of the canopied inflatable life-raft may well merit amendments to the regulations concerning life saving appliances. And there may well be circumstances (e.g. more up to date meteorological information and better design of ships) that merit amendments to the 1930 load-line rules.

In the interest of all who go down to the sea in ships, there seems little doubt that both these conferences, designed to improve safety at sea, are justified.

MARINE SUPERINTENDENT.

## WORK OF THE MARINE DIVISION, METEOROLOGICAL OFFICE, THE VOLUNTARY OBSERVING FLEET AND THE WEATHER SHIPS DURING THE YEAR ENDING 31st MARCH, 1959

### 1. Voluntary Observing Ships

During the year the Port Meteorological Officers at London, Liverpool, Southampton, Glasgow and Cardiff and Merchant Navy Agents at Newcastle, Hull and Leith have maintained good liaison with the various ships of the Voluntary Observing Fleet. It is their duty not only to interest the masters and officers of merchant ships in this work and to recruit the various categories of ships for that purpose, but also to instruct the officers in meteorological observations and to give general guidance as to the meteorological services which are available for shipping. They also supply and inspect meteorological instruments and issue publications and stationery to the ships as necessary. An endeavour is made to visit each voluntary observing ship at least once a quarter, for it is only by these personal contacts with the masters, observing officers and radio officers of the ships that a high standard of observation can be attained and instruments properly maintained.

During the year, the Port Meteorological Officers and Merchant Navy Agents made approximately 4,500 visits to the observing ships.

The British Voluntary Observing Fleet, as shown in the table on page 98, has averaged about 670 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 very 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.

Both these categories of ships have, during the year, in addition to their routine meteorological observations, recorded in their logbooks observations of sea surface currents and ice for the Meteorological Office; aurora observations for the Department of Philosophy at Edinburgh University; whales sighted on behalf of the National Institute of Oceanography, and information about various natural phenomena observed during the course of their voyages. Any of these observations which do not come within the scope of the Meteorological Office are referred to the relevant authority.

(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 radio telegraphy or radio telephony). 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".)

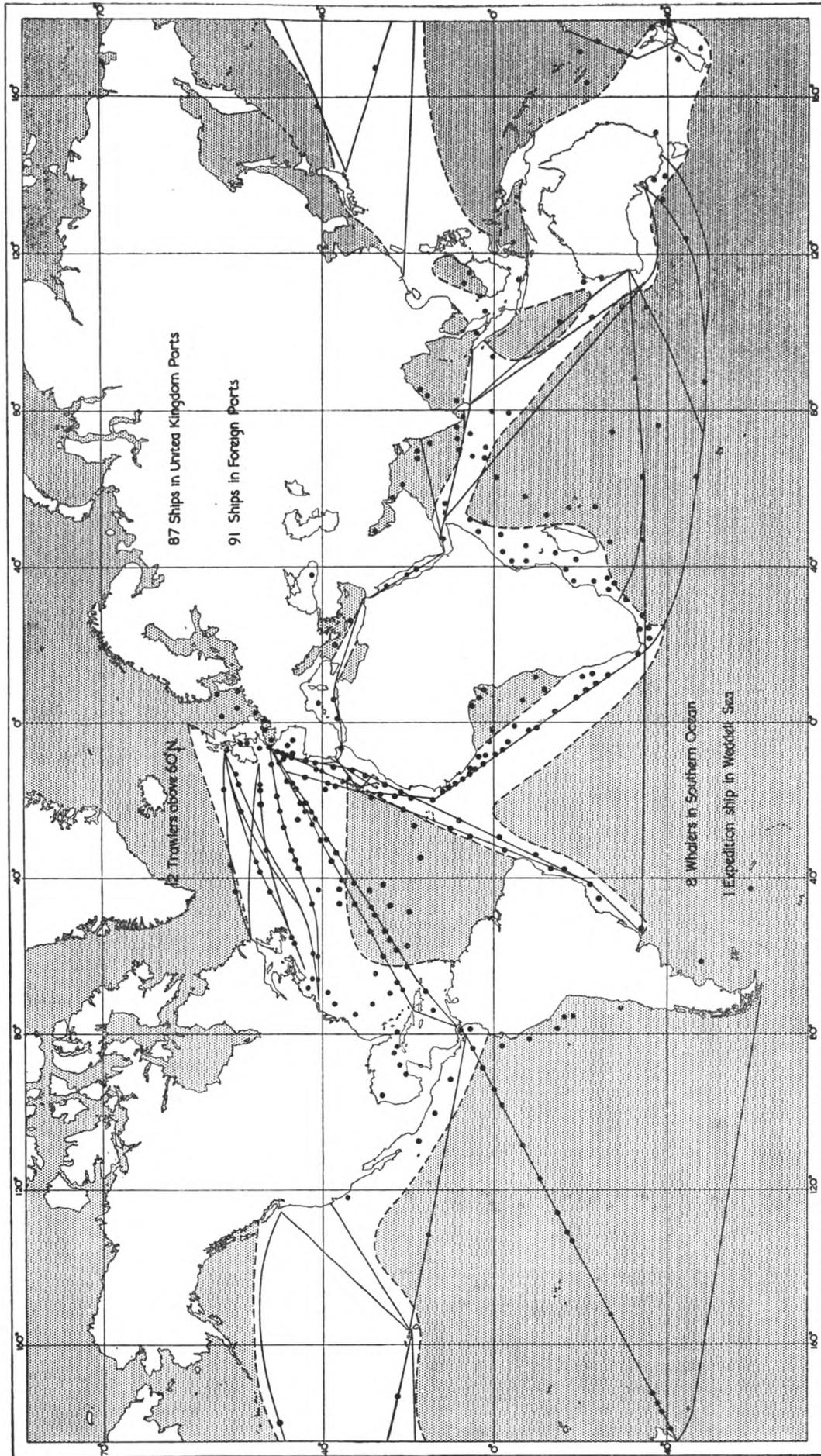
(e) *Trawlers*, which make visual observations (no instruments being needed) and transmit them by W/T and R/T (in Code Form F.M.23A) to radio stations in the United Kingdom, Canada, Iceland or Norway as convenient (depending on the area in which they are fishing).

(f) *Auxiliary ships*. In accordance with a scheme initiated by the W.M.O., special arrangements were made during the period of the International Geophysical Year to recruit "Auxiliary ships" to make observations similar to those made aboard trawlers, but with the addition of pressure and temperature readings (using the ships' own instruments), in areas where shipping is sparse. Special maps are issued to these ships indicating the "sparse areas", and the ships are only expected to make the observations in these areas (the extent of the areas is shown on the map on page 99). A considerable number of the necessary forms for recording the observations have been supplied to British ships known to be trading in such waters, not only by P.M.Os. and Merchant Navy Agents in the United Kingdom but also in certain ports of the British Commonwealth and of other countries abroad. Arrangements have been made that this scheme will continue throughout 1959 as a continuation of the I.G.Y. programme. Ninety-five of these ships have been recruited in United Kingdom ports and up to the present 30 "logbooks" have been received from them.

A trade recently established by British ships from New Zealand to the west coast of South America will enable meteorological records to be obtained from an area where observations have often been almost non-existent.

As seen in the table on page 98, a daily average of over 100 messages from British ships in the eastern North Atlantic and about 15 messages a day from British ships in coastal waters have been received at the Meteorological Communications Centre at Dunstable by radio. In association with the reports from foreign Selected Ships and Ocean Weather Ships, this provides a satisfactory network of observations. About 56 per cent of the messages from the eastern North Atlantic were received within one hour and 77 per cent within two hours. Bearing in mind the amount of radio traffic from shipping in the eastern Atlantic which has to pass through the G.P.O. coast stations and the fact that many of the

		1958												1959		
		April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March			
<b>Table 1. Number of British Observing Ships</b>																
No. of Selected Ships	..	461	439	448	459	461	463	471	478	470	471	472	471			
No. of Supplementary Ships	..	57	58	58	61	61	61	64	64	62	58	59	58			
No. of Coasting Vessels (Marid Ships)	..	97	100	100	100	100	99	99	101	100	98	99	99			
No. of Light-vessels	..	13	13	13	13	13	13	13	13	13	13	13	13			
No. of Trawlers	..	30	35	35	30	30	30	30	30	30	31	31	31			
<b>Table 2. Ships' Radio Weather Messages received at Dunstable</b>																
<b>1. British Selected and Supplementary Ships</b>																
No. reporting to Dunstable	..	315	351	345	331	334	313	335	344	324	319	308	322			
Daily average of messages	..	106	110	104	91	103	105	111	111	96	101	99	79			
<b>2. British Coasting Vessels (Marid Ships)</b>																
No. reporting to Dunstable	..	58	60	55	56	53	50	53	49	46	45	52	52			
Daily average of messages	..	15	15	15	16	14	13	13	14	12	9	11	12			
<b>3. Foreign Ships</b>																
No. reporting to Dunstable	..	232	175	179	195	193	221	197	185	152	174	167	233			
Daily average of messages	..	26	20	21	21	19	27	25	21	18	20	18	20			
<b>4. Light-vessels</b>																
No. reporting to Dunstable	..	11	11	11	11	11	11	11	11	11	11	11	11			
Daily average of messages	..	34	33	33	34	34	34	36	35	36	36	36	36			
<b>5. Trawlers</b>																
No. reporting to Dunstable	..	21	33	29	20	21	22	22	30	29	23	20	24			
Daily average of messages	..	11	19	16	14	14	14	15	26	25	21	19	20			



The positions of British ships which made observations on 24th November, 1958. The shaded areas ("sparse areas") are those in which Auxillary ships make observations (see page 97).

ships have only one radio operator on board, this is very satisfactory. It is perhaps of interest to recall that in 1939 the average daily number of reports received from merchant ships in the eastern Atlantic was about 30.

We have no 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 from such ships during the year averaged about 100). Logbooks generally indicate that in other oceanic areas reports from British ships are transmitted regularly as provided for in the international scheme.

The number of radio weather messages received from trawlers increased to about 530 a month compared with about 150 a month in 1956. Reports from distant water trawlers working in far northern latitudes (Davis Strait, Icelandic waters or the Barents Sea) provided valuable observations which are unobtainable from any other source. A monthly newsletter for trawlers which was initiated in 1957 has done much to stimulate their interest in this voluntary work.

In an endeavour to get more ship reports in the North Sea area, as a result of an international conference, Port Meteorological Officers and Merchant Navy Agents have made special efforts to increase the recruitment of ships trading in this area. The actual number of reports received per day from these ships was 11 per cent higher in 1958 than in 1957.

A written record of all reports from voluntary observing ships eventually reaches the Marine Division of the Meteorological Office, either in the form of logbooks, or (in the case of trawlers and coasting vessels from which no written records are required) in the form of teleprinter messages which are forwarded from Dunstable. As in previous years all these observations have been punched on to Hollerith cards and are thus made available for climatological work or for answering enquiries.

All meteorological logbooks received during the year have been scrutinised and classified by a Nautical Officer and awarded marks for their quality; they have also been carefully checked for error by meteorologists before the data have been punched. As a general rule, the logbooks show that the observations are made conscientiously and accurately; aboard most ships the observations are made regularly throughout their voyages and the coded messages have been regularly transmitted to the radio stations concerned.

The painstaking way in which various natural phenomena are reported and illustrated (many of these being reproduced in the "Marine Observer's Log") provides graphic proof of the enthusiasm that ships' officers have for this work.

During the year, a selection of physical oceanographical phenomena (unusual waves, discoloured water, sudden sea temperature variations and exceptionally strong currents, etc.) recorded aboard British Selected Ships during 1947 to 1958 formed the subject of a paper read by the Marine Superintendent of the Meteorological Office at a meeting of the Challenger Society.

During the year about one-third of the observations received from voluntary

**Table 3. Numbers of British selected ships on main routes from and to the United Kingdom**

Australasia	..	..	..	..	..	..	107
Far East	..	..	..	..	..	..	70
Persian Gulf	..	..	..	..	..	..	29
South Africa	..	..	..	..	..	..	31
North Atlantic	..	..	..	..	..	..	81
West Indies	..	..	..	..	..	..	24
Atlantic coast of South America	..	..	..	..	..	..	41
Pacific coast of South America	..	..	..	..	..	..	4
Pacific coast of North America	..	..	..	..	..	..	12
Europe, mainly northern Europe	..	..	..	..	..	..	28
Falklands Islands and Antarctic	..	..	..	..	..	..	7
World-wide "tramping"	..	..	..	..	..	..	85

observing ships have been in the original logbook; the remainder have been transcribed into a "fair copy". As far as the Meteorological Office is concerned, a neat original log is as good as a "fair copy", and it is left to the individual ship-master and principal observing officer as to whether a "fair copy" is necessary.

Table 3 opposite shows the trades in which British Selected Ships were engaged during the year. The map on page 99 shows the world-wide distribution of British Selected Ships on a day picked at random.

## 2. Ocean Weather Ships

Eleven years of satisfactory service in the North Atlantic was completed during the year by the four British ocean weather ships. *Weather Explorer* was withdrawn and sold to a Greek buyer in May 1958 after 81 voyages as an ocean weather ship. She was replaced by the former "Castle" class frigate *Oakham Castle*, which was converted to an ocean weather ship at a shipyard in the Clyde and was renamed O.W.S. *Weather Reporter* by Lord Hurcomb, Chairman of the Meteorological Committee, at a ceremony in Greenock in May 1958. (Two interior photographs are shown opposite page 133: a previous article and photographs appeared in the October 1958 number of this journal.) It is anticipated that three more "Castle" class vessels will be converted and commissioned as ocean weather ships within the next two years to replace the other three ships nearing the end of their economic life as ocean weather ships. The "Castle" class vessels are somewhat larger than the present "Flower" class, making it possible to site the meteorological office in a more convenient position on the upper deck forward of the balloon shelter, instead of right aft between decks. More comfortable and spacious living accommodation can also be provided in these ships. They have a bigger fuel capacity, and their radio equipment is more modern and efficient. *Weather Reporter* is proving a successful ship in service.

During the year under review, the British weather ships have operated in rotation with French and Netherlands ships, at Ocean Stations "A" ( $62^{\circ}\text{N.}, 33^{\circ}\text{W.}$ ), "I" ( $59^{\circ}\text{N.}, 19^{\circ}\text{W.}$ ), "J" ( $52^{\circ} 30'\text{N.}, 20^{\circ}\text{W.}$ ) and "K" ( $48^{\circ}\text{N.}, 16^{\circ}\text{W.}$ ).

At the request of the Director of the French Meteorological Service (on behalf of the French National History Museum), the deck officers aboard the British weather ships are regularly making ornithological observations on a voluntary basis when on duty at Ocean Stations A, J and K.

Increased use is being made by both civil and military transatlantic aircraft of the weather ships' navigational aids and communication facilities; most of these aircraft also request meteorological information by radio from the ships.

Special observations of sea water temperature gradient with the bathythermograph continued aboard all British weather ships, and observations of waves by means of an electric wave recorder now installed in *Weather Reporter* were continued.

Further experiments with rain gauges were carried out aboard *Weather Recorder* but the results were disappointing and the rain gauge arrangements are now being redesigned. Investigations into different methods of sea temperature and air temperature observation with the object of achieving greater accuracy and simplicity were also carried out aboard these ships.

A new type of insulated rubber bucket as replacement of the familiar canvas bucket has been introduced aboard voluntary observing ships and weather ships, whereby it is hoped to obtain more accurate sea temperature observations.

Special radio investigations have been carried out aboard the weather ships on behalf of the Radio Research Establishment; tests have been made also with a radio teletype receiver in order to monitor reception of weather messages from aircraft in flight, and with the "Dectra" long range navigational aid, on behalf of M.T.C.A.

Plankton and sea surface samples were obtained at sea for the Ministry of Agriculture and Fisheries and Scottish Home Department.

Microfilm copies of observations recorded aboard British weather ships were

made and distributed in exchange for similar microfilms from other operating countries of the North Atlantic Ocean Station Agreement.

### **3. Special work for the International Geophysical Year**

Observations from voluntary observing ships and from the ocean weather ships provided a valuable contribution to the International Geophysical Year programme, comprising as they do the only means of obtaining meteorological information from the oceans. Observations from "sparse areas" from the auxiliary ships should be particularly valuable for filling in gaps. The article on page 129 of this number gives an indication of the general scope of that programme. All ship observations made during the I.G.Y., having been transferred from logbooks to Hollerith cards, are tabulated and forwarded direct to the World Meteorological Organisation for scientific investigation. About 120,000 observations, covering the first six months of the I.G.Y., have thus been tabulated during the year.

A gratifying number of aurora observations, which form a feature of the programme, have been received from Selected Ships in all oceans. The ocean weather ships have been using specially large balloons in order to obtain radar wind and radio sonde observations up to a height of about 100,000 feet. The weather ships have also continued to make observations of the net flux of radiation and total solar radiation by means of specially designed instruments; these records, which are unique, are being analysed and tabulated in the Marine Division.

### **4. Marine Climatology and Enquiries**

The average number of logbooks received from voluntary observing ships was 90 per month. 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 Hollerith cards as soon as possible after they have been received in the Office.

A start was made on preparing a 10-year summary of the meteorological observations made at ocean stations I and J. This summary will be in addition to the annual summaries which are prepared each year for stations A, I and J.

Some work was done on the calculation of energy balance terms (involving radiation observations and observations of such elements as air and sea temperatures) for selected five-day periods at ocean station J.

An investigation was started into the occurrence of sea fog in the western approaches and on the computation of wave height frequencies for 5° squares of latitude and longitude for each month in all ocean areas.

An investigation into the climatic fluctuation of air and sea temperature in the tropical Atlantic was completed and a paper written on the subject.

The number of enquiries dealt with was slightly greater than in 1957. Information was supplied to government departments, meteorological services of other countries, scientific institutions, commercial firms and private individuals. The following are examples of the range covered:

Tables showing the percentage frequency of winds of force 3 or less for each month in various oceanic areas of the Far East.

Information about the highest air temperature and humidity at sea in connection with the testing of life-jackets.

Percentage frequency of wind direction and force and wave heights in connection with the channel tunnel project.

Information (including sea temperature data) in connection with the design of cooling systems for nuclear power stations.

Frequency of gale force winds in specified areas in connection with possible modifications to load-line areas.

Information to shipping companies about state of ice in northern seas.

Details of weather conditions in the vicinity of hurricane "Carrie" in September 1957.

Long period averages of sea surface temperature at light-vessels.

Meteorological information was supplied to the Ministry of Transport and Civil Aviation for investigation into several shipping casualties. Personal attendance of a Scientific Officer was necessary at Formal Investigations held into the following casualties:

*Nordic Star*—lost with all hands in the Atlantic in January 1957

*Hawkstone*—lost with all hands in the Thames in February 1958

*Narva*—lost with all hands in the North Sea in December 1957

*Bosworth*—abandoned in the North Sea in December 1957

## 5. Currents and Ice

A new atlas of the surface currents of the Eastern North Pacific is with the printer. Computation work was continued for the analysis of currents in the eastern part of the South Pacific, to be eventually combined in one atlas with the current data for the western part of that ocean (which have already been calculated).

Surface current and ice sections of eight Admiralty Pilots were revised during the year and ocean current information was supplied to the Admiralty for inscribing on 36 navigational charts.

## 6. Publications, etc.

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

(b) The monthly *Climatological and Sea Surface Current Charts of the North Atlantic Ocean* were published. The companion charts for the South Atlantic Ocean have been prepared but publication has been delayed pending a decision about price.

(c) A third edition of the *Marine Observer's Guide* is in the press.

(d) The Marine Superintendent, in association with Mr. Cartwright (National Institute of Oceanography) read a paper on "Ocean Waves" at a technical meeting of the Honourable Company of Master Mariners.

## 7. Awards

As a result of the assessment made by a Nautical Officer in the Marine Division of the meteorological logbooks received from voluntary observing ships, "Excellent" awards are being presented to the masters, principal observing officers and radio officers of the ships whose logbooks came in the first 100 in order of merit. The books selected for these awards are: *The University Atlas* and *An Illustrated History of Science* by F. Sherwood Taylor. In addition, similar awards will be made to two trawlers and two coasting ("marid") vessels, the basis of their award being the number of observations received from the ship by radio (see page 104).

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*, April 1959).

### EXCELLENT AWARDS, 1958-59

Once again, as in every July number of *The Marine Observer* since 1924, it is our pleasure to congratulate the captains, principal observing officers and radio officers of the hundred voluntary observing ships whose meteorological records received at Harrow during the year ended 31st March, 1959 have earned an Excellent Award.

The captains and officers named in the list will be individually notified of the award by post and asked to give us an address to which they would like us to send it. If, however, any officer sees his name in the list before he receives the official letter we would be delighted if he would write to us claiming the award and giving the address. This will save time and possibly further correspondence should the first letter not catch up with him for several months. As in previous years, we ask all recipients of the award to sign and return the receipt for it which will be sent.

## EXCELLENT AWARDS (Year ending 31st March, 1959)

SHIP	CAPTAIN	PRINCIPAL OBSERVING OFFICER	SENIOR RADIO OFFICER	OWNERS
<i>Achilles</i>	D. R. Jones	D. M. Wright	W. S. Young	A. Holt & Co.
<i>Apollo</i>	G. V. Barnes	W. Kaye	P. Howell (deck officer)	Bristol S.N. Co., Ltd.
<i>Arakaka</i>	J. A. Carter	R. A. Hammond	J. Banks	Booker Line, Ltd.
<i>Argyllshire</i>	A. J. Hogg	C. W. Mills	G. Martyn, M.B.E.	Clan Line Steamers, Ltd.
<i>Athenic</i>	G. Heywood	A. J. Saunders	H. S. Knight	Shaw Savill & Albion Co., Ltd.
<i>Beaverford</i>	L. H. Johnston, M.B.E.	R. P. Wilman	H. E. Brookfield	Canadian Pacific Steamships
<i>Birmingham City</i>	F. R. Neil	L. T. Williams	A. B. Pilkington	Bristol City Line of Steamships, Ltd.
<i>Borodino</i>	A. T. Jardine	R. L. Cole	F. E. Smith	Ellerman's Wilson Line, Ltd.
<i>British Sailor</i>	R. C. D. Flamsteed	F. A. Stalberger	W. Sharkey	B.P. Tanker Co., Ltd.
<i>Cairnion</i>	J. Hogg	D. Liston	D. Leeson	Cairns, Noble & Co., Ltd.
<i>Cairngowan</i>	I. G. Foster	K. B. Singer	E. Johnston	Cairns, Noble & Co., Ltd.
<i>Cambridge</i>	P. P. O. Harrison	R. N. Jordan	G. Thomas	Federal S.N. Co., Ltd.
<i>Cape Clear</i>	P. Farmborough	J. Carr	W. R. Downinton	Lyle Shipping Co., Ltd.
<i>Cape Howe</i>	A. M. Fraser	J. Cameron	D. O'Moore	Lyle Shipping Co. Ltd.
<i>Captain Hobson</i>	A. Rowlands	J. F. Gaffney	R. R. Waddell	P. Henderson & Co.
<i>Chantala</i>	L. T. Carter	B. R. Sanderson	J. R. Fields	British India S.N. Co., Ltd.
<i>Chindwara</i>	M. H. Vincent	A. D. Methven	S. A. White	British India S.N. Co., Ltd.
<i>Chingalese Prince</i>	H. J. Pirie	R. V. Hann	C. F. Page	Prince Line, Ltd.
<i>City of Winchester</i>	J. W. Wotherspoon, M.B.E.	P. G. Evans	W. H. Carmichael	Ellerman & Bucknall S.S. Co., Ltd.
<i>Clan Campbell</i>	K. C. Simpson	S. Young	R. F. Cole, M.B.E.	Clan Line Steamers, Ltd.
<i>Clan Davidson</i>	T. A. Watkinson	W. Marshall	J. E. Whitworth	Clan Line Steamers, Ltd.
<i>Clan MacBrayne</i>	C. A. Thomas	D. I. McMinn	W. Cowie	Clan Line Steamers, Ltd.
<i>Clan Macleay</i>	S. S. Davidson	R. E. Todd	F. Fawcett	Clan Line Steamers, Ltd.
<i>Clan Sutherland</i>	F. H. Turton	J. H. Szablowski	W. Gay	Clan Line Steamers, Ltd.
<i>Corinthic</i>	A. C. Jones	P. F. Hogg	T. J. Lillie	Shaw Savill & Albion Co., Ltd.
<i>Cumberland</i>	L. W. Fulcher	G. S. Breen	R. Waters	Federal S.N. Co., Ltd.
<i>Darro</i>	C. C. Dingle	I. Worrall	R. Fenton	Royal Mail Lines, Ltd.
<i>Dartmoor</i>	F. Bradfield	D. Nicholas	T. P. Barrow	W. Runciman & Co., Ltd.
<i>Devon</i>	S. W. Lambrick	R. J. Bayliss	D. J. Gerrard	Federal S.N. Co., Ltd.
<i>Ditwara</i>	B. A. Rogers, D.S.C., R.D.	R. J. Elston	G. Syer	British India S.N. Co., Ltd.
<i>Durham</i>	K. Barnett, R.D.	D. T. Evans	T. A. Battye	Federal S.N. Co., Ltd.
<i>Edward Wilshaw</i>	R. Porter-Reynolds	P. Bushell	L. S. Cohn	Cable & Wireless, Ltd.
<i>Explorer (F.R.S.)</i>	E. A. Bruce	P. A. Burn	J. A. Ross	Scottish Home Department
<i>Gardenia</i>	W. Hunter	J. M. Oliver	J. R. Mace	J. Robinson & Sons
<i>Glenartney</i>	H. S. Wood	A. I. Scott	J. R. R. Binding	Glen Line, Ltd.
<i>Glenfinlas</i>	N. A. Rae, M.B.E., R.D.	P. Denham	J. B. Carr	Glen Line, Ltd.

<i>Glenorchy</i> ..	J. B. Anderson ..	G. R. Matley ..	A. Brown ..	..	Glen Line, Ltd.
<i>Gloucester City</i> ..	S. Smith ..	M. J. Winter ..	M. Brett ..	..	Bristol City Line of Steamships, Ltd.
<i>Gothic</i> ..	L. J. Hopkins ..	T. T. Salmon ..	B. McGovern ..	..	Shaw Savill & Albion Co., Ltd.
<i>Greathope</i> ..	R. Cook ..	A. McGrath ..	K. Blackmore ..	..	E. R. Newbigin, Ltd.
<i>Hadrian Coast</i> ..	W. Wyness ..	J. C. Cowie ..	P. M. Bowie (deck officer) ..	..	Aberdeen S.N. Co., Ltd.
<i>Helena</i> ..	T. R. Phillips ..	H. Bostock ..	A. Holman ..	..	A. Holt & Co.
<i>Hemiglypta</i> ..	S. A. Greenaway ..	J. M. Conolly ..	J. P. Connolly ..	..	Shell Tankers, Ltd.
<i>Himalaya</i> ..	R. G. Freeman ..	J. N. H. Davies ..	H. A. M. Jardine ..	..	P. & O. S.N. Co.
<i>Hinakura</i> ..	N. Warren ..	D. Hyde ..	R. Jay ..	..	New Zealand Shipping Co., Ltd.
<i>Imperial Star</i> ..	G. L. Evans ..	A. Fordham ..	D. Whitehead ..	..	Blue Star Line, Ltd.
<i>Inishowen Head</i> ..	H. N. Clarke ..	D. A. Chinn ..	A. E. Adams ..	..	G. Heyn & Sons, Ltd.
<i>Interpreter</i> ..	W. Weatherall ..	R. Rice-Hughes ..	T. A. Harris ..	..	T. & J. Harrison, Ltd.
<i>Ixon</i> ..	G. Edge ..	J. S. Hunter ..	W. W. Beebee ..	..	A. Holt & Co.
<i>Journalist</i> ..	D. Wolstenholme ..	R. L. Harvey ..	P. Goulden ..	..	T. & J. Harrison, Ltd.
<i>King William</i> ..	G. Russ ..	W. S. Wallace ..	A. Ahearne ..	..	King Line, Ltd.
<i>Kirkham Abbey</i> ..	H. H. Fox, M.B.E. ..	D. C. Thomas ..	M. T. Walker (deck officer) ..	..	British Transport Commission
<i>Laurentia</i> ..	T. S. Graham ..	I. B. McLundie ..	D. Murray ..	..	Donaldson Bros. & Black, Ltd.
<i>Leicestershire</i> ..	E. D. Brand ..	A. G. Broadwith ..	A. E. Unsworth ..	..	Bibby Bros. & Co.
<i>Malayan Prince</i> ..	B. M. Collard ..	M. Black ..	P. McBride ..	..	Furness, Withy & Co. Ltd.
<i>Manchester Mariner</i> ..	E. W. Raper ..	A. S. Bashford ..	M. Doran ..	..	Manchester Liners, Ltd.
<i>Manchester Progress</i> ..	M. E. Bewley ..	P. Jones ..	J. C. Kane ..	..	Manchester Liners, Ltd.
<i>Marengo</i> ..	D. A. Stokes ..	P. Rotheram ..	V. Heaney ..	..	Eilerman's Wilson Line, Ltd.
<i>Marna</i> ..	J. A. McConachie ..	J. Carnie ..	S. Manson (deck officer) ..	..	Chr. Salvesen & Co.
<i>Menastone</i> ..	S. F. Sheasby ..	A. M. Brown ..	D. R. Eddows ..	..	Thomas Stone (Shipping), Ltd.
<i>Newfoundland</i> ..	C. H. Kenyon ..	K. Swinburne ..	J. C. Keegan ..	..	Johnston Warren Line, Ltd.
<i>Nova Scotia</i> ..	J. E. Wilson, O.B.E. ..	E. W. Foxworthy ..	P. Finn ..	..	Johnston Warren Line, Ltd.
<i>Orontes</i> ..	S. Ayles ..	J. W. Denly ..	H. A. Palmer ..	..	Orient S.N. Co., Ltd.
<i>Otato</i> ..	A. Hocken ..	A. Carver ..	P. Broome ..	..	New Zealand Shipping Co., Ltd.
<i>Paparaoa</i> ..	F. M. Williamson ..	I. M. Pears ..	M. B. Wood ..	..	New Zealand Shipping Co., Ltd.
<i>Parthia</i> ..	J. Crosbie Dawson ..	T. A. Nicholson ..	A. O'Sullivan ..	..	Cunard S.S. Co., Ltd.
<i>Planter</i> ..	E. Whitehouse ..	J. W. Chatfield ..	T. Slattery ..	..	T. & J. Harrison, Ltd.
<i>Port Adelaide</i> ..	V. G. Battle ..	G. Brandon ..	T. Phillips ..	..	Port Line, Ltd.
<i>Port Auckland</i> ..	C. R. Townshend ..	L. G. Williamson ..	H. Horrocks ..	..	Port Line, Ltd.
<i>Port Brisbane</i> ..	F. W. Bailey, M.B.E. ..	J. D. Hitchmough ..	J. D. Greenan ..	..	Port Line, Ltd.
<i>Port Hobart</i> ..	W. Craig ..	R. I. Jenkins ..	D. McCartney ..	..	Port Line, Ltd.
<i>Port Napier</i> ..	P. S. Ball ..	R. J. Golligly ..	T. Hargrave ..	..	Port Line, Ltd.
<i>Port Vindex</i> ..	E. E. Roswell ..	B. E. Ching ..	N. W. Hodgson ..	..	Port Line, Ltd.
<i>Queensland Star</i> ..	R. White, D.S.C. ..	E. G. Bee ..	A. Horton ..	..	Blue Star Line, Ltd.
<i>Rakaia</i> ..	H. N. Lawson, R.D. ..	D. Watt ..	E. Barley ..	..	New Zealand Shipping Co., Ltd.
<i>Rangitane</i> ..	R. G. Rees ..	J. Thomson ..	L. Whittington ..	..	New Zealand Shipping Co., Ltd.

SHIP	CAPTAIN	PRINCIPAL OBSERVING OFFICER	SENIOR RADIO OFFICER	OWNERS
<i>Regent Hawk</i> ..	G. H. Hobson	P. W. Cresswell	J. G. Gearon ..	Regent Petroleum Tankship Co., Ltd.
<i>Rialto</i> ..	H. Greenhill	J. Edwards	A. Gavin	Ellerman's Wilson Line, Ltd.
<i>Richard de Larrinaga</i>	A. Mathison	P. R. Owen	K. A. Mackenzie	Bolton S.S. Co., Ltd.
<i>River Afton</i> ..	J. Meade ..	F. Wearing	J. Hunter	Larrinaga S.S. Co., Ltd.
<i>Ruahine</i> ..	J. P. Johnson	G. O. Griffiths	V. H. George ..	Campbells' (Newcastle), Ltd.
<i>Runa</i> ..	P. S. Calcutt	J. P. Crowder ..	J. Heath	New Zealand Shipping Co., Ltd.
<i>St. John</i> ..	J. H. Gilfillan	T. Mitchell	A. Corless	Glen & Co., Ltd.
<i>Shackleton</i> ..	F. Meneight	A. H. Gwyther	J. E. Conway ..	South America Saint Line, Ltd.
<i>Silverbrook</i> ..	N. R. Brown	T. Woodfield ..	A. Irving	Falkland Islands Government
<i>Silverdale</i> ..	P. L. Hopkins	D. C. Dunn	S. H. Ebel	Silver Line, Ltd.
<i>Southern Cross</i> ..	N. H. B. Bloye, D.S.C., R.D.	J. W. Barney ..	M. Farelly	Silver Line, Ltd.
<i>Surrey</i> ..	L. H. Edmeads	J. M. Brew	H. Matthews ..	Shaw Savill & Albion Co., Ltd.
<i>Tana</i> ..	H. J. D. Sladen	A. E. Robinson	A. Titley	Federal S.N. Co., Ltd.
<i>Tarantia</i> ..	L. B. Anderson	A. S. Thomson	W. Morrison (deck officer)	Chr. Salvesen & Co.
<i>Teviot</i> ..	R. S. Paton	A. J. Dickie	A. McPherson	Anchor Line, Ltd.
<i>Torr Head</i> ..	J. H. Napper	F. G. Nickson	E. Tarling	Royal Mail Lines, Ltd.
<i>Trevince</i> ..	S. J. Stark ..	R. A. Maxwell	D. Hodgson	G. Heyn & Sons, Ltd.
<i>Trevorlas</i> ..	F. G. Bolton	W. R. Clipson	I. Hopkins	Hain S.S. Co., Ltd.
<i>Velletta</i> ..	W. Carmichael	G. C. Blight ..	J. Walsh	Hain S.S. Co., Ltd.
<i>Wairangi</i> ..	J. C. Nettleship	T. I. Davies	J. R. Dixon	Shell Tankers, Ltd.
<i>Winga</i> ..	B. Forbes-Moffatt	B. Bloxham	G. Adamson	Shaw Savill & Albion Co., Ltd.
<i>Wokingham</i> ..	R. J. McNinch	J. M. Bryan	J. Brown	Glen & Co., Ltd.
<i>Worcestershire</i>	F. W. Grist	A. D. Sugden ..	A. Maclean	Watts, Watts & Co., Ltd.
	F. C. Brooks	E. H. Jones	D. Alcock	Bibby Bros. & Co.

### MARID SHIPS (Coasting vessels)

<i>Clupea</i> ..	J. E. Jappy	J. Smith	R. Daley (Deck Officer)	Scottish Home Department
<i>Slieve Bearnagh</i> ..	E. H. Ashton	J. McCarlie		British Transport Commission

### TRAWLERS

SKIPPER	WIRELESS OPERATOR	SHIP	OWNERS
A. E. Crewdson ..	N. Hird ..	<i>Lucida</i>	J. Marr & Son, Ltd. (Fleetwood)
T. H. Spall ..	C. J. J. Youngs ..	<i>Vanessa</i>	Atlas Steam Fishing Co., Ltd. (Grimsby)
		<i>Velinda</i>	

The assessing of all ships' meteorological logbooks continues to be done by the Nautical Officer at Harrow, supported by the advice of the Port Meteorological Officers who are in personal touch with the observers and who can thus often advise him as to the conditions under which the observations have been made. Comparison between the meteorological logbooks of such a variety of ships as is contained in the voluntary observing fleet, from the two-mate short sea trader where the Master works the R/T, to the seven-mate passenger liner whose radio is manned 24 hours a day, is not easy, nor is it lightly undertaken. But the miscellany of ships which figure in the Excellent Award list every year tends to show that the system of marking which we have adopted after long experience is a just one.

In the year ended 31st March, 1959, the best books were received from the following nine ships:

1. *Tarantia* (Anchor Line, Ltd.), Captain R. S. Paton.
2. *Dartmoor* (Messrs. W. Runciman & Co.), Captain F. Bradfield.  
*Hadrian Coast* (Aberdeen S.N. Co., Ltd.), Captain W. Wyness.
3. *Laurentia* (Donaldson Line), Captain T. S. Graham.  
*River Afton* (Campbells' (Newcastle), Ltd.), Captain J. P. Johnson.
4. *British Sailor* (B.P. Tanker Co., Ltd.), Captain R. C. D. Flamsteed.  
*Greathope* (Newbigin & Co., Ltd.), Captain R. Cook.  
*Regent Hawk* (Regent Petroleum Tank Ship Co.), Captain G. H. Hobson.  
*Wokingham* (Messrs. Watts, Watts & Co., Ltd.), Captain F. W. Grist.

This is the fifth year in which we have published a "short list" and we must congratulate *Laurentia* on making her third appearance and *Tarantia* on appearing for the second time. Special praise is also due to *Hadrian Coast*, a small Supplementary Ship engaged on the London-Aberdeen trade, who has attained such a high place in her first year of observing for us. The customary photographs of the best three ships of the year appear opposite page 116. This year's awards are shared between ships of 53 companies, eight more than in the previous year, and this range seems to exemplify the uniform quality of the observations and the enthusiasm of the officers in all types of trades and in all types of ships.

It is to be expected that the larger companies will secure most awards because of the size of their observing fleets, but a study of the short lists over the past few years, as during the year under review, shows that it is by no means the larger companies who secure the top places.

During the year, 1,087 meteorological logbooks were received from selected and supplementary ships, of which 384 (35·32 per cent) were assessed as "Excellent". Once again this is an improvement on the previous year, indeed, the yearly improvement from 17·3 per cent in 1954, through 23·3, 25·6, 28·8 and 30·28 in successive years to the present figure is very heartening. Competition for Excellent Awards is getting very keen and we welcome this as a measure of the spirit which animates the corps of voluntary marine observers.

The number of ships which can qualify for an award is fixed at 100 each year and, as the years go on, if the number of logbooks gaining an "Excellent" assessment maintains its present increase, there will be more and more officers wondering why they do not receive an award for a book which, they feel sure, will have had an excellent marking. The answer is, of course, that there are degrees, even of excellence. We have not yet received the perfect logbook. It was once said that "perfection is finality and finality is death" and we do not look forward with any pleasure to the coming of the perfect logbook for it may herald the end of competition, the life-blood of the voluntary observing system.

Awards to coasting vessels ("Marid" ships) and trawlers are listed on page 106. The unspectacular voluntary work which these ships do, often under conditions of acute discomfort, has been of great help to the meteorologists responsible for the preparation of forecasts—for the benefit not only of shipping, aviation and other forms of transport, but also for the general public. So their awards are well earned.

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.

### DISTURBED WATER

#### North Pacific Ocean

M.V. *Durham*. Captain K. Barnett, R.D. Balboa to Noumea. Observers, the Master and Mr. J. A. Needham, 3rd Officer.

14th July, 1958. At 1000 S.M.T., when 80-90 miles off Cape Mala, the vessel passed through an area of disturbed water extending from horizon to horizon, in a N.-S. direction, and approximately a mile wide. Small waves, moving from a SE'y direction, were breaking on the surface: the remainder of the sea was merely rippled. There was no discoloration of the water nor soundings at 600 fm. The sea temperature remained steady at 82°F. Wind SW., force 2. Low SW'y swell.

