Met.O. 799

The Marine Observer

A quarterly journal of Maritime Meteorology

Volume XXXVIII No. 221

July 1968

PRICE 7*s.* 0*d.* NET

METEOROLOGICAL OFFICE

Ships' Code and Decode Book

(Met.O. 509) 7th Edition

The World Meteorological Organization has introduced some changes in the international meteorological codes for weather reports to and from ships. These changes, which came into effect on 1st January 1968, are incorporated in the 7th Edition of this book.

The codes affected are those used by ships of the Voluntary Observing Fleet in their reports of weather at sea, and also those used in forecasts to shipping — the International Analysis Code (I.A.C. FLEET) and the Maritime Forecast Code (MAFOR).

This new edition, which is available on free loan to U.K. voluntary observing ships from their Port Meteorological Officers and Agents, is on sale from H.M. Stationery Office at 4s. net (by post 4s. 6d.).

Published by

HER MAJESTY'S STATIONERY OFFICE

and obtainable from the Government Bookshops at the addresses on the title page (post orders to P.O. Box 569, London, S.E.1), or through any bookseller

Met.O. 799

THE MARINE OBSERVER

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

VOL. XXXVIII No. 221 JULY 1968

CONTENTS

	Page
Editorial	102
Excellent Awards, 1967–1968	108
The Marine Observers' Log—July, August, September	112
Icing on Fishing Vessels due to Spray. By H. O. Mertins	128
A Voyage to the Arctic by Submarine. By R. F. Lovett	131
Royal Naval Birdwatching Society	137
Notes on Ice Conditions in Areas Adjacent to the North Atlantic Ocean—January to March 1968	138
Book Reviews:	
The Torrey Canyon	145
Ocean Wave Statistics	146
Indian Excellent Awards	147
Fleet Lists	148

Letters to the Editor, and books for review, should be sent to the Editor, "The Marine Observer," Meteorological Office, Eastern Road, Bracknell, Berkshire

Published for the Meteorological Office by
HER MAJESTY'S STATIONERY OFFICE

To be purchased direct from H.M. Stationery Office, at any of the following addresses: 49 High Holborn, London, W.C.1; 423 Oxford Street, London, W.1; 13a Castle Street, Edinburgh, 2; 109 St. Mary Street, Cardiff, CF1 1JW; Brazennose Street, Manchester, 2; 50 Fairfax Street, Bristol, 1; 258–259 Broad Street, Birmingham, 1; 7–11 Linenhall Street, Belfast, BT2 8AY, or from any bookseller.

PRICE 7*s.* 0*d.* NET or £1 9*s.* 8*d.* per annum (including postage)

Editorial

On 11th March 1968 the Meteorological Office launched its first official scheme for the provision of regular weather-routeing advice by radio to merchant ships trading across the North Atlantic. Similar weather-routeing facilities have, for several years, been provided by the U.S. Navy for their military supply ships and by commercial organizations in the United States for merchant ships and latterly by the Netherlands and the U.S.S.R. authorities for their merchant ships and one might well ask why Britain, with her large merchant fleet, is only now a newcomer into this field. One reason for this is that British shipowners and shipmasters have not, until comparatively recently, displayed much interest or confidence in the idea of a weather-routeing service. In 1960 a questionnaire circulated to representative shipmasters about the value of including actual and forecast wave data in the North Atlantic Bulletin, as a possible approach to weather routeing, only provided very lukewarm replies. Subsequently articles on weather routeing and its potential advantages from the viewpoint of economy and safety have appeared from time to time in *The Marine Observer*. Meanwhile British meteorologists have been studying with much interest various aspects of the weather-routeing facilities provided, in particular, by the U.S.A. and Netherlands; both these countries have been very helpful in providing information about their techniques. For various practical reasons, in which manpower availability played a big part, it was not until experience had been gained in numerical forecasting with the aid of the high-speed English Electric computer KDF 9 that our Director-General decided that the time had come for the Meteorological Office to offer a weather-routeing service to shipping in the North Atlantic.

As a preliminary to instituting this service, a special informal meeting was held on 9th March 1966 aboard the *Wellington*, Headquarters ship of the Honourable Company of Master Mariners, at which six papers on various aspects of weather routeing were read and discussed, with the object of trying to find out the present views of shipowners and shipmasters about this subject (see *The Marine Observer*, October 1966 and January 1967). This very successful meeting showed that there was a lot of interest in the subject and, as a result of further consultation by correspondence with North Atlantic shipowners, a weather-routeing experiment was carried out with four west-bound cargo ships across the North Atlantic in September 1967. The period of the experiment was 1st–18th September and the ships concerned were the Cunard's *Parthia* from Liverpool and *Samaria* from Southampton, Furness Withy's *Newfoundland* from Liverpool and Sugar Line's *Sugar Carrier* from Antwerp. As anybody familiar with the North Atlantic knows, September is often a boisterous month and has the added complication of being the month of maximum hurricane intensity; during the experiment it lived up to its reputation and produced plenty of problems for the weather routers. The primary aim of weather routeing from shore is to advise the master of the ship as to the route which will, as far as possible, avoid the areas of highest waves, consistent with providing the quickest and most economic passage. Nowadays, thanks to improvements in forecasting technique, aided by the electronic computer, meteorologists can look further ahead into the weather situation and deal more effectively than previously with difficult problems like wave forecasting. This is particularly true in the North Atlantic where the relatively large number of radio weather messages from merchant ships and ocean weather ships enables the meteorologist to prepare more accurate weather maps than in any other ocean. Also the speed of cargo ships nowadays, being commonly in excess of 15 knots, makes it much more feasible than previously to take action to avoid bad weather areas.