Position of ship: 6° 36'N., 82° 30'W.

### DISCOLOURED WATER

#### Off Ghana

S.S. *Obuasi*. Captain H. C. Allen. Calabar to Takoradi. Observer, Mr. F. Drury, 2nd Officer.

15th July, 1958. At 1455 G.M.T., under blue skies and in good visibility, the sea suddenly changed from a deep blue to a very bright red colour, remaining so for 5 min, in which time the vessel covered a mile. The red then became patchy, turned gradually grey and finally deep blue again. It was estimated that the discoloration covered an area of about 1 square mile, the locality being 16 miles due S. of Cape Coast, Ghana. Wind SW., force 2, slight sea and swell.

Position of ship: 4° 50'N., 1° 13'W.

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

"It sounds like either *Ciliate protozoa* or *Dinoflagellata* to me, but one can only guess in the absence of a sample and guessing is not a very scientific procedure."

#### Vicinity of Galapagos Islands

M.V. *Cornwall*. Captain F. C. Taylor. Auckland to Cristobal. Observer, Mr. J. Knight, 4th Officer.

15th September, 1958. At 1845 G.M.T. several patches of discoloured water were seen, one of them being estimated to be about a mile long by 300 yd wide. It was a distinct green colour, compared with the deep blue of the surrounding sea, and was covered with small breaking ripples. The sea surface temperature, taken by

standard bucket before entering the patch, was 66.8°F; during the crossing it was found to have risen by 5.5° to 72.3°. The rise continued after leaving the area, the temperature reaching 75.2° by midnight. The echo sounder revealed nothing abnormal and the ship's steering was unaffected. Wind SE., force 4. Sea rippled, with low SE'ly swell.

Position of ship: 0° 17'N., 87° 47'W.

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

"The position just on the edge of the comparatively shallow water north and east of the Galapagos Islands is certainly where such phenomena are to be expected. There is a strong confluence of currents in that region due mainly to the off-shore deflection of the Peru coastal current. Queer localised plankton patches are known to occur at times under such conditions, but have been very little investigated. From the present report one cannot say more than that the appearance was probably caused by some of these."

### North Pacific Ocean

M.V. *Fresno City*. Captain D. L. Beynon. Tokyo to Geelong. Observer, Mr. S. I. Clough, 3rd Officer.

19th July, 1958. An area of discoloured water was observed at 2330 G.M.T., fine on the starboard bow at a distance of about 1 mile. On approaching the area it was found to be about a mile long and a cable in width, running in an approximate direction 150°-330°. The colour was a dark greenish brown. No other patches were seen and there was no change in sea temperature (which remained at 83°F). The ship's echo sounding gear gave no bottom at 600 fm. Wind SE., force 3.

Position of ship: 13° 33'N., 147° 51'E.

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

"The report from *Fresno City* near Guam, to the east and south of the Marianas, sounds like an *Alga* water bloom, most probably the form of *Trichodesmium* that occurs so abundantly farther north and west in the South China Sea. I think this is the first report we have had from that precise area in these last four years."

### RADIO FADEOUT

#### Indian Ocean

M.V. *Otaio*. Captain A. Hocken. Melbourne to Aden. Observer, Mr. A. M. Gurney, 2nd Radio Officer.

16th August, 1958. At 0438 G.M.T. all short wave radio bands went silent quite suddenly, with no appreciable increase in background noise. At the time, the vessel was working M.V. *Middlesex* (MPBK) on 12.579 Mc/s and that vessel later reported that our signals faded completely, as did hers. All short wave broadcast stations were also silent, but the 500 kc/s band appeared normal. At 0650, Ceylon Radio (GZP5) was heard, signal strength 1-2 and gradually improving, but efforts to make contact failed as our signals (12.579 Mc/s) were too weak. No contact was possible on 16 Mc/s, but GZP6 was heard weakly there. Apparently normal propagation returned about 0810 G.M.T. and traffic was cleared to GZP5 with no trouble.

Position of ship: 3° 12'S., 61° 06'E.

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

"Dellinger fade-outs, similar to that experienced by the M.V. *Otaio* between 0438 G.M.T. and 0810 G.M.T. on the 16th August, 1958 were also reported by receiving stations in the U.K. as having affected all eastern circuits between 0440 and 0805 G.M.T. Similar radio fade-outs were reported by receiving stations in Hong Kong and Singapore and occurred during 0441-0650 G.M.T. and 0440-0630 G.M.T. respectively.

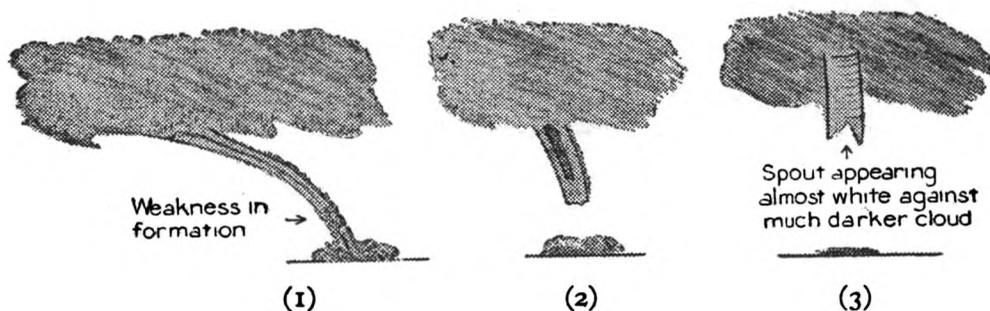
"Dellinger fade-outs are caused by a sudden increase in the ultra-violet radiation emitted by the sun and this particular fade-out was probably associated with the large sunspot, of area 600 millionths of the sun's visible hemisphere, which was seen during the period 6th-18th August."

## WATERSPOUT

### North Atlantic Ocean

M.V. *Tarantia*. Captain R. S. Paton. Norfolk Va. to Avonmouth. Observer, Mr. A. J. Dickie, 2nd Officer.

6th September, 1958. The waterspout illustrated formed rapidly about  $\frac{1}{2}$  mile



away at 1701 G.M.T., the column showing a certain amount of weakness at a height of about 100–150 ft above the sea: slight disturbance of the surface could be seen through glasses (Fig. 1). At 1705, when the spout was about  $\frac{1}{4}$  mile from the ship, the column was in the process of retracting, but much the same degree of surface disturbance persisted. Many sheerwaters appeared to be attracted to it, all circling round (Fig. 2). By 1706 the core had disappeared, but the anticlockwise spin was clearly seen. There was now rather less sea disturbance (Fig. 3). At 1709 the spout shortened still more and faded out. Cloud:  $\frac{5}{8}$  Cb,  $\frac{8}{8}$  Ac. Air temp.  $63^{\circ}\text{F}$ , sea  $66^{\circ}$ . Wind E., force 2–3. Sea smooth or slight. Local showers. Visibility very good.

Position of ship:  $46^{\circ} 49'\text{N.}$ ,  $37^{\circ} 45'\text{W.}$

## BANNER CLOUD

### South Pacific Ocean

M.V. *Hauraki*. Captain R. G. Hollingdale. Balboa to Auckland. Observers, Mr. J. J. Forrest, 3rd Officer and Mr. E. J. Wilson, 4th Officer.

7th July, 1958, 2324 G.M.T. Whilst passing the island of Raivavae, banner cloud was observed (see photograph opposite page 117). The base of the cloud was approximately 1,000 ft.

Position of ship:  $23^{\circ} 52'\text{S.}$ ,  $147^{\circ} 35'\text{W.}$

*Note. 1.* This is an interesting though typical case of banner cloud—the shape and contours of the island, in close proximity to the sea, providing ideal conditions for its formation. The following note, taken from *The Meteorological Glossary*, gives a few technical details concerning the formation and occurrence of this type of cloud:

“Banner cloud is a lenticular cloud that forms in the lee of an obstruction which causes a forced up-draught of wind, the clear but damp air being then dynamically cooled by its ascent to the point of cloud formation. Usually a descent and re-heating of the air will follow at some distance further down wind, and there the banner terminates. The banner cloud, though stationary itself, has a free flow of air constantly through it. The Helm Cloud over Crossfell Range, the Table Cloth over Table Mountain, Tursui over Mount Fuji and the cloud over the Rock of Gibraltar during the Levanter, are all well-known examples of banner cloud.”

*Note 2.* Captain Hollingdale loaned us a very nice coloured transparency of this cloud, a copy of which has been added to the collection in the Meteorological Office Library.

## PHOSPHORESCENCE

### Gulf of Guinea

M.V. *Trelissick*. Captain G. A. McKay. Takoradi to Burutu. Observer, Mr. D. Field, 3rd Officer.

7th July, 1958. At about 2000 G.M.T. patches of phosphorescence were seen, and it was decided to switch on the echo sounder in spite of the fact that the vessel was in an area where soundings were approximately 1,500 fm. To the surprise of the observer, a strong echo was found at 40 fm. The depth from which the echo was returned, increased over a period of 8 min to a maximum of 150 fm after which there was no further return. Air temp. 76°F, sea 78°, wind sw'ly, force 3. Sea slight.

Position of ship: 5° 30'N, 4° 32'E.

*Note.* The Ministry of Agriculture and Fisheries, to whom this observation was submitted, expressed their appreciation and commented that information of this nature played an important part in their work concerning the movements of shoals of fish.

### Arabian Sea

M.V. *Trevince*. Captain F. G. Bolton. Aden to Singapore. Observer, Mr. W. R. Clipson, 2nd Officer.

19th August, 1958. Between 0315 and 0340 S.M.T., the vessel passed through an area of phosphorescence. The sea changed gradually from its normal black appearance to a milky white or pearly grey, so nearly the same shade as the sky that it was impossible to distinguish the horizon, which both before and after crossing the area was clearly defined. Although the whole sea appeared light, it was not highly luminous, as occasional specks of phosphorescence showed up clearly against it, but it was sufficiently bright to cause wave crests and the bow wave to appear a dull, dirty white.

In spite of the fact that wave crests were to be seen, the sea as a whole was smoother during the passage of this area than elsewhere, and the vessel only once shipped spray, whereas, before and after, she frequently shipped both spray and light water along the weather side. Air temp. 77.6°F. Wind s., force 4.

Position of ship: 13° 04'N., 54° 05'E.

### Persian Gulf

S.S. *British Sailor*. Captain R. C. D. Flamstead. Bandar Mashur to Kwinana. Observer, Mr. F. A. Stolberger, 2nd Officer.

8th September, 1958. At 0000 G.M.T., when the sea temperature thermometer was withdrawn from the canvas bucket, several spots of phosphorescence were seen upon it. They were about  $\frac{1}{2}$  in. in diameter, and emitted a brilliant blue glow which persisted for approximately 30 sec. When rubbed with the fingers, each spot split up into fragments—the glow gradually fading. The phosphorescence in the sea itself was not at the time particularly marked.

Air temp. 88°F, sea 90°. Wind sw., force 3. Sea slight.

Position of ship: 26° 25'N., 55° 37'E.

*Note.* This observation is of interest because it illustrates that organisms capable of phosphorescence do not always emit light but require some form of stimulating mechanism.

### South Atlantic Ocean

M.V. *Fresno City*. Captain D. L. Beynon. Cape Town to Dakar. Observers, Mr. D. Jack, Chief Officer and Mr. C. Rothery, Apprentice.

16th September, 1958. At 1945 G.M.T. the vessel passed through a large circular patch of bright green phosphorescence, about 1 mile in diameter. An exceptionally brilliant streak lay NW.—SE. through the middle and another very vivid band was caused by the vessel's wake. Air temp. 77°F, sea 74°. Wind SE., force 3. Sea and swell slight.

Position of vessel: 1° 25'S., 8° 05'W.

## PHOSPHORESCENT FISH

### South Indian Ocean

M.V. *Sydney Star*. Captain W. T. Pitcher. Beira to Auckland. Observer, Mr. D. Tink, 4th Officer.

6th September, 1958. At 1300 G.M.T. approximately a dozen luminous fish were seen, their length being about 18 in. to 20 in. They kept head-on to the ship all the time as if attracted by its lights. No other phosphorescence was visible. Air temp. 52°F, sea 52°. Wind wsw., force 5.

Position of ship: 39° 30'S., 97° 57'E.

## GOSSAMER THREADS

### Beira anchorage

S.S. *Clan Davidson*. Captain T. A. Watkinson. Lourenço Marques to Beira. Observers, Mr. W. Marshall, 3rd Officer and Mr. J. E. Whitworth, Radio Officer.

14th July, 1958. While lying at anchor in Rio Pungue, white strands of gossamer were observed standing out at right angles to all rigging, halyards and aerials. The strands varied in length, some being several yards in extent. Air temp. 68°F, dew point 60°, sea 70°.

*Note.* Mr. D. J. Clark, of the Natural History Museum, comments:

"The young of several families of spiders disperse by means of gossamer. This usually takes place in the early morning when the sun has warmed the ground and evaporated the dew, producing air-currents.

"The spiders run to the tops of grass stalks, their abdomens produce a drop of silk, which is drawn out into a thread, or sometimes into two diverging threads, by the movement of the air-currents. When the threads are sufficiently long to support the spider, it lets go of the stem and floats away, to be carried sometimes great distances, and at great heights.

"Darwin records gossamer on the rigging of the *Beagle* when 60 miles from land. McCook records spiders landing on a ship 200 miles from land. Many of the spiders will have already detached themselves from the gossamer on landing, which again floats away, becoming entangled into strands, sometimes very thick and long."

## PORTUGUESE MEN O' WAR

### Arabian Sea

M.V. *Avonmoor*. Captain A. Coaster. Three Rivers to Kandla. Observers, the Master and Mr. A. Dean, Chief Officer.

9th August, 1958, 1110-1140 G.M.T. Groups of opaque white discs were occasionally seen floating on the surface. They were apparently thicker at the edge than at the centre, and slightly upturned. Sea temp. 84°F. Wind N'ly, force 1.

Position of ship: 20° 52'N., 65° 22'E.

*Note.* Dr. W. J. Rees, of the Natural History Museum, comments:

"It looks as if the opaque white discs were *Verella vellella*. At this size the discs are more rounded than oval and the crest is not particularly well developed. The alternative is *Porpita*, which seldom goes beyond 1½ in. in diameter. There is nothing unusual about the position or the number of *Verella*."

## WHITE-TIPPED SHARK

### North Atlantic Ocean

M.V. *Parima*. Captain G. A. Gibbons. Salvador to Las Palmas. Observer, Mr. C. J. W. Bush, 2nd Officer.

7th August, 1958. While the ship was hove-to for engine repairs, a large number of sharks were seen swimming round the ship and baited lines were put overside. At 1700 G.M.T. a shark was hooked and landed on deck. It was a sandy brown colour on top and white underneath. The dorsal fin, which stood about 12 in. high, was also a sandy colour—except for the top 2½ in., which were white. From the front to the extreme limit of the tail fin, the shark was 7 ft. 1 in. long and

weighed 142 lb. When the shark was in the water, two small fish, believed to be zebra fish, were seen swimming, one on either side and slightly forward of the dorsal fin. They were about 8 in. long with vertical black and white stripes. When it was landed, the shark had a small black fish about  $3\frac{1}{2}$  in. long stuck just inside its lower jaw. The shark was cut open and the contents of its stomach examined. These consisted of half a grapefruit and six empty cartons which had previously been thrown overboard. There were also five perfectly formed young in the uterus, still attached to the mother by the umbilical cord. They were about 9 in. long, black on the top and white underneath. Just before the shark died it prematurely gave birth to a sixth, which was only 3 in. long and a dirty yellow in colour.

Position of ship:  $17^{\circ} 28'N.$ ,  $21^{\circ} 24'W.$

*Note.* Mr. N. B. Marshall, of the Natural History Museum, comments:

"The photographs and description show that the fish was *Pterolamiops Longimanus* (Poey), the white tipped shark. This shark grows to at least 13 feet in length and is found in the tropical and sub-tropical Atlantic. Recent investigations have shown it to be abundant in the warm waters of the western North Atlantic. Its food consists mainly of squids and fishes, but it will also swallow garbage.

"Mating and pupping seems to take place in late spring or early summer and the gestation period is thought to be about one year. The female carries from 2-9 young. In a paper concerning the natural history of this shark, published in 1956, it is said that 1-3 shark-suckers (*Remora remora*) are generally attached to white-tips. The photograph showing one of these fishes clinging to the floor of the mouth is interesting. However, it may well have retreated into the shark's mouth as it was being caught.

"Besides shark suckers, 1 or 2 pilot-fish (*Naucrates ductor*), the Zebra fish of the observation, may accompany the shark. They are described as generally swimming a little above and behind the shark's first dorsal fin. Dolphin fishes (*Coryphaena hippurus*) may also swim in company with this species of shark."

## ABNORMAL REFRACTION

### North Atlantic Ocean

M.V. *Sussex*. Captain N. A. Thomas. Montreal to Liverpool.

17th August, 1958. At 0900 G.M.T. a vessel, exhibiting an inverted image, was seen to the N., and behind, on the horizon, lay a belt of dense fog or low cloud. As the vessel under observation rose on a swell, its image was reduced in height until only the masts and funnel could be seen: when it sank into the troughs, the complete image was seen again. It is thought that the presence of the fog or low cloud in some way limited the vertical extent of the image when the ship was on the tops of the swell. Air temp.  $48^{\circ}F$ , dewpoint  $46^{\circ}$ , sea  $47^{\circ}$ . Wind S., force 2. Cloud, St.

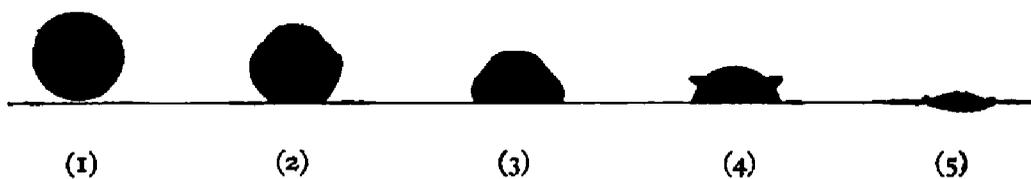
Position of ship:  $52^{\circ} 32'N.$ ,  $52^{\circ} 28'W.$

*Note.* Abnormal refraction is caused by unusual local variations in the temperature and moisture content of the atmosphere, and is therefore a function of the path of the light rays from the object to the image. The rise and fall of the ship, caused by the swell, could therefore change the path of the light rays sufficiently to affect the image of a ship under observation. The presence of fog or low cloud might indicate abnormal vertical variations of atmospheric moisture content sufficient to cause variations in the image of the ship.

### Straits of Gibraltar

M.V. *Achilles*. Captain D. R. Jones. Birkenhead to Suez Canal. Observers, Mr. R. C. Riseley, Chief Officer and Mr. D. M. Wright, 3rd Officer.

17th August, 1958. As the sun descended towards the horizon it became a deep



orange colour and underwent considerable distortion, the various phases being shown in the accompanying sketch. Just before dipping below the horizon (see 5th diagram) a rapid change in the colouring took place, the orange giving way to a bright yellow which in turn was replaced by green that spread from the edges over the remainder of the visible disc. The green was quite vivid when it first appeared but it rapidly deepened until just before the sun finally disappeared it became almost blue. During the whole of the afternoon evidence of the stratified condition of the air was given by the presence of layers of smoke which rose to a low level and then flattened out into long wisps and streaks. At 1800: Air temp. 75°F, wet bulb 70°, sea 69°. Wind w., force 4. Visibility very good.

Position of ship at 2100: 36° 18'N., 6° 18'W.

*Note.* This observation is of interest because it not only gives details of abnormal refraction but gives further evidence of abnormal vertical temperature distribution in the layers of the atmosphere within about 1000 ft of the sea. It is probable that such complex phenomena are associated with abnormal conditions over a great depth of the atmosphere.

## LUNAR RAINBOW

### North Atlantic Ocean

M.V. *Trelissick*. Captain G. A. McKay. London to Freetown. Observer, Mr. D. Field, 3rd Officer.

1st July, 1958. At 2045 G.M.T. when the vessel was passing near a rain squall, a full and perfect rainbow, exhibiting the whole normal range of colours, was seen. The moon was in the SE., and the bow was observed against the rain shower in the NW. No secondary bow was present. Cloud, 5/8 Cu. Visibility very good. Sea slight.

Position of ship: 12° 08'N., 17° 52'W.

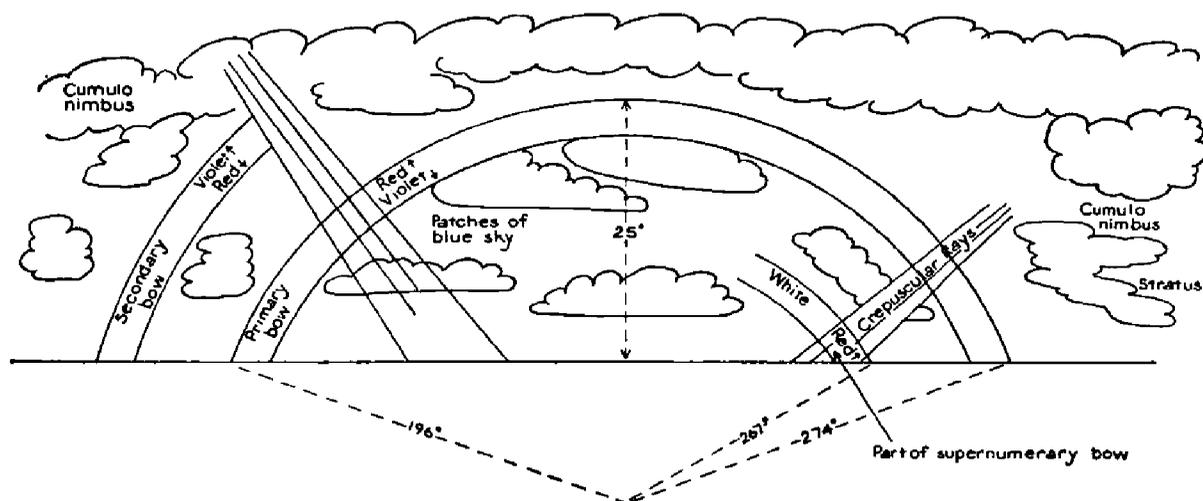
*Note.* Such a well developed lunar rainbow is rare. Angular measurements, with an indication of the sequence of colours, would have added to the value of this observation.

## UNUSUAL RAINBOW

### Indian Ocean

M.V. *Cambridge*. Captain P. P. O. Harrison. Wellington to Aden. Observers, the Master and Mr. R. N. Jordan, 3rd Officer.

14th July, 1958. At 0215 G.M.T. a complete rainbow of normal brilliance was



seen, reaching an elevation of 25°, accompanied by a portion of the secondary which also extended, on the left side of the primary, from the horizon to about 25° elevation. The secondary lasted for 2 min. Inside the primary, on the right hand side and parallel to it, a portion of a colourless bow, which persisted for 5 min, extended

from the horizon—the spacing between the two bows being  $7^\circ$  of arc. A number of crepuscular rays crossed the primary and secondary, while another set crossed the primary and the colourless bow. A very interesting feature was the well-marked band of colouring that occurred in the place where the crepuscular rays and the colourless bow overlapped. The order of colouring was the same as in the primary—i.e. with red on the outside. See sketch. Air temp.  $65.3^\circ\text{F}$ , wet bulb  $59.8^\circ$ , sea  $70.0^\circ$  Wind SE's., force 5.

Position of ship:  $23^\circ 48'\text{s.}$ ,  $90^\circ 32'\text{E.}$

## UNIDENTIFIED PHENOMENON

### Mozambique Channel

M.V. *British General*. Captain N. Poulter. Aden to Cape Town. Observer, Mr. I. W. Soutar, 2nd Officer.

22nd August, 1958. While moderately heavy showers of rain were falling at 1200 G.M.T., a faint rainbow was seen bearing  $110^\circ$ . Vertically below the apex of the bow, in a seemingly "compressed" state, was a remarkable "block" of light showing the colours of the spectrum, with yellow predominating. As the bow disappeared, the "block" of light rose and expanded until it in turn became a bow, but the intensity of the colouring was by now very much reduced, and there was no predominant tint.

The phenomenon occurred very near to the ship and covered a period of 12 min. Air temp.  $75^\circ\text{F}$ , wet bulb  $71^\circ$ , sea  $77^\circ$ . Wind SE., force 3. Visibility very good.

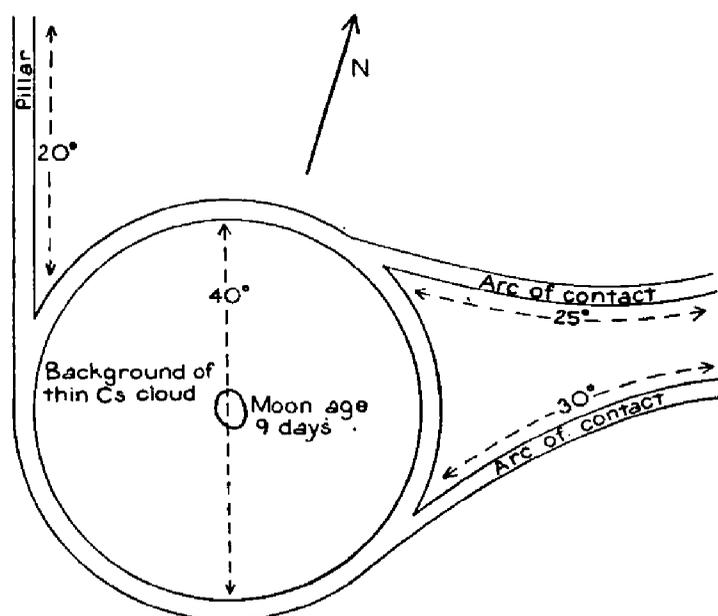
Position of ship:  $14^\circ 40'\text{s.}$ ,  $41^\circ 36'\text{E.}$

## LUNAR HALO COMPLEX

### Off Cape Verde

M.V. *Fresno City*. Captain D. L. Beynon. Geelong to Leith. Observers, the Master and Mr. S. I. Clough, 3rd Officer.

21st September, 1958. The halo shown in the accompanying sketch was seen



at 2130 G.M.T. It was about  $40^\circ$  in diameter and there were two arcs of contact on the right hand side of the halo, the upper one being about  $25^\circ$  in length and the lower one  $30^\circ$ . Both lay in a direction of  $070^\circ$ . On the left hand side, a pillar about  $20^\circ$  long rose to just below the zenith. After about 35 min the halo phenomena faded as the Cs cloud thickened. The moon, which was 9 days old, was a

little w. of the meridian at an altitude of about  $75^\circ$ . Weather, cloudy. Visibility very good.

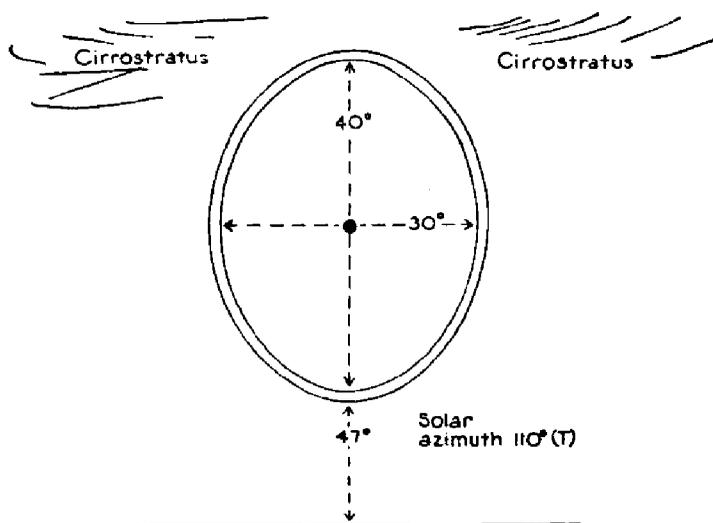
Position of ship at 1800:  $13^\circ 54'N.$ ,  $17^\circ 30'W.$

## HALO

### North Atlantic Ocean

S.S. *City of Brisbane*. Captain E. G. Chapman. London to Corner Brook (Newfoundland). Observer, Mr. R. E. W. Butcher, Junior 3rd Officer.

8th July, 1958. The halo shown in the sketch was seen from 1200 to 1230 G.M.T.



It was silvery in appearance, against the 7/8 layer of white Cs cloud present.

Position of ship:  $45^\circ 45'N.$ ,  $45^\circ 40'W.$

*Note.* This halo is of special interest because it is elliptical. Almost all such luminous rings are circular.

## ZODIACAL LIGHT

### South Pacific Ocean

S.S. *Devon*. Captain S. W. Lambrick. Balboa to Brisbane. Observer, Mr. R. J. Bayliss, 3rd Officer.

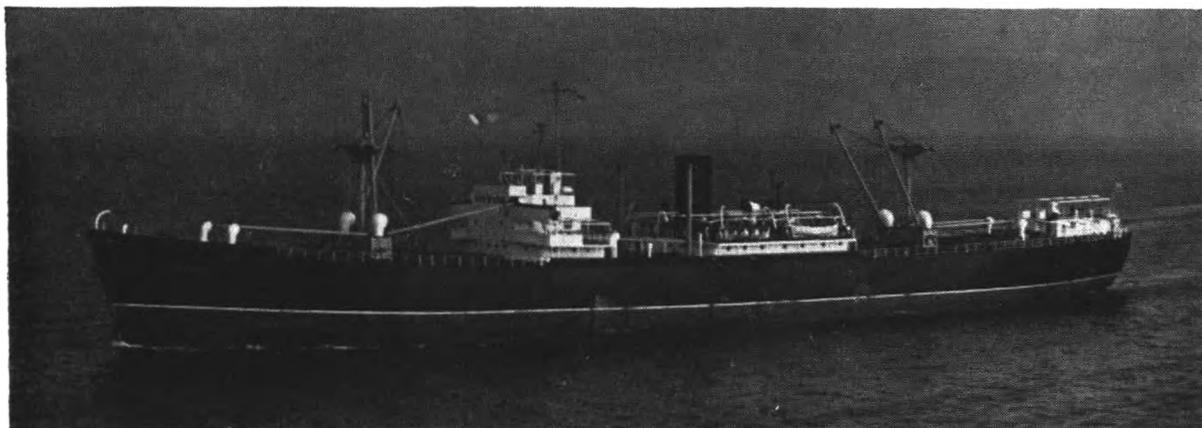
10th July, 1958. At 0500 G.M.T. in position  $17^\circ 22'S.$ ,  $132^\circ 55'W.$ , the zodiacal light was observed, as shown in the sketch. It was a uniform misty white which gradually diminished in brightness with increasing distance from its axis. There was no trace of the gegenschein or zodiacal band. By 0650 the brighter portion of the light had set below the horizon, but a faint luminosity remained between  $250^\circ$  and  $290^\circ$  up to an altitude of  $25^\circ$ , at  $270^\circ$ .

11th July. No observation due to cloud.

12th July. At 0600 in position  $20^\circ 14'S.$ ,  $144^\circ 52'W.$ , the zodiacal light was again seen, but it was less intense, smaller in area and set earlier, than on 10th. It occupied the same position in the sky, reaching in altitude to  $\eta$  Virginis and from Zosma to just north of  $\gamma$  Hydrae in width. The brightest part was approximately as intense as the "fairly bright portion" observed on 10th.

On 13th and 14th, the light was faintly seen at 0800 through gaps in the cloud. Due to stormy weather it could not be seen from 15th-17th.

On 18th at 0910 in position  $25^\circ 59'S.$ ,  $177^\circ 02'E.$ , the light was clearly seen and appeared to be at least as bright as on the 10th. It was very bright up to  $15^\circ$  altitude, then faded gradually to  $30^\circ$  altitude. The axis was vertical and bore  $280^\circ$ , the light being fairly uniform. It faded to a narrow band, thought to be the zodiacal band, at  $35^\circ$  altitude, and this in turn faded away at approximately  $45^\circ$



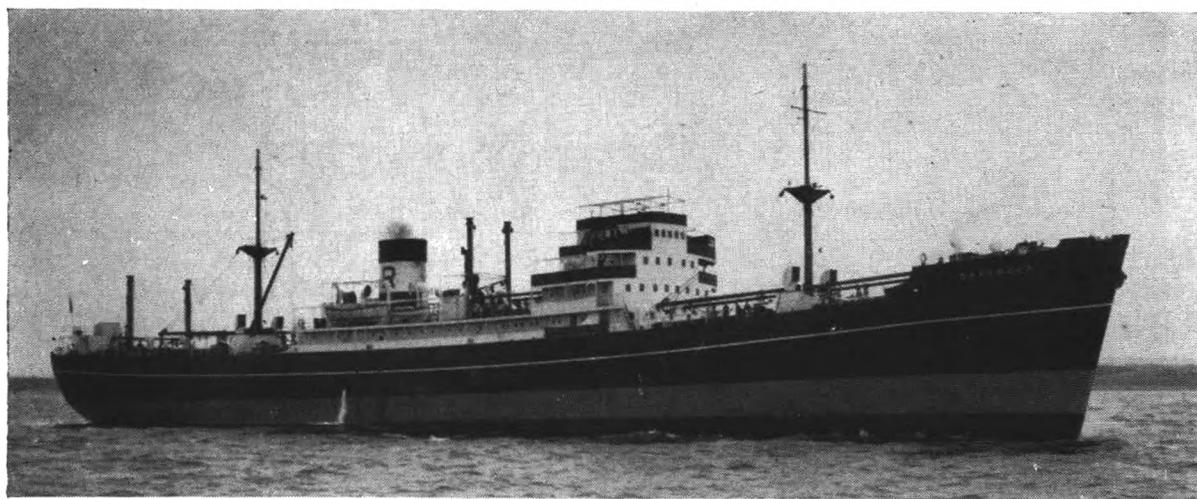
*Photo by Pat Sweeney, Dublin*

*Tarantia (Anchor Line, Ltd.), Captain R. S. Paton*



*By courtesy of Skyfotos*

*Hadrian Coast (Aberdeen S.N. Co., Ltd.), Captain W. Wyness*



*By courtesy of Wm. Doxford & Sons, Ltd.: photo by Turners Ltd., Newcastle*

*Dartmoor (Messrs. W. Runciman & Co.), Captain F. Bradfield*

The three ships which gained the highest markings for their meteorological logbooks during the year ended March 1959 (see page 107).

(Opposite page 117)

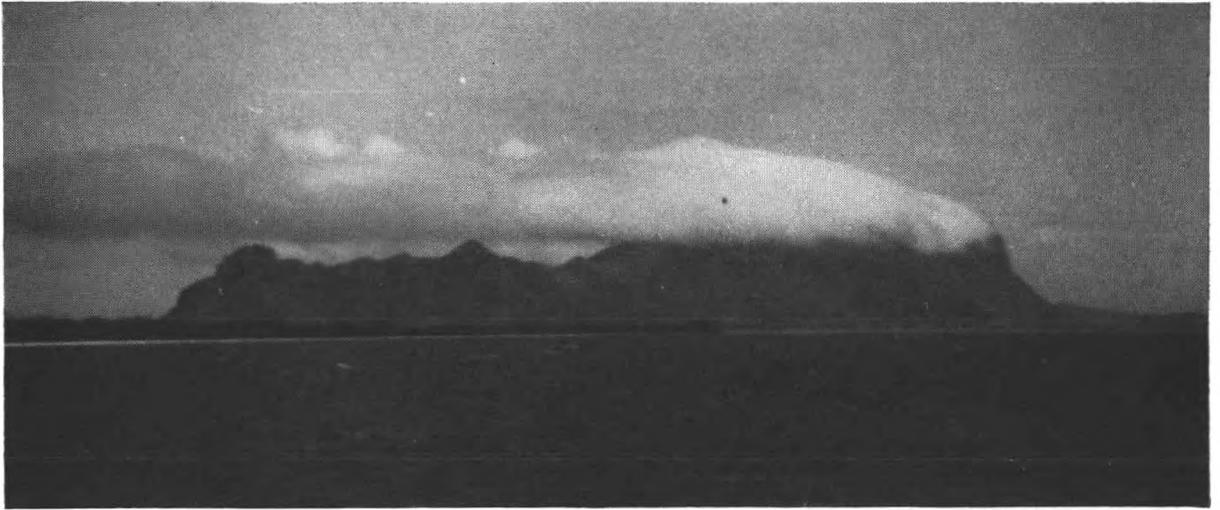
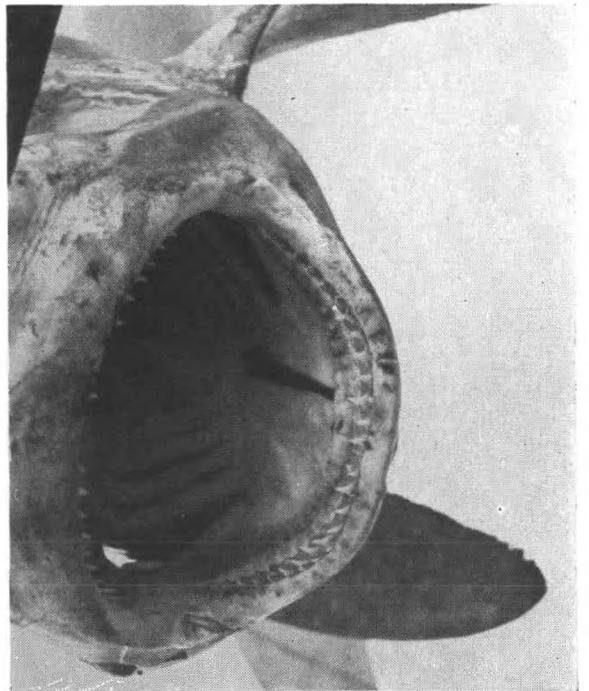
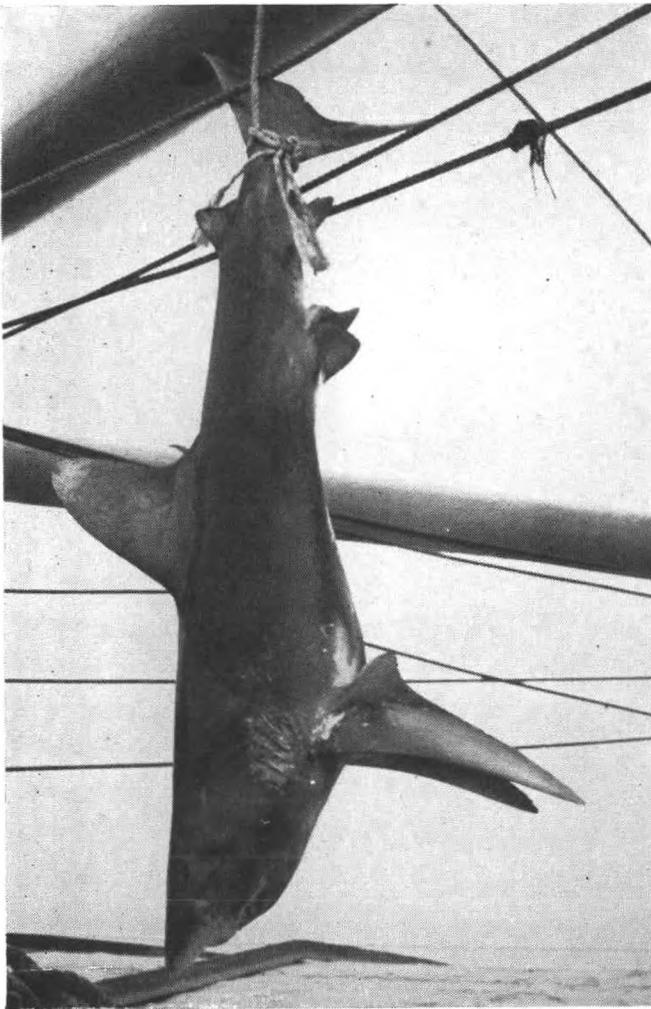


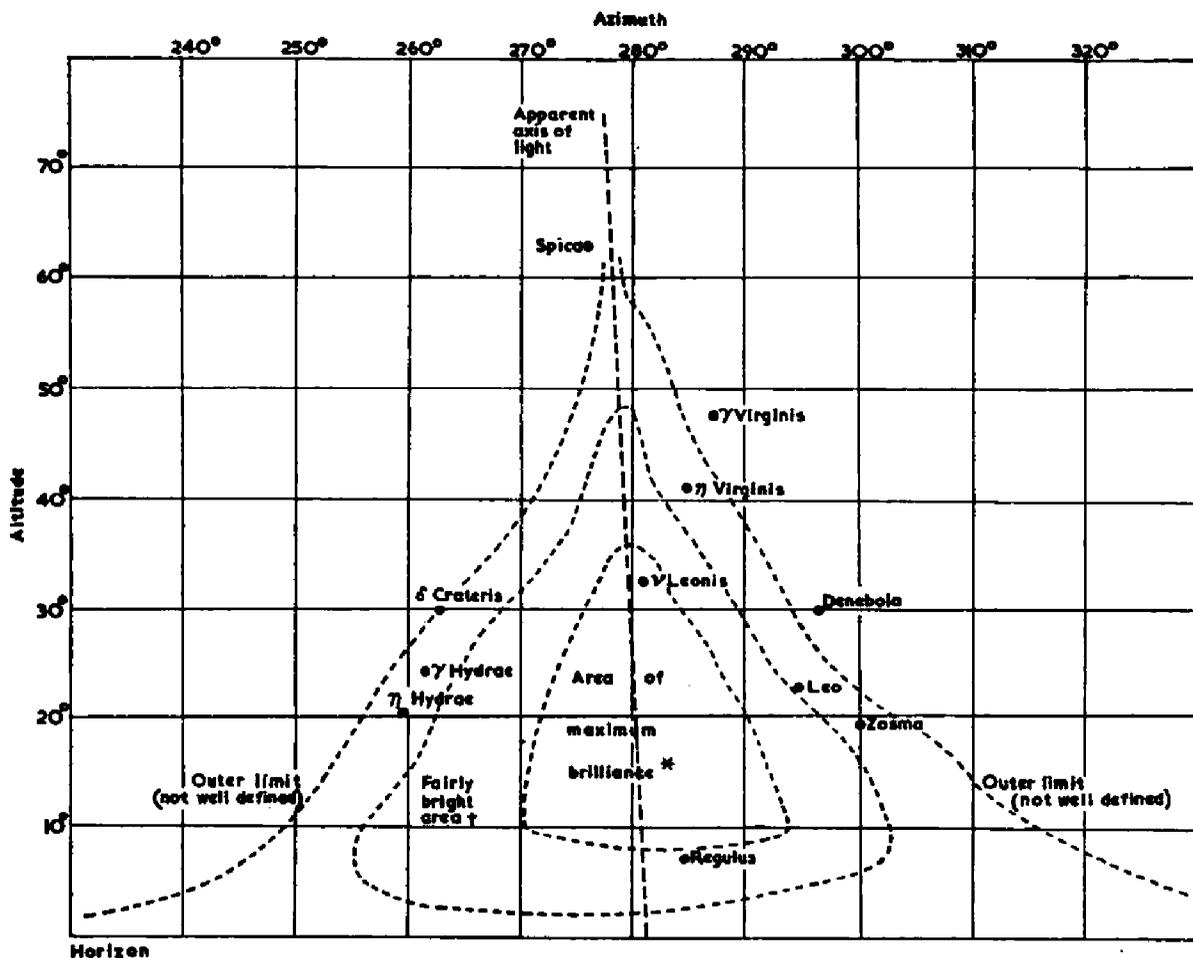
Photo by E. J. Wilson

Banner cloud observed from M.V. *Hauraki* (see page 110).



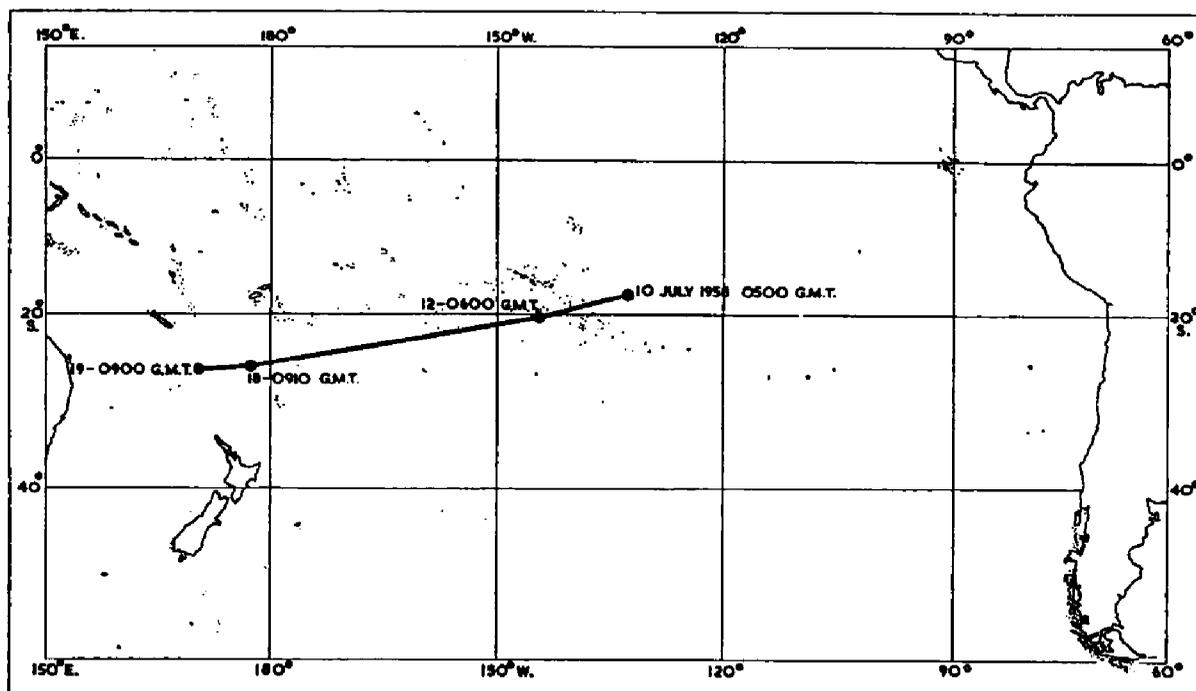
Photos by C. J. W. Bush

Shark landed by M.V. *Parima* (see page 112). The photograph on the right shows a sucker fish in the interior of its mouth.



Pattern of zodiacal light observed.

\* Maximum brilliance was about equal to intensity of Milky Way around  $\eta$  Argus, but was more uniform.  
 † The fairly bright area was of same intensity as Milky Way between  $\theta$  Scorpii and  $\eta$  Sagittarii.



Positions from which zodiacal light was observed by S. S. Devon.

altitude. Its position in the sky was about  $5^\circ$  to the left of that shown in the sketch but the shape was the same, though the orientation was different.

On 19th at 0900 in position  $26^\circ 11'S.$ ,  $170^\circ 38'E.$ , the light was again observed.

It was as bright, up to  $15^\circ$  altitude, as the Milky Way in the vicinity of  $\eta$  Argus. Up to  $35^\circ$  altitude the degree of luminosity was comparable to the Milky Way near  $\theta$  Scorpii and  $\eta$  Sagittarii. The axis bore  $280^\circ$ , the light had the same misty, uniform appearance as previously, and occupied the same position as on 18th July.

### GREEN FLASH

#### Mozambique Channel

M.V. *British General*. Captain N. Poulter. Aden to Cape Town. Observer, Mr. J. Land, 3rd Officer.

25th August, 1958. At 1524 G.M.T., just before sunset, while part of the sun's



disc was still visible, a bright green colouration was seen to spread quickly from the edge, towards the centre, until the whole segment became covered, just before it disappeared below the horizon. The duration of the phenomenon was 5 sec, the changes in the appearance of the disc being observed through binoculars ( $6\times$ ). See sketch. Air temp.  $70^\circ\text{F}$ , wet bulb  $62^\circ$ , sea  $74^\circ$ . Fine. Visibility excellent.  $1/8$  Cu. Wind SE'ly, force 3.

Position of ship:  $25^\circ 01'S$ ,  $35^\circ 19'E$ .

### AURORAE

*Note.* Interesting accounts of aurora displays, well distributed over the sea routes of both the Northern and Southern Hemispheres, have been received. Thirty-nine ships sent in reports of displays, many of which must have been impressive both for their beauty and complexity. Unfortunately, owing to shortage of space, it has been possible to publish only eight of these reports, although all have been sent to the Aurora Survey. As for all observations of interesting natural optical phenomena, carefully drawn diagrams giving accurately measured angles add greatly to the value of reports of Aurora.

#### North Sea

S.S. *Carlo*. Captain B. Waldie. Hull to Norway. Observers, the Master and Mr. P. J. S. Bishop, 3rd Officer.

4th September, 1958, between 1945 and 1955 G.M.T. A band of red light about  $10^\circ$  wide, which began  $5^\circ$  above the horizon and ended at an elevation of  $40^\circ$ , was seen in the W.: at the same time there was a faint white glow towards the N. About half an hour later, as the vessel was approaching Brevik Fjord, the whole sky became covered with red and white aurora, taking the form of an immense cone, the apex of which was right above the ship. The display lasted for some considerable time, with the colour changing from red to white and then to red again.

Position of ship:  $58^\circ 55'N$ ,  $10^\circ 00'E$ .

#### Norwegian waters

S.S. *Menastone*. Captain S. F. Sheasby. River Tyne to Archangel. Observers, Mr. A. M. Brown, 2nd Officer and Mr. P. Rashley, 3rd Officer.

26th July, 1958, between 2200 and 2300 G.M.T. Whilst approaching Lodingen, Vest Fjord, N. Norway, the mountains to the north were outlined against a deep blood red and purple sky which had lines of deeper purple running across it. Clouds made it impossible to observe the height to which the coloration extended. It was seen for about one hour, then gradually faded and broke up into small patches.

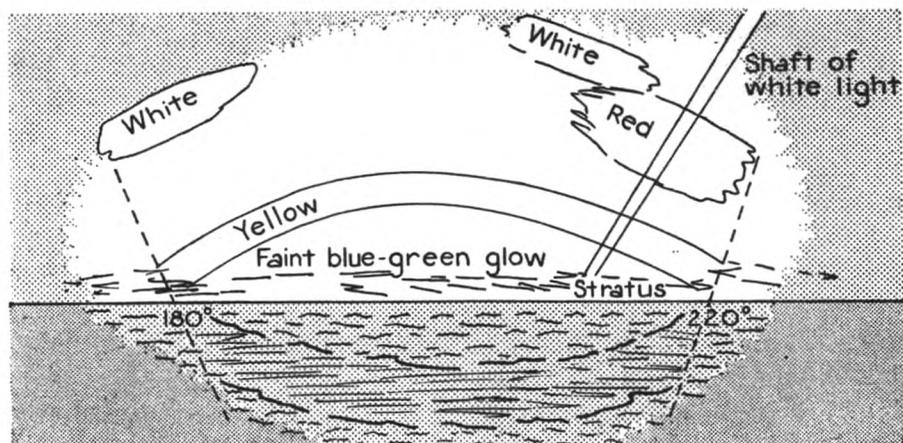
27th July, 1958. At 0000 G.M.T. when proceeding northward through Tjeldsundet, N. Norway, openings in the cloud to the northward showed the sky to be a deep crimson colour. At 0040 G.M.T. the sky was completely overcast.

Position of ship:  $68^\circ 30'N$ ,  $16^\circ 18'E$ .

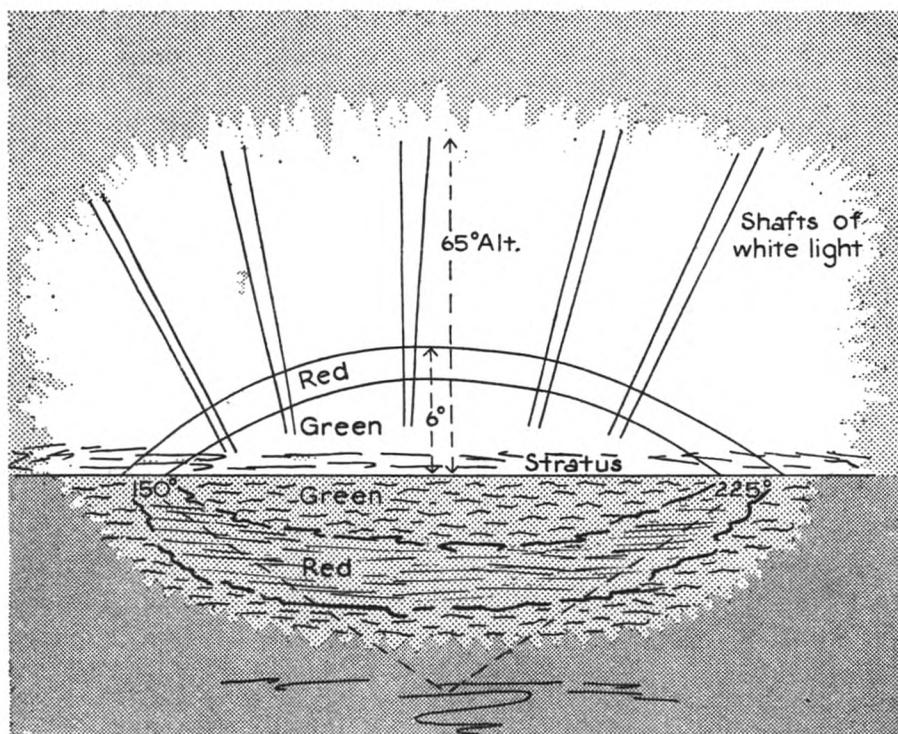
### Australian waters

M.V. *Cambridge*. Captain P. P. O. Harrison. Wellington to Aden. Observers, the Master and Mr. R. Jones, 4th Officer.

8th July, 1958. At 1915 S.M.T. the initial development of the aurora shown in



(1)



(2)

Fig. 1 was observed: the stage reached at 1940 is shown in Fig. 2. By 1930 the arc had become such a deep and brilliant red that stars in the southern heavens showed a marked loss of intensity and those shining through the aurora were difficult to distinguish. Throughout the display, rays of white light were fading and intensifying at fairly regular intervals, but by 2000 the aurora was becoming pale, though still very distinct. A bank of cloud low on the horizon was present during the period of observation.

Position of ship:  $37^{\circ} 08' \text{S.}$ ,  $126^{\circ} 50' \text{E.}$

## South Indian Ocean

M.V. *Port Napier*. Captain P. S. Ball. Las Palmas to Durban. Observer, Mr. I. B. Rankin, Junior 3rd Officer.

8th July, 1958, at about 2030 G.M.T. The sky to the southward, up to  $15^{\circ}$  altitude, took on a deep red hue over an arc extending from  $120^{\circ}$  to  $200^{\circ}$ . Bands of light gradually became more intense until three were plainly visible against the deeper red background. They were about  $2^{\circ}$  wide and rose almost vertically. Throughout the period, the intensity of the aurora ranged from being almost invisible to a lurid blood red colour. At the centre of the display, on the horizon, a pale green arc of light appeared at 2130. This gradually expanded until by 2315 no red colouring was visible. The sky throughout was cloudless.

Position of ship:  $34^{\circ} 57'S$ ,  $20^{\circ} 24'E$ . (Off Cape Agulhas.)

S.S. *Helenus*. Captain T. R. Phillips. Sydney to Aden. Observer, Mr. H. F. Bostock, 3rd Officer.

8th July, 1958. Between 1450 and 1505 G.M.T. a very fine display of aurora was seen, consisting of concentric arcs of green, white and red light, each merging into the other. The green glow was centred on the horizon on a bearing of  $185^{\circ}$  and extended over  $30^{\circ}$  of horizon. It merged into the white arc above it, which reached an elevation of  $35^{\circ}$  approximately. The white arc, in turn, diffused into a broader, deep red arc, which had a maximum elevation of  $65^{\circ}$  and covered  $120^{\circ}$  of the horizon. During the display, the green sector changed little in appearance, but red and white arcs suffered distortion and became patchy. They were traversed by pink rays which varied rapidly in shape and position. These were visible only when the whole display was at its brightest, and emanated from the green area, excepting near the E. and W. extremities. The red portion of the aurora dominated the display, being very bright, and was so rich in colour that the ship was bathed in what is best described as "pink moonlight". From dusk to dawn the auroral light, consisting mainly of irregularly shaped patches of red and white, was clearly visible. At 1700 another flare up was observed but this did not compare in brilliance with that seen earlier.

Captain Phillips stated that this was a remarkable display, and that he had never seen such a bright aurora in this latitude.

Position of ship:  $36^{\circ} 54'S$ ,  $126^{\circ} 18'E$ .

S.S. *Dunedin Star*. Captain J. McInnes. Beira to Melbourne.

8th July, 1958. At 1430 G.M.T., aurora was seen in the shape of an arc, red in colour and intense near the horizon. It faded out at 1515 but at 1630 it reappeared and covered a much greater area of sky. It originated, as before, in the SE., but this time it assumed the form of bands and rays which moved over the sky in all directions. Tinges of green were seen in the aurora, which persisted until 1745 G.M.T. At 1830 vivid red and white rays were seen between bearings of  $110^{\circ}$  and  $190^{\circ}$ , rising to an altitude of  $70^{\circ}$ : all but the brightest of the stars were obliterated by the display. Between 1850 and 2000 the activity decreased and was replaced by a white glow over the southern sky: there were, however, intermittent displays of red to the E. of S., each of which lasted from 5 to 10 min. During the period the sky was mainly free from cloud.

Position of ship:  $37^{\circ}S$ ,  $90^{\circ}E$ .

*Note.* There appears to have been a widespread display of aurora in the southern Indian Ocean between Australia and Africa around 8th July, 1958. Examples of these are given above.

S.S. *Jason*. Captain W. K. Hole. Aden to Albany. Observers, Mr. M. J. Glover, 2nd Officer and Midshipman W. W. Mitchell.

4th September, 1958. At 1900 G.M.T. several large diffuse patches of brilliant red aurora were seen against a background of delicate pink light. They extended from  $130^{\circ}$  to  $250^{\circ}$  and varied in elevation from  $10^{\circ}$  to  $80^{\circ}$  above the horizon. At one point a vivid beam of light was seen for about 10 sec, moving vertically upwards from  $10^{\circ}$  above the horizon to an elevation of about  $60^{\circ}$ . Adjacent to this ray, and separating it from the next patch, was an area of sky completely clear of any auroral light. This was also in the form of a straight shaft, having the same elevation, but much greater width. This area was about  $10^{\circ}$  across, as compared with the  $2^{\circ}$  width of the ray of light.

Position of ship:  $31^{\circ} 44' \text{S}$ ,  $109^{\circ} 34' \text{E}$ .

### New Zealand waters

M.V. *Cornwall*. Captain F. C. Taylor. Dunedin to Bluff. Observers, Mr. P. Lay, Chief Officer, Mr. B. Wood, 3rd Officer and Mr. J. Knight, 4th Officer.

9th July, 1958. Aurora was seen at 1830 G.M.T. in the form of a pale green arc lying between bearings  $140^{\circ}$  and  $230^{\circ}$  and reaching a maximum altitude of approximately  $40^{\circ}$ . Brighter rays of similar hue, apparently radiating from a point below the horizon, occasionally crossed the arc and were sufficiently bright to obscure the lesser stars. The display continued with variable intensity until 1930, when the rays lying from  $140^{\circ}$  to  $180^{\circ}$  increased in brilliance and assumed the form of draperies, pale blue-green in colour, rising to an altitude of  $30^{\circ}$ . There were rapid variations in brightness and, although the basic glow weakened, the curtains became more brilliant towards 1945 but were of insufficient intensity to obscure the stars. Previous to this, at 1940 a broad red band, bearing  $260^{\circ}$ , rose to an altitude of  $25^{\circ}$ . It varied in intensity but generally was less bright than the neighbouring minor stars. The curtains and rays moved rapidly over small arcs and then disappeared, the activity being especially noticeable around the upper end of the red band, from which rays seemed to radiate outward and flash with a sweeping movement, before disappearing. The red band phenomena ceased abruptly at 1955, but the green glow, curtains, and rays from near the horizon were seen until 2040 after which the display faded out. During the whole period the sky was mainly clear.

Position of ship:  $46^{\circ} 30' \text{S}$ ,  $169^{\circ} 50' \text{E}$ .

## METEORS

### North Atlantic Ocean

M.V. *Dilwara*. Captain B. A. Rodgers, D.S.C., R.D. Southampton to Singapore. Observers, Mr. R. J. Elston, 2nd Officer, Cadet R. T. Lindsay and the Quartermaster.

23rd August, 1958. At 0210 G.M.T., a meteor, fairly large, but only as bright as Sirius, was observed at an altitude of  $10^{\circ}$ , bearing  $140^{\circ}$ , and moving in a s'ly direction. It emitted a trail about  $3^{\circ}$  long, which lay at an angle of  $45^{\circ}$  to the horizon. After about a second the meteor burned out, the trail lengthened and its centre part rotated in an anticlockwise direction for several minutes. No cloud. Visibility very good.

Position of ship:  $36^{\circ} 12' \text{N}$ ,  $6^{\circ} 48' \text{W}$ .

### North Pacific Ocean

M.V. *Trevince*. Captain F. G. Bolton. Ube to Fiji. Observer, Mr. W. R. Clipson, 2nd Officer.

22nd September, 1958. At 1702 G.M.T. a meteor appeared overhead with a vivid flash and moving southwards disappeared on a bearing of  $180^{\circ}$  at an altitude of  $58^{\circ}$ . The head was white, about three or four times as brilliant as Sirius and twice as

large, with a white tail approx.  $5^\circ$  long, almost as bright as the head. The meteor itself was seen for only 2 sec, but the tail remained visible for 3 min. For the first 7 or 8 sec it continued to be very bright: it then faded slowly, but still remained clearly defined for 2 min, before finally disappearing during the third min. Weather fine. Small amount of Cu. Visibility very good.

Position of ship:  $22^\circ 50'N.$ ,  $144^\circ 18'E.$

*Note.* This observation has been included because of the abnormally long time during which the tail was visible. This requires that there were probably some special phenomena associated with the break-up of the meteor.

## DOUBLE METEOR

### South Atlantic Ocean

*M.V. Port Hardy.* Captain A. N. Williamson. Las Palmas to Cape Town. Observer, Mr. R. M. Ellison, Junior 3rd Officer.

14th July, 1958. At 1832 G.M.T. two brilliant meteors, separated by  $1^\circ$ , were seen following the same track. They were first observed bearing  $070^\circ$ , altitude  $15^\circ$ , and after a flight lasting 2 sec disappeared on a bearing of  $095^\circ$ , altitude  $7^\circ$ . The colour varied between yellow and green and the sky to the E. was brightly illuminated when the meteors passed behind a cloud. Weather fair:  $3/8$  Cu. Visibility excellent.

Position of ship:  $26^\circ 44'S.$ ,  $11^\circ 37'E.$

## METEOR SHOWERS

### North Atlantic Ocean

*S.S. Gloucester City.* Captain S. G. Smith, O.B.E. Avonmouth to New York.

12th August, 1958. Between 0200 and 0300 G.M.T. many meteors were observed, mainly in the NW., SE. and in the zenith. They also fell in rapid succession in the W., travelling in a SW. direction. One meteor, brighter by far than any star and leaving a glowing trail for a brief period after the parent body had disappeared, was seen on an approximate bearing of  $130^\circ$ , moving in a S'ly direction.  $1/8$  As. was present.

Position of ship:  $40^\circ 58'N.$ ,  $63^\circ 30'W.$

*M.V. Tarantia.* Captain R. S. Paton. Glasgow to New York. Observers, Mr. A. J. Dickie, 2nd Officer and Mr. W. R. Miller, 3rd Officer.

12th August, 1958. At 0146 G.M.T. a large irregularly shaped body, several times the size and brilliance of Venus, was observed bearing  $150^\circ$ , altitude  $21^\circ$ . It appeared to rise very slightly at first, and then drifted slowly downwards, disappearing in the SW. at an altitude of about  $12^\circ$ . It was visible for 2 sec, and during its fall the brilliance fluctuated.

Numerous other meteors were also seen, of which at least nine originated at an altitude of approximately  $49^\circ$ , bearing W. and close to Vega. The direction of travel was SW. from the point of origin. Several others originated in the same position as the meteor described above, and these moved in a SE'ly direction.

It was noticed that in the two hours between 0400 and 0600 G.M.T. the great majority of meteors in the western sky (several dozen in all) travelled from their points of origin towards a bearing of between  $220^\circ$  and  $240^\circ$  at the horizon. Those originating on a bearing of  $230^\circ$  disappeared on the same bearing.

Atmospheric conditions were exceptionally clear during the night, stars at an altitude of only  $2^\circ$ - $3^\circ$  being clearly visible. There was no cloud.

Position of ship at 0500:  $41^\circ 47'N.$ ,  $61^\circ 40'W.$

# A Chat about Climatic Changes

By R. G. VERYARD, B.SC.

(Deputy Director of Central Services, Meteorological Office)

“ Man’s yesterday may ne’er be like his morrow  
Naught may endure but mutability.”

*P. B. Shelley*

Before we talk about climatic changes, it is necessary for us to be clear what we mean by “ climate ”. To many people, the word is taken to refer to the “ mean ” or “ normal ” weather conditions averaged over a fairly long period. Indeed, it has been agreed within the World Meteorological Organisation that the “ normal ” value of a meteorological element should be based on observations made over a period of 30 years and, to provide a world-wide standard of comparison, the periods 1901–1930, 1911–40 and so on, are used for computing “ standard ” normals. Obviously, a long-term mean of one single element, such as temperature or rainfall, is not really enough to characterise the climate of a place; it is necessary to refer to a combination of all the significant elements, such as temperature, humidity, rainfall, sunshine, etc. But even this is not really adequate. To distinguish clearly the climate of one place from another, it is also necessary to refer to the daily, seasonal and annual variations of the various elements, their extreme values and the coincidence or non-coincidence of these extremes; in the case of rainfall, in particular, there is a need to know not only the amounts but also the frequencies of falls of specified duration and intensity.

Given the required data, we could attempt to work out a scheme of climatic classification and then determine the various climatic zones or areas. In fact, there are already quite a number of climatic classifications—but it is not proposed to discuss them here. We will have learned at school that the word “ climate ” is derived from a Greek word meaning “ to incline ” and that the original zones of climate were zones in which the inclination of the sun’s rays at noon was the same, i.e. zones of latitude. We will also have learned that true climatic zones do not run strictly parallel with lines of latitude and that the climate of a locality is governed not only by latitude but by position relative to the continents and oceans, height, aspect, and other local geographical conditions. We will have been told about the climatic importance of ocean currents, of the difference between maritime, continental and desert climates, and how the various climatic zones are related to the “ general circulation of the atmosphere ” comprising the doldrums, the trade wind belts, the horse latitudes, the westerlies of middle latitudes, the monsoons and so on. But we will not have been given precise scientific explanations of climatic phenomena because it is not yet possible to formulate mathematically the mechanism which produces specific climates or obtain solutions which could explain the observed facts.

Now let us consider what is known about climatic changes and fluctuations in the past. From the mineral content of rocks, from the evidence of glacier action and of variations in lake and sea levels, from the fossil remains of vegetable and animal life, it has been possible for geologists and palaeontologists to establish that what is known as the Great Ice Age began more than half a million years ago reaching its peak about thirty thousand years ago, and that for scores of millions of years earlier the climate of the world was warmer than it is today with no ice even at the poles! There is evidence, too, that there was at least one earlier Ice Age, if not two. During the Great Ice Age, an ice sheet extended as far south as the middle of North America; in Europe, an ice sheet covered the whole of Scandinavia and reached as far south as the Great Plain of Europe that stretches from Northern France eastwards into the U.S.S.R.; an ice sheet covered Ireland, Scotland and also Northern England with its southern boundary across the Midlands. Also, there is evidence that during this period the climate was cooler all over the world:

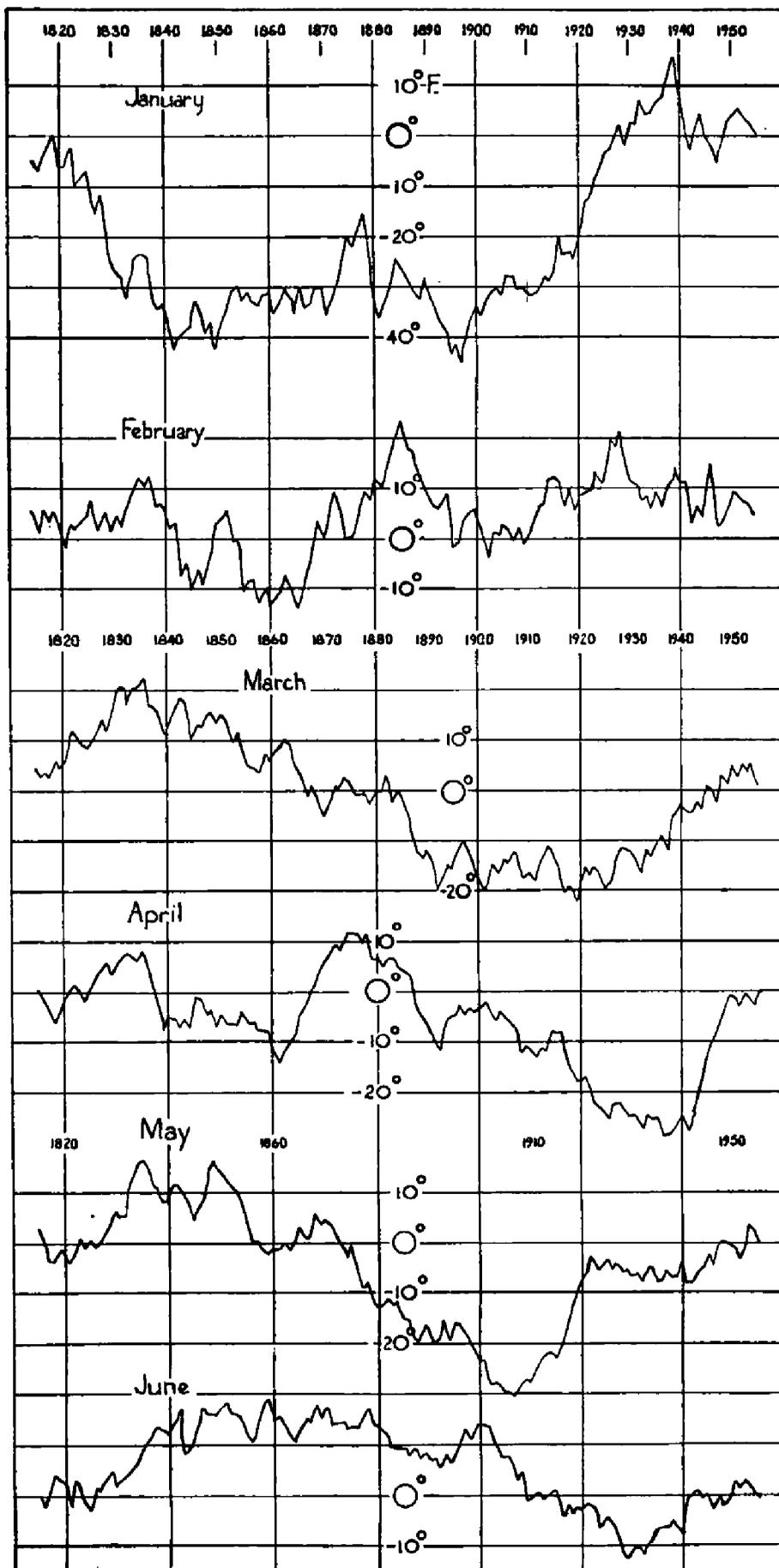
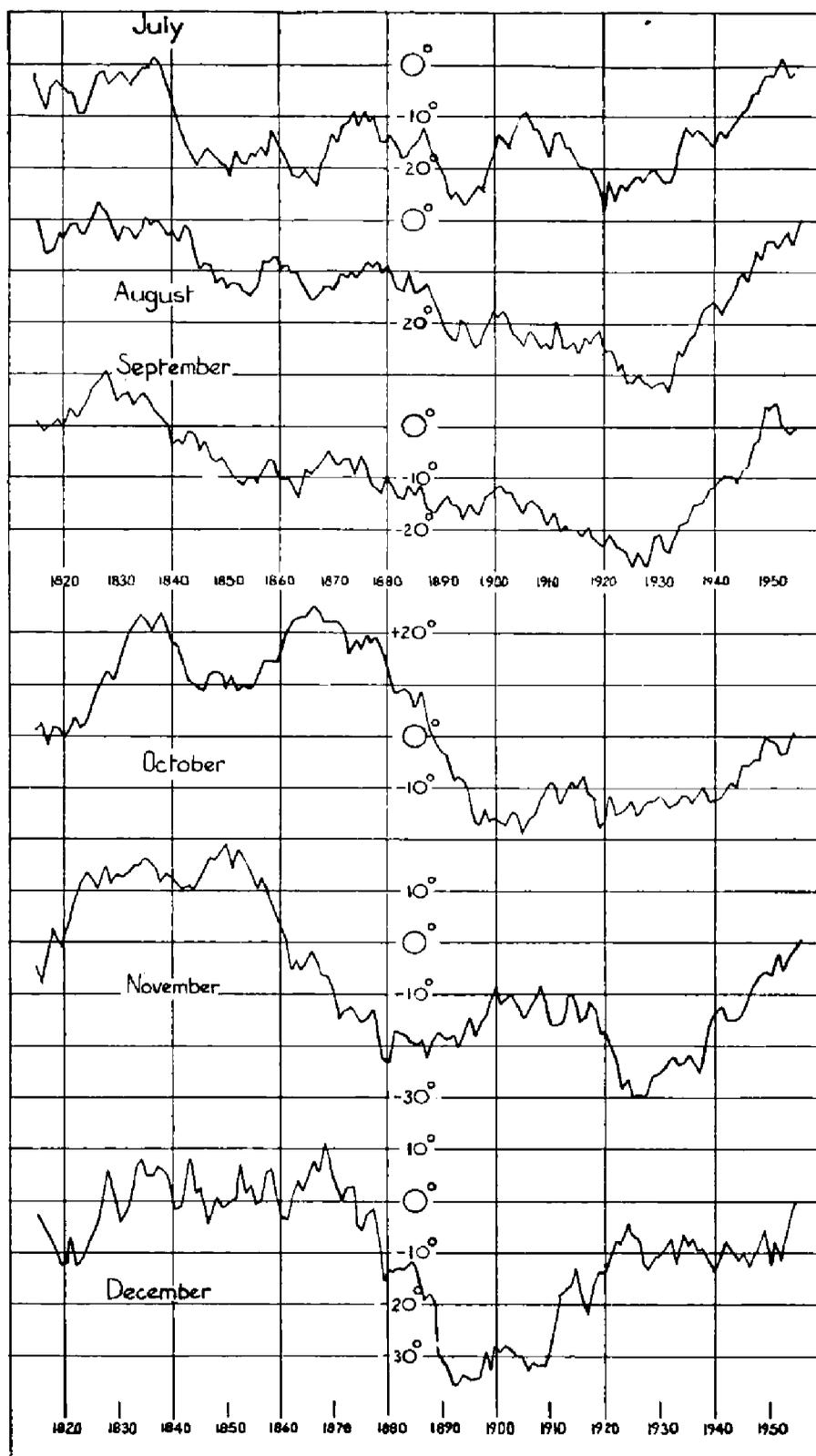


FIG. 1. Accumulated difference from average of mean



(A down-slope signifies a month with mean temperature below average, an up-slope signifies a month with mean temperature above average: e.g. the down-slope in January from 1878 to 1881 means that in each of the years 1879, 1880 and 1881 the mean temperature of January was below average, the departures from average adding up to  $-19^{\circ}\text{F}$ . The up-slope from 1881 to 1884 means that in each of the years 1882, 1883 and 1884 the mean temperature of January was above average, the departures from average adding up to  $+11^{\circ}\text{F}$ .)

monthly temperature at Oxford from 1815 to 1955.

New Zealand had an ice cap; there were glaciers in Tasmania; Patagonia was covered by an ice sheet; the glaciers of Mount Kenya reached as low as 10,000 feet or less. It has also been shown that the retreat of the ice was not a continuous process; there were four cold periods, separated by three warm or "genial" periods when the glaciers receded into the mountains—the last major ice sheet over Scandinavia retreating about 6,000–8,000 B.C. Indeed, it can be said that we have not yet completely emerged from the Great Ice Age, as even today there remain the ice sheets of Greenland and of Antarctica. Actually, it is now generally agreed that about 5,000–3,000 B.C. the temperature, at least in North Western Europe, was rather higher than it is now and this period is known as the "climatic optimum"—when Greenland was a fair and pleasant land. Since the climatic optimum there appear to have been several variations—a cold and rainy period about 850 B.C., a secondary optimum about A.D. 800–1,000, a dry period in the north temperate belt in the sixth and eighth centuries, great storminess and heavy rainfall in the twelfth and fourteenth centuries, and a marked deterioration in the seventeenth and eighteenth centuries with a "Little Ice Age"—producing a considerable advance in the European glaciers. After the 1830s, there was a significant amelioration with a rising trend of temperature in almost all areas in the middle latitudes of the northern hemisphere. These changes are not universally accepted; the main evidence for them is, in Europe, fluctuations of alpine glaciers and in the traffic across the alpine passes; in Asia, variations in the level of the Caspian Sea and other lakes; in North America variations in the growth rate, as revealed by three rings of the Sequoias of California, some of which are more than 3,000 years old. During the last 100–200 years there are available, fortunately, instrumental meteorological observations which provide more trustworthy evidence of climatic fluctuations. Studies of these observations have yielded some very interesting results. In Massachusetts, from about 1850 to 1950 there was a rise of  $3.5^{\circ}\text{F}$  in winter temperatures; in Lapland there was a rise of about  $5^{\circ}\text{F}$  in the mean temperature of November and December between 1901 and 1930 and 1935–1950; at Spitsbergen the January mean temperature rose by over  $10^{\circ}\text{F}$  in the second and third decades of this century—but this remarkable warming appears to be confined to a narrow zone in the region of the retreating ice limit; in New South Wales and Victoria there was a marked increase in rainfall after the early 1890s. Impressive indirect evidence is available which confirms a general warming, especially in the winter months, in high latitudes during the last 100 years; there have been upward trends in the surface temperature of the North Atlantic; there are the retreats of glaciers, the upward movement of snow lines accompanied by an advance of birch and pine up the mountains, the lengthening of the freeze-free season, the northward migration of fish, and so on. Similar phenomena have been noted in earlier historical times and have died away. Is the recent climatic amelioration still continuing? There is some doubt about this. The Alpine glaciers still appear to be retreating but the rate of warming in North-West Europe seems to have slowed down—at least temporarily. In England, average winter temperatures have been  $2^{\circ}\text{F}$  lower in the last decade or two than in the 1920s; between 1897 and 1936 there were only two really severe winters in Britain whereas there have been five to six since 1937. Since 1950, summers have also deteriorated, as holiday makers in the British Isles (and other parts of North West Europe) will still remember! But, at present, it is quite impossible to make any sound deductions about what is happening. The risk of drawing false conclusions, especially from mean *annual* temperatures (see Fig. 2), will be realised from Fig. 1, which gives curves for the accumulated departures from average of *monthly* mean temperature (i.e. the individual differences from average for each month are added and plotted year by year) at Oxford from 1815 to 1955. The lack of parallelism between the curve for the year (Fig. 2) as a whole and the curves for individual months (Fig. 1) can be seen at a glance! As we still do not know precisely the factors that determine average conditions it will be readily understood that we are quite unable to forecast future changes!

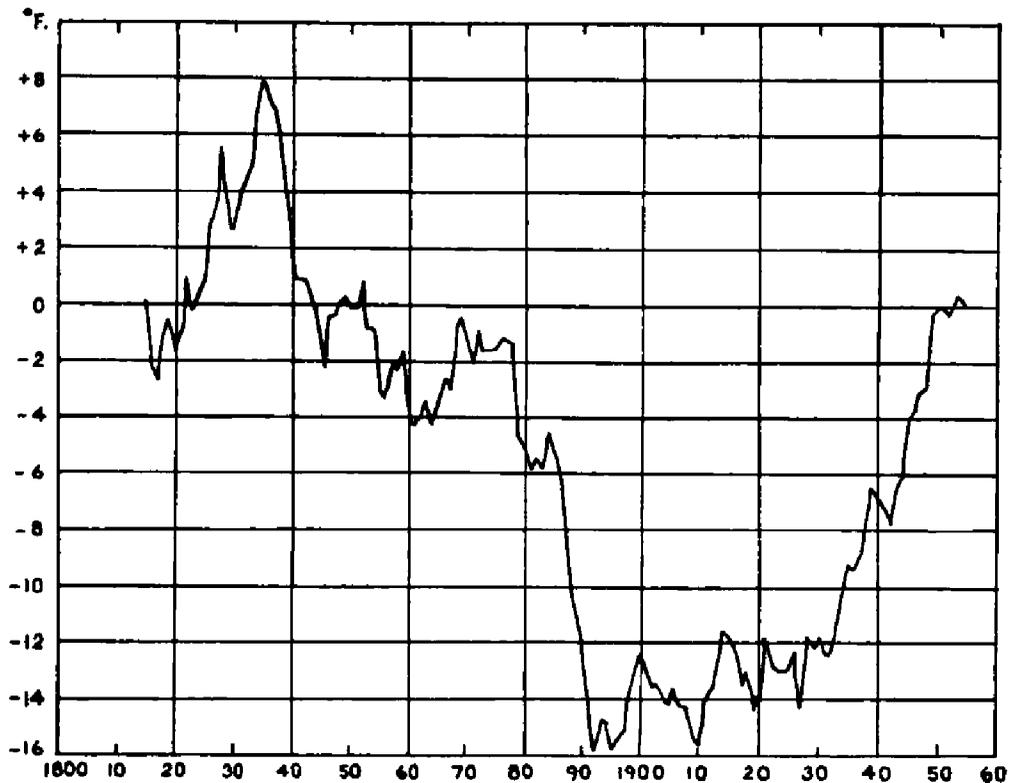


Fig. 2. Accumulated difference from average of mean annual temperature at Oxford from 1815 to 1955.

What are the possible causes of climatic change? First of all, we must get firmly into our minds the idea that the land-ocean-atmosphere system constitutes a complicated heat engine driven by energy received from the sun. At the equator the solar radiation (short wave) received at the top of the atmosphere is 900 calories per square centimetre every day, whereas at the poles the corresponding figure is 1,070 in mid-summer but nil in winter. For the Northern hemisphere, if we consider a long period average, about 47 per cent of this incoming radiation reaches the earth directly or by scattering and about 15-20 per cent is directly absorbed by the atmosphere and clouds; the rest is reflected back to space. At the earth's surface some of the sun's radiation is reflected back to space, some is stored, at least temporarily, and some is passed back to the atmosphere by convection and by long wave radiation. In the atmosphere itself, there is a gain of short wave radiation from the sun and a gain of long wave radiation from the earth balanced by a loss of long wave radiation both to the earth and to space. At the surface some energy is used up in evaporation whilst in the upper air, often at some distance from the areas where evaporation is taking place, "stored" energy is released by the latent heat of condensation. All these energy exchanges are affected by the thermal properties of the surface and the "transparency" of the atmosphere—so that the amount of heat which reaches the atmosphere directly or by the transfer of "stored" heat may vary considerably from day to day and from month to month; for example, the change in heat reflected to space and therefore lost to the atmosphere due to a change in cloudiness from nil to overcast may be as much as 100 to 200 calories per square centimetre per day. On the other hand, it is important to bear in mind that, whereas increased heating at the surface may lead to increased evaporation, increased evaporation may lead to increased cloudiness which, in turn, could lead to a reduction in the amount of solar radiation reaching the ground and therefore to decreased heating at the surface! Thus, this inter-locking complex of heat "sources" and "sinks" in the sea-land-atmosphere system can be thought

of as an inter-linked system of heat engines complete with fly-wheels and feed-back mechanisms! We can say that, primarily, the energy of atmospheric motion and ocean currents is derived from horizontal gradients of temperature. The heat engines do mechanical work against friction by carrying the working fluids, the air and the water of the oceans, from the "boiler" of the tropics to the "condenser" of the polar regions. In the atmosphere, there is a complicated coupling of eddy patterns varying from the huge system of trade winds, and the depressions of middle latitudes, to hurricanes and tornados. In the sea, there are the larger units of circulation such as the Gulf Stream and the Kuro Shio and the sluggish currents at the bottom of the oceans.

Bearing in mind that any significant modification of the radiation balance can modify the general motion of the atmosphere and the oceans, we can now envisage possible theories as to the causes of climatic change. We would certainly regard as deserving of consideration those theories, and there are many of them, which are based on assumed variations in solar radiation, e.g. that the sun itself is a "variable" star, that sunspots or solar flares are accompanied by marked changes in the output of solar energy, and that similar changes are brought about by tidal oscillations raised on the sun by the planets in their orbits: it is estimated that a 1 per cent change in the intensity of the incoming solar radiation would give about 1°C change in the average air temperature. Another possible cause would be the effect of cosmic dust of varying density interposed between the sun and the earth; the recently discovered belts of intense radiation which surround the earth are particularly interesting in this connection. As we might expect, there are the theories based on variations of solar distance associated with the changing ellipticity of the earth's orbit, the precession of the equinoxes and the varying tilt of the earth's axis. Finally, we might anticipate those theories of climatic change based on variations in the "transparency" of the atmosphere attributable to the dust from meteors, the dust from volcanic eruptions, and man-made pollution. In regard to the latter, it should not surprise us that some theories of climatic change are based on variations in the carbon dioxide content of the atmosphere—because carbon dioxide has the property of letting through the short wave radiation of the sun but keeping in the long wave radiation from the earth, i.e. there is a so-called "greenhouse" effect. It has been estimated that the present rate of consumption of coal and oil is adding to the carbon dioxide content of the atmosphere at the rate of 30 per cent a century! Another possible cause of long-period climatic change (which might *not* occur to us) is variation in the relative distribution of land and sea; there are, in fact, some most interesting theories based on an alleged drifting of the continents and also on other topographic changes.

Thus we find many theories—some related to the long period changes associated with the Ice Ages, some related to the short period changes known to have occurred in historical times—hence the quotation at the beginning of this article! Not one theory has satisfactorily linked the cause and the effect, not one theory has yet been generally accepted. None of the alleged weather "cycles" has been established beyond doubt. However, a dynamical approach to climatology has already begun and it is not too much to hope that, with the increased knowledge of the general circulation of the atmosphere which may be obtained from the data made available during the International Geophysical Year, and with the aid of electronic computers, it may be possible to determine the whys and wherefores of climatic differences and of climatic change.

As a concluding paragraph to this article, it may not be inappropriate to express the hope, in view of what has been said above, that the observers in the voluntary observing ships will realise how important it is to make accurate observations of sea surface temperature and of ocean currents! In view of the multiplicity of writings on climatic change and the space which would be required to give even a fair selection, no references have been given here—but officers of the voluntary observing ships to whom this article is addressed, who would like to read more

about the subject, should consult the Librarian of the Meteorological Office at the Harrow Headquarters, who would be happy to give advice. Also, any shipmasters or officers who, during their travels, have learned of any significant changes of ocean currents or local climate are invited to communicate such information to the Editor; it is possible that such contributions could be of value to the Meteorological Office and they would be considered for publication in *The Marine Observer*.

## Some Achievements of the International Geophysical Year

By D. C. MARTIN, B.SC., PH.D., F.R.I.C., F.R.S.E.

(This article consists of extracts from a paper read by the author at the Royal Society of Arts on 11th March, 1959. It is published here by kind permission of that Society. The author was largely responsible for co-ordinating the I.G.Y. activities of the United Kingdom.)

Man more or less adjusts or is adjusted to his immediate environment. He can provide himself with local heat, clothing and buildings for his protection. He has learned to provide local power sources from natural fuels and the control of water movement. But if we inquire a little into the cosmic environment of his planet earth and the forces which act on it we find many unanswered questions. Earth is a member of a family of planets. It spins on an axis and moves around the sun, the centre of the solar system. Any major change in the sun would wipe out the human race, as earth stands in a critical relationship with this central source of life-giving power. Life on the earth's surface is protected by its atmosphere, again dependent on the sun. This atmosphere protects us from the dangers of outer space, for example, cosmic rays and meteors, and it provides us with the air we breathe. It is important in the budget of the heat and water relationships on the earth's surface. Another element in this budget consists of the oceans which cover two-thirds of the surface. And what of the solid earth itself? If we were to take an apple and cut it through, the earth's crust and its atmosphere would be represented by the skin of the apple. As yet we have not penetrated underneath the crust and we can only deduce what goes on there from indirect experiment. We really know so very little about the physical forces and processes which determine the conditions in which we exist. We have detected and measured the earth's magnetic field, we know that there are sunspots and we have detected the cosmic radiation reaching the surface of the earth, but we do not yet fully know why events such as these occur. We can make a reasonable attempt to forecast to-morrow's weather, but next week's or next month's or next year's still baffles us, because we don't know enough of the weather-forming processes. To try to find some of the answers to these questions is the reason for the International Geophysical Year.

### The Organisation of the I.G.Y.

Planning the I.G.Y. called for a large effort over many years. It was done by the International Conference of Scientific Unions, which appointed a special international committee of experts for the purpose. The committee, with the aid of national scientific organisations of which the Royal Society was one, named the period, 1st July, 1957, to 31st December, 1958, and the programme. Standardised procedure and timetables were circulated beforehand. An estimate of the total number of stations would be in the region of, say, 4,000, with several thousands more with volunteer observers. It is estimated that about 30,000 scientists, engineers and technicians took part and, taking into account all the support services, for example, in transporting personnel to Antarctica and elsewhere, one rough estimate made by our U.S.A. colleagues of the total cost is £500,000,000.

We have seen a simple concept, mooted in a private home in 1950, catch the imagination first of a few interested scientists, then the support of national scientific institutions which have persuaded Governments to provide the financial resources required to execute their plans. Then came the realisation of the plan, the greatest co-operative scientific enterprise in history, providing an example of many nations working together with a common aim. This achievement of the I.G.Y. holds promise for further endeavours which could be of considerable importance in world affairs. For example, here is a quotation from a national newspaper:

The past 18 months of the I.G.Y. have completely affirmed the enormous efficacy of the ideas going into its organisation and has completely justified the not inconsiderable outlay of material resources and human effort put into it. One can confirm this boldly even now, regardless of the fact that the assimilation of the scientific data received has only just begun. . . . In the future [our] scientists will do everything in their power for the further widening and deepening of international collaboration. We hope that our colleagues abroad will share these aspirations and on their side will help in the continuation and strengthening of the international scientific collaboration so well carried out. The I.G.Y. has brilliantly demonstrated all the scientific advantages of similar material-creating efforts by scientists of all countries.

That was from a translation of an article in *Pravda* (29th December, 1958), written by a Soviet scientist (V. Belousov).

It was agreed some time ago that data resulting from the I.G.Y. studies would be deposited in three World Data Centres: one in the U.S.A., one in the U.S.S.R., and a third dispersed between a number of scientific institutions at other localities, as follows:

- CENTRE A—11 sub-centres at different institutions (all subjects) in the U.S.A.
- CENTRE B—3 sub-centres in Moscow,
  - 1 in the Crimea (all subjects)
- CENTRE C—Meteorology in W.M.O. (Switzerland)
  - Geomagnetism (Denmark, Japan)
  - Aurora (United Kingdom, Sweden)
  - Airglow (France, Japan)
  - Ionosphere (United Kingdom, Japan)
  - Solar Activity (Switzerland, Italy, France, Germany, Australia)
  - Cosmic Rays (Sweden, Japan)
  - Glaciology (United Kingdom)
  - Rockets and Satellites (United Kingdom)
  - Seismology (France)
  - Gravity (Belgium)
  - Nuclear Radiation (Sweden, Japan)

Each of the three World Data Centres A, B and C will receive original copies of I.G.Y. data from countries that elect to use that particular centre as the archives for their data. Each Centre will then supply copies to each of the other two. By international agreement any scientist may request, and be supplied at the cost of reproduction, with copies of data he requires.

Meteorological data, which are being reproduced on to microcards at the World Meteorological Organisation's headquarters in Geneva, may well contribute about half of the total I.G.Y. observational data in quantity. I give this example to underline the fact that so much of the I.G.Y. is of a synoptic character and that we cannot expect results for some years to come. Even with the aid of computers the reduction of the data, and its study to discern patterns and trends, calls for an enormous effort yet to come. For the first time it will be possible to compile daily weather maps of the entire globe, but these will only become available in a year or two from now.

### **Some Scientific Achievement of the I.G.Y.**

#### **(a) THE SOLAR PATROL**

Whilst the scientific planners selected a period of sunspot maximum for the

I.G.Y. they could not have foreseen that they had chosen the period of greatest sunspot activity since records began to be kept in 1778. The all-time record was about mid-way in the I.G.Y. period. Outbursts of energy on the sun called solar flares are associated with sunspots, and these flares are the principal influence on solar terrestrial relationships. They emit radiation of two main types—waves and particles. Some of the waves come to us as visible light. Some have a wavelength which is shorter; these are the ultra violet and X-rays. Some are longer in wavelength and these are the radio waves. All these waves come at the same speed of 186,000 miles per second and travel the 92 million odd miles between the sun and the earth's surface in 8.3 minutes. Earth-bound observers can receive the light on optical instruments, one of the principal of these being the spectrohelioscope. Fifty stations throughout the world have been making observations at set times in hydrogen light.

The shorter waves, the ultra violet and X-rays, have a marked impact on the ionosphere, the mirror in the sky consisting of electrified layers which reflect radio waves sent out from earth surface transmitters and which make long-distance radio communication possible. When these short waves disturb the ionosphere, we have a radio fade-out and so we can detect the disturbances on our radio receivers and accurately record them.

The longer radio waves coming directly from the sun can be recorded by the radio telescopes, and among stations which have been "listening" to the sun are radio telescopes at Jodrell Bank and Cambridge University.

The *particles* travel much more slowly—on an average at about 1,000 miles a second—and they follow on the *waves* some 24 to 36 hours after the wave effect has been noticed. These are all charged particles. One group, mainly positively charged, are cosmic rays, and their incidence is measured by monitors on the earth's surface at over 100 stations. The other group consists of ions and electrons, and the impact of these charged particles on the earth's outer atmosphere has the most dramatic of all the influences of a solar flare. They cause magnetic storms which have been known to disrupt line transmission of electricity in some northern cities. They are known to be closely associated with the appearance of the aurora. They also cause ionospheric storms with consequent severe disturbance of radio reception.

The I.G.Y. scientist seeking a better understanding of these influences of the sun has therefore been keeping a careful record of magnetic storms at over 250 magnetic observatories. The appearance of the aurora has been carefully recorded by a greater corps of observers, many of them volunteers, than ever before. Men in ships and aircraft have assisted in recording their visual observations of the detailed changes in form and movement of aurora. Automatic cameras photographing the whole sky have been operated in the higher latitudes at night-time. In day-time radio echo methods have been used to record the aurora. The ionospheric physicists at more than 250 stations have obtained vast records of the sun's influence on the ionosphere.

The I.G.Y. had the best possible start, for on the first day, 1st July, 1957, there was a great solar flare, which gave rise to all these phenomena caused by solar wave and particle radiation, and especially to an extraordinarily fine auroral display. Activity remained high for the opening five months. During the I.G.Y. as a whole there were 21 occasions when a Special World Interval was declared, thus enabling I.G.Y. scientists everywhere to intensify their measurements during these periods when these atmospheric disturbances followed the outbursts of major solar flares.

During these periods rockets were flown to high altitudes to make direct measurements of the radiation, and U.S. experiments have shown the existence of a powerful flare of solar X-rays in the wave band 1 to 8Å, and that this is very probably the cause of the short-wave radio fade-outs. A fine opportunity to examine the sun's short-wave radiation presented itself when there was an eclipse of the sun on 12th October, 1958. From a point in the zone of totality, the Danger

Islands in the Pacific Ocean, five rockets were launched by U.S. scientists with instruments to measure the ultra-violet radiation and the X-radiation. Four rockets, reaching to 140–150 miles, sent back radio messages, which when interpreted showed that the ultra-violet radiation diminished as the surface of the sun was obscured by the moon, but that the intensity of X-rays remained the same. This was considered to be the first conclusive proof that the source of the X-rays is the sun's outer atmosphere, or corona, which remained as a halo during the eclipse, and that the ultra violet radiation comes from the solar disk or chromosphere. The ionospheric sounding confirmed the continued existence of a reflecting layer.

There have also been great advances in the U.S.A. and the U.S.S.R. in the detailed studies of magnetic fields in active solar regions, and it appears that in a flare there is a sudden conversion of magnetic energy into wave and particle radiation.

#### (b) ANTARCTICA

There are two very good reasons for the inclusion of Antarctica in the studies related to the earth's surface. First, the I.G.Y. study is world-wide, and without information from this great land mass the collection of observations would be seriously incomplete. Secondly, both polar regions are highly important because, as the earth is a great magnet, charged particles from the sun are drawn towards the earth's magnetic poles and the phenomena they give rise to, the aurora, the magnetic storms and so on, are more pronounced there than anywhere else on earth. Before the I.G.Y. we knew practically nothing about Antarctica. There had been individual journeys of exploration associated with men such as Amundsen, Scott, Shackleton, Mawson and Byrd. But these small parties could only investigate a minute part of this uninhabited continent, which is as large as the U.S.A. and Europe taken together.

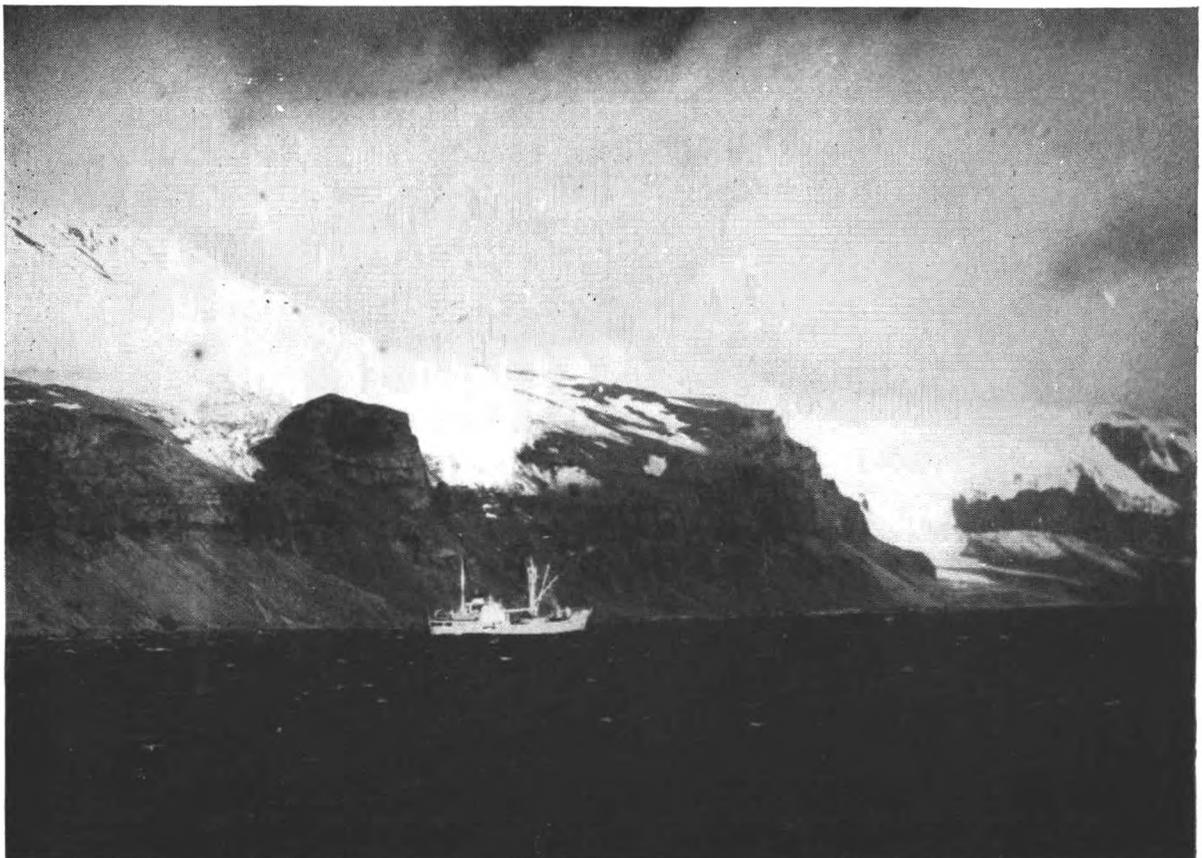
Because of its importance in geophysics it was proposed that as many nations as possible should send expeditions to the Antarctic mainland, and sites were suggested to achieve a ring of stations round the South Pole. Before the I.G.Y. only Australia at Mawson had a permanent base on the Antarctic mainland, whilst Great Britain, Argentina and Chile had a number of bases on the Grahamland peninsula. In addition, there were bases on some of the neighbouring islands. Photographs of Heard Island, where Australia has had a base, are shown on opposite page. This lack of bases contrasts markedly with the many permanent stations in the north polar regions—where incidentally there are also a few stations whose scientists live and work on stations on ice floes which drift about in the ice-covered waters surrounding the North Pole. One of the Antarctic sites selected as being particularly desirable was in Vahsel Bay at the head of the Weddell Sea, and although this had a bad reputation for navigation because of the danger of heavy pack ice, the Royal Society, after consulting many authorities, decided in August 1955, to make the attempt to set up an Antarctic I.G.Y. base there. The expedition leader's orders stated that the base should be established south of  $75^{\circ}$  South latitude, since on the information then available this would be a very appropriate spot from which to observe geophysical phenomena. The advance party selected a site for the base at  $75^{\circ} 31's. 26^{\circ} 36'w.$  early in January 1956. By mid April they had erected a huge base hut 130 feet long and 30 feet wide, living meanwhile in tents. During the year a limited but valuable programme of scientific work was carried out in auroral studies, meteorological observations and ionospheric studies. In the autumn of 1955, Dr. (now Sir Vivian) Fuchs was preparing to set up his advance base for the Commonwealth Trans-Antarctic Expedition also at Vahsel Bay and, some weeks after Dalglish had selected his site for the I.G.Y. base, Fuchs established his advance party at Shackleton base in latitude  $77^{\circ} 57's.$  and longitude  $37^{\circ} 16'w.$  Later in 1956 the Royal Society's suggestion that the name Halley Bay be given to the I.G.Y. base and the bay at which the party and its stores were landed was



*Australian Official photograph*

The remarkable example of rotor cloud shown above has a strong resemblance to a flying-saucer. It was formed by wave-motion in the atmosphere on the lee side of "Big Ben" (9,000 feet).

The lower photograph shows the Australian National Antarctic Research Expedition relief ship *Kista Dan* in Atlas Cove, at the foot of Mount Ohlsen.



*Australian Official photograph*

Heard Island, Antarctica (see opposite page)



(Crown Copyright)

O.W.S. *Weather Reporter* (see page 101). The photograph above shows the plotting of radar winds in the meteorological office; the master's quarters are shown below.



By courtesy of Solastos, Ltd.

adopted. This was done to commemorate the tercentenary of the birth of Edmund Halley, a pioneer geophysicist and sometime Secretary of the Royal Society.

The main parties of both the Royal Society's I.G.Y. Antarctic Expedition and the Commonwealth Trans-Antarctic Expedition left London in the *Magga Dan* on 14th November, 1956. M.V. *Tottan*, which had landed the advance party in January 1956, went along too, to carry supplementary stores for the 20-man expedition. Both ships had successful voyages. M.V. *Tottan* was shared by the Society and the Norwegian Polar Institute in the 1957 relief voyage, and she again successfully completed her mission to Norway Base and Halley Bay.

The programme at Halley Bay comprised almost all the subject divisions of the I.G.Y. Meteorological observations were made both at the surface and by upper-air balloons carrying radio sondes launched twice a day. These provided temperature, pressure and humidity measurements, and the use of a windfinding radar equipment was used to track the sonde balloons to great heights in all weathers. Measurements were also made on the ozone layer in the atmosphere, and these are proving of great interest.

The observation of aurora has also been part of the programme. This has been done visually, by automatic camera and by using radio echoes. The automatic camera takes a succession of exposures, of about 15 seconds in duration, of the whole of the sky as reflected in a spherical mirror, and during a display the whole history of its development can be traced. A rotating aerial is used in making the records of radio echoes from aurora, and this can be used during daylight when the auroral light cannot be observed. A similar apparatus is used at Jodrell Bank, and a comparison has shown, for the first time, that it is reasonable to conclude that the great aurora of the northern hemisphere are accompanied simultaneously by a greatly enhanced activity of the southern aurora.

Geomagnetic records have been made daily since the spring of 1957, and a small team of radio scientists has also been making daily records of the behaviour of the ionosphere by reflecting radio waves vertically from it, measuring its absorption and its drift, and by receiving through it radio waves emitted by the radio star Centaurus. Radio echoes from meteors have been recorded and a table of hourly rates compiled. Earthquake shocks have been recorded on a seismograph and glaciological measurements have been made to measure the accumulation and ablation during the period, and, by digging a pit, the rate of accumulation in years prior to the I.G.Y. has been measured; this provides a clue to the weather which prevailed in these former times.

Similar measurements and others have been done at the other I.G.Y. stations. Twelve nations, the Argentine, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, the Union of South Africa, the U.S.S.R., the U.S.A. and this country have set up or maintained some 57 stations in the Antarctic or sub-Antarctic region. In addition, we have the gravity measurements and seismic measurements of overland traverses, notably that of the Trans-Antarctic Commonwealth Expedition. The creation of an observational network covering the Antarctic region has made it certain that new knowledge of Antarctic meteorology has been obtained and that from this we can deduce much about the atmospheric circulation in high southern latitudes. This knowledge could have an important bearing on southern hemisphere weather forecasts and may enable some estimate to be made of the influence of the coldest region on earth on world weather. The world record low temperature of  $-124^{\circ}\text{F}$  was observed on 17th August, 1958, by Soviet scientists 400 miles from the South Pole.

Antarctic seismic measurements have caused a revision of the estimated amount of ice in the world. The I.G.Y. programme in glaciology is making a world census of the ice cover. Antarctica accounts for 90 per cent of it. There the new measurements have discovered ice thicknesses of up to 14,000 feet and the latest estimate is 4,500,000 cubic miles, an increase of about 40 per cent compared

with previous estimates. If this were to melt into water, vast land areas in the world would be submerged.

### (c) OCEAN STUDIES

Although man has sailed the oceans for centuries and the principal large surface current movements have been known for some time, the scientific study of the oceans is still a comparatively young subject. A full understanding of tidal and ocean waves deriving from a number of causes including interaction with the atmosphere, submarine earthquakes, etc., has yet to be achieved, and most of the I.G.Y. work has been devoted to this end. The installation of 50 tide gauges at many points, including some on oceanic islands, has been one of the principal means of acquiring automatic records that are yet to be studied. Records have also been made of the mean sea level. From previous mean sea record observations we know that the level of water in the oceans is rising as the Arctic becomes warmer and the glaciers recede. As the ice cover melts it lightens the load and the sea bottom begins slowly to rise, for example, in shallow northern seas such as Hudson's Bay and the coastal areas north of Canada and Siberia. This also raises the mean sea level. This sort of change is of interest to others besides the scientist: for instance, the 6-inch rise per hundred years, which is the rise in the South of England, will necessitate higher sea walls to protect highly populated industrial areas situated below the level of ordinary spring tides. The new tide gauges installed during the I.G.Y. are just the beginning of a search to detect and understand these changes.

The study of general circulation in the oceans is another important aspect of the I.G.Y. oceanographic programme, and here there have been a few dramatic discoveries about deep ocean currents. Eighty ships from 20 countries have taken part in I.G.Y. ocean surveys. Among British ships have been the R.R.S. *Discovery II*, Fishery Research vessels and H.M. Survey ships. Detailed studies have hitherto been somewhat difficult to make, but the National Institute of Oceanography developed an instrument just before the I.G.Y. began which has greatly facilitated the measurement of ocean currents at all depths.

In co-operation with U.S. oceanographers, R.R.S. *Discovery II* has made a study of the Gulf Stream in the area  $32^{\circ}$ – $33^{\circ}$ N. and  $75^{\circ}$ – $76^{\circ}$ W. (off South Carolina). At the surface there was a strong northwards movement, at a depth of 5,000 feet a little horizontal movement, but down at 8,000–9,000 feet a counter current of up to 1 to 3 knots towards the south was recorded. U.S. oceanographers working below the South Equatorial current in the eastern Pacific found a deep counter current with speeds of 1 to 2 knots, and collaborative work done by R.R.S. *Discovery II*, together with Norwegian and French vessels, has shown that in an area 400 miles west of Oporto and Lisbon deep current speeds range from 1 to 2 miles a day. Along with these measurements, temperature, salinity, oxygen content, and other variables have been measured and it appears that deep water movements carry as much water as surface currents. Further work will be done to seek a better understanding of the effect of these movements in climate and fisheries. One might also mention that dumping of radioactive wastes in the sea might have unforeseen consequences in the absence of such knowledge of deep water movements.

Several new submarine topographical features have been discovered in the oceanographic work and a region rich in minerals found in the South-East Pacific (the value is estimated at about £170,000 per square mile). In this subject we have an example of how, when the inquirer is seeking the answer to one question, several more questions present themselves.

### (d) THE EARTH'S ATMOSPHERE

Upper atmosphere research with rockets began in the U.S.A. soon after the end of the war as a consequence of the V2 rocket activities of the Germans. During the I.G.Y. over 200 rocket launchings took place, and in addition to the U.S.A.

and the U.S.S.R., Australia, France, Japan and this country took part. The British "Skylark" rocket programme has been co-ordinated in this country by a Royal Society Committee. The firings have been carried out at the Woomera range in Australia. The "Skylark" has proved to be a reliable rocket and there has been a successful programme of launchings, carrying instruments, some of novel design, to enable experiments to be made at heights up to 100 miles, on the direct measurement of temperature, pressure, wind movements, ion density, and the impact of micrometeorites during flight. Either the rocket carries equipment to send radio messages of some of the measurements it makes, or measurements are made by ground based observations. Already valuable results, some of them of an accuracy not achieved in other rocket research programmes, have been obtained, and the programme is to continue with rockets carrying out additional experiments, e.g. measurements of the magnetic field, to greater heights. Further study at heights below that in which artificial satellites can operate (150 miles) still needs to be done.

On 4th October, 1957, when the I.G.Y. was just three months old, the Soviet Union successfully placed a satellite into orbit round the earth. Sputnik I was a sphere containing a radio transmitter using frequencies of 20 and 40 Mc/s. Even if it had contained no transmitter much valuable information could be obtained from observing the satellite and determining its orbit. If there were no atmosphere and the earth were a perfect sphere, the orbit of a satellite not too remote from the earth's surface would be an ellipse of a fixed size and in one fixed plane. Observation has shown that the elliptical orbit does change in size and the plane of the orbit rotates slowly about the earth's axis. The change of orbit is due to atmospheric drag which make the ellipse more circular, and the rotation of the orbital plane is due to the equatorial bulge or the extent to which the earth's shape departs from that of a perfect sphere. Observations on Sputnik I and its successor satellites have shown that the earth's atmosphere is denser than we thought previously and that there is a greater flattening at the poles than we had calculated before the I.G.Y.

Although there are at present only two countries which launch satellites, there is nothing to prevent scientifically advanced countries from making observations of them if they pass overhead. This can be done by three principal methods. First, by visual and optical observation; secondly, by radio echoes bounced off the satellite; thirdly, by radio reception if the satellite carries a radio transmitter. In all three methods British scientists have been active, and this observational programme is being co-ordinated in the Royal Society. The satellite can only be seen when the observer is in the shadow cast by the earth and the satellite itself is in the sunlight. The U.S.A. satellites are out of range of our observers and it is only when there have been favourable orbits of the Sputniks that observation has been possible, and then only if there was no cloud cover. The instruments used are telescopes, specially designed cameras, and kinetheodolites or photo-electric devices. Valuable help has been given by amateurs. For radar observation, the Jodrell Bank radio telescope has given valuable information, as no other instrument with its capabilities yet exists anywhere else. The Radio Research Station of the Department of Scientific and Industrial Research now operates a Prediction Service and gives information on the orbit, forecasting the appearance of the satellite. As these satellites have travelled outside the electrically charged layer, the ionosphere, much has been learned about the ionospheric behaviour by receiving radio messages through it. The later satellites carry instruments to make measurements of various kinds, such as those made by rocket instruments, temperature, pressure, magnetism, ion density, micrometeorites, cosmic rays, the nature of the solar spectrum, and so on. These measurements are coded into radio transmissions which are received and analysed by the observers on the earth's surface.

The most exciting discovery of the I.G.Y. rocket and satellite programme has been the discovery of an intense radiation belt prominent at heights of 400 to

500 miles, which is trapped in the earth's magnetic field. The discovery was made in Explorer I, when Geiger counters to record the cosmic radiation soon became saturated with intense radiation. Later satellites—Explorers III and IV—carried a special instrumentation to investigate this radiation further. This consisted of a series of counters whose measurements were recorded on magnetic tape which could be read out on radio command from the ground. The U.S.A. moon rocket programme provided an opportunity for further research into this new phenomenon.

The period of the I.G.Y. was no sooner ended when, on 2nd January, 1959, Moscow radio announced that a multi-stage rocket was already *en route* to pass in the vicinity of the moon. It passed within 5,000 miles of the moon's surface early on 4th January, having travelled over 220,000 miles in 34 hours. By 8th January this new instrument was 750,000 miles away and began to travel round the sun in a planetary orbit of its own. It will take 450 days to complete a single orbit. The near approach to the moon was a remarkable bit of shooting. It has been said that to hit the moon, which is 2,160 miles in diameter, would be more difficult than scoring a bull's eye on a moving object from a gun mounted on a fast-moving vehicle. The radio guidance control from the ground therefore was of amazingly high accuracy. This guided missile had sufficient velocity as it passed the moon not to be greatly disturbed by the moon's gravity pull. As a means of optically checking a point in its trajectory, 2 lbs. of sodium was evaporated at a very accurate time interval after launching, controlled by a quartz clock. The evaporated sodium produced a large cloud which glowed in the sunlight, like an artificial comet, and was seen and photographed by specially designed cameras. The time was selected so that the cloud could be observed at night-time by the largest possible number of Soviet observing stations. This experiment went precisely according to plan, and may well be used in future as a standard method for checking trajectories of space probes. At 300,000 miles the Soviet space probe passed out of radio range. The last stage rocket carried several instruments, including the sodium ejection device, cosmic ray counters and a hermetically sealed sphere which contained further instruments and two radio transmitters. Radio messages giving observations were received and recorded on magnetic tapes and films at the ground stations. Soviet scientists have already stated that much information has been collected about the cosmic radiation, magnetic fields of the earth, moon, and in space, as well as the micro-meteoritic dust in interplanetary space, and possibly it will provide the verification or refutation of a new theory that the earth is simply a speck enveloped by the sun's own atmosphere.

### **The Legacy of the I.G.Y.**

The example of the I.G.Y. is already also being followed in several specific fields. The International Council of Scientific Unions has appointed a Committee on Space Research using an organisational pattern similar to the I.G.Y.

The great Antarctic effort will continue under the auspices of the international Special Committee for Antarctic Research. To provide the national link in this country the Royal Society has appointed National Committees for Space Research and Antarctic Research. Oceanic research too is to have an international Special Committee with a family of national members. Also being discussed is a proposal for a World Magnetic Survey at the next period of sunspot minimum in 1962-63, that is, when magnetic storms caused by the sun will be fewer. These projects then form a part of the legacy of the I.G.Y. It is not perhaps too much to say that the I.G.Y. is the greatest single achievement of organised science in history and I should like to end by quoting the words of the Indian geophysicist, Professor K. R. Ramanathan: "The I.G.Y. . . . has involved the bringing together of workers of many nations with differing ideologies and in varying stages of scientific development. A keen diligent observer with modest education in any corner of the world has a respected place in the I.G.Y. scheme. The approach is human and earthy, and the potentialities for the unification of mankind are infinitely greater."

# An Introduction to Meteorological Navigation

By C. E. N. FRANKCOM

During the second session of the Commission for Maritime Meteorology (World Meteorological Organization) at Hamburg in October 1956, a series of lectures were given on the general subject of "meteorological navigation". The texts of these lectures have now been published by the W.M.O. Secretariat, and in view of the obvious importance of this subject to ships' officers and of its potential value to the shipping industry, extracts from some of these lectures are to be published in *The Marine Observer*.

The first of these lectures, which was in the nature of an introduction to the subject, was given by the President of the Commission and is reproduced below.

From the moment a ship casts off from a quay or weighs her anchor, it is inevitable that the weather will play a part in the navigational problems which confront her masters and officers.

On leaving the quay, dock or anchorage, the direction and force of the wind, its gustiness and also the visibility will affect the manner in which the ship is handled and will influence the decision as to whether tugs are to be employed or not. Here experience of the particular type of ship herself and the fact that she has single or twin screws or that she is propelled by diesels, turbines or reciprocating machinery are all factors which have to be taken into consideration. Before the ship is built, the designer himself also needs to consider these various points and in this respect local considerations, such as the trade in which the ship is going to be engaged, need to be taken into account, which implies the need for some climatological study.

Having left the dock, if there is a river to be negotiated, the forecast visibility as well as the present visibility is important and one must remember that visibility may be affected very seriously not only by mist or fog but also by heavy rain showers or snow, or even by industrial smoke.

Once the ship is safely at sea, whether the master has a choice of route or not, the weather will continue to have a considerable effect upon her navigation. Obviously this was more so in the days of the sailing ship, as not only did the weather affect her safety but wind was her sole motive power. And today the weather still plays an important part in the navigation of power-driven vessels of all sizes and types. The statistics published by Lloyds and other authorities show how many shipping casualties even today are caused directly or indirectly by the weather. One need only look at the average merchant ship end on to realise how much a head wind can retard that ship's speed even if there is not much sea, and any seaman knows how quickly a head sea reduces the ship's speed, as soon as the sea gets up, even if the ship's propeller is well immersed. Swell similarly has an adverse effect upon a ship's speed, depending upon the height and length of the swell and the direction from which it comes relative to the ship's course. As the wind draws further aft, it obviously has less and less effect, but with a beam wind, there is leeway which has to be corrected, and there is also the effect of heavy rolling of the ship, which is not only uncomfortable but adversely affects her speed for various reasons. Even a rough following sea will tend to damp out an advantage that the following wind itself has, due to the excessive motion of the ship and the fact that even in a loaded condition there will be times when the stern is lifted so much that the screw races or loses effectiveness.

If the wind is associated with a current or tide, the resultant effect upon the ship needs to be taken into consideration and as the seaman cannot see the effect of the tide or current, these constitute a greater potential danger to her navigation than the wind itself and the mariner therefore needs to have literature and charts advising him as to the tides and currents he may expect to encounter. Unfortunately nobody can predict exactly the strength and direction of current and tide, so that in dealing with this element, the mariner has always to be extremely alert and face up to the fact that he may perhaps be making a wrong allowance, and unless he fixes the ship's position frequently, he may well get into trouble. When coasting, a sudden shift of wind may expose the ship to a possible danger from proximity to a lee shore.

If the wind is of force 8 or above, unless the master of the ship handles her with

care, even the largest and best found vessel can fairly easily get damaged by the sea and this may occur whether she is steaming into the sea or otherwise; it may be prudent in such circumstances to ease down or alter course somewhat. In the case of tropical storms, there are special rules to be observed; in most cases nowadays, meteorological services are able to give detailed warning to shipping by radio concerning the extent, intensity and movement of such storms, which eases the master's problem. Here is an example of when it is necessary that all ships send frequent radio weather messages.

There are still a few ships afloat equipped with the old-fashioned rod and chain steering gear. The strain on the rudder when running before a gale not infrequently causes the steering gear of such a ship to carry away, with the result that she broaches to, consequently taking heavy water, and perhaps foundering if she happens to be deeply laden and fitted with large wooden hatches covered with tarpaulin. Fortunately, most of that type of ship have now gone to the ship-breakers; steering gear is much more efficient and is not placed in exposed positions on deck, and wooden hatches have largely been replaced by the steel variety which does not even need tarpaulin. On the other hand, there have been, of recent years, a surprisingly large number of occasions when ships have lost their propellers in heavy weather and occasionally we hear of a ship—particularly a tanker—breaking in half in heavy weather at sea.

If the wind is both strong and gusty, a ship which happens to be in a somewhat "tender" condition or even a ship that is too "stiff" (e.g. a ship loaded with iron ore) or perhaps a ship loaded with bulk grain cargo with some weakness in her shifting boards, may well be in considerable danger with the wind anywhere near the beam. If she is tender, although her statistical stability may be fairly reasonable, her dynamic stability may not be sufficient in conditions of gustiness. If she is too stiff, she may roll so heavily as to shift some cargo, bringing about a risk of capsizing. In extreme cases, her ventilators or even the funnel may be torn out of the deck by the violence of the motion, leaving her open to the inrush of the sea.

The adverse effect of low visibility on the navigation of a ship is obvious, for the reduction of speed required by the collision regulations will inevitably delay the ship in her voyage and this applies whatever the cause of the lessening visibility, for thick snow can be a greater menace at times than fog.

While on the subject of visibility, it is inevitable nowadays to think of radar and here again meteorological conditions may have a considerable influence upon the efficiency of this aid to navigation at a particular time. It may be possible some day to include in a radio weather bulletin for shipping a statement or forecast of radar conditions. Mention should also be made here that the possession of radar or any other navigational aid does not lessen the need for the mariner to *obey the collision regulations*. In low visibility, the question of the efficiency of sound signals also arises, for it must be remembered that sound is sometimes conveyed in a rather capricious way through the atmosphere. Therefore, in fog and particularly in snow it may happen that a sound signal is not heard at as great a distance in a particular direction, or in any direction, as it would be under certain other meteorological conditions. This adds to the mariner's problems and emphasizes the wisdom of reducing speed in thick weather.

When navigating in the vicinity of ice—whether it be field ice such as is encountered in the Baltic in winter, or icebergs with or without field ice as is encountered on the Grand Banks and in the Antarctic, meteorological considerations are inevitably involved—including the problem of the effectiveness of radar for detecting the ice under all conditions. And then there is the case of a trawler operating in Arctic waters in winter time, where there is always the risk that gales associated with an air temperature below the freezing point of salt water may so ice the ship up that she capsizes. The best service that can be provided to the skipper by the meteorologist in such conditions is to give good warning of such weather conditions, so that the trawler can seek an area of higher temperatures.

It does not seem amiss, when talking about meteorological navigation, to think also about the care of the cargo aboard the ship and the comfort of the passengers. The discomfort of plugging into a heavy sea or swell has already been discussed but the safety of the ship's cargo may also be affected by this.

The function of a master of a ship is not only to get the ship safely from A to B, but also to deliver his cargo, or his passengers, in good condition at their destination. In most cases, it is hoped that the stowage of the cargo will be so good that no matter how the ship plunges about in the sea the cargo will not shift. Nevertheless, grain and bulk cargoes do sometimes shift, to the ultimate danger of the ship herself. A timber cargo on deck may become so waterlogged due to bad weather or heavy seas (particularly towards the end of the voyage) that the ship becomes excessively tender. In the case of a ship loaded with motor-cars or locomotives, one or more of them may break adrift and do damage; and heavy pounding or very violent lurching of the ship may well cause ullage of liquids in casks or cases. If the ship has to be battened down for excessively long periods, ventilation may be impossible. Also, if the ship has to proceed in the course of her voyage through areas where very rapid changes in temperatures and humidity occur, then various problems arise concerning the ventilation of the cargo and how to protect it from moisture damage.

These examples merely illustrate how meteorology comes into so many aspects of the ship's voyage and that it is the master's duty to take every possible advantage of the meteorological advice which is available to him, so as to ensure that his ship makes the most expeditious and safe voyage. This general subject is discussed in some detail in a paper which appeared in *La Météorologie*, by Mr. J. Noat, entitled "Meteorological Navigation at Sea". Some aspects of this question have also been discussed in articles by Dr. Rodewald in *Wetterlotse* and by Mr. Louis Allen in "Weather Wise" and in brief articles by various authors in the *Marine Observer*.

A weather ship on duty at an ocean station provides an unusual example of meteorological navigation. Her master normally endeavours to remain reasonably close to the centre of his patrol area, consistent with maximum fuel economy. At North Atlantic ocean stations "India" and "Juliett" for example, there is a more or less constant set of the surface water currents of about 1 knot to the eastward and a frequent series of east-moving depressions passing through the area. By a judicious study of the synoptic map compiled by his meteorologist aboard the ship from the Atlantic bulletin and the forecast, combined with the information he has about currents, he endeavours to so place his vessel that he avoids expensive steaming into heavy weather. It is perhaps of interest that the masters of these ships, by making observations with buoys and drogues, have confirmed the existence of a progressive motion of the ship due to swell.

This question of meteorological navigation is, of course, nothing new. The masters of Arab dhows have used it with considerable success in a rudimentary form for thousands of years. Prince Henry the Navigator undoubtedly used meteorological navigation when planning his voyages of discovery. It was Maury, in the 1850's, who really brought the subject up to date in a properly organised manner from the climatological viewpoint, and who inspired international co-operation in collecting and publishing information about the winds and weather and surface currents of the oceans.

The mariner, nowadays, wherever his voyages take him, has at his disposal radio weather bulletins, including forecasts and analyses, which enable him to prepare his own weather maps aboard the ship. Provided the information which he receives is correct, it is possible under certain circumstances to alter course or reduce speed or take some other means of avoiding the worst of bad weather. Before he starts on his voyage, he has climatological and ocean current information available in the form of atlases and in the text of sailing directions, which enables him to plan his voyage in advance, and he should not only have the safety of his ship in mind, but also the comfort of his passengers and the care of his cargo. He can

usually, if he wishes, have a telephone consultation with a meteorologist at a central forecast office before sailing.

Meteorological navigation is, of course, used to a considerable extent by the aviation industry, but an aircraft has the advantages of having only one medium—the atmosphere—to consider, combined with its high speed. The seaman has wind, current and tide to think of, associated with his relatively slow speed.

Before the master of a ship (or her owner) can seriously get down to this business of meteorological navigation, there seems little doubt that something will have to be done to improve both the accuracy and period of validity of forecasts; at the same time, somewhat more useful climatological information might perhaps be provided. Ships themselves can help a lot in improving forecasting accuracy by sending radio weather messages.

In June 1923 the steamer *Trevessa* foundered at  $28^{\circ} 45' \text{S}$ .  $85^{\circ} 42' \text{E}$ ., her nearest land being Australia, and the subsequent action taken by her master in the handling of her lifeboats provides an example of meteorological navigation being used to save lives. It might have been possible for her boats to reach safety by first sailing to the south, picking up a westerly wind and an easterly set which would have taken them towards safety. Unfortunately, however, the said easterly set turns north when still some distance from Australia, and subsequently turns west. In addition, the westerly wind might have been too boisterous for the lifeboats. The two boats sailed north into the south-east trade wind and westerly currents and made the passage to Mauritius in less than a month. The master of that ship had studied the winds and currents of the oceans to advantage.

## Book Reviews

*Introduction to Dock and Harbour Engineering*, by Rolt Hammond,  $9\frac{1}{4}$  in.  $\times$   $6\frac{1}{2}$  in. pp. xii + 160. *Illus.* Thos. Nelson & Sons, Ltd., Edinburgh, 1958. 25s.

This book is one of a series entitled NELSON'S NAUTICS which is designed to give "those who are concerned with shipping in any of its many aspects a full factual survey of the way in which ships operate". The general editor of the series is a naval architect, and in his preface he points out that the series has been planned to cover all sides of the subject, and to suggest ways in which the shipping world can best meet demands likely to be made on it. The books are written so as to be understandable by those without specialised knowledge, and to be of use to all who desire to acquire a wide general grip on the subject. Each volume deals with the varied aspects of a single wide subject and is complete in itself; the authors are all experts of international repute. The book under review is No. 2 in the series.

It is by no means surprising that this book should be reviewed in *The Marine Observer* because

- (a) Meteorology plays quite a large part in the forces of nature that the harbour engineer has to contend with, and has also a considerable effect upon the general operation of harbours and upon the quick turn round of ships. In other words, the economy of harbour operation depends quite a lot on the weather.
- (b) *The Marine Observer* is designed primarily for the information of officers serving in merchant ships, and there is no doubt that an officer who is keen about his job will derive benefit from some knowledge about this subject of dock and harbour engineering.

The book is divided into ten chapters: The forces of the sea; Planning the harbour; Equipment for submarine work; Dredges and dredging; Ingenuity in dock and harbour construction; The harbour engineer in war; Oil handling at ports;

Mechanical engineering in ports; Transport facilities in and to ports; Speeding turn-round in ports.

It is fairly obvious that in order to discuss such a highly technical subject, a certain amount of mathematics and engineering phraseology has to be introduced, and some portions of the book need some detailed study in order to understand it. But generally the author has managed to make the text very interesting and readable, and as illustration of various aspects he quotes outstanding achievements of harbour engineering in different parts of the world. The text is profusely illustrated with detailed drawings which are fairly easy to understand by those having no engineering knowledge. There are also some excellent photographs.

Chapter 1 of the book gives some interesting facts and figures about the behaviour of waves in shoal water and under various weather conditions, as well as the complications caused by tidal movements. In this chapter, which only occupies 17 pages, the author cleverly manages to include quite a lot of detail as to the construction of various types of breakwaters for the protection of artificial harbours on an exposed coast.

Chapter 2 deals rather more with harbours remote from exposed coasts and touches upon such subjects as the necessity of the designer having a sound knowledge of climatic and weather conditions in the area. He discusses the adverse effect of low visibility on a harbour, which can be alleviated nowadays with the use of an effective port radar installation.

Chapter 6 deals almost entirely with the remarkable ingenuity which was used in the design and operation of the Mulberry Harbour and how well it stood up in practice to the exceptionally bad weather which occurred subsequent to the landings in June 1944. The author reminds us that "the floating breakwaters at both harbours withstood about 30 hours of gale before serious damage occurred."

Chapter 5 includes a reference to the ingenious use of light-weight "terapods" (eccentric-shaped concrete blocks) which French engineers have developed for use in exposed harbours on the North African coast, and of large-scale experiments which have been carried out in various parts of the world involving the use of compressed air associated with submerged pipelines to create a "breakwater". The author shows that these experiments have indicated that partial damping of waves of 200 feet or more in length by this means may prove both practicable and economical.

C. E. N. F.

*Ships in Rough Water*, by J. K. Kent. 9½ in. × 6¾ in. pp. xiv + 287. *Illus.* Thos. Nelson & Sons, Ltd., Edinburgh, 1958. 32s. 6d.

This valuable book, which seems to cover every aspect of a ship's behaviour in various sea conditions, is the first of the series of NELSON'S NAUTICS referred to in the review above. The General Editor mentions in his preface that the author was at one time Superintendent of the Experimental Tank at Teddington and that he "writes not only as a mathematician and naval architect but as a man who has spent much of his time at sea, watching, testing and modifying the theories which he had formed". In his preface, the author reminds us that at least 30 per cent of the service life of a vessel at sea is spent in rough water and that this book is an attempt "to put before the ship designer and the student of naval architecture the effect of the shaping of certain parts of the hull lines upon the ship's performance in rough weather, and also the effect upon her propulsion efficiency of the propeller dimensions and blade design, in so far as they are known at the present time".

A study of this book shows that although it was written primarily for the technician ashore, it is written in such simple, straightforward language that much of it will be readily understandable by any ship's officer who takes an intelligent interest in naval architecture (the deck officer is, after all, a student of naval architecture) and there seems little doubt that a study of its contents will do much to help such officers to understand the whys and wherefores of the behaviour of a ship at sea.

It will also help to teach any mariner how best to "nurse" his ship in order to get the best out of her in heavy weather.

The book is divided into three parts, entitled "Ocean Weather", "Ship Behaviour in a Seaway", and "Resistance and Propulsion of Ships in Rough Water" respectively. Part 1 consists of three chapters, all of which are subject to some criticism. Chapter 1, which deals with "Ocean winds", is necessarily very brief because of the many varied aspects of "ship behaviour" with which the book has to deal, but it might well have been improved by the addition of a wind map of the world for (say) January and July. It is almost impossible to describe ocean winds in three pages as the author tries to do, and he makes some rather surprising statements. For example, we find that "If a cyclonic disturbance meets a strong wind blowing from the poles towards the equator, the path of the centre of the cyclone may become erratic . . ." and "Northers . . . blow across the Gulf (of Mexico) every few days and along the boundaries of the 'Northers' cyclonic air disturbances are formed which periodically escape out into the Atlantic". The author's suggestion that the speeds of trade winds which he experienced in winter in the North Atlantic were between 20 and 30 knots sounds somewhat excessive. Chapters 2 and 3, entitled "Ocean Swells" and "Wind Speeds and Wave Dimensions", are to some extent complementary and touch upon the whole subject of waves at sea. But for some unknown reason, the author persistently refers in this chapter and throughout the book to "swell" as a general term for waves, when on many occasions he is obviously referring to "sea" waves. This is a pity because it is apt to confuse the reader, and one would have thought that an author with such wide experience would have known better. In chapter 3 he wrongly defines "fetch" as "the distance travelled by a wave which is acted upon all the time from its generation to its full growth by a wind of constant velocity and direction."

In the fourth chapter, which briefly deals with ocean currents, the author implies that ocean currents are mainly divided into "tidal currents" and "thermal currents" and that these "are affected by the winds which blow over them". This conveys an erroneous impression to the reader, in view of the intimate relationship between the wind and the main ocean current circulation of the oceans. Here again, although ocean currents have only an indirect effect upon the "rough water" aspect, it would have helped the reader if a simple map of at least the surface currents of the oceans (which primarily affect shipping) had been included. Apart from these criticisms, which concern subjects in which the author is not an expert, the book seems to suit its purpose admirably.

In Part 2 of the book, which includes seven chapters, the author discusses such a variety of subjects as rolling, pitching, yawing, slamming and the effect of a combination of such movements in a seaway. The question of steering in rough weather and seakindly ships form the subjects of the last two chapters in this part of the book.

This part is extremely interesting and its study is facilitated by the numerous graphs with which it is illustrated. Under "seakindly ships", the author goes into such details as structural noise, vibration, means taken to avoid smoke and fuel ash on weather decks, and the design of bridge screens. Each chapter contains much about the meteorological aspect, in view of the large part that wind and sea play in relation to the subject under discussion.

Part 3 contains six chapters, dealing with such subjects as "Wind resistance", "Propeller efficiency", "Loss of ship speed in rough water with changes in the direction of the weather to the ship" and "Effect upon ship's speed of intensity of weather conditions". The final chapter gives a summary of the principal features of hull design which affect a ship's performance in rough weather. From the titles of these chapters, it is obvious that this part of the book includes many practical examples of the application of meteorology to ship design, ship behaviour and ship handling. Such questions as the shape and position of deck erections, in view of their effect upon wind resistance, are discussed, for example, and the author finds

space to point out that skin friction resistance varies with sea temperature. On the subject of ship handling in rough weather, he rightly reminds us of the value of change of course as an alternative to change of speed.

One's general impression on finishing this book is of the extraordinarily large scope that it covers and the ingenuity that the author has used in compressing it into such a relatively small volume of about 270 pages.

C. E. N. F.

## Personalities

RETIREMENT.—CAPTAIN P. M. BURRELL, C.B.E., retired in March 1959 after 45 years at sea with Royal Mail Lines. Since November 1955, he has been Commodore of the company in the *Andes*.

Peter M. Burrell began his sea-going career in March 1914 as a cadet with Royal Mail, and received his first command, the cargo vessel *Sabor*, in 1941. This ship was lost by enemy action in 1943.

Captain Burrell went on to command 12 Royal Mail ships. They were the former troopships *Asturias* and *Empire Ken*, the *Gascony*, *Paraguay*, *Almanzora*, *Durango*, *Deseado*, *Drina*, *Loch Garth*, *Highland Chieftain*, and *Andes*. In the 1957 Birthday honours he was appointed a C.B.E.

Captain Burrell's association with the Meteorological Office goes back to 1925 when he was in the *Ohio*. Since then he has, in 14 years, sent us 32 meteorological logbooks, nearly half of which have been classed "excellent". He received excellent awards in 1950 and 1951, both of them earned in the *Durango*.

We wish him health and happiness in his retirement.

E. R. P.

## ERRATA

*The Marine Observer*, April 1959.

Page 52 and photograph opposite, lightning, S.S. *Leicestershire*: the photograph was taken by Mr. D. R. Clayton, 3rd Officer.

Opposite page 53, waterspout, S.S. *Oxfordshire*: the drawing is by Mr. K. Adams, 4th Officer.

Page 90, line 3: *for* direct or reflected images *read* direct and reflected images.

Page 91, line 5 from foot of page: *for* Portpatrick *read* Malin Head.

## Fleet Lists GREAT BRITAIN

The following is a list of British ships voluntarily co-operating 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
<i>Acra</i> ..	4.9.58	R. W. Philip ..	R. E. Harvey, A. J. Bryant ..	J. Stuart ..	Elder Dempster Lines, Ltd.
<i>Achilles</i> ..	25.3.59	D. R. Jones ..	W. B. Johnson, W. B. Bannerman, K. A. Lowe ..	W. S. Young ..	A. Holt & Co.
<i>Adelaide Star</i> ..	29.9.58	H. Wylie ..	N. Rouse, R. Webb, M. Rigden ..	B. S. Green ..	Blue Star Line, Ltd.
<i>Aden</i> ..	24.12.58	J. L. Dunkley ..	H.arker, C. N. Chrystall, I. R. Neil ..	R. Ballantyne ..	Peninsular & Oriental S.N. Co.
<i>Afghanistan</i> ..	9.12.58	A. N. Henderson ..	C. M. Gibbs, A. M. Jenkins, A. Farquharson ..	G. P. Boulder ..	F. C. Strick & Co., Ltd.
<i>Africa</i> ..	9.1.59	A. E. Smith, R.D. ..	M. J. A. Clark, C. C. Patterson, H. E. Williams ..	J. Taylor ..	Shaw Savill & Albion Co., Ltd.
<i>Aigona</i> ..	25.9.58	I. D. Blacke ..	P. Sparkes, R. S. Grubb, H. Jones, P. Richards ..	T. Tomlinson ..	Trinder Anderson & Co.
<i>Albatross</i> ..	10.2.58	E. C. Thompson ..	K. Brown, W. Bosson, J. Brown ..	T. Gardner ..	F. C. Strick & Co., Ltd.
<i>Alsatia</i> ..	8.5.58	J. E. Woolfenden, D.S.C., R.D. ..	S. M. Nurse, R. E. Hills, M. C. Lohore, M. Dodds ..	J. Bishop ..	Cunard S.S. Co., Ltd.
<i>Amakura</i> ..	20.2.59	— Armitage ..	J. Dulligham, T. Hopper, T. W. Jones ..	D. Aird ..	Booker Line, Ltd.
<i>Andes</i> ..	15.5.57	D. R. Miller ..	J. Hunt, I. Farquharson, C. Sturke ..	— Quinton ..	Royal Mail Lines, Ltd.
<i>Andria</i> ..	19.11.58	H. L. De Legh, R.D. ..	D. A. Davies, P. Mullan, H. L. Smith, W. Nightingale ..		
<i>Apapa</i> ..	3.6.58	J. S. Cowan ..	R. H. C. Dale, C. Woodward, E. Atkinson ..	D. Byrne ..	Cunard S.S. Co., Ltd.
<i>Arabia</i> ..	1.4.59	W. B. Tanner, R.D. ..	B. Edwards, G. A. Newcombe, R. Grindrod ..	G. Gilling ..	Elder Dempster Lines, Ltd.
<i>Arabistan</i> ..	9.10.58	R. B. Arthur, M.B.E. ..	J. E. Belt, E. Fraser, G. Harris ..	T. D. Sandham ..	Cunard S.S. Co., Ltd.
<i>Araby</i> ..	20.10.58	M. B. Wingate ..	J. Thorogood, J. H. Jones, J. D. Williams ..	B. L. Stephens ..	F. C. Strick & Co., Ltd.
<i>Arakaka</i> ..		J. A. Carter ..	R. Brecknell, J. M. Evans, V. G. McCool ..	J. M. Cromien ..	Royal Mail Lines, Ltd.
<i>Aramaic</i> ..	1.2.59	G. Conolly ..	N. J. Case-Green, D. Aberdeen, J. Mason, K. Mackenzie ..	J. Bankes ..	Booker Line, Ltd.
<i>Argentina Star</i> ..	1.10.58	E. R. Pearce, O.B.E. ..	M. B. Foster, P. Stevens, J. Brownbill ..	R. Sadler ..	Shaw Savill & Albion Co., Ltd.
<i>Argyllshire</i> ..	9.2.59	A. J. Hogg ..	C. W. Hills, J. K. Currie, R. N. McGrail ..	W. Long ..	Blue Star Line, Ltd.
<i>Armagh</i> ..	27.10.58	T. Hastings ..	P. Butcher, P. Ross Farthing, J. Garnes ..	G. Martyn ..	Clan Line Steamers, Ltd.
<i>Ashburton</i> ..	1.2.59	H. Jones ..	J. O'Malley, P. Guerrerri, P. Richards ..	N' Reno Sabb ..	Trinder Anderson & Co.
<i>Asia</i> ..	26.10.58	D. J. Brinn, R.D. ..	C. J. Allister, — Finlay, W. Nightingale, J. W. S. Dunn ..	T. M. Sherriff ..	Trinder Anderson & Co.
<i>Asyria</i> ..	23.1.59	J. G. Bradley, R.D. ..	D. W. Robertson, D. H. Lee, R. A. Woodall ..	A. Gandon ..	Cunard S.S. Co., Ltd.
				B. A. Long ..	Cunard S.S. Co., Ltd.

<i>Athefoam</i>	1. 1. 59	C. Billson	D. Ortway, J. C. Crook, H. Flannigan	J. Brown	Athel Line, Ltd.
<i>Athletic</i>	10. 11. 58	G. Heywood	A. J. Saunders, B. A. Hills, B. E. F. Pittar	H. S. Knight	Shaw Savill & Albion Co., Ltd.
<i>Castle</i>	3. 2. 59	C. C. Page	R. A. Ellima, P. D. T. Roberts, R. J. Steam	J. Summers	Union Castle Mail S.S. Co., Ltd.
<i>Aureol</i>	2. 4. 59	W. Munt	J. Lawton, P. Burden	F. W. J. Broomfield	Elder Dempster Lines, Ltd.
<i>Australia Star</i>	19. 11. 58	D. L. Mackinnon	J. Suddes, I. Owen, P. Brecknell, A. Payn	L. Cooper	Blue Star Line, Ltd.
<i>Australind</i>	27. 1. 59	J. F. Wood	J. Cole, J. Lillico, R. Knight, A. White	W. Ryan	Trinder Anderson & Co.
<i>Ayrshire</i>	22. 10. 58	P. MacMillan	M. Chambers, — Ure, — McCarthy	M. Collins	Clan Line Steamers, Ltd.
<i>Avonmoor</i>		A. Coaster	I. Sinclair, — Atean, C. B. Nicholas	A. Whittaker	W. Runciman & Co., Ltd.
<i>Balaena</i>	8. 9. 58	P. Virik	A. Jensen	J. Dahl	Hector Whaling, Ltd.
<i>Baron Ardrossan</i>	11. 8. 58	R. Reid	H. A. Whitfield, W. H. Davis, J. Johnstone	J. D. Connor	H. Hogarth & Sons, Ltd.
<i>Baron Glenconner</i>	23. 1. 59	W. Warden	G. Downie, J. Morrison, P. R. Warburton	D. C. Bullard	H. Hogarth & Sons, Ltd.
<i>Baron Murray</i>	25. 11. 58	I. F. W. Wallis	V. Squibbs, A. K. Watson	S. Fletcher	T. & J. Harrison, Ltd.
<i>Baskerville</i>	30. 12. 58	C. A. Smith	I. Macdonald, I. Bean, F. W. Brant	S. B. Thorburn	W. Runciman & Co., Ltd.
<i>Bassano</i>	19. 9. 58	G. C. Goodman	R. Gibens, P. Holton, B. Bird, T. J. Stewart	A. Leary	Ellerman's Wilson Line, Ltd.
<i>Beaverburn</i>	29. 5. 58	G. C. Geddes	A. Clark, E. Brewer	C. Adamson	Canadian Pacific S.S., Ltd.
<i>Beavercoose</i>	26. 9. 58	W. S. W. Main, R.D.	M. V. P. Doyle, G. E. Gamblin, J. Yeandle-Hignell	W. McMahon	Canadian Pacific S.S., Ltd.
<i>Beaverdeil</i>	5. 8. 58	L. H. Johnston	D. C. Lumbard, R. T. King, B. O. H. Brown	J. N. Coultis	Canadian Pacific S.S., Ltd.
<i>Beaverford</i>	19. 1. 59	W. J. P. Roberts	R. P. Wilman, K. R. Dancy, G. Coron	R. P. Willman	Canadian Pacific S.S., Ltd.
<i>Beaverglan</i>	9. 12. 58	J. Soame	R. P. Wilman, J. A. Griffin, J. Bruce, R. P. Blyth	A. McCartney	Canadian Pacific S.S., Ltd.
<i>Beaverlake</i>	23. 2. 59	E. F. Aikman	M. D. Watts, J. Brooks, J. D. Goring	G. W. Evans	Canadian Pacific S.S., Ltd.
<i>Beaverlodge</i>	25. 11. 58	A. J. Lawson	W. Gardiner, M. Pounley, M. Brewer	M. H. Crocker	Canadian Pacific S.S., Ltd.
<i>Beecher Island</i>	10. 12. 58	J. P. Robertson	A. S. Flint, S. V. Garratt, J. Daws, R. G. Holmes	E. Fitzgerald	Canadian Pacific S.S., Ltd.
<i>Benvannoch</i>	23. 2. 59	L. Vernon	G. B. Goldie, A. H. Grant, J. W. Mitchell	T. N. Guina	B.P. Tanker Co., Ltd.
<i>Brasil Star</i>	26. 2. 59	J. A. Etches	H. Fells, A. Jacobs, C. Flavell	W. Thomson & Co., Ltd.	
<i>Bravo</i>	11. 7. 58	S. Foulkes	J. Garroway, T. A. Wren, P. L. Willingham	Blue Star Line, Ltd.	
<i>Brisbane Star</i>	14. 11. 58	I. D. Armstrong	C. R. Stencer, A. Cheshire, J. B. Kirkham, C. Flavell	Ellerman's Wilson Line, Ltd.	
<i>Britannic</i>	23. 9. 58	W. L. Pugh	R. J. Ogilvy, P. J. Lawley, J. M. Quinlaw	Lampport & Holt Line, Ltd.	
<i>British Consul</i>	8. 12. 58	A. Davies	M. A. Lavender, F. W. D. Lambert, P. Waller	Cunard S.S. Co., Ltd.	
<i>British Endeavour</i>	29. 9. 58	T. R. L. Tanner	J. B. Farrell, A. Carter, H. W. Milligan	B.P. Tanker Co., Ltd.	
<i>British Patience</i>	7. 11. 58	A. G. Davidson	M. Dunning, W. Mackenzie, W. G. Bothwell	B.P. Tanker Co., Ltd.	
<i>British Purpose</i>	4. 2. 59	R. C. D. Flarnstead	A. F. Hedgcock, N. Rutherford, D. Pearson	B.P. Tanker Co., Ltd.	
<i>British Resource</i>	28. 1. 59	J. R. Robinson, M.B.E.	F. A. Stolberger, J. W. Guy, M. J. Hooper, M. Smyth	B.P. Tanker Co., Ltd.	
<i>British Sailor</i>	5. 8. 58	J. A. Barton	B. Cater, W. Henderson, G. B. Panes	B.P. Tanker Co., Ltd.	
<i>British Splendour</i>	28. 1. 59	J. W. Scott	D. Robinson, J. R. Jenkins, R. Thompson	B.P. Tanker Co., Ltd.	
<i>Brackleymoor</i>	30. 12. 58	I. G. Foster	J. Liston, J. Campbell, L. Andrews	Royal Mail Lines, Ltd.	
<i>Cairnahu</i>	24. 11. 58	P. M. Ralston	R. L. Andrews, D. M. Aitchison, D. G. Curry	Walter Runciman & Co., Ltd.	
<i>Cairnforth</i>	27. 11. 58	D. Lair	F. G. O'bridge, J. Lobban, A. Anderson	Cairns, Noble & Co.	
<i>Calabar</i>	29. 5. 58	F. R. Gibbens	K. B. Singer, P. Wallace, N. Wallace	Cairns, Noble & Co.	
<i>Caladonia</i>	13. 2. 59	I. A. Mackenzie	B. P. Telfer, J. Stott, B. Normanton, R. A. Moody	Cairns, Noble & Co.	
<i>Calgaria</i>	22. 12. 58	T. H. Davies	D. Barclay, R. Langmuir, R. Gilliland	Elder Dempster Lines, Ltd.	
<i>California Star</i>	3. 12. 58	P. Farmborough	J. C. Mattocks, A. L. McCugan, A. Dougal	Anchor Line, Ltd.	
<i>Caltex Canberra</i>	27. 11. 58	P. Smith	R. Westrip, P. Davies, M. May	Donaldson Line, Ltd.	
<i>Caltex Edinburgh</i>	6. 10. 58	J. Trayner	J. Whyte, P. Wiggins, J. A. Fuller, G. Pritchard	Blue Star Line, Ltd.	
<i>Caltex London</i>	2. 7. 58	A. Bankier	M. J. Woodward, J. Maclean, J. Chambers	Overseas Tankship (U.K.), Ltd.	
<i>Canopic</i>			D. Wheadon, H. R. Hall, D. H. Williams	Overseas Tankship (U.K.), Ltd.	
<i>Canton</i>			F. F. Michael, J. Weston, L. E. Howell, R. Jones	Federal S.N. Co., Ltd.	
<i>Cape Clear</i>			R. Adams, K. Wyles, F. Hart, K. McKellan	Shaw Savill & Albion Co., Ltd.	
<i>Cape Grafton</i>			R. Ridley, D. Bradley, R. J. Collier	Peninsular & Oriental S.N. Co.	
<i>Capetown Castle</i>			J. C. Carr, R. W. Wotherspoon, H. Henderson	Lyle Shipping Co., Ltd.	
<i>Captain Cook</i>			J. M. Brigstocke, A. Macleod, K. Fox	Lyle Shipping Co., Ltd.	
			— Tidswell, — Beale, — Kelly	Union Castle Mail S.S. Co., Ltd.	
			B. Scott-Brown, R. Allan, T. B. Scott, A. H. Ross	Donaldson Bros. & Black, Ltd.	

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Cardiganshire</i>	3.2.59	R. T. Harries	P. Shorrocks, A. Stand	W. Steward	Glen Line, Ltd.
<i>Carinthia</i>	7.10.58	S. A. Jones, R.D.	C. J. Burtinshaw, D. Ridley, A. Binnell	Shaw	Cunard S.S. Co., Ltd.
<i>Carraroon Castle</i>	15.9.58	W. S. Byles, R.D.	Kaye, Deen, Wilson, Jamison	—	Union Castle Mail S.S. Co., Ltd.
<i>Caronia</i>	25.11.58	A. B. Fasting, R.D.	D. A. Williams, P. Brush, T. H. L. Boyd, R. Southern	H. M. S. Williams	Cunard S.S. Co., Ltd.
<i>Carrigan Head</i>		W. A. Haddock, O.B.E.	P. Ellis, J. Hanna, R. Crawford	—	G. Heyn & Son, Ltd.
<i>Carthage</i>	21.1.59	G. Randall	T. Underwood, M. J. Burland, A. Pridoux	F. J. Arthurs	Pennular & Oriental S.N. Co.
<i>Caslon</i>	30.12.58	T. O. Hodgson	C. Looker, T. Hamer, C. A. Hann	W. D. Brown	Runciman (London), Ltd.
<i>Catalina Star</i>	27.8.58	C. Holleyoak	C. R. Veno, E. A. Jones, W. Coverdale, J. Dover	M. Hooks	Blue Star Line, Ltd.
<i>Ceramic</i>	26.3.59	F. A. Smith	M. A. Gretton, Doidge, J. D. Haberfield, D. J. Bridger	R. O'Shaughnessy	Shaw Savill & Albion Co., Ltd.
<i>Chantala</i>	23.1.59	L. T. Carter	B. R. Sanderson, A. K. Wilkinson, J. M. Corlett	J. Field	British India S.N. Co., Ltd.
<i>Chindwara</i>	26.1.59	M. H. Vincent	A. D. Methven, J. Raglan, J. Coulthard, J. B. Barnett, M. Ranson	S. A. White	British India S.N. Co., Ltd.
<i>Cilicia</i>	17.3.59	A. C. Johnston	A. McKendrick, E. D. Wilson, D. Allan	J. H. Martin	Anchor Line, Ltd.
<i>Cingalese Prince</i>	10.2.59	H. J. Pirie	R. V. Hann, J. G. Smith, T. A. Tate	G. F. Page	Prince Line, Ltd.
<i>City of Birmingham</i>	29.9.58	P. C. Arthur	J. A. Gibson, W. Paton, R. F. Jones	J. D. G. S. Gallacher	Ellerman Lines, Ltd.
<i>City of Brisbane</i>	4.12.58	E. G. Chapman	R. E. W. Butcher, M. C. Swan, H. M. Townsend	F. E. L. Hall	Ellerman Lines, Ltd.
<i>City of Bristol</i>	25.8.58	W. G. McCulloch	J. C. Palmer, L. W. Roberts, D. W. Anderson	J. B. Stainforth	Ellerman Lines, Ltd.
<i>City of Cape Town</i>	17.3.59	R. A. Jones	D. I. Tunncliffe, M. Graham, G. J. Barrow	G. Barling	Ellerman Lines, Ltd.
<i>City of Carlisle</i>	15.10.58	T. M. Williams	W. Locker, H. Lewis, C. Bolton, L. Cullen	H. H. Lyon	Ellerman Lines, Ltd.
<i>City of Chester</i>	17.12.58	T. S. Dennis	R. I. Smith, J. Campbell, A. A. Ramsden	S. D. Sutherland	Ellerman Lines, Ltd.
<i>City of Coventry</i>	26.6.58	W. S. Doidge	N. B. Aitken, K. Graham, R. G. MacMahon	R. J. Haplin	Ellerman Lines, Ltd.
<i>City of Durham</i>	19.11.58	H. G. White	J. Craig, J. B. Somerville, D. G. Howe	E. N. Cameron	Ellerman Lines, Ltd.
<i>City of Edinburgh</i>	3.2.59	P. J. Byrne	J. K. Ashby, D. B. Williams, D. J. Griggs, D. Duffield	D. N. Cumming	Ellerman Lines, Ltd.
<i>City of Johannesburg</i>	16.2.59	J. B. MacLaren	T. C. Mathews, H. Wharton, W. M. Macgregor, S. A. Bloomfield	H. MacGowan	Ellerman Lines, Ltd.
<i>City of Khartoum</i>	2.4.59	H. Roberts	R. C. Edwards, Cooper, Owen, Parry	A. Mathieson	Ellerman Lines, Ltd.
<i>City of Lichfield</i>	1.2.59	G. Stewart	P. G. Pike, A. M. Oxberry, S. M. Carr	T. G. Murray	Ellerman Lines, Ltd.
<i>City of Liverpool</i>	5.4.59	J. L. Robertson	M. Matheson, K. C. Powell, D. Steward	G. Aspinall	Ellerman Lines, Ltd.
<i>City of Lucknow</i>		W. T. Wortley	R. F. Jones, T. Grant, D. R. Moody, K. Graham	R. Kerr	Ellerman Lines, Ltd.
<i>City of Manchester</i>	4.12.58	I. R. Pulford	R. B. Melk, G. Greenhow, M. P. Lambie	I. Barry	Ellerman Lines, Ltd.
<i>City of New York</i>	16.2.59	B. F. Hooper	M. J. Cole, M. Hicks, R. Stenhouse, R. Bellhouse	P. J. Small	Ellerman Lines, Ltd.
<i>City of Portsmouth</i>	17.11.58	E. Fawcett	P. Petts, J. L. Kinley, J. Blackie	K. G. Arthur	Ellerman Lines, Ltd.
<i>City of Pretoria</i>	27.8.58	A. G. Freeman	M. V. Hawker, I. McBeath, K. Horton, J. Coles	P. Stewart	Ellerman Lines, Ltd.
<i>City of Swansea</i>	27.7.58	J. Vizer	J. Jones, A. M. Boag, C. Davies	W. H. Carmichael	Ellerman Lines, Ltd.
<i>City of Winchester</i>	4.11.58	J. W. Wotherspoon	P. G. Evans, T. Innes, G. Barden	B. Watts	Ellerman Lines, Ltd.
<i>Clan Brodie</i>	25.11.58	A. V. Gordon	P. D. Penn, A. G. Allison, D. Bell	I. Lamb	Ellerman Lines, Ltd.
<i>Clan Buchanan</i>	3.12.58	J. Dunphy	S. Young, E. L. Besky, G. M. Macleod	R. F. Cole, M.B.E.	Ellerman Lines, Ltd.
<i>Clan Campbell</i>	21.1.59	K. C. Simpson	R. A. Robertson	E. J. Shillabeer	Ellerman Lines, Ltd.
<i>Clan Chaitan</i>	2.4.59	J. V. Findlay	K. George, C. J. Irvine, R. McCrone, G. Godfrey	E. N. O'Connor	Ellerman Lines, Ltd.
<i>Clan Chisholm</i>	30.12.58	T. A. Watkinson	A. J. Rowley, R. M. Crone, G. Stokes	S. Aspinall	Ellerman Lines, Ltd.
<i>Clan Davidson</i>	9.2.59	G. W. Spiller	A. J. Fienley, G. Rowland, J. R. Jeffrey	J. R. Hubbard	Ellerman Lines, Ltd.
<i>Clan Forbes</i>	16.1.59	J. Browne	H. Urkiss, M. McInnes, A. R. MacIntyre	C. Heggarty	Ellerman Lines, Ltd.
<i>Clan Macaulay</i>	13.2.59	A. F. Banks	D. I. McMinn, R. A. G. Simmons, I. F. B. Currie	W. Cowie	Ellerman Lines, Ltd.
<i>Clan Macbrynie</i>	8.1.59	C. A. Thomas	D. S. Williams, D. H. Macmillan, K. R. Hogg	G. E. McNeil	Ellerman Lines, Ltd.
<i>Clan Macdonald</i>	30.12.58	H. D. T. Lockyer	C. F. Knott, I. Dalziel, G. P. Wallin	G. E. Randall	Ellerman Lines, Ltd.
<i>Clan Macdougall</i>	4.2.59	T. N. Soane	P. W. Vaughan, K. Morton, M. R. Andrews	J. Cox	Ellerman Lines, Ltd.
<i>Clan Macintosh</i>	24.9.58	R. N. Mayo	G. A. Anderson, A. T. Campbell, I. C. Laing	R. W. Moore	Ellerman Lines, Ltd.
<i>Clan MacLaren</i>	24.12.58	J. de Garia			Ellerman Lines, Ltd.

Clan MacLay	18.12.58	S. S. Davidson	R. E. Todd, I. A. Williamson, J. A. Swindlehurst	F. Fawcett	Clan Line Steamers, Ltd.
Clan Maclean	1.2.59	H. Whitehead	W. G. Parry, —, Ridge, J. M. Bracken, G. I. Hughes	J. E. Guthrie	Clan Line Steamers, Ltd.
Clan Macleod	12.3.59	W. W. Simpson	P. M. Gurnell, J. Curwen, D. Richards	H. A. Gray	Clan Line Steamers, Ltd.
Clan Macrae	8.9.58	R. R. Baxter	J. L. Pattison, I. W. Bennet, A. M. Ewing	A. R. Cox	Clan Line Steamers, Ltd.
Clan Macravarish	21.8.58	S. W. Brown	M. Dominy, E. Taylor, J. Aspin	W. Ellmers	Clan Line Steamers, Ltd.
Clan Robertson	23.3.59	C. M. Powell, M.B.E.	D. C. Stobbar, J. K. Robinson, R. Grant	N. Birnie	Clan Line Steamers, Ltd.
Clan Shazo	5.4.59	L. C. Higgins, M.B.E.	J. L. Harris, D. Hedges, J. T. Shaw	G. H. Hudd	Clan Line Steamers, Ltd.
Clan Sutherland	9.2.59	F. H. Turton	J. H. Szablowski, M. P. R. Turner, E. N. Bass	W. Gay	Clan Line Steamers, Ltd.
Clan Urquhart	23.12.58	L. Pogson	J. W. Costley, T. L. Kirby, E. N. Bass	J. D. Carroll	Clan Line Steamers, Ltd.
Condesa	7.10.58	E. J. Loughheed	C. P. Moore, V. Owen, J. Woodbridge	D. Birkinshaw	Houlder Bros. & Co., Ltd.
Consuelo	2.4.59	A. Gillis	H. Forrester, J. Fugill, A. Burrell	F. W. Portess	Ellerman's Wilson Line, Ltd.
Corfu	24.12.58	W. T. Banks	L. Barefoot, D. O. Williams, B. Miles, M. J. Coker	J. Lamb	Peninsular & Oriental S.N. Co.
Corinaldo	24.9.58	J. L. McQueen	J. Macdonald, S. Ewing, D. Campbell	—, Little	Donaldson Bros. & Black, Ltd.
Corinthic	1.2.59	A. C. Jones	—, Altham, —, McDougall, —, Veralls	B. Nutt	Shaw Savill & Albion Co., Ltd.
Corwall	13.2.59	F. C. Taylor	C. Morgan, C. J. Gilbert, G. J. Edmonds	—, Hills	Federal S.N. Co., Ltd.
Corrales	20.2.59	W. Young	R. S. McLundie, A. MacLean, W. Cheyne	J. Stewart	Elders & Fyffes, Ltd.
Cortona	14.5.58	A. L. Hunter	L. M. Hayler, D. Houghton, I. Davie	M. Garrett	Donaldson Line, Ltd.
Cotopaxi	5.1.59	J. Hart	G. A. Pallett, J. M. Estill, R. I. G. Calder	H. M. Burson	Pacific Steam Navigation Co.
Cretic	8.1.59	W. E. Williams	C. A. Carew, A. T. Creek, R. B. Wilson	F. A. Tison	Shaw Savill & Albion Co., Ltd.
Crofter		E. Owen	M. Houchen, T. Burke, W. Hunt	N. A. P. Grice	Sugar Line, Ltd.
Crystal Bell		L. W. Fulcher	G. S. Breen, A. Miller, D. E. Smith, J. Sherwood	R. Water	Federal S.N. Co., Ltd.
Cumberland	2.4.58	R. D. S. Eckford	J. S. Ross, R. M. Atwater, A. B. Powell	V. Dalton	Pacific S.N. Co.
Cuaco	31.12.57	H. C. Smith	D. W. Clarke, J. A. Constantine, G. Grant	W. Charlton	Shaw Savill Line, Ltd.
Cymric		F. D. Lloyd	I. Worrall, M. Bennett, D. Hatton, R. Dote	W. Stevenson	Ropner Shipping Co., Ltd.
Daleby	18.9.58	C. C. Legg	D. A. Snowden, A. Richardson, T. Tynson	R. Fenton	Royal Mail Lines, Ltd.
Darro	14.1.59	J. R. Copping	J. R. Day, A. Dekonski, P. Sparkes	S. Buttery	Lampoort & Holt Line, Ltd.
Deerport	23.4.58	G. L. Carroll, D.S.C., R.D.	J. O. Jenkins, —, Borthwick, —, Buckle	J. T. Garvey	Ropner Shipping Co., Ltd.
Delphic	20.10.58	C. S. Grant, R.D.	P. W. L. Ramage, J. Flood, R. O. Cammack	J. B. Allan	Shaw Savill & Albion Co., Ltd.
Desadeo	23.2.59	J. E. Budgell	R. J. Bayliss, K. W. Mayhew, M. Henson, D. LeCornu	H. Lyon	Royal Mail Lines, Ltd.
Devon	5.1.59		P. R. Carling, D. Millhouse, V. J. Gatis	D. J. Gerrard	Federal S.N. Co., Ltd.
Devonshire	24.2.59	G. W. Dobson	R. J. Elston, G. M. Warren, J. K. Leverton, W. Brown	A. Jones	Bibby Bros. & Co.
Ditwara	12.3.59	B. A. Rogers, D.S.C., R.D.	C. Myles, —, Hook, I. Johnston, A. J. Palmer	G. Syer	British India S.N. Co., Ltd.
Diomed	2.4.59	W. J. Moore, D.S.C., R.D.	M. Corner, G. L. Swanson, J. Kempton	A. White	A. Holt & Co.
Discovery II	6.10.58	J. D. Gray	W. H. Thomson, W. Murrison, C. Howett	L. A. Miller	National Institute of Oceanography
Dominion Monarch	1.4.59	K. D. G. Fisher	G. K. Geen, R. Brown, J. O'Malley	W. Clarke	Shaw Savill & Albion Co., Ltd.
Donzgal	20.6.58	R. F. Hellings	M. Pinner, J. Thorpe, D. Bailie	J. Ryan	Trinder Anderson & Co., Ltd.
Dorset	3.12.58	J. E. Bury	M. J. Kingham, M. G. Rogers, N. R. Slacke	M. Hartson	Federal S.N. Co., Ltd.
Drina	22.7.58	F. J. Swallow	W. F. R. Whiting, T. Taylor, S. N. Hurst	J. Duignan	Royal Mail Lines, Ltd.
Duke of Athens	21.1.58	L. W. Loose	R. Dolan, D. MacDonald, W. MacCree	K. Dugdale	Trent Maritime Co., Ltd.
Duncairg	8.12.58	R. P. Forrest	A. Hepburn, J. Miassey, T. Thomas	W. Anderson	J. & J. Denholm & Co.
Dunedin Star	9.3.59	R. Stark	J. A. Wrightson, C. R. Monk, G. Scott, R. G. Worthington	D. Leaby	Blue Star Line, Ltd.
Dunera	8.1.59	H. W. B. Cray, M.B.E.	J. A. Cox, T. Davies, J. Holt	W. C. G. Sturgess	British India S.N. Co., Ltd.
Durango	19.3.58	T. W. F. Bolland	R. Elliott, M. Dulling, —, Marchmont	F. Griffiths	Royal Mail Lines, Ltd.
Durban Castle	1.12.58	R. A. D. Cambridge, D.S.C., R.D.	J. A. Needham, A. Rollinson, E. D. Jones, D. T. Evans	—, Bristow	Union Castle Mail S.S. Co., Ltd.
Durham	28.11.58	A. Hocken	J. S. Rille, M. Mortimer, I. A. Le Brecht	A. Batty	Federal S.N. Co., Ltd.
Eden	21.7.58	E. Card	T. Daughtry, —, Wass, —, Hansen	H. E. Hare	Royal Mail Lines, Ltd.
Edenfield	19.8.58	A. Harrison	H. A. Bonsor, J. Lane, G. Oakley	T. Twisleton	Hunting & Son, Ltd.
Edinburgh Castle	12.1.59	H. A. Deller	N. M. Macfarlane, A. R. Hutcheon, A. Johnston, N. C. Cameron	J. Hodgson	Union Castle Mail S.S. Co., Ltd.
Eglida	10.10.58	W. MacVicar, M.B.E.		F. Blyth	Anchor Line, Ltd.

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Elysia</i>	30.1.59	A. J. F. Colquhoun	W. Stockley, D. Weir, J. M. Murray, —, McLarty	R. Drake	Anchor Line, Ltd.
<i>Empire Fowey</i>	17.11.58	L. A. Hill, D.S.C., R.D.	A. J. Foot	..	Peninsular & Oriental S.N. Co.
<i>Empire Star</i>	27.11.58	G. King	M. Woodhouse, A. Chivers, D. Colley	..	Larnport & Holt Line, Ltd.
<i>Empress of Britain</i>	1.4.59	J. P. Dobson, D.S.C., R.D.	A. H. Thompson, S. St. C. Shaw, G. Backwell	J. Mann	Canadian Pacific S.S. Co., Ltd.
<i>Empress of England</i>	22.12.58	C. L. de H. Bell, D.S.C., R.D.	J. G. Forster, W. F. P. Cannel, M. Scott, J. Archbold	P. B. McNab	Canadian Pacific S.S. Co., Ltd.
<i>Empress of France</i>	10.12.58	S. W. Keay	B. Tyre, C. Turner, S. P. Embleton, J. S. Brooks	P. W. Booth	Canadian Pacific S.S. Co., Ltd.
<i>Endorby</i>	..	F. Holst	A. Gblin, O. Andersen, S. Sorensen	B. Holtan	Hector Whaling Co., Ltd.
<i>English Star</i>	30.12.58	C. H. Watson	W. Macintosh, N. D. T. Johnson, M. May	J. Thomas	Blue Star Line, Ltd.
<i>Ernest Holt</i>	..	H. J. Aldiss, R.D.	R. Melvin, E. Wilburn, S. Briggs	R. W. J. Gregory	Ministry of Agriculture & Fisheries
<i>Eskitiffe</i>	..	R. E. Bennett	D. H. McCree, M. Bennett, J. S. Barton, J. A. Shepherd	C. Hury	Esk Shipping Co., Ltd.
<i>Essequibo</i>	18.8.58	A. J. G. Barff, R.D.	W. G. Dick, C. S. Masson, B. L. Cole, G. D. Younger	..	Royal Mail Lines, Ltd.
<i>Essex</i>	1.1.59	S. Andrew	J. Hickson, T. Moor	P. Snaith	..
<i>Esso Cambridge</i>	23.3.59	C. L. Thomas	A. Lees, H. Johnson, E. Kemp	L. Sutton	Federal S.N. Co., Ltd.
<i>Esso Canterbury</i>	2.1.59	J. Palmer-Felgate	W. McMaster, T. Campbell, R. Preece	J. Brewer	Esso Petroleum Co., Ltd.
<i>Esso Essex</i>	16.3.59	R. Davies	R. H. Rendell, G. Milne, I. C. Tall	C. Julius	Esso Petroleum Co., Ltd.
<i>Esso Manchester</i>	12.3.59	W. Brians	J. A. Scrimgeour, J. Petrie, J. Swan	D. Dooling	Esso Petroleum Co., Ltd.
<i>Eucadia</i>	9.3.59	R. Harris	J. H. White, I. Bulteel, B. Blemings	I. R. Tinkler	Esso Petroleum Co., Ltd.
<i>Eumæus</i>	30.12.58	R. G. Rippon	P. S. Burn, J. Craig, G. H. Harwood	A. McPhail	Anchor Line, Ltd.
<i>Explorer</i>	4.3.59	E. A. Bruce	J. Bothwell, T. McI. Hamill, O. Sauvage	H. Whitelegs	A. Holt & Co.
<i>Fanad Head</i>	22.10.58	J. Alexander	D. Christie, W. Macphree, R. Rippengill, P. Thomas	D. Ross	Scottish Home Department
<i>Fidra</i>	20.2.59	M. B. Scott	D. J. Ellis, B. J. Coppack, C. Pringle	L. Hartly	Ulster S.S. Co., Ltd.
<i>Flamenco</i>	4.3.59	J. H. Altemby	J. A. Bernie, D. B. Jack, S. I. Clough	J. G. Sherwood	Chr. Salvesen & Co.
<i>Fresno City</i>	8.10.58	D. Beynon	D. H. Thomas, R. Baldwin, T. V. Hathergall	S. Coldray	Pacific S.N. Co.
<i>Glenartney</i>	1.4.59	D. C. Evans	C. Partridge, D. R. Matthews, G. Lillie	..	Sir William Reardon Smith & Sons, Ltd.
<i>Glenbank</i>	26.3.59	J. Hill	T. A. Walker, D. W. Macdonald, J. Ellis	J. Binding	Glen Line, Ltd.
<i>Glenfinlas</i>	18.2.59	N. A. Rae, M.B.E., R.D.	G. R. Matthey, A. S. Thompson, J. B. Swindles, J. Greenwood	R. Foster	Andrew Weir & Co., Ltd.
<i>Glenforchy</i>	3.12.58	J. B. Anderson	W. Doodson, R. Michael, C. Hill, D. Pounder	J. B. Carr	Glen Line, Ltd.
<i>Gloucester</i>	30.6.58	J. E. Budgett	J. Eanes, T. Chappell, A. N. Couch	A. Brown	Glen Line, Ltd.
<i>Gloucester City</i>	12.11.58	S. G. Smith, O.B.E.	J. F. Stuart, J. W. Crossley, D. Morris, A. Ditchfield	P. Leigh	Federal S.N. Co., Ltd.
<i>Golfito</i>	1.12.58	G. M. Roberts	T. I. Oliver, T. de Ogier, G. Cairns, R. H. Dyer	M. Brett	Charles Hill & Sons
<i>Gothic</i>	3.12.58	L. J. Hopkins	L. Jarrett, T. Jackson, M. Bradley	P. J. Kelly	Elder & Fyffes, Ltd.
<i>Graic</i>	5.2.59	R. Dodds	A. C. Thomas, W. J. Cross, T. R. McNulty	B. McGovern	Shaw Savill & Albion Co., Ltd.
<i>Great City</i>	6.4.59	J. H. Thornhill	D. I. Jamison, R. E. Baker, D. B. Fantham, J. W. Gill	L. Phillips	Edwal Williams & Co., Ltd.
<i>Haparangi</i>	9.3.59	W. J. T. Stevens	R. Fallowes, J. Higham, —, Hanson	D. H. Davies	Sir William Reardon Smith & Sons, Ltd.
<i>Harbaltion</i>	1.1.58	A. R. Phelps	T. Wilson, G. Sinclair, J. Higham	A. J. Palmer	New Zealand Shipping Co., Ltd.
<i>Harrington</i>	19.3.59	R. Storr, O.B.E.	J. J. Forrest, A. W. S. Cripps, M. W. Carrell, E. J. Wilson	F. Blyth	J. & C. Harrison & Co., Ltd.
<i>Hauraki</i>	8.1.59	R. G. Hollingdale	D. H. Lawrenson, B. A. Hood, D. J. Bateson	..	New Zealand Shipping Co., Ltd.
<i>Hector</i>	19.1.59	G. F. Lock	H. Bostock, N. Welden, P. Elder	A. R. Terry	A. Holt & Co.
<i>Helenus</i>	30.12.58	T. R. Phillips	J. M. Conolly, M. T. John, W. R. Smith	W. H. Williams	A. Holt & Co.
<i>Hemiglypta</i>	27.1.59	S. A. Greenaway	E. B. Naibett, E. T. Rowlands, T. H. Whyatt, J. P. Blamey	A. Holman	Shell Tankers, Ltd.
<i>Hertford</i>	27.11.58	H. C. R. Dell	M. Kingham, F. Diaper, P. Foster, W. Thwaiter	J. P. Connolly	..
<i>Highland Brigade</i>	6.4.59	G. Fletcher	G. Kemp, T. Milner, P. Jowers, R. Brockbank	B. Percy	Federal S.N. Co., Ltd.
<i>Highland Monarch</i>	16.2.59	H. Sang	..	T. Desboro	Royal Mail Lines, Ltd.

<i>Highland Princess</i>	9.2.59	E. N. Giller, M.B.E.	A. Smith, C. L. Earl, M. S. Jones, P. J. Williams	F. G. Goodall	Royal Mail Lines, Ltd.
<i>Hilary</i>	22.12.58	J. H. Stoker	J. Reilly, J. Ugarte	R. Bennett	Booth S.S. Co., Ltd.
<i>Himalaya</i>	28.1.59	H. C. Shinn	S. W. Townsend, J. B. Latham, R. E. L. Webb, I. H. Nichol, A. R. Turner	H. A. M. Jardine	Peninsular & Oriental S.N. Co. New Zealand Shipping Co., Ltd. New Zealand Shipping Co., Ltd. Sir William Reardon Smith & Sons, Ltd.
<i>Hinakura</i>	13.3.59	N. Warren	D. Hyde, O. Embleton, M. Elsam	R. Jay	Booth S.S. Co., Ltd.
<i>Hororata</i>	17.3.59	H. R. M. Smith	J. Macrae, J. Piner, A. Faulkner	T. Harris	Federal S.N. Co., Ltd.
<i>Houston City</i>	17.3.59	G. Harvey	J. Williams, D. S. Sapp, V. Cartwright	J. S. Louden	New Zealand Shipping Co., Ltd. Baltic Trading Co., Ltd.
<i>Hubert</i>	29.9.58	J. Whayman, D.S.C., R.D.	J. A. McBoyle, B. Fletcher, G. Thompson	F. Fitzgerald	Blue Star Line, Ltd.
<i>Huntingdon</i>	23.4.58	J. Guyer	W. A. Macrae, B. L. Cole, D. Weir	D. E. Warts	Ulster S.S. Co., Ltd.
<i>Hurunui</i>	21.1.59	F. Pover	D. G. Watson, P. Ogden, J. Hightfield, J. R. Rutherford	P. Callender	Walter Runciman & Co., Ltd. T. & J. Harrison, Ltd. Cunard S.S. Co., Ltd.
<i>Hycania</i>	14.6.57	J. Robertson	H. D. Holburn, N. Parington, J. Seivert	N. Ellis	A. Holt & Co.
<i>Imperial Star</i>	24.12.58	G. L. Evans	A. Fordham, A. White, F. Agnew, M. Robert	D. Whitehead	Kaye, Son & Co., Ltd.
<i>Inishoreen Head</i>	25.2.59	H. N. Clarke	H. Thompson, J. Roberts, R. Harris	A. E. Adams	A. Holt & Co.
<i>Innesmoor</i>	20.2.59	D. J. Nicholas	J. K. Schofield, R. D. Davidson, I. McLeod	G. Turner	Falkland Islands Government
<i>Interpreter</i>	30.1.59	W. Weatherall	R. Rice-Hughes, J. Pearson, F. H. Curry	T. A. Harris	T. & J. Harrison, Ltd.
<i>Ioernia</i>	19.9.58	S. A. Jones, R.D.	A. J. Foster, A. Bell	F. Brown	Union Castle Mail S.S. Co., Ltd.
<i>Ixion</i>	17.3.59	G. Edge	J. S. Hunter, B. Drummond, A. Sinclair	W. W. Beebee	Pacific S.N. Co.
<i>Jamaica Producer</i>	30.10.58	E. M. Jenkins	M. J. Belcher, R. A. Hill, J. Munro	J. Robertson	British India S.N. Co., Ltd.
<i>Jason</i>	21.11.58	W. K. Hole	A. Donnan, M. J. Glover, D. Mathews	I. T. Davies	King Line, Ltd.
<i>John Biscoe</i>	19.11.58	R. A. Simpson	J. P. Morley, R. Le Pivert, M. S. Smith	H. Kempe	F. C. Strick & Co., Ltd.
<i>John Holt</i>	6.10.58	D. Wolstenholme	M. de Lacy, E. Jones, K. Bridson	R. Goulden	P. Henderson & Co.
<i>Journalist</i>	24.2.59	A. C. Hicks	R. L. Harvey, I. Mitchell, J. C. Chambers	P. G. Llewellyn	Lampport & Holt Line, Ltd.
<i>Kenilworth Castle</i>	1.1.59	H. B. W. Cray	T. Thorpe, —, Kelsco, —, Wigham, —, Whitechurch	N. Roberts	Turnbull Martin & Co., Ltd.
<i>Kenuta</i>	26.3.59	T. Coats	T. Robbins, A. J. Hughes, T. Kelsco	J. D. Masterman	Houlder Bros., Ltd.
<i>Kenya</i>	25.11.58	I. A. Lewis	D. McElvogue, C. McCarthy, R. Hind	D. Murray	Donaldson Bros. & Black, Ltd.
<i>King Robert</i>	4.11.58	R. Hodgson	L. A. Bartrip, J. H. Apsey, W. S. Wallace	A. E. Unsworth	Bibby Bros. & Co.
<i>King William</i>	3.2.59	M. F. M. Fair	—, Hughes, G. B. Bagnall, T. H. Brain	P. Mullane	Trinder Anderson & Co., Ltd.
<i>Kohistan</i>	11.3.59	E. D. Spooner	A. R. Phinler, G. M. Graham	R. Greenhalgh	T. & J. Harrison, Ltd.
<i>Koyan</i>	24.11.58	R. B. Linsley	J. R. Owen, R. P. Willis, W. A. Wilson	J. Limpitlaw	Donaldson Line, Ltd.
<i>Lalande</i>	29.10.58	J. R. Faulkner	D. C. W. Wellstead, J. D. W. Chapple, I. Cameron	J. Greenhalgh	Ellerman's Wilson Line, Ltd.
<i>Lanarkshire</i>	30.12.58	T. S. Graham	P. J. E. Charman, G. Sutcliffe, J. Austin	D. Stevenson	Royal Mail Lines, Ltd.
<i>Langton Grange</i>	28.1.59	E. D. Brand	H. H. Grant, R. Doornon, A. D. McCallum, W. G. Cullen	J. Barter	Royal Mail Lines, Ltd.
<i>Laurentia</i>	26.11.58	C. Parry	A. G. Broadwith, J. W. Waldie, J. Clark	L. Francis	Royal Mail Lines, Ltd.
<i>Lincestershire</i>	8.1.59	C. S. Boam	T. R. Wood, H. G. Chafer, N. R. Warwick	G. Warder	Chr. Salvesen & Co.
<i>Linguist</i>	14.8.58	R. McNie	J. Lundberg, R. Bell, R. Stamer	B. I. D. Mellors	London & Overseas Freighters, Ltd.
<i>Lismoria</i>	26.3.58	R. Massam	R. Brewster, W. F. Joyce, D. G. Hall, W. Spowart	B. I. D. Mellors	Shell Tankers, Ltd.
<i>Livorno</i>	13.2.59	T. W. F. Bolland	B. A. Gash, J. A. Debeer, T. Lee	A. Turner	T. & J. Brocklebank, Ltd.
<i>Loch Avon</i>	30.12.58	L. T. Peterson	A. V. Pratt, R. J. Kistler, R. E. Fairley, J. V. Marks	B. Beecham	T. & J. Brocklebank, Ltd.
<i>Loch Garth</i>	6.11.58	F. A. C. Thacker	J. W. E. Thwaites, J. H. Thompson, R. N. Miller	S. B. Lee	T. & J. Brocklebank, Ltd.
<i>Loch Gowan</i>	26.1.59	G. M. Fletcher	J. G. Jardine, G. Varney, J. Niblock	E. Macfarlane	T. & J. Brocklebank, Ltd.
<i>Loch Loyal</i>	9.12.58	W. S. Thomas	D. I. Polson, —, Harkness	E. McKinnon	T. & J. Brocklebank, Ltd.
<i>Loch Ryan</i>	16.2.59	L. B. Andersen	R. E. Ambrose Jones, L. Clark, R. J. Blythe		
<i>Logna</i>	8.12.58	W. B. Blackmore	A. Rossouw, B. Lloyd, D. H. White		
<i>London Pride</i>	13.1.56	N. Clarke	J. M. Gray, G. W. Sinclair, A. C. Stallard		
<i>Lotorium</i>	30.10.58	H. F. Scoins	A. Warren, J. Long, A. Wilkinson, A. Dunster		
<i>Magharida</i>	13.3.58	J. P. Jackson	I. G. H. Foulkes, W. Lloyd, —, Williams, J. B. Popplewell		
<i>Magdapor</i>	8.1.59	G. A. Jackson	R. Evans, J. Moore, R. Owen, A. Lloyd		
<i>Mahanada</i>	8.9.58	J. Richardson	B. Watson, R. E. Roberts, T. Williams		
<i>Mahseer</i>	20.3.59	J. M. Coles			
<i>Makalla</i>					

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Malancha</i> ..	6. 4. 59	J. G. Nuttall ..	D. H. Winter, R. C. Floyd, B. R. Ross ..	J. E. McVicar ..	T. & J. Brocklebank, Ltd.
<i>Manchester City</i> ..	6. 3. 59	A. Starmer ..	W. R. Donaldson, J. S. Watson, D. Gregson ..	W. K. Wilson ..	Manchester Liners, Ltd.
<i>Manchester Explorer</i> ..	3. 9. 57	J. E. Askew ..	J. Williamson, A. G. Rowlands, G. B. Hannaford ..	D. Hodgson ..	Manchester Liners, Ltd.
<i>Manchester Mariner</i> ..	13. 1. 59	E. W. Raper ..	A. S. Bashford, D. D. Barlow, M. Barnes ..	J. Buchanan ..	Manchester Liners, Ltd.
<i>Manchester Merchant</i> ..	17. 9. 58	W. H. Downing ..	A. S. Rimmer, J. A. McKay, B. Hancock ..	A. S. Broadbent ..	Manchester Liners, Ltd.
<i>Manchester Miller</i> ..	4. 11. 58	E. W. Raper ..	G. S. Bashford, A. O. Copeland, D. Thomas ..	A. S. Broadbent ..	Manchester Liners, Ltd.
<i>Manchester Pioneer</i> ..	26. 6. 58	G. R. Thompson ..	C. B. Rapp, P. N. Fielding, W. Gianville ..	K. J. McGuire ..	Manchester Liners, Ltd.
<i>Manchester Port</i> ..	26. 1. 59	J. E. Askew ..	S. N. Simpson, J. Watson, J. A. McKay ..	M. Doran ..	Manchester Liners, Ltd.
<i>Manchester Progress</i> ..	24. 4. 58	W. Hine ..	G. H. Gleave, P. Frier, J. Illingworth, M. W. Kipling ..	J. C. Kane ..	Manchester Liners, Ltd.
<i>Manchester Prospector</i> ..	27. 10. 58	F. Lewis ..	D. R. Nutton, P. D. Cullen, D. W. Whitworth ..	W. Macpherson ..	Manchester Liners, Ltd.
<i>Manchester Regiment</i> ..	31. 3. 59	W. E. Quirk, R.D. ..	A. L. Morris, P. Cullen, K. Leapug ..	T. Berry ..	Manchester Liners, Ltd.
<i>Manchester Shipper</i> ..	19. 1. 59	E. W. Espley ..	G. B. Hannaford, J. M. Rushworth, J. W. Shaw ..	A. Kenny ..	Manchester Liners, Ltd.
<i>Manchester Spinner</i> ..	29. 7. 57	H. Downing ..	R. N. R. Shinkfield, A. O. Copeland, L. Taylor ..	J. Reid ..	Manchester Liners, Ltd.
<i>Manchester Trader</i> ..	16. 3. 59	E. W. Espley ..	J. Rimmer, J. Baker, A. Cowell ..	R. Williams ..	Manchester Liners, Ltd.
<i>Manchester Vanguard</i> ..	30. 12. 58	G. R. Thompson ..	C. Bishop, R. M. Bertenshaw, D. Whitworth, G. A. Cowell ..	F. Mullen ..	Manchester Liners, Ltd.
<i>Manchester Venture</i> ..	10. 12. 58	I. E. Jones ..	D. M. Oliver, R. Tester, M. T. Storr ..	D. Broadbridge ..	Manchester Liners, Ltd.
<i>Mandator</i> ..	25. 11. 58	S. E. Turner ..	D. A. Evans, G. A. Jenkins, D. F. Barratt ..	N. Brecknock ..	T. & J. Brocklebank, Ltd.
<i>Manistee</i> ..	24. 9. 58	F. Barber ..	C. E. Marsh, D. Boon, D. J. Morris, J. Robinson ..	P. Prole ..	Elder & Fyffes, Ltd.
<i>Marabank</i> ..	6. 8. 58	C. G. Watterson ..	W. Mottram, J. K. Mathias, R. C. Lescombe ..	J. Fahy ..	Andrew Weir Shipping & Trading Co., Ltd.
<i>Marengo</i> ..	30. 5. 58	D. A. Stokes ..	P. Rotherham, R. Howlett, A. Burrell ..	V. Heaney ..	Ellerman's Wilson Line, Ltd.
<i>Marland</i> ..	2. 12. 58	P. J. Pembroke ..	A. L. Davie, G. F. Kay, P. Swift ..	D. F. Lawrence ..	T. & J. Brocklebank, Ltd.
		P. J. Pembroke ..	P. G. Whitmore, D. L. des Landes, J. Cayzer, J. L. Clucas ..		
<i>Matheran</i> ..	20. 8. 58	H. Simpson ..	C. D. Croall, A. G. M. Ward, J. Millichap ..	P. Y. Wright ..	T. & J. Brocklebank, Ltd.
<i>Matina</i> ..	3. 2. 59	W. F. Young ..	P. Tambling, J. Wright, G. Spikins ..	J. G. Rawlings ..	T. & J. Brocklebank, Ltd.
<i>Mauretania</i> ..	12. 9. 58	A. Mackellar, R.D. ..	J. King, A. T. Cant, A. L. G. Gossett ..	A. Campbell ..	Elder & Fyffes, Ltd.
<i>Media</i> ..	19. 11. 58	J. Treasure-Jones, R.D. ..	D. J. McManus, K. T. Jones, A. D. Monro ..	A. Cancock ..	Cunard S.S. Co., Ltd.
<i>Melbourne Star</i> ..	26. 3. 59	A. Penrice ..	K. A. Mackenzie, G. Williams, J. McNeill ..	A. Hopkinson ..	Cunard S.S. Co., Ltd.
<i>Merchant Duke</i> ..	23. 3. 59	S. E. Hooper ..	G. Curnow, H. Harrison, —, Laverne ..	F. G. Huggett ..	Blue Star Line, Ltd.
<i>Middlesex</i> ..	29. 9. 58	I. Davison ..	L. Money, A. Britain, C. Jones, D. Osborne ..	D. Hambleton ..	Drake S.S. Co., Ltd.
<i>Monarch</i> ..	17. 12. 58	J. P. F. Betson, O.B.E. ..	I. J. L. Lang, D. W. Alford, J. Lofts ..	R. Heath ..	Federal S.N. Co., Ltd.
<i>Monmouthshire</i> ..	4. 12. 58	A. K. Sanderson ..	P. A. Rothery, W. R. Jolly, I. R. Davies ..	R. Pharo ..	H.M. Postmaster-General
<i>Montreal City</i> ..	1. 10. 58	E. E. Dunn ..	J. M. Dawson, E. V. Mace, B. G. Rees ..	Glen Line, Ltd. ..	Glen Line, Ltd.
<i>Murston</i> ..	6. 1. 59	A. C. Hough ..	A. Storrow, R. Price, P. W. Price ..	A. V. Chappel ..	Charles Hill & Son
<i>Myrtlebank</i> ..	1. 10. 58	W. L. Murphy ..	S. Cutlack, D. McCaffery, J. Haig ..	W. Robinson ..	F. C. Strick & Co., Ltd.
<i>Napier Star</i> ..	1. 4. 59	J. A. McCherrie ..	P. Daniel, N. M. Millan, J. Winship ..	F. Ross ..	Andrew Weir & Co., Ltd.
<i>Natania</i> ..	3. 4. 59	C. H. McDonald ..	K. S. Kelly, E. N. Taylor, R. C. Brown ..	C. S. Thomas ..	Booth S.S. Co., Ltd.
<i>Nestor</i> ..	14. 5. 58	A. McKeon ..	R. W. Jack, P. A. Smith, I. B. Hunter ..	T. King ..	Shell Tankers, Ltd.
<i>Newfoundland</i> ..	19. 11. 58	J. Ramsay ..	G. J. Harfoot, D. Simpson ..	D. Hunter ..	A. Holt & Co.
<i>New York City</i> ..	17. 10. 58	E. L. Jermyn, O.B.E. ..	I. C. Wood, P. Entwistle, M. Bindon ..	A. Brookes ..	Furness Withy & Co., Ltd.
<i>New Zealand Star</i> ..	28. 8. 58	S. R. Simons, M.B.E. ..	D. Milburn, B. Sturgess, I. P. Jay ..	R. Morris ..	Charles Hill & Sons
<i>Nordic</i> ..	5. 12. 58	J. G. West ..	J. C. Hume, D. E. Moran, R. Shannon, W. Smith ..	T. Drake ..	Booth S.S. Co., Ltd.
<i>Norfolk</i> ..			V. G. Worth, B. H. Wise, T. S. Gwyer, R. H. Ockenden ..	J. Bilton ..	Prince Line, Ltd.
<i>Norseman</i> ..			I. W. Stirling, G. Pool, G. Lott, D. Jenkins ..	A. Greenwood ..	Federal S.N. Co., Ltd.
<i>Northumberland</i> ..				R. Waters ..	Cable & Wireless, Ltd.
					Federal S.N. Co., Ltd.

Nottingham	25.2.59	F. G. Bevis	E. G. Dixon, E. Gale, W. R. Harris, P. J. Egan	G. W. Wyatt	Federal S.N. Co., Ltd.
Nova Scotia	23.2.59	J. E. Wilson, O.B.E.	M. D. Jones, R. W. Holmes, D. J. Cook	P. Finn	Furness Withy & Co., Ltd.
Novetist	13.3.59	C. C. Heaton	C. H. Roberts, E. P. Jones, B. W. Jones	T. G. Jones	T. & J. Harrison, Ltd.
Obuasi	18.8.58	H. C. Allen	D. Howieson, J. R. Angus, F. Drury	R. D. Walsh	Elder Dempster Lines, Ltd.
Ocean Layer	8.7.58	A. M. Ross	R. James, D. W. Angus, J. Thompson, J. Newsham	R. E. Barker	Submarine Cables, Ltd.
Oilfield	4.11.58	G. S. Wake	W. Thomson, J. A. M. Haddow, J. G. W. Gray	P. Shine	Hunting & Son, Ltd.
Orcades	22.12.58	J. D. Birch, D.S.C., R.D.	M. D. Rushan, D. B. Gaffney, G. Munson	— Macrae	Orient S.N. Co., Ltd.
Orion	1.4.59	C. Edgcombe, R.D.	I. B. Jones, D. Steff, B. O'Sullivan	F. Harrop	Orient S.N. Co., Ltd.
Oronsay	16.2.59	R. W. Roberts, O.B.E., D.S.C.	W. M. Cowles, E. A. Robinson, D. T. Hughes	R. A. Oakley	Orient S.N. Co., Ltd.
Orontes	19.2.59	S. Ayles	W. J. Denly, N. I. Collett, J. M. Boyde	M. Palmer	Orient S.N. Co., Ltd.
Orosua	26.11.58	N. W. Smith	J. M. B. Wells, T. J. McCarthy, J. L. Chapman	P. Parish	Orient S.N. Co., Ltd.
Orotao	12.3.59	A. Hocken	R. C. Ford, D. Jones, R. Cooke, W. Chaplin	P. Broome	New Zealand Shipping Co., Ltd.
Otaki	26.11.58	J. Bennett	I. N. R. McCarthy, W. Dan, E. J. Carr, P. Saunders	A. McInnes	New Zealand Shipping Co., Ltd.
Otaofu	5.8.58	W. Scott	H. McKay, R. Hare	A. Rodger	Chr. Selvesen & Co.
Oxfordshire	6.1.59	N. F. Fitch, M.B.E.	D. N. B. Nutman, D. C. Monteith, K. Adams	A. Bullard	Bibby Bros. & Co.
Pacific Envoy	26.1.59	P. F. Owens	D. Milliken, B. Roberts, J. Heathcote	— Murray	Furness, Withy & Co., Ltd.
Pacific Fortune	19.11.58	G. Brown	N. Firth, D. Mander, K. Lewis	A. Hemlin	Furness, Withy & Co., Ltd.
Pacific Reliance	15.9.58	A. H. Cooke	G. M. Pugh, T. William, — Deene	T. Elliot	Furness, Withy & Co., Ltd.
Pacific Stronghold	22.12.58	J. Stewart	H. Campbell, R. Howell, W. Deeley	E. G. Hutchinson	Furness, Withy & Co., Ltd.
Pacific Unity	27.10.58	H. A. Shaw, O.B.E.	J. Phillips, R. Weales, W. Dempster	H. Roderick	Elders and Fyffes, Ltd.
Pacuare	29.9.58	J. L. Sims	D. A. Whitaker, O. Pascoe, G. Ferris	A. Hammond	Royal Mail Lines, Ltd.
Pampas	17.3.59	J. Penny	I. S. Ditchfield, P. Surtees, G. Bateley	J. R. Birnshaw	New Zealand Shipping Co., Ltd.
Papanui	21.1.59	G. C. W. Meldrum	P. O. Kean, D. James, D. E. Smith	P. Stephenson	New Zealand Shipping Co., Ltd.
Paparao	19.11.58	M. J. Heron	A. L. Jackson	J. MacDonald	Blue Star Line, Ltd.
Paraguay	4.11.58	D. B. Brittain	D. Bell, M. Mortimer, M. R. Simon	E. Shaw	Royal Mail Lines, Ltd.
Paraguay Star	6.11.58	G. C. W. Meldrum, M.B.E., R.D.	D. Rogers, D. MacKillop, M. Jackson	A. O'Sullivan	Union Castle Mail S.S. Co., Ltd.
Pardo	22.12.58	D. R. MacFarlane, O.B.E., D.S.C.	R. J. L. Oliphant, B. Sugden, P. T. Shephard	P. Linehan	R. S. Daigleish, Ltd.
Parina	12.12.58	W. A. Kennedy	M. Baskerville, C. J. W. Bush, A. Crebbin	P. Lurch	Peninsular & Oriental S.N. Co.
Parthia	5.1.59	G. A. Gibbons	C. C. Walker, T. A. Nicholson, C. R. Lucas, F. Pollitt	C. R. McAnerney	A. Holt & Co.
Pendennis Castle	18.3.59	G. H. Mayhew	P. Eckford, J. Hobbs, J. Taylor	J. Pattie	Turnbull, Martin & Co., Ltd.
Pennyworth	10.2.59	N. Thompson	J. Bertram, C. P. Bridgwood, C. Bell	A. McCormick	Royal Mail Lines, Ltd.
Perim	1.2.59	A. G. Stanfield	W. M. Lucas	C. G. Wyatt	New Zealand Shipping Co., Ltd.
Perseus	3.7.58	H. C. Large	M. A. S. Pugsley, I. Webster, G. Cameron, M. L. Morgan, J. Carter	T. Tynan	Pacific S.N. Co.
Perthshire	8.11.57	E. W. Jenkin	R. G. Toogood, G. Healey, M. Andrews	— Beverley	Port Line, Ltd.
Pilcomayo	3.12.58	J. T. Peattie	J. A. Philip, J. Hunt, D. S. Guinness	H. Harrocks	Port Line, Ltd.
Pipiriki	21.1.59	J. E. Evans, D.S.C., R.D.	A. M. Watt, W. D. Cooper, B. R. Blood, J. P. Blamey	L. Foley	Port Line, Ltd.
Pizarro	25.3.59	H. B. Conby	R. Hetherington, F. Nuttal, R. Pearson	T. Cameron	Bibby Lines, Ltd.
Port Adelaide	23.2.59	C. R. Townshend	J. C. Boyle, C. S. Liley, B. Martin	D. McCartney	Port Line, Ltd.
Port Auckland	6.3.59	F. W. Bailey, M.B.E.	I. D. Hitchmough, A. A. Gough, W. J. Haastie	J. Goddard	Port Line, Ltd.
Port Brisbane	29.1.59	J. R. Dolton	M. R. Haslam, M. R. Mortimore, R. C. Center	S. Connell	Port Line, Ltd.
Port Dunedin	26.11.58	A. N. Williamson	D. F. T. Downard, F. G. Gurney, R. M. Ellison	E. F. Heenan	Port Line, Ltd.
Port Hardy	25.2.59	W. Craig	R. J. Jenkins, B. M. Eaton, M. S. O'Byrne	V. Waddington	Port Line, Ltd.
Port Invercargill	11.8.58	A. Brown	D. L. Taylor, M. H. C. Twomey, G. D. Shearn	F. C. Sterry	Port Line, Ltd.
Port Lincoln	18.2.59	W. Eastoe	C. H. P. Brown, D. I. Orr, I. G. Watson	K. A. Makin	Port Line Ltd.
Port Macquarie	22.12.58	J. Stannard	R. Bramley, J. H. Lloyd-Davies, M. Luce		
Port Napier	6.11.58	E. W. Dingle, M.B.E.	J. C. Roske, G. Hay, J. Gibson		
Port Phillip	19.3.59	P. S. Ball	R. I. Collogly, A. E. Hoggarth, I. B. Rankin		
Port Pirie	5.1.59	A. S. McClouan	J. A. Cullen, E. Walshaw, R. Harding		
Port Townsville	28.11.58	L. J. Skalles	G. D. B. Thomas, J. A. Bramley, O. R. Barlow		
		J. S. Moate	D. J. Turner, D. I. Pull, D. Shearsmith, A. D. Braithwaite		

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Port Victor</i> ..	24.12.58	J. A. Fairbairn	T. R. Howe, W. J. North, M. J. Sebbage	McMillan	Port Line, Ltd.
<i>Port Vindex</i> ..	6.4.59	E. Young	J. Burt, J. Hart, J. Whitcher	N. W. Hodgson	Port Line, Ltd.
<i>Port Wanstead</i> ..	18.2.59	I. W. Jackson	J. R. Tirmm, D. N. Allan, A. El Pharaony	G. Maddison	Watts, Watts & Co., Ltd.
<i>Port Wellington</i> ..	9.2.59	C. Hodson	P. Goldberg, M. Rose, N. Hogg	S. Macpherson	Port Line, Ltd.
<i>Port Wyncham</i> ..	22.12.58	R. H. Finch	P. J. Henley, D. Hart, M. Ell	T. McMinn	Port Line, Ltd.
<i>Potaro</i> ..	14.1.59	J. Fox	S. Phillips, J. Thornhill, J. Hunt	J. Shaw	Royal Mail Lines, Ltd.
<i>Potosi</i> ..	17.3.59	R. D. S. Eckford	T. Wake, W. D. Hughes, P. L. Whitaker	C. D. McCarthy	Pacific S.N. Co.
<i>Prestoria Castle</i> ..	13.1.58	G. H. Mayhew	K. J. Barry, J. Lane	P. Williams	Union Castle Mail S.S. Co., Ltd.
<i>Prospector</i> ..	20.3.59	E. Whitehouse	C. D. Riley, J. Dickenson, F. F. Humble	M. B. Murphy	T. & J. Harrison, Ltd.
<i>Queensland Star</i> ..	18.8.58	R. White, D.S.C.	E. G. Bee, D. Greenland, R. Barrett	A. Horton	Blue Star Line, Ltd.
<i>Rakata</i> ..	9.2.59	H. N. Lawson, R.D.	D. Watt, I. Excell, H. Crane	E. Barley	New Zealand Shipping Co., Ltd.
<i>Ramilies</i> ..	26.3.59	W. J. Thomas	K. T. Connolly, J. F. Doyle, D. Miller	D. Warner	John Cory & Son
<i>Ramore Head</i> ..	28.7.58	W. Baird	J. McD. Knox, R. J. Crawford, T. Frizell	T. Lyons	Ulster S.S. Co., Ltd.
<i>Ramsay</i> ..	16.1.59	J. C. Pratt	S. J. Readman, P. B. Jordan, T. N. Davies	G. M. Hargreaves	Bolton S.S. Co., Ltd.
<i>Rangitane</i> ..	20.3.59	R. G. Rees	J. M. Withington, G. MacIver, D. G. Marris, J. Jackson	L. Whittington	New Zealand Shipping Co., Ltd.
<i>Rangitata</i> ..	3.4.59	E. H. Hopkins	G. S. Green, M. Bosworth, J. Rutherford, C. Hufflet	W. Fowler	New Zealand Shipping Co., Ltd.
<i>Rangitiki</i> ..	19.1.59	A. E. Lettington, O.B.E., D.F.C.	C. H. T. Whale, H. Harkins, C. M. Turner, R. Barnard	C. L. Lambe	New Zealand Shipping Co., Ltd.
<i>Rangitoto</i> ..	9.3.59	L. W. Fulcher	J. H. Hutson, J. B. Evans, R. Box	G. A. Parker	New Zealand Shipping Co., Ltd.
<i>Rathlin Head</i> ..	6.6.58	M. Kennedy	W. B. Niblock, C. E. Pringle, W. D. Teal	E. Heywood	Ulster S.S. Co., Ltd.
<i>Regent Hawk</i> ..	20.2.59	S. S. Jenkins	W. D. Cook, J. Beard, F. M. Ford	C. Plomer	Regent Petroleum Tankship Co. Ltd.
<i>Regent Royal</i> ..	10.2.59	J. A. Creswell	R. J. Peters, C. Pinchbeck, P. S. L. Nobes	R. W. Jones	Regent Petroleum Tankship Co. Ltd.
<i>Reina del Mar</i> ..	1.2.59	A. G. Litherland	D. J. Bishop, P. Barry, L. M. Hatler	T. Hurley	Pacific S.N. Co.
<i>Retriever</i> ..	18.3.57	J. G. West	D. Silwood, P. Watts, M. Simmons	Fitzsimmons	Cable & Wireless, Ltd.
<i>Reynolds</i> ..	1.1.59	E. E. Roberts	D. Fullwood, W. Brown, L. Gillies	J. Burns	Bolton S.S. Co., Ltd.
<i>Rialto</i> ..	19.3.59	H. Greenhill	J. Edwards, P. Ramsay, R. A. Jones	A. Gavin	Ellerman's Wilson Line, Ltd.
<i>Ribbthead</i> ..	5.1.59	G. Murray	P. R. Owen, G. Leith, P. Baylis	K. A. Mackenzie	Bolton S.S. Co., Ltd.
<i>Richard de Larrinaga</i> ..	1.2.59	J. Meade	F. Waring, —, Daniels, J. Sullivan	J. Hunter	Larrinaga S.S. Co., Ltd.
<i>Richmond Castle</i> ..	27.10.58	A. T. Underdown	S. Cazalet, R. Bamlett, B. Webb	G. Hurst	Union Castle Mail S.S. Co., Ltd.
<i>Ripon</i> ..	27.1.58	B. A. Lillivick	A. Millie, M. Jenkins, G. Metcalf	A. G. H. Phail	Houlder Bros. & Co., Ltd.
<i>Ripplingham Grange</i> ..	13.2.59	A. McEwan	P. R. Robertson, D. C. Hall, E. T. Taylor	V. H. George	Mungo Campbell & Co., Ltd.
<i>River Afton</i> ..	30.12.58	J. P. Johnson	—, Kaye, —, Patterson, White	F. Sullivan	Union Castle Mail S.S. Co., Ltd.
<i>Rochester Castle</i> ..	15.12.58	C. E. Lorrain	S. Middleton, A. Dekonski, T. F. Cary	N. Elsworth	Ropner Shipping Co., Ltd.
<i>Romanby</i> ..	17.11.58	E. A. Sneath	E. C. Dix, D. J. McAllister, R. Derham	D. Nicholls	Bolton S.S. Co., Ltd.
<i>Romanic</i> ..	6.4.59	W. J. Copping	N. C. Kerr, E. Seaton, R. Pledge, J. Green, J. Ronald	R. M. S. Stirling	Ulster S.S. Co., Ltd.
<i>Roonagh Head</i> ..	22.7.58	E. M. Black, O.B.E.	M. L. Ingle, J. W. Johnston, T. M. Dene	D. F. Drage	Avenue Shipping Co., Ltd.
<i>Roscommon</i> ..	24.3.59	M. R. Foster	K. S. Garrett, G. Francis	P. Marriott	Union Castle Mail S.S. Co., Ltd.
<i>Roswallan Castle</i> ..	11.3.59	A. T. Underdown	B. Lee, —, Fellow, S. Foulkes	P. Hull	New Zealand Shipping Co., Ltd.
<i>Roxburgh Castle</i> ..	4.12.58	R. M. Wright	J. P. Crowder, J. B. Ashford, D. Pomphrey, R. Blood	J. P. Crowder	Union Castle Mail S.S. Co., Ltd.
<i>Ruathine</i> ..	8.9.58	P. S. Calcutt	T. Mitchell, R. Kennedy	T. Corless	New Zealand Shipping Co., Ltd.
<i>Runa</i> ..	6.1.59	J. H. Gilfillan	A. R. Smith, L. Mouncey, T. Statham	—, MacMurray	Shaw Savill & Albion Co., Ltd.
<i>Ruric</i> ..	2.3.59	C. W. Sendall	J. Conn, S. Ward, K. H. Tjlstone	G. H. Preveziotis	Headlam & Son
<i>Runsack</i> ..	29.1.59	L. Weatherill	W. Wood, S. A. Gallon, B. Vale	C. Child	Ellerman's Wilson Line, Ltd.
<i>Sacramento</i> ..	23.2.59	H. Grunmill	M. Hammond, T. Wilson, D. Chiswell	J. Conway	South America Saint Line, Ltd.
<i>St. John</i> ..	15.8.58	C. Bradley, M.B.E.	F. K. Davies, D. McGugan, A. Johnston	M. Prior	Donaldson Bros. & Black, Ltd.
<i>Salacia</i> ..	3.12.57	G. M. Clark	A. Craig, W. A. E. Johnston, B. Glen	P. Argument	Pacific S.N. Co.
<i>Salamanca</i> ..		A. Loyal			

<i>Salaverry</i>	14. 11. 58	R. B. Bryant	T. F. Hill, A. C. Gordon, C. T. Taylor	W. M. Fryer	Pacific S.N. Co.
<i>Salinas</i>	16. 1. 59	P. D. O'Driscoll, R.D.	C. D. Outhwaite, J. Turner, A. M. Jestico	J. K. Windle	Peninsular & Oriental S.N. Co.
<i>Salween</i>	19. 1. 59	K. S. Marah	E. Maclean, — MacMillan, J. Johnston	W. Allan	P. Henderson & Co.
<i>Sansu</i>	27. 8. 58	A. Ness	P. G. Bowman, G. H. Bickerton	L. Sutron	Elder Dempster Lines, Ltd.
<i>Santander</i>	19. 8. 58	A. B. Powell	J. A. Rogers, T. Wilcockson, D. Good	J. MacKinnon	Pacific S.N. Co.
<i>San Valino</i>	10. 12. 58	W. W. Gibb	H. F. Mitchell, D. A. Doyle, K. Thomas	D. Ambler	Eagle Oil & Shipping Co., Ltd.
<i>San Veronica</i>	18. 4. 58	K. E. Spencer	M. Parke, L. J. Coutris, R. A. Johnston	C. W. Watson	Eagle Oil & Shipping Co., Ltd.
<i>San Vulfirano</i>	3. 7. 58	A. J. Weightman	J. D. Tomlinson, F. R. Rowden, R. H. Anthony	F. Mathews	Eagle Oil & Shipping Co., Ltd.
<i>Sarmiento</i>	17. 10. 57	P. B. Potts	M. Hetherington, J. Jenkins	E. P. Bishop	Pacific S.N. Co.
<i>Saxonia</i>	30. 12. 58	E. A. Divers, O.B.E., R.D.	W. Smith, B. A. Sharp, L. W. Crump	M. Southern	Cunard S.S. Co., Ltd.
<i>Saxon Star</i>	6. 11. 58	L. W. Evans	E. Mawdsley, D. Murray, J. Massey	D. Ciark	Booth S.S. Co., Ltd.
<i>Scottish Eagle</i>	7. 1. 59	W. Graham	E. J. Fisk, E. S. Surgey, R. C. Cawdery	F. Twisleton	Scottish Tankers, Ltd.
<i>Scottish Star</i>	6. 3. 59	E. Laidlaw	R. Bilton, R. Parker, K. Lovell	A. Irving	Blue Star Line, Ltd.
<i>Selector</i>	24. 3. 59	C. C. Heaton	D. N. R. Edmunds, M. Watson, G. A. Livingstone	S. Hebel	Falkland Islands Government
<i>Settler</i>	19. 5. 58	T. Flack	M. Cleaver, T. Woodfield	M. F. Farally	Silver Line, Ltd.
<i>Shackleton</i>	19. 1. 59	P. L. Hopkins	J. Bond, J. Wyness, D. Farquhar, N. Whitfield	T. F. Williams	Silver Line, Ltd.
<i>Silverbrook</i>	18. 2. 59	N. H. B. Bloye, D.S.C., R.D.	J. W. Barney, R. S. Pomphrey, C. Forth	S. Ribee	Torry Research Station
<i>Silverdale</i>	26. 3. 59	A. A. Walker	P. K. McCarthy, W. Marnie, M. R. Duke	G. R. Harding	Peninsular & Oriental S.N. Co.
<i>Silverstrand</i>	18. 7. 58	J. Munro	S. Ribee, M. Slater	E. Marks	Blue Star Line, Ltd.
<i>Sir William Hardy</i>	4. 2. 59	W. H. Waghorn	I. Gibb, J. W. Stee, C. S. Bradley	H. Matthews	Shaw Savill & Albion Co., Ltd.
<i>South Africa Star</i>	25. 2. 59	R. S. Hopper, D.S.C.	A. Francombe, L. Graham, G. Jones	A. R. Turnbull	Chr. Salvesen & Co.
<i>Southern Cross</i>	6. 5. 58	L. H. Edmeads	J. M. Brew, I. P. N. Cameron, S. C. Carr, M. G. Jennings, B. Collingwood, C. G. Davies	R. Oliver	Chr. Salvesen & Co.
<i>Southern Garden</i>	8. 5. 58	J. Ross	W. N. H. Anderson	D. MacKay	Chr. Salvesen & Co.
<i>Southern Harvester</i>	22. 4. 58	A. F. Baikie	J. B. Kerr, W. Holbu, J. Lough	J. McMorran	Chr. Salvesen & Co.
<i>Southern Opal</i>	6. 5. 58	H. Myhre	H. I. Anson, D. I. Polson, C. J. Nicolson	W. Larus	Chr. Salvesen & Co.
<i>Southern Satellite</i>	9. 3. 59	J. F. Oakley	O. Viklander, D. Jensen	M. Murphy	Chr. Salvesen & Co.
<i>Southern Venture</i>	23. 1. 59	W. C. Rodger	W. Bewley, R. Akerman, P. Laister	P. Moloney	Union Castle Mail S.S. Co., Ltd.
<i>Stirling Castle</i>	15. 7. 58	G. A. H. Cummins	N. D. Macgregor, D. M. Geddes, M. B. Fowkes	J. F. Clark	Peninsular & Oriental S.N. Co.
<i>Stirlingshire</i>	18. 3. 59	H. J. M. Perry	A. J. Bull, D. K. Murray	N. Fancett	Peninsular & Oriental S.N. Co.
<i>Strathaird</i>	17. 11. 58	C. P. Robinson	C. R. Smylie, A. C. Johns, T. W. Stevens	A. Titty	Federal S.N. Co., Ltd.
<i>Strathmore</i>	28. 1. 59	H. J. D. Sladen	A. L. McNeil, D. E. Moran, G. MacIver	T. D. Bee	Federal S.N. Co., Ltd.
<i>Sturrock</i>	3. 12. 58	N. A. Thomas	N. MacIver, M. Ewens, N. Niblock, R. Bristow	H. Williams	Ropner Shipping Co., Ltd.
<i>Sussex</i>	25. 11. 58	C. H. Churchill	D. W. D. Pitt, P. Mouton, W. J. Hodey, K. Scollay	A. F. Crosby	Cunard S.S. Co., Ltd.
<i>Swiftpool</i>	18. 2. 59	W. T. Pitcher	M. MacDonald, B. J. Siddell, D. M. Small	T. Ainsworth	F. C. Strick & Co., Ltd.
<i>Sylvania</i>	27. 5. 58	F. G. Watts, R.D.	A. W. Kinghorn, P. Weaver, D. Tink	J. Hawley	Union Castle Mail S.S. Co., Ltd.
<i>Tabaristan</i>	4. 3. 59	R. Mace	G. Cook, R. Wadsworth, G. Parry, E. V. Inch	G. S. Cavaye	Shaw Savill & Albion Co., Ltd.
<i>Tanale</i>	20. 3. 59	J. A. Cleator	J. H. Frost, C. Baker, W. Mackenzie, D. R. Carden	W. Stirling	Elder Dempster Lines, Ltd.
<i>Tantallon Castle</i>	11. 3. 59	J. B. James	J. H. Mills, A. Morton, D. Allan, J. Heppard	A. P. Moss	Blue Star Line, Ltd.
<i>Taranaki</i>	4. 2. 59	C. Beck	T. D. Maxwell, G. Wood, R. Olden	W. B. Shone	Shell Tankers, Ltd.
<i>Tarkwa</i>	26. 11. 58	E. Kingan	M. F. Hughes, B. Hinderwell, F. Miller	F. Lawton	Royal Mail Lines, Ltd.
<i>Tasmania Star</i>	25. 7. 58	F. N. Johnson	J. R. Graber, J. L. Moffat, P. R. Kennedy	E. Tarling	Shell Tankers, Ltd.
<i>Tectus</i>	10. 10. 58	G. Robson	C. R. Veno, J. G. Reeve, W. D. Coverdale, M. J. Jackson	J. Lynch	Shell Tankers, Ltd.
<i>Teitela</i>	24. 3. 58	J. Nicholson	F. R. Christian, A. F. Barber, D. S. Nicol	E. Bergan	Hector Whaling, Ltd.
<i>Teviot</i>	31. 10. 58	J. H. Napper	T. Gray, P. A. Chubb, G. Spikins	A. Patterson	Ivanovic & Co., Ltd.
<i>Theticonus</i>		G. J. McLean	F. G. Nickson, J. H. Evans, D. Dunbar	G. S. Dunn	Ellerman's Wilson Line, Ltd.
<i>Thule</i>		F. Holst	A. Calvert, R. Stewart, W. S. Clark	R. F. Holmes	New Zealand Shipping Co., Ltd.
<i>Tidecrest</i>		S. H. Bennett	A. Karlsen, L. Sorenson		
<i>Tinto</i>		I. Y. Batley	J. G. B. Hughes, J. Main, R. Todorovich		
<i>Tongarivo</i>			K. R. Richmond, T. H. Lewis, H. Blagdon		

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
Toronto City	9.3.59	J. R. Campbell	A. Ivins, W. Combes, B. G. Rees	T. M. Jenkins, M.R.E.	Charles Hill & Sons
Torr Head	21.1.59	S. J. Stark	I. D. Savage, J. Gomez, G. W. Houston	B. P. O'Callaghan	Ulster S.S. Co., Ltd.
Tregenna		W. F. Denyer	J. D. Mitchell, J. Williams, G. D. Stratford	M. Cannon	Hain S.S. Co., Ltd.
Treleuan	2.3.59	W. Phillips	J. Armstrong, D. Loud, M. Paterson	L. Kay	Hain S.S. Co., Ltd.
Trelissick	26.2.59	G. A. McKay	A. V. Rowles, T. C. Jewell, D. Field	F. Donnelly	Hain S.S. Co., Ltd.
Trelvon		I. M. Price	J. Crease, W. Wilson, D. Hunkin	J. Jenkins	Hain S.S. Co., Ltd.
Tremeadoo	13.1.59	S. K. Hawken	C. J. Ducker, R. Bulmer, D. Veal	F. B. Bawles	Hain S.S. Co., Ltd.
Tremorvah	1.2.59	H. Care	P. P. Sandercock, C. D. Abbott, S. Vass	A. Watt	Hain S.S. Co., Ltd.
Trevelyan	11.11.58	C. E. Pratt	K. Sadler, D. Proudfoot, D. Gillespie	T. Kelly	Hain S.S. Co., Ltd.
Trevince	23.4.58	F. G. Bolton	J. H. B. Armstrong, D. J. Moloney, J. M. F. Barrett	F. A. Tilson	Hain S.S. Co., Ltd.
Trevorlas	28.11.58	W. Carmichael	G. C. Blight, J. O. Spence, A. G. B. Wyatt	J. Walsh	Hain S.S. Co., Ltd.
Tribulus	1.12.58	J. Carr	P. J. Wearing, R. Bridgewood, J. E. Tinney	J. S. Kirkwood-Hackett	Shell Petroleum Co., Ltd.
Trochurus		W. Broughton	A. W. Leyland, —, Karlson, A. P. I. McGuigan	D. Spooner	Shell Tankers, Ltd.
Tweed	28.4.58	C. Robertson	W. Carver, R. Bland, R. Sutton	B. A. Corr	Royal Mail Lines, Ltd.
Tyrone	6.8.58	N. Fraser	H. Goulden, E. Docherty, I. Morrison	J. Brierley	Trinder Anderson & Co., Ltd.
Umtata	1.1.58	F. E. J. O'Hea	I. H. Szablowski, M. P. R. Turner, N. J. Parker	J. Molloy	Bullard King & Co., Ltd.
Velletia	26.3.59	J. A. Thomson	T. I. Davies, H. K. Green, T. E. Arbuthnot	J. R. Dixon	Shell Tankers, Ltd.
Volo	21.1.59	L. R. Stilwell	G. F. Setterfield, A. R. Whittleton	W. McCarthy	Ellerman's Wilson Line, Ltd.
Wairangi		B. Forbes-Moffatt	B. Roberts, J. Williams, D. James, E. Puddiffer	E. C. Jones	Shaw Savill & Albion Co., Ltd.
Waivera	11.3.59	R. G. E. Grant	J. A. Thompson, B. Bloxham, P. Lawrence	J. Downie	Shaw Savill & Albion Co., Ltd.
Welsh Trader		E. Atkinson	E. Lightowler, C. G. Foot, B. Hall		Trader Navigation Co., Ltd.
Wendover	8.1.59	J. D. Smith	R. W. Beaumont, D. J. Vincent, L. Fordyce, A. Meenan	A. Nolan	Watts, Watts & Co., Ltd.
Westmeath	26.3.59	N. Waite	G. S. Fishwick, H. Smith, P. Morgan	J. Turnbull	Trinder Anderson & Co., Ltd.
Winchester Castle	29.1.59	G. W. B. Lloyd	D. G. Keen, E. Thorne, D. Bell	E. H. Pitt	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	30.1.59	F. W. Grist	D. H. Wells, D. M. Marshall, R. Hall-Solomon	I. Rae	Watts, Watts & Co., Ltd.
Woodford	30.12.58	R. T. Mudd	S. G. Vass, R. Hall-Solomon, J. Tompson, J. German	G. Barling	Watts, Watts & Co., Ltd.
Woolwich	4.3.58	J. Cormack	M. Jones, A. Brown, M. J. Court	A. True	Watts, Watts & Co., Ltd.
Worcestershire	23.3.59	H. Davies	D. F. T. Downard, P. Maltby, M. Horn	D. Alcock	Bibby Bros. & Co.
Yoma	5.9.58	T. A. Hood	D. M. Taylor, J. Wilkie, —, Macleod	J. H. Brown	P. Henderson & Co.

## Supplementary Ships

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Apollo</i>	30.1.59	G. V. Barnes	W. Kays, P. Howells, R. Pearce	..	Bristol S.N. Co., Ltd.
<i>Ballerby</i>	..	E. Dunn	A. O'Hara, B. Cherry, E. Seppel	..	Sir R. Ronner (Management), Ltd.
<i>Bordino</i>	10.3.59	A. T. Jardine	R. L. Cole, J. T. Houtnes, J. J. Bradley	F. E. Smith	Ellerman's Wilson Line, Ltd.
<i>Byland Abbey</i>	..	T. W. Westerdale	—, Drury, R. E. Bielby, T. W. Walker	..	Associated Humber Lines, Ltd.
<i>Cape Howe</i>	3.7.58	A. M. Fraser	J. Cameron, T. R. Baker, A. R. Kerr	..	Lyle Shipping Co., Ltd.
<i>Cara</i>	24.1.58	A. McKay	P. Skinner, W. Taylor, A. Sage	D. O'Moore	Glen & Co.
<i>Carlo</i>	10.9.58	B. Waldie	J. Calam, J. Stevenson, P. Willingham	J. McDonald	Ellerman's Wilson Line, Ltd.
<i>Cato</i>	2.3.59	H. G. Mowat	E. Powell, A. S. Phillips	F. Nichol	Bristol Navigation Co., Ltd.
<i>Circasia</i>	25.7.58	I. McGill-Brown	R. Watt, M. MacMillan, N. Cameron	J. MacDonald	Anchor Line, Ltd.
<i>Clan Lamont</i>	5.11.57	F. D. Bonney, M.B.E.	J. N. Powell, J. C. Lynch	D. W. Wilson	Clan Line Steamers, Ltd.
<i>Dartmoor</i>	30.1.59	J. O. Roberts	L. Latham, E. Hawlett, R. Leask	W. Stevenson	Walter Runciman & Co., Ltd.
<i>Eastern City</i>	1.12.58	I. Williams	D. L. Baker, J. Randall, R. Croft	P. J. White	Sir William Reardon Smith & Sons, Ltd.
<i>Echo</i>	10.12.58	E. H. Taylor	J. Tremlett, M. Salisbury	..	Bristol Steam Navigation Co., Ltd.
<i>Edward Wilshaw</i>	5.1.59	R. Porter-Reynolds	P. Bushell, D. Ferrey, R. Valvona	L. S. Cohn	Cable & Wireless, Ltd.
<i>Gardenia</i>	13.10.58	J. H. Gray	D. Alder, E. Hutchinson, A. Ferguson	J. R. Mace	Stag Line, Ltd.
<i>Gitira</i>	20.10.58	S. Sutherland	D. Corbett, R. D. McGlashan	..	Chr. Salvesen & Co.
<i>Greathope</i>	7.11.58	R. Cook	A. Magrath, W. Craig, L. Dobson	K. Blackmore	Newbiggin S.S. Co., Ltd.
<i>Greenbat</i>	14.4.58	R. Cook	W. Littlewood	V. Hulme	Newbiggin S.S. Co., Ltd.
<i>Hadrian Coast</i>	19.1.59	W. Wyness	J. C. Cowie, P. M. Bowie	..	Aberdeen S.N. Co.
<i>Hesone</i>	28.1.59	R. Helme	Z. M. Patankar, G. Wilson, C. Houghton	J. D. Bolitho	Houston Line (London), Ltd.
<i>Hudson Deep</i>	18.2.58	J. Gibbons, D.S.C.	D. Lee, G. Cunningham, A. E. Ford	V. Smith	Hudson S.S. Co., Ltd.
<i>Hudson Firth</i>	16.2.59	A. Crosby	M. R. Uminski, D. Nicholson, M. Davis	P. O'Shaughnessy	Hudson S.S. Co., Ltd.
<i>Kingsbury</i>	30.12.58	A. H. Gibbs	D. W. Luft, F. Ferguson, P. Slatyer	H. C. S. Slinger	Houlder Bros. & Co., Ltd.
<i>Kirkham Abbey</i>	..	H. H. Fox, M.B.E.	D. C. Thomas, R. D. Dukes, M. T. Walker	..	Associated Humber Lines
<i>Lingula</i>	..	R. S. Walker	R. Hayward Wills	..	Shell Tankers, Ltd.
<i>Lord Codrington</i>	27.11.58	W. R. H. Lewis	J. S. Fowler, C. A. J. Skeay, A. Kamdrion	J. L. McDade	Norships Ocean Carriers Co., Ltd.
<i>Malmö</i>	1.11.55	C. Everingham	G. Smowdon, L. Gibson	P. Taylor	Ellerman's Wilson Line, Ltd.
<i>Marie Louise Mackay</i>	..	C. F. Hunter	L. P. Denny, H. Goodbody, W. Nimmo, L. Cook, S. Bailely	..	Commercial Cable Co.
<i>Marna</i>	27.10.58	J. A. McConachie	J. Carnie, S. Manson	E. Mathias	Chr. Salvesen & Co.
<i>Menastone</i>	6.10.58	S. F. Sheasby	A. M. Brown, G. F. Hogg, P. Rashley	I. Hendry	Thomas Stone (Shipping), Ltd.
<i>Meta</i>	31.12.57	A. W. Macnab	R. S. Machachian, R. G. Laursen, J. Punton	D. Gough	Glen & Co., Ltd.
<i>Milo</i>	8.1.59	J. L. Jenkins	W. G. Sommerfeld, J. A. Hogg	..	Bristol S.N. Co., Ltd.
<i>Mirror</i>	14.7.58	C. C. Muckleston, R.D.	J. H. Neal, W. T. Goodale, M. R. Bonds	W. Bryce	Cable & Wireless, Ltd.
<i>Nicenia</i>	24.2.58	J. Morrison	B. Atkinson, W. E. Reed, J. F. Dagleas	B. L. Drake	Shell Tankers, Ltd.
<i>Northia</i>	19.3.59	J. Frankland	J. Norrington, E. Bolton, G. Lomax	T. C. Willis	Shell Tankers, Ltd.
<i>Port Fairy</i>	8.8.58	A. J. Hawkins	W. G. Starkey, R. C. Case-Green, G. West	N. J. Braddon	Port Line, Ltd.
<i>Rockwood</i>	26.1.59	A. I. Dover	H. Whiston, P. Williams, G. Lowe	R. Staunton	F. Fenwick & Co., Ltd.
<i>Shuna</i>	1.1.59	T. Henry	J. B. Fyfe, J. Macintosh, D. Mackinnon	T. Balmer	Glen & Co., Ltd.
<i>Soutra</i>	..	I. Leask	J. Phinister, A. Nickolson	..	Chr. Salvesen & Co.
<i>Tarantia</i>	26.3.59	R. S. Paton	A. J. Dickie, J. Walker, H. A. Cameron	C. R. Frost	Anchor Line, Ltd.
<i>Tremayne</i>	19.8.58	L. J. White	P. R. Donlin, S. Mallory, R. Cartwright	J. Dugan	Hain S.S. Co., Ltd.
<i>Tyrean</i>	..	S. Watkins	K. W. Davidson, W. T. W. Price, —, Saddler	..	Hain S.S. Co., Ltd.
<i>Tronda</i>	9.12.58	S. Sutherland	W. Sinclair, S. Manson	..	Chr. Salvesen & Co.
<i>Truro</i>	25.2.59	J. K. Marrow	J. E. Wray, D. Clough, B. Scarbrough	F. Petch	Ellerman's Wilson Line, Ltd.
<i>Tweedbank</i>	21.7.58	R. A. Brant	G. A. Palmer, R. L. Loads, T. Orford	K. Darwen	Andrew Weir Co., Ltd.

**Supplementary Ships—Contd.**

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Tynemouth</i>	22.12.58	W. L. Pattison	F. Wright, J. Barrass, J. Ayre, K. Brammer	S. G. L. Rice	Burnett S.S. Co., Ltd.
<i>Uganda</i>	1.2.59	— Baber	— Welsh, — Davidson, — Hands	— Soulsby	British India S.N. Co., Ltd.
<i>Umwoti</i>	23.10.58	T. Halliday	P. J. Ward, D. Grant, R. Fullarton	C. Ritchie	Bullard King & Co., Ltd.
<i>Warwick Castle</i>	9.2.59	L. H. Farrow	G. H. Draysey, P. J. Sheridan, J. Spencer, W. G. McFarland	R. Cullen	Union Castle Mail S.S. Co., Ltd.
<i>Winga</i>	2.1.59	R. S. MacLachlan	J. M. Bryan, D. H. Fairweather, A. Corless	J. Brown	Glen & Co., Ltd.

## 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	OWNERS/MANAGERS
<i>Actuality</i> .. .. .	D. O'Leary .. .. .	F. T. Everard & Sons, Ltd.
<i>Amsterdam</i> .. .. .	A. Greenham .. .. .	British Transport Commission
* <i>Angelo</i> .. .. .	E. R. Corp .. .. .	Ellerman's & Wilson Line, Ltd.
† <i>Apollo</i> .. .. .	A. G. Barnes .. .. .	Bristol S.N. Co., Ltd.
* <i>Ariosto</i> .. .. .	W. C. Gill .. .. .	Ellerman's & Wilson Line, Ltd.
<i>Atlantic Coast</i> .. .. .	H. J. Cowan .. .. .	Coast Line, Ltd.
* <i>Blyth</i> .. .. .	J. M. Waters .. .. .	Associated Humber Lines, Ltd.
* <i>Bolton Abbey</i> .. .. .	H. Aaron .. .. .	Associated Humber Lines, Ltd.
<i>Borthwick</i> .. .. .	G. M. Patience .. .. .	G. Gibson & Co. Ltd.
<i>British Coast</i> .. .. .	P. A. Johnson .. .. .	Coast Lines, Ltd.
<i>Caledonian Coast</i> .. .. .	F. Mara .. .. .	Coast Lines, Ltd.
<i>Cambria</i> .. .. .	E. A. Bradshaw .. .. .	British Transport Commission
<i>Cheshire Coast</i> .. .. .	M. Leask .. .. .	Coast Lines, Ltd.
† <i>Cara</i> .. .. .	A. McKay .. .. .	Glen & Co.
* <i>Cicero</i> .. .. .	F. Tyler .. .. .	Ellerman's Wilson Line, Ltd.
<i>Claymore</i> .. .. .	J. C. McKinnon .. .. .	David MacBrayne, Ltd.
* <i>Clupea</i> .. .. .	J. Jappy .. .. .	Fishery Board for Scotland
* <i>Corfen</i> .. .. .	A. Metcalfe .. .. .	Wm. Cory & Son, Ltd.
* <i>Cormain</i> .. .. .	J. T. Collin .. .. .	Wm. Cory & Son, Ltd.
* <i>Cormead</i> .. .. .	J. Allen .. .. .	Wm. Cory & Son, Ltd.
* <i>Cormoat</i> .. .. .	M. Firth .. .. .	Wm. Cory & Son, Ltd.
* <i>Cormull</i> .. .. .	R. V. O'Connell .. .. .	Wm. Cory & Son, Ltd.
<i>Corncrake</i> .. .. .	J. D. Pascoe .. .. .	General S.N. Co., Ltd.
* <i>Crane</i> .. .. .	J. Cullum .. .. .	General S.N. Co., Ltd.
* <i>Darlington</i> .. .. .	W. Brown .. .. .	Associated Humber Lines, Ltd.
* <i>Drake</i> .. .. .	L. Ward .. .. .	General S.N. Co., Ltd.
* <i>Dryburgh</i> .. .. .	G. Simpson .. .. .	G. Gibson & Co., Ltd.
* <i>Duke of Argyll</i> .. .. .	W. N. Greenwood .. .. .	British Transport Commission
<i>Duke of Lancaster</i> .. .. .	J. Irwin, R.D. .. .. .	British Transport Commission
<i>Duke of Rothesay</i> .. .. .	H. Thompson .. .. .	British Transport Commission
<i>Empire Cymric</i> .. .. .	R. Hockings .. .. .	Atlantic S.N. Co., Ltd.
<i>Empire Gaelic</i> .. .. .	J. T. Gaelic .. .. .	Atlantic S.N. Co., Ltd.
<i>Empire Nordic</i> .. .. .	D. Bergess .. .. .	Atlantic S.N. Co., Ltd.
* <i>Fountains Abbey</i> .. .. .	F. W. Wooler .. .. .	Associated Humber Lines, Ltd.
<i>Fruin</i> .. .. .	J. McGugan .. .. .	Sloan & Co., Ltd.
* <i>Fulham X</i> .. .. .	D. Battle .. .. .	Central Electricity Authority
<i>Golden Daxon</i> .. .. .	A. Adamson .. .. .	A. Adamson, M.B.E.
<i>Great Western</i> .. .. .	D. O. Griffiths .. .. .	British Transport Commission
* <i>Grebe</i> .. .. .	J. S. Lickis .. .. .	General S.N. Co., Ltd.
<i>Greyfriars</i> .. .. .	D. M. Hunt .. .. .	E. R. Newbigin, Ltd.
<i>Guernsey Coast</i> .. .. .	P. Meras .. .. .	Coast Lines, Ltd.
† <i>Hadrian Coast</i> .. .. .		Coast Lines, Ltd.
<i>Hebble</i> .. .. .	G. Shipley .. .. .	Associated Humber Lines, Ltd.
* <i>Heron</i> .. .. .	E. C. Painter, D.S.C. .. .. .	General S.N. Co., Ltd.
* <i>Hibernia</i> .. .. .	E. A. Horspool .. .. .	British Transport Commission
<i>Hibernian Coast</i> .. .. .	C. H. Mearns .. .. .	Coast Lines, Ltd.
* <i>Iberian Coast</i> .. .. .	G. Croxford .. .. .	Tyne Tees Shipping Co., Ltd.
* <i>Innisfallen</i> .. .. .	T. A. McVeigh, M.B.E. .. .. .	City of Cork Steam Packet Co.
<i>Isle of Guernsey</i> .. .. .	H. G. Hequet .. .. .	British Transport Commission
<i>Isle of Jersey</i> .. .. .	F. Cattle .. .. .	British Transport Commission
<i>Isle of Sark</i> .. .. .	C. E. Hatchley .. .. .	British Transport Commission
<i>Jersey Coast</i> .. .. .	H. G. Keilit .. .. .	Coast Lines, Ltd.
<i>Lairds Crest</i> .. .. .	N. Campbell .. .. .	Burns Laird Line, Ltd.
<i>Lairds Wood</i> .. .. .	F. Flint .. .. .	Burns Laird Line, Ltd.
<i>Lancashire Coast</i> .. .. .	C. A. Hopkins .. .. .	Coast Lines, Ltd.
* <i>Leinster</i> .. .. .	P. Mullan .. .. .	British & Irish Steam Packet Co.
<i>Loch Seaforth</i> .. .. .	J. Smith .. .. .	David MacBrayne, Ltd.
* <i>Lochearn</i> .. .. .	N. Campbell .. .. .	David MacBrayne, Ltd.
* <i>Melrose</i> .. .. .	T. McDougall .. .. .	Geo. Gibson & Co., Ltd.
† <i>Meta</i> .. .. .	A. D. McNab .. .. .	Clydesdale Shipowners Co., Ltd.
† <i>Milo</i> .. .. .	J. L. Jenkins .. .. .	Bristol S.N. Co., Ltd.
<i>Minna</i> .. .. .	J. Macrae .. .. .	Fishery Board for Scotland
* <i>Munster</i> .. .. .	J. Macfarlane .. .. .	British & Irish Steam Packet Co.
* <i>Netherlands Coast</i> .. .. .	E. G. Fisher .. .. .	Tyne Tees Shipping Co., Ltd.
<i>Ocean Coast</i> .. .. .	G. H. Clarke .. .. .	Coast Lines, Ltd.
* <i>Olivian Coast</i> .. .. .	T. S. Stewart .. .. .	Coast Lines, Ltd.
* <i>Pluto</i> .. .. .	F. Dudgeon .. .. .	Bristol S.N. Co., Ltd.
<i>Princess Maud</i> .. .. .	W. J. Roberts .. .. .	British Transport Commission
* <i>Rollo</i> .. .. .	S. N. Stockes .. .. .	Ellerman's Wilson Line, Ltd.
<i>St. Helier</i> .. .. .	G. C. Cartwright .. .. .	British Transport Commission
<i>St. Julien</i> .. .. .	V. Newton .. .. .	British Transport Commission
* <i>St. Magnus</i> .. .. .	L. Mainland .. .. .	N. of Scotland & Ork. & Shet. S.N. Co., Ltd.
* <i>St. Niman</i> .. .. .	A. Dundas .. .. .	N. of Scotland & Ork. & Shet. S.N. Co., Ltd.
* <i>Scotia</i> .. .. .		Scottish Home Dept.
† <i>Shuna</i> .. .. .	T. Henry .. .. .	Glen & Co., Ltd.
* <i>Silvio</i> .. .. .	H. Whitfield .. .. .	Ellerman's Wilson Line, Ltd.
<i>Slieve Bawn</i> .. .. .	G. R. Gill .. .. .	British Transport Commission
<i>Slieve Bearnagh</i> .. .. .	E. N. Ashton .. .. .	British Transport Commission
<i>Slieve Bloom</i> .. .. .	A. Robertson .. .. .	British Transport Commission
<i>Slieve League</i> .. .. .	R. I. Griffiths .. .. .	British Transport Commission
<i>Slieve More</i> .. .. .	A. Robertson .. .. .	British Railways (L.M. Region)

## Marid Ships—contd.

NAME OF VESSEL	CAPTAIN	OWNERS/MANAGERS
<i>Southern Coast</i> ..	D. Mercer .. .. .	Coast Lines, Ltd.
* <i>Suffolk Coast</i> ..	A. Davison .. .. .	Tyne Tees Shipping Co., Ltd.
<i>Teano</i> .. .. .	E. R. Corp .. .. .	Ellerman's Wilson Line, Ltd.
* <i>Vienna</i> .. .. .	R. Good, O.B.E. .. .. .	British Railways (Easter Region)
* <i>Whitby Abbey</i> ..	H. M. Collier .. .. .	Associated Humber Lines
† <i>Winga</i> .. .. .	.. .. .	Glen & Co., Ltd.
<i>Yarmouth Trader</i> ..	R. A. Goodings .. .. .	Great Yarmouth Shipping Co., Ltd.
<i>Zena</i> .. .. .	L. W. Loose .. .. .	Glen & Co., Ltd.

\* 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 OWNERS/MANAGERS	SKIPPER	TRAWLER OWNERS/MANAGERS
G. R. Argumont	Thomas Hamling & Co., Ltd.	E. Hogg ..	Kingston Steam Trawlers Co., Ltd.
H. Bunce ..	St. Andrew's Steam Fishing Co., Ltd.	G. Honhold ..	Hellyer Brothers, Ltd.
C. Burt ..	Kingston Steam Trawlers Co., Ltd.	A. Jackson ..	Kingston Steam Trawlers Co., Ltd.
G. Casson ..	Kingston Steam Trawlers Co., Ltd.	E. Johnson ..	Thomas Hamling & Co., Ltd.
G. Chamberlain	Sir Thomas Robinson & Son (Grimsby), Ltd.	J. A. Kersey ..	Charleson-Smith Trawlers, Ltd.
T. Christy ..	J. Marr & Son, Ltd.	W. Marsh ..	Hellyer Bros., Ltd.
A. Conling ..	Thomas Hamling & Co., Ltd.	— Miller ..	Thomas Hamling & Co., Ltd.
F. R. Cornish ..	Kingston Steam Trawlers Co., Ltd.	J. Moran ..	J. Marr & Son, Ltd.
C. Coultas ..	Sir Thomas Robinson & Son	G. S. Pevins ..	Lord Line, Ltd.
L. Coultas ..	Onward Steam Fishing Co., Ltd.	H. M. Rogers ..	Boston Steam Fishing Co., Ltd.
A. E. Crewdson	J. Marr & Son, Ltd.	G. Smith ..	Onward Steam Fishing Co., Ltd.
J. Dobson ..	Thomas Hamling & Co., Ltd.	S. Smith ..	Northern Trawlers, Ltd.
J. Gibson ..	Thomas Hamling & Co., Ltd.	T. H. Spall ..	Atlas Steam Fishing Co., Ltd.
G. Gower ..	Hudson Brothers, Ltd.	R. Thompson ..	Kingston Steam Trawlers Co., Ltd.
F. Gray ..	Thomas Hamling & Co., Ltd.	E. Thundercliff	Loch Fishing Co.
A. E. Hall ..	St. Andrew's Steam Fishing Co., Ltd.	G. Ward ..	Dominion Steam Fishing Co., Ltd.
R. Hall ..	Hudson Brothers, Ltd.	B. C. Wharam	St. Andrew Steam Fishing Co., Ltd.
		— Whur ..	Charleson-Smith Trawlers, Ltd.

## Light-vessels

NAME OF VESSEL	MASTERS
<i>Bar</i> .. .. .	E. E. Abbott, N. S. Burns
<i>Dowsing</i> .. .. .	T. J. Lewis, W. E. Fenn
<i>East Goodwin</i> .. .. .	G. A. Nixon, J. J. Quinn
<i>Galloper</i> .. .. .	E. G. Mullitt
<i>Humber</i> .. .. .	H. V. Fuller, D. A. Bacon
<i>Newarp</i> .. .. .	B. Hadden, R. Middleton
<i>Royal Sovereign</i> .. .. .	L. P. Dawson, S. G. Sharman
<i>St. Gowan</i> .. .. .	S. G. Lloyd, W. Milson
<i>Seven Stones</i> .. .. .	J. Davies
<i>Shambles</i> .. .. .	A. C. Edward, C. N. Duff
<i>Shipwash</i> .. .. .	J. Goldsmith, F. J. Rees
<i>Skulmartin</i> .. .. .	J. O'Neill, J. K. Carley
<i>Smith's Knoll</i> .. .. .	B. E. Cunham, R. E. Say

## Training Establishment

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
<i>Conway, H.M.S.</i> .. .. .	E. Hewitt, R.D., Capt. R.N.R. .. .. .	8.6.58
<i>Pangbourne Nautical College</i> .. .. .	H. C. Skinner, O.B.E., Cdr. R.N. (Retd.) .. .. .	16.12.58
<i>Reardon Smith Nautical College</i> .. .. .	J. N. Rose, R.D., Lt.-Cdr. R.N.R. (Retd.) .. .. .	9.3.59
<i>Warsash, School of Navigation</i> .. .. .	G. W. Wakeford, M.B.E. .. .. .	28.11.58
<i>Worcester, H.M.S.</i> .. .. .	R. Gabbett-Mulhallen, Cdr. R.N. (Retd.) .. .. .	26.9.58

## BRITISH COMMONWEALTH

The following lists give the names of observing ships that co-operate with meteorological services of the British Commonwealth

### AUSTRALIA (Information dated 30.6.58)

NAME OF VESSEL	CALL SIGN	OWNERS
<b>Selected Ships:</b>		
<i>Aros</i> .. .. .	SMPT	Australia West Pacific Line
<i>Asphalion</i> .. .. .	GZPZ	A. Holt & Co.
<i>Bulolo</i> .. .. .	VJPD	Burns, Philp & Co.
<i>Canara</i> .. .. .	MAGZ	British India S.N. Co.
<i>Carpentaria</i> .. .. .	GQLB	British India S.N. Co.
<i>Charon</i> .. .. .	GZJQ	A. Holt & Co.
<i>Chupra</i> .. .. .	GDZV	British India S.N. Co.
<i>Citos</i> .. .. .	SEDN	Australia-West Pacific Line
<i>Dunroon</i> .. .. .	VLFB	Melbourne S.S. Co., Ltd.
<i>Gorgon</i> .. .. .	MBKC	A. Holt & Co.
<i>Idomeneus</i> .. .. .	GKYZ	A. Holt & Co.
<i>Koojarra</i> .. .. .	VMXK	Western Australian State Steamships
<i>Koorawatha</i> .. .. .	VLCW	McIlwraith & McEachern, Ltd.
<i>Kooringa</i> .. .. .	VLKR	McIlwraith & McEachern, Ltd.
<i>Malaita</i> .. .. .	VJYY	Burn, Philp & Co.
<i>Malay</i> .. .. .	VSNW	Austasia Line, Ltd.
<i>Malekula</i> .. .. .	VLWB	Burns, Philp & Co.
<i>Mandama</i> .. .. .	VSPA	Austasia Line, Ltd.
<i>Milos</i> .. .. .	SIVA	Australia-West Pacific Line
<i>Montoro</i> .. .. .	GVKG	Burns Philp & Co., Ltd.
<i>Nellore</i> .. .. .	GBLZ	Eastern & Australian S.S. Co., Ltd.
<i>Orestes</i> .. .. .	GFPQ	A. Holt & Co.
<i>Port Melbourne</i> .. .. .	GTFF	Port Line, Ltd.
<i>Sibigo</i> .. .. .	PHMG	Royal Interocean Lines
<i>Sigli</i> .. .. .	PHMW	Royal Interocean Lines
<i>Surabang</i> .. .. .	PHMJ	Royal Interocean Lines
<i>Triadic</i> .. .. .	GDNM	British Phosphate Commissioners
<i>Trienza</i> .. .. .	GJJZ	British Phosphate Commissioners
<i>Triona</i> .. .. .	GDFZ	British Phosphate Commissioners
<i>Wanganella</i> .. .. .	VJPQ	Huddart, Parker & Co., Ltd.
<i>Westralia</i> .. .. .	VJNJ	Huddart, Parker & Co., Ltd.
<b>Supplementary Ships:</b>		
<i>Delamere</i> .. .. .	VNWL	Western Australian State Steamships
<i>Dorrigo</i> .. .. .	VMWE	Western Australian State Steamships
<i>Dulverton</i> .. .. .	VJVJ	Western Australian State Steamships
<i>Kabbarli</i> .. .. .	VLXV	Western Australian State Steamships

### BERMUDA (Information dated 1.2.56)

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

**CANADA** (Information dated 3.3.59)

NAME OF VESSEL	CALL SIGN	OWNERS
<b>Selected Ships:</b>		
<i>Arosa Sun</i>	HPTT	Arosa Lines (Canada), Ltd.
<i>Baffin</i>	CGCL	Minister of Mines and Technical Surveys
<i>Bluenose</i>	VDND	Minister of Transport, Canadian Government
<i>C. D. Howe</i>	CGSS	Government of Canada
<i>Cyrus Field</i>	GKQC	Western Union Telegraph Company
<i>D'Iberville</i>	CGSM	Minister of Transport, Canadian Government
<i>Esso San Juan</i>	HOJV	Panama Transport Co., Panama, R.P.
<i>Fort Hearne</i>	VCGX	Hudson's Bay Co., Ltd.
<i>Imperial St. Lawrence</i>	HOOX	Caribbean Oil & Transport Co.
<i>Irvingbrook</i>	HPBM	Western Trading Corporation, Nassau, Bahamas
<i>Irving Glen</i>		Highland Traders Inc., Panama, R.P.
<i>John W. MacKay</i>	GFXK	Commercial Cable Co.
<i>Labrador</i>	CGVM	Government of Canada
<i>Lakemba</i>	VPKV	Pacific Shipowners, Suva, Fiji
<i>Lakonia</i>	GCDB	Donaldson Lines, Ltd.
<i>Lord Kelvin</i>	GMMM	Western Union Telegraph Co.
<i>Montcalm</i>	CGBB	Government of Canada
<i>N. B. McLean</i>	CGSN	Government of Canada
<i>Pinnacles</i>	VGGZ	Shell Canadian Tankers, Ltd.
<i>Rupert Island</i>	VDXX	Hudson's Bay Co., Ltd.
<i>Sungbeam</i>	LJSQ	Lorents S. Lyngass, Tonsberg, Norway
<i>Sunjarv</i>	MSPD	Saguenay Terminals, Ltd.
<i>Thor I</i>	LLWZ	A.S. Thor Dahl, Sandefjord, Norway
<i>Thorscape</i>	LARD	A.S. Thor Dahl, Sandefjord, Norway
<i>Thorsgaard</i>	LALK	A.S. Thor Dahl, Sandefjord, Norway
<i>Waihemo</i>	ZMJO	Union S.S. Co. of New Zealand
<i>Waitomo</i>	ZMKO	Union S.S. Co. of New Zealand
<b>Supplementary Ships:</b>		
<i>Anna Bakke</i>	LHNK	Knutsen Line
<i>Banksland</i>	VGTF	Hudson's Bay Co., Ltd.
<i>Bougainville</i>	LMSQ	Klaveness Line
<i>Bronxville</i>	FFFM	Klaveness Line
<i>Elisabeth Bakke</i>	LJXX	Knutsen Line
<i>Ellen Bakke</i>	LDAA	Knutsen Line
<i>Fort Seven</i>	VDKN	Hudson's Bay Co., Ltd.
<i>Gjertrud Bakke</i>	LJZK	Knutsen Line
<i>Hindanger</i>	LMAB	Westal-Larsen, Bergen, Norway
<i>Indiana</i>		Ameritalia S.P.A., Trieste
<i>Kristen Bakke</i>	LATI	Knutsen Line
<i>Markland</i>	CYMP	Bowater S.S. Co., Ltd.
<i>Paloma Hills</i>	VGGX	Shell Canadian Tankers, Ltd.
<i>Princess Helene</i>	VGKL	Canadian Pacific Steamships
<i>Rincon Hills</i>	VGGY	Shell Canadian Tankers, Ltd.
<i>Stugard</i>	LMIZ	Hjalmar Roed & Co., Tonsberg, Norway
<i>Sunadele</i>	HBFL	Zurich Shipping Co., Zurich, Switzerland
<i>Sunbeam</i>	LMCE	Sarnulsen Falsun, Norway
<i>Sunmoira</i>	LLXD	Dampskibsselskapet, Marna A/S, Oslo, Norway
<i>Sunnyville</i>	LNQZ	Klaveness Line
<i>Sunprincess</i>		Princess Shipping Co., Monrovia, Liberia
<i>Sunrose</i>	LLLR	Lorents S. Lyngass, Tonsberg, Norway
<i>Ventura</i>	LAFS	Ditleve-Simonsen, Ltd.
<i>Vigan</i>	LAGQ	Ditleve-Simonsen, Ltd.
<i>Wabana</i>	VDRG	Dominion Shipping Co., Ltd.
<i>William Carson</i>	VOLW	Minister of Transport, Canadian Government

**PAKISTAN** (Information dated 1.10.58)

NAME OF VESSEL	CALL SIGN	OWNERS
<b>Selected and Supplementary Ships:</b>		
<i>Al-Hasan</i>	AQAN	Muhammadi S.S. Co., Ltd.
<i>Al-Husaini</i>	AQAH	Muhammadi S.S. Co., Ltd.
<i>Al-Sayyada</i>	AQAS	Muhammadi S.S. Co., Ltd.
<i>Anwarbaksh</i>	AQAM	United Oriental S.S. Co., Ltd.
<i>Kadarbaksh</i>	AQBK	United Oriental S.S. Co., Ltd.
<i>Maulabaksh</i>	AQBP	United Oriental S.S. Co., Ltd.
<i>Mustali</i>	AQBU	Gulf S.S. Co., Ltd.
<i>Ocean Endurance</i>	AQBW	Trans-Oceanic S.S. Co., Ltd.
<i>Pakistan Prosperity</i>	AQAZ	Karachi S.N. Co., Ltd.
<b>Auxiliary Ships:</b>		
<i>Fakirji Cowasjee</i>	AQBQ	East & West S.N. Co., Ltd.
<i>Fausta</i>	AQBH	East & West S.N. Co., Ltd.
<i>Firdausa</i>	AQAL	East & West S.N. Co., Ltd.
<i>Firoza</i>	AQBE	East & West S.N. Co., Ltd.
<i>Ocean Endeavour</i>	AQBD	Trans-Oceanic S.S. Co., Ltd.
<i>Ocean Enterprise</i>	AQAY	Trans-Oceanic S.S. Co., Ltd.
<i>Ocean Envoy</i>	AQBT	Trans-Oceanic S.S. Co., Ltd.

HONG KONG (Information dated 8.4.59)

NAME OF VESSEL	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
Anking	R. McLennan	T. A. C. Taylor, R. J. Shipp, J. Paisley	P. K. Karkaria	China Navigation Co., Ltd.
Anshun	W. Pollock	L. P. James, P. S. Fleming, R. D. Harvey	Leung Man Hin	China Navigation Co., Ltd.
Belinda	P. V. Pattison	R. E. Easley, S. T. Cheung, K. H. Ng	K. F. Chan	Shun Cheong S.N. Co., Ltd.
Changcha	J. F. Follert	J. B. H. J. Aldiss, N. B. Manning, J. K. Davies	U. In San	China Navigation Co., Ltd.
Changte	R. A. Smith	T. I. Robertson, J. W. Tinson, A. K. Wadey	Robert McNamara	China Navigation Co., Ltd.
Chefoo	J. M. Parker	R. E. Brooks, D. C. Brockbank, M. S. Briant	Chan Man Kit	China Navigation Co., Ltd.
Chekiang	J. McKinlay, M.B.E.	J. W. G. Wilby, J. Lough, D. T. Hollands	Yeung Wai Ki	China Navigation Co., Ltd.
Chengtu	H. Pilling, M.B.E.	F. Cunningham, J. Bowden, T. R. Gilchrist	Ling Shui Ming	China Navigation Co., Ltd.
Choy Sang	J. H. Thomas	I. P. Skipp, Wong Pui Choi, Wilkie Wan	D. H. Stone	Indo-China S.N. Co., Ltd.
Chungking	W. E. Hargrave	C. E. Lingard, P. R. Grime, D. R. Owens	Wai Pun Un	China Navigation Co., Ltd.
Eastern Argosy	G. P. Parish	W. D. Skidmore, J. A. C. Tennant, E. J. Parr	A. P. MacIsaac	Indo-China S.N. Co., Ltd.
Eastern Glory	J. F. Fotheringham	G. C. Taylor, P. D. Seddon, K. Millar	S. I. V. Yarrow	Indo-China S.N. Co., Ltd.
Eastern Maid	W. E. Reeve	T. H. Nichols, I. F. Kite, Wu Jeng Sheng	G. G. Stringer	Indo-China S.N. Co., Ltd.
Eastern Muse	F. H. Main	J. R. Simpson, R. Charter, Shih Hui Tang	A. O'Neill	Indo-China S.N. Co., Ltd.
Eastern Queen	E. J. Thomson	F. G. Christie, G. A. Angus, G. W. Ison	R. O. Smith	Indo-China S.N. Co., Ltd.
Eastern Saga	M. J. Groundwater	B. O. Jensen, N. J. Wilson, D. G. Cauvin	T. Cleary	Indo-China S.N. Co., Ltd.
Eastern Star	W. J. Bartlett	R. Tasker, B. G. Cox, G. A. Milward	A. Smith	Indo-China S.N. Co., Ltd.
Elisbeth	F. N. Booth	C. W. A. Ellis, S. Luk	K. P. Wong	Shun Cheong S.N. Co., Ltd.
Fengning	J. A. McDonald	R. A. Elder, K. M. Nairn, G. Burgum	Chin Fook On	China Navigation Co., Ltd.
Fengtien	C. A. N. Baker	K. D. Johnson, P. H. A. Montgomery, R. C. W. Yu	Wo Shui Ying	China Navigation Co., Ltd.
Foochow	A. V. Harrison	J. Keates, M. T. Anderson, C. Davidson	Ng Kai Chong	China Navigation Co., Ltd.
Fukien	K. A. Page	W. Cooper, R. Kennett, Y. S. Loh	Tang Yuen	China Navigation Co., Ltd.
Funing	A. Atkin	R. Sanders, C. M. Knight, S. M. Ho	Mak Yau	China Navigation Co., Ltd.
Hai Fing	Halvor Andersen	A. Sjoberg, Rolf Andresen, L. V. Skau	Chung Yeuk	China Siam Line
Hai Lee	E. Nordendal	G. K. Forde, D. Storeaether	Chan Wuie Ju	China Siam Line
Hai Meng	H. Kystvag	A. Overland, E. J. Barane, B. Varhaug	Chan Kam Tsun	China Siam Line
Halldor	T. Thorkildsen	J. Bogwald, O. Skaugstad, Alf Svinterud	Bjorn Tangerud	China Siam Line
Hang Sang	J. Eide	A. Gronvik, L. O. Nordli, Ingolf Vikse	H. V. Leong	China Siam Line
Hanyang	M. J. K. Crichton	R. C. Hoggard, E. Dunbar, S. C. Tseng	T. J. Shea	Indo-China S.N. Co., Ltd.
Henrik	J. Hunter	D. G. Langdon, C. J. H. Ennion, K. Y. Teo	Li Hon Wah	China Navigation Co., Ltd.
Hermelin	J. P. Johansen	T. M. Hansen, S. H. Nielsen, F. C. Wong	T. Y. Chan	China Navigation Co., Ltd.
Hermid	O. Saltvold	O. Johannesen, P. Boe, J. Jensen	Ip Yuk Fai	China Siam Line
Hervar	E. Eliassen	H. Yndestad, Arne Solbakk, O. Langva	Chiu Tze Kong	China Siam Line
Hsu Sang	O. Osterberg	B. Maaren, N. A. Mathisen, R. Johansen	Lai Kwong Yin	China Siam Line
Hin Sang	O. J. Apold	Holm Andersen, N. Klokk, J. H. Andersen	Poon Chee Pooi	China Siam Line
Hoi Houw	A. Lerstang	K. Jacobsen, Helge Vikan, O. Henriksen	Fung Wing Kee	China Siam Line
Hoi Wong	J. G. Perrin	J. D. McNeill, Hsu Chien Szu	Mak Sui Ka	Indo-China S.N. Co., Ltd.
Hoi Ying	L. C. Cox	M. H. Major, D. E. Viles, Kwok Ping Ying	O. F. McLea	Indo-China S.N. Co., Ltd.
Hop Sang	O. Utseth	R. Okland, K. Andersen, T. Bjermeland	H. Olsen	H. M. Wrangell & Co., Hangsund
Hou Sang	J. Bjerkenes	J. Ekrene, J. Samuelisen, L. Hovland	O. Rudi	H. M. Wrangell & Co., Hangsund
Huan	T. C. W. Marr	A. Vespestad, S. Fjelland, O. Knudsen	O. Moen	Indo-China S.N. Co., Ltd.
Hupei	C. Preston	R. Maund, Liu Hsian Jen, K. K. Chen	A. P. Burns	Indo-China S.N. Co., Ltd.
Jacob Jebsen	V. R. Woolfe	I. D. Patterson, Cheng Sze Ming, T. Y. Yuen	W. I. Briggs	China Navigation Co., Ltd.
Kwangtung	R. E. Selwyn-Jones	J. M. Innes, C. G. Cocksedge, C. Yueh	Cheung Shau Wai	China Navigation Co., Ltd.
	R. A. D. Nielsen	E. Andersen, F. Brodersen, W. Fabricius	Yue Shui Ming	China Navigation Co., Ltd.
	L. King	R. A. Taylor, J. Y. Dymock, D. A. Harper	Leung Kan	China Navigation Co., Ltd.

Lao	S. A. Ostling	L. A. Andersson	T. H. P. Gustafson	H. Lundsbjerg	N. E. G. Nilsson	Everett Steamship Corporation
Lok Sang	G. Kinley	G. MacKay	P. Ferrar	D. H. Mobberty	S. G. Clatworthy	Indo-China S.N. Co., Ltd.
Michael Jebson	J. N. Holst	G. Andersen	B. T. Ipsen	T. Soerensen	C. H. Lai	Jebson & Co.
Pakhoi	R. C. W. Gorman	K. H. Nettleship	C. G. Corbett	G. W. P. George	Lau Wan Leung	China Navigation Co., Ltd.
Poyang	D. W. R. Gash	R. J. Carson	C. D. Nisbet	C. Y. Zia	Tong Sik Iu	China Navigation Co., Ltd.
Produce	F. Orpetvedt	T. Hetland	F. Jorgensen	A. Hjaltalin	Wong Chi Hung	Jacob Odland S.S., Hangsund
Sangola	R. S. Freakes	G. A. Hankin	G. A. Potts	M. J. Kerley	D. Dowie	British India S.N. Co., Ltd.
Shansi	W. J. Bunney	M. E. Barrett	N. S. Palmer	R. D. Poulton	Henry Chin	China Navigation Co., Ltd.
Sinkiang	I. F. O'Connor	M. W. Lewis	R. F. D. Pook	B. A. Owen	Wan Siu Hung	China Navigation Co., Ltd.
Soochow	F. Hindle	M. R. M. Seale	T. H. Connell	R. Porter	Brian Liu	China Navigation Co., Ltd.
Star Alcyone	A. A. Olander	S. A. Bengtsson	L. O. Lunden	K. G. Erbe	L. A. Larson	Everett Steamship Corporation
Star Betelgeuse	S. E. Sundstedt	S. G. Andersson	R. Krastins	L. Svahn	E. B. Ostling	Everett Steamship Corporation
Szechuen	E. H. Histed	A. T. Tugwell	H. C. Swanson	P. J. Wu	Choi Pong Cheung	China Navigation Co., Ltd.
Tai Chung Shan	D. O. Conway	W. M. Pearson	Tsai Pao Chang	Ip Chi Wah	K. Y. Pun	Shun Cheong S.N. Co., Ltd.
Tai Ping	N. L. Hall	J. A. Doyle	W. M. Courts	M. Boyd	E. P. Emery	China Navigation Co., Ltd.
Tai Poo An	A. H. Bathurst	D. Goodwin	T. C. Mak	C. H. Fung	G. Y. Lum	Shun Cheong S.N. Co., Ltd.
Taiyuan	E. Bruce	J. M. K. Kelly	M. H. A. Swift	J. F. Reilly	Ngu Chi Siang	China Navigation Co., Ltd.
Tak Sang	J. M. Marshall	D. J. Hooper	N. D. D. J. Tonner	R. W. Gibson	D. Alexander	Indo-China S.N. Co., Ltd.
Watwang	D. D. Minnema	A. Verwayen	N. D. D. J. Tonner	Th. Mulder	L. P. Fraenkel	Royal Intercean Lines
Yochow	A. Harper	R. V. Crowhurst	P. J. Stock	Y. Lin	Kong Shi Wei	China Navigation Co., Ltd.
Yunnan	A. J. Keddie	P. A. Blaney	W. S. Sutcliffe	J. R. Bryan	Lo Kin Chek	China Navigation Co., Ltd.

### MALAYA (Information dated 1.4.59)

NAME OF VESSEL	CALL SIGN	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICERS	OWNERS AND MANAGERS
Bentong	ZBNF	R. G. Ogden	J. C. Hammond	A. Hamid bin Haji, Md. Said	Straits S.S. Co., Ltd.
Benweg	GMWB	R. D. Robb	R. Dick	N. E. Lawrence	Ben Line Steamers, Ltd.
Bidor	ZBBZ	R. I. Goss	R. W. Cotter	N. Barathon	Straits S.S. Co., Ltd.
Darvel	VPOC	E. E. Fenwick	R. O. Williams	David Lange	Straits S.S. Co., Ltd.
Islander	VSPS	P. B. Bruce	R. Bromfield	Arthur Fishburn	Christmas Island Phosphate Commis- sioners; Houstead & Co., Ltd.
Kah Poh	ZBBJ	S. J. Harvey	S. J. Harvey, Md. Nor bin Lanang	F. Menezes	Ho Chiang Shipping Co., Ltd.
Kayang	VPOD	A. Mackay	D. Farrier	Finery Evans	Straits S.S. Co., Ltd.
Katong	ZBNR	A. B. Durrant	A. M. Hatton	P. V. Abraham, Yap Hon Phen	Straits S.S. Co., Ltd.
Kimans	VSND	H. W. Richardson	P. Hicks, Khalil b. Haji Dzafir	K. A. Menon	Straits S.S. Co., Ltd.
Kimabalu	MGDC	H. W. Wilkinson	J. Walls, E. V. Eyeakiel		Straits S.S. Co., Ltd.
Larut	VPKO	D. J. Evans	K. L. Edwards, Abdul Majid b. Mohamed Talip bin Abu Assan	Sheri Rustoniji Bharuda	Straits S.S. Co., Ltd.
Marudu	VPOB	N. R. Murray	W. M. Evans	C. E. George, Chung Ping Yong	Straits S.S. Co., Ltd.
Matang	VSPB	M. L. Brown	P. D. Hughes	Tan Chong Hin	Straits S.S. Co., Ltd.
Perak	VSPJ	R. E. Davies	H. P. Davies	K. M. Pillai	Straits S.S. Co., Ltd.
Perlis	VSRA	C. A. Morfee	J. H. Martin	Low Loke Kwai	Straits S.S. Co., Ltd.
Recorder	GSFS	R. E. Small	J. D. Hawkins, A. Shelton, Swindle Brown	J. Wade	Cable & Wireless, Ltd.
Salong	VSYZ	E. H. Robinson	E. H. Robinson	Wilfred Cross	Straits S.S. Co., Ltd.

## INDIA (Information dated 11.4.59)

NAME OF SHIP	OWNERS
<b>Selected Ships:</b>	
<i>Amra</i> .. .. .	British India S.N. Co., Ltd.
<i>Andamans</i> .. .. .	Eastern Shipping Corporation.
<i>Bahadur</i> .. .. .	Asiatic S.N. Co., Ltd.
<i>Dara</i> .. .. .	British India S.N. Co., Ltd.
<i>Daressa</i> .. .. .	British India S.N. Co., Ltd.
<i>Dumra</i> .. .. .	British India S.N. Co., Ltd.
<i>Dwarka</i> .. .. .	British India S.N. Co., Ltd.
<i>Havildar</i> .. .. .	Asiatic S.N. Co., Ltd.
<i>Indian Exporter</i> .. .. .	India Steamship Co., Ltd.
<i>Indian Merchant</i> .. .. .	India Steamship Co., Ltd.
<i>Indian Pioneer</i> .. .. .	India Steamship Co., Ltd.
<i>Indian Reliance</i> .. .. .	India Steamship Co., Ltd.
<i>Indian Shipper</i> .. .. .	India Steamship Co., Ltd.
<i>Indian Trader</i> .. .. .	India Steamship Co., Ltd.
<i>Islami</i> .. .. .	Mogul Line, Ltd.
<i>Jalaketu</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalakrishna</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalamanjari</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalaprakash</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalavihar</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalayamuna</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalazad</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalawahar</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Kampala</i> .. .. .	British India S.N. Co., Ltd.
<i>Karanja</i> .. .. .	British India S.N. Co., Ltd.
<i>Mahadevi</i> .. .. .	Asiatic S.N. Co., Ltd.
<i>Mohammedi</i> .. .. .	Mogul Line, Ltd.
<i>Mozaffair</i> .. .. .	Mogul Line, Ltd.
<i>Nadir</i> .. .. .	Asiatic S.N. Co., Ltd.
<i>Nicobar</i> .. .. .	Eastern Shipping Corporation
<i>Nurani</i> .. .. .	Asiatic S.N. Co., Ltd.
<i>Pradeep</i> .. .. .	Dept. of Lighthouses and Lightships, Govt. of India
<i>Rajula</i> .. .. .	British India S.N. Co., Ltd.
<i>Rizwani</i> .. .. .	Mogul Line, Ltd.
<i>Santhia</i> .. .. .	British India S.N. Co., Ltd.
<i>Shahjehan</i> .. .. .	Asiatic S.N. Co., Ltd.
<i>Sirdhana</i> .. .. .	British India S.N. Co., Ltd.
<i>State of Bombay</i> .. .. .	Eastern Shipping Corporation
<i>State of Kutch</i> .. .. .	Eastern Shipping Corporation
<i>State of Madras</i> .. .. .	Eastern Shipping Corporation
<i>State of Saurashtra</i> .. .. .	Eastern Shipping Corporation
<i>State of Travancore-Cochin</i> .. .. .	Eastern Shipping Corporation
<i>Subadar</i> .. .. .	Asiatic S.N. Co., Ltd.
<i>Umaria</i> .. .. .	British India S.N. Co., Ltd.
<b>Supplementary Ships:</b>	
<i>Bharatbhushan</i> .. .. .	The Bharat Line, Ltd.
<i>Bharatdeepak</i> .. .. .	The Bharat Line, Ltd.
<i>Bharatmitra</i> .. .. .	The Bharat Line, Ltd.
<i>Bharatraja</i> .. .. .	The Bharat Line, Ltd.
<i>Bharatrani</i> .. .. .	The Bharat Line, Ltd.
<i>Bharatratna</i> .. .. .	The Bharat Line, Ltd.
<i>Bharatveer</i> .. .. .	The Bharat Line, Ltd.
<i>Bharatvijaya</i> .. .. .	The Bharat Line, Ltd.
<i>Indian Commerce</i> .. .. .	India Steamship Co., Ltd.
<i>Indian Renown</i> .. .. .	India Steamship Co., Ltd.
<i>Indian Resolve</i> .. .. .	India Steamship Co., Ltd.
<i>Indian Resource</i> .. .. .	India Steamship Co., Ltd.
<i>Indian Security</i> .. .. .	India Steamship Co., Ltd.
<i>Jag Ganga</i> .. .. .	Great Eastern Shipping Co., Ltd.
<i>Jag Janani</i> .. .. .	Great Eastern Shipping Co., Ltd.
<i>Jag Rani</i> .. .. .	Great Eastern Shipping Co., Ltd.
<i>Jag Tara</i> .. .. .	Great Eastern Shipping Co., Ltd.
<i>Jag Vijay</i> .. .. .	Great Eastern Shipping Co., Ltd.
<i>Jaladhan</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jaladharna</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jaladhanya</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalagovind</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalakendra</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalamayur</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalamohan</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalapadma</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalaprabha</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalaputra</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalarajendra</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalausha</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalavijaya</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalavishnu</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Jalvallabh</i> .. .. .	Scindia S.N. Co., Ltd.
<i>Malika</i> .. .. .	Asiatic S.N. Co., Ltd.
<i>Rajah</i> .. .. .	Asiatic S.N. Co., Ltd.
<i>Ranee</i> .. .. .	Asiatic S.N. Co., Ltd.
<i>Saudi</i> .. .. .	Mogul Line, Ltd.
<i>State of Andhra</i> .. .. .	Eastern Shipping Corporation
<i>State of Orissa</i> .. .. .	Eastern Shipping Corporation
<i>State of West Bengal</i> .. .. .	Eastern Shipping Corporation

## NEW ZEALAND (Information dated February, 1959)

NAME OF VESSEL	OWNERS
<b>Selected Ships:</b>	
<i>Kaimanawa</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Kaimiro</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Kaitoa</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Kaitoke</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Kaituna</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Karitane</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Kauri</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Kawaroa</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Kawatiri</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Kawerau</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Komata</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Kopua</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Koramui</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Koromiko</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Kouhai</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Kurou</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Kurutai</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Matua</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Maui Pomare</i> .. .. .	New Zealand Government
<i>Monowai</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Port Montreal</i> .. .. .	Port Line, Ltd.
<i>Port Quebec</i> .. .. .	Port Line, Ltd.
<i>Port Saint John</i> .. .. .	Port Line, Ltd.
<i>Tarawera</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Tofua</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Waimate</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Waimea</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Waipori</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Wairata</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Wairimu</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Waitemata</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<b>Supplementary Ships:</b>	
<i>Coromel</i> .. .. .	Jurie Shipping Co., Ltd.
<i>Holmglen</i> .. .. .	Holm & Co., Ltd.
<i>Holmlea</i> .. .. .	Holm & Co., Ltd.
<i>Kaitapo</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Kaimai</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Kaitangata</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Kaitawa</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Katea</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Konui</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Koraki</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Korowai</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Navua</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Viti</i> .. .. .	Tasman S.S. Co. of New Zealand, Ltd.
<i>Waiana</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.
<i>Waikare</i> .. .. .	Union S.S. Co. of New Zealand, Ltd.

## SOUTH AFRICA (Information dated 13.4.59)

NAME OF VESSEL	OWNERS/COMMANDING OFFICER
<i>Africana II</i> .. .. .	Division of Fisheries, Cape Town
<i>Constantia</i> .. .. .	South African Marine Corporation, Cape Town
<i>Dalia</i> .. .. .	South African Railways and Harbours
<i>Frances Repetto</i> .. .. .	Tristan Development Co., Cape Town
<i>F. T. Bates</i> .. .. .	South African Railways and Harbours, Cape Town
<i>Herero Coast</i> .. .. .	Thesens Steamship Co., Cape Town
<i>Morgenster</i> .. .. .	South African Marine Corporation, Cape Town
<i>South African Merchant</i> .. .. .	South African Marine Corporation, Cape Town
<i>South African Trader</i> .. .. .	South African Marine Corporation, Cape Town
<i>South African Transporter</i> .. .. .	South African Marine Corporation, Cape Town
<i>Tristania</i> .. .. .	Tristan Development Co., Cape Town
<i>Vergelegen</i> .. .. .	South African Marine Corporation, Cape Town
South African Nautical College, "General Botha"	Captain G. V. Legassick, D.S.C., R.D., Capt. R.N.R.
Naval Gymnasium, Saldanha Bay .. .. .	Inst.-Commander S. C. Biermann, B.A.

## WEST INDIES (Information dated 16.8.58)

NAME OF VESSEL	OWNERS
<i>Electra</i> .. .. .	Cable & Wireless, Ltd.

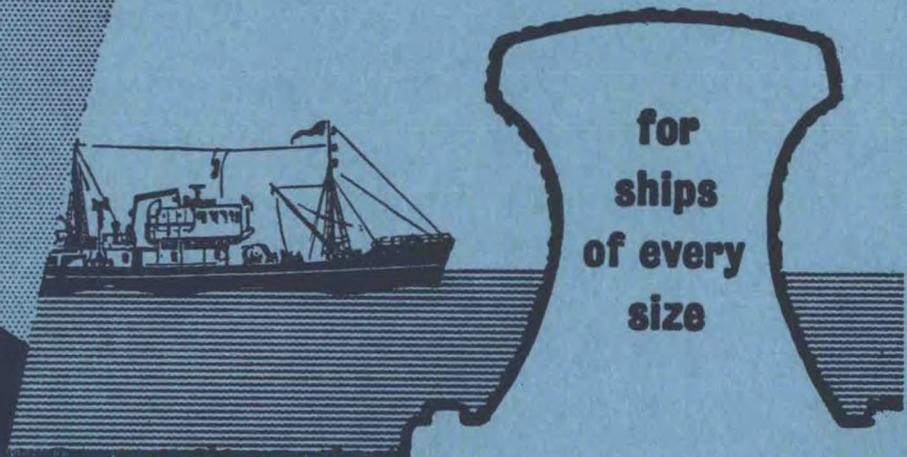


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