The surface forecasts of wind and weather and the wave forecasts used in the Meteorological Office for the provision of weather routeing for shipping are almost

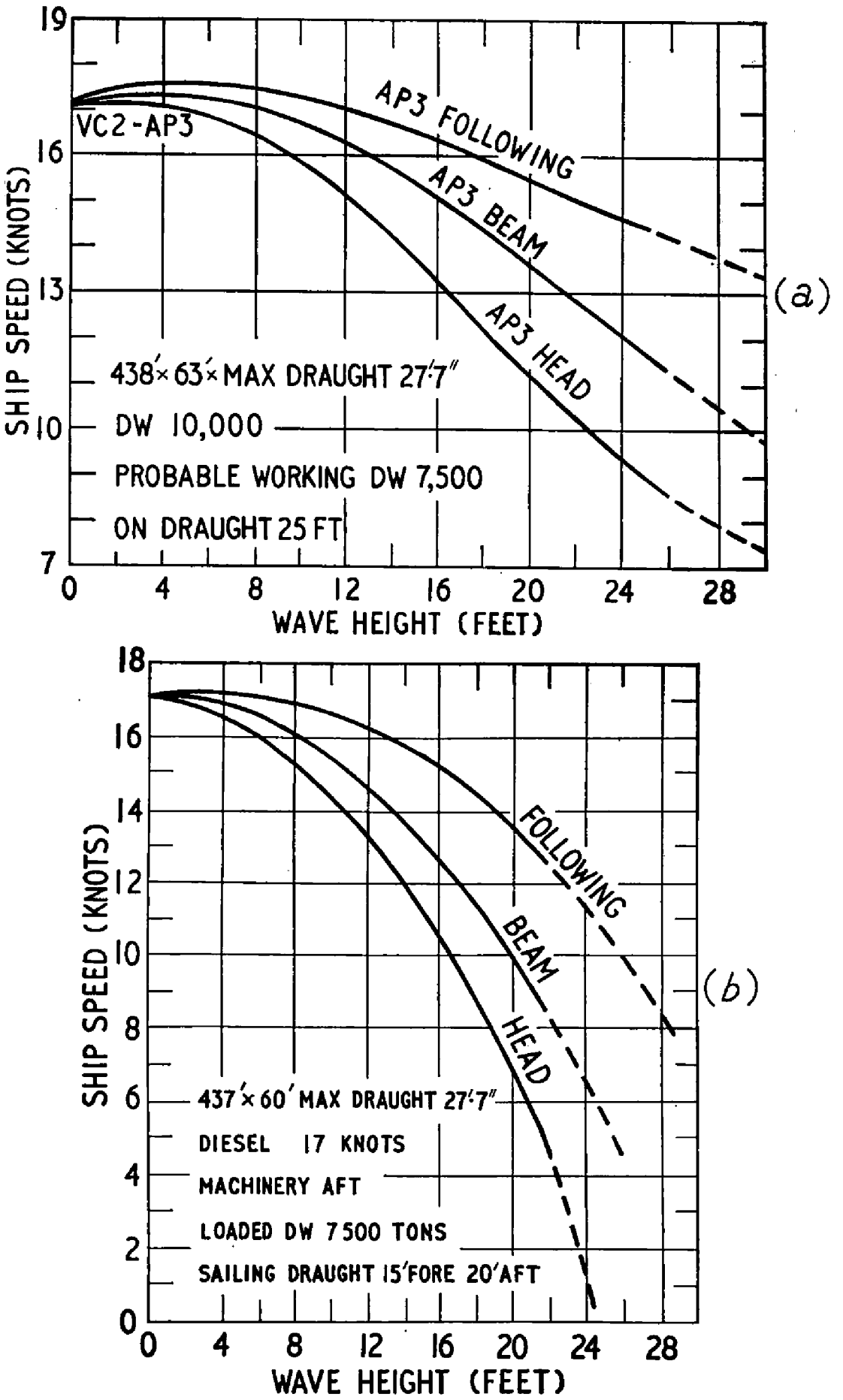


Fig. 1. Ship performance curves (ship's speed/wave height) for (*a*) Victory ship (AP3) on mean draught of about 25 ft and (*b*) *Parthia* on draught of 15 ft forward, 20 ft aft.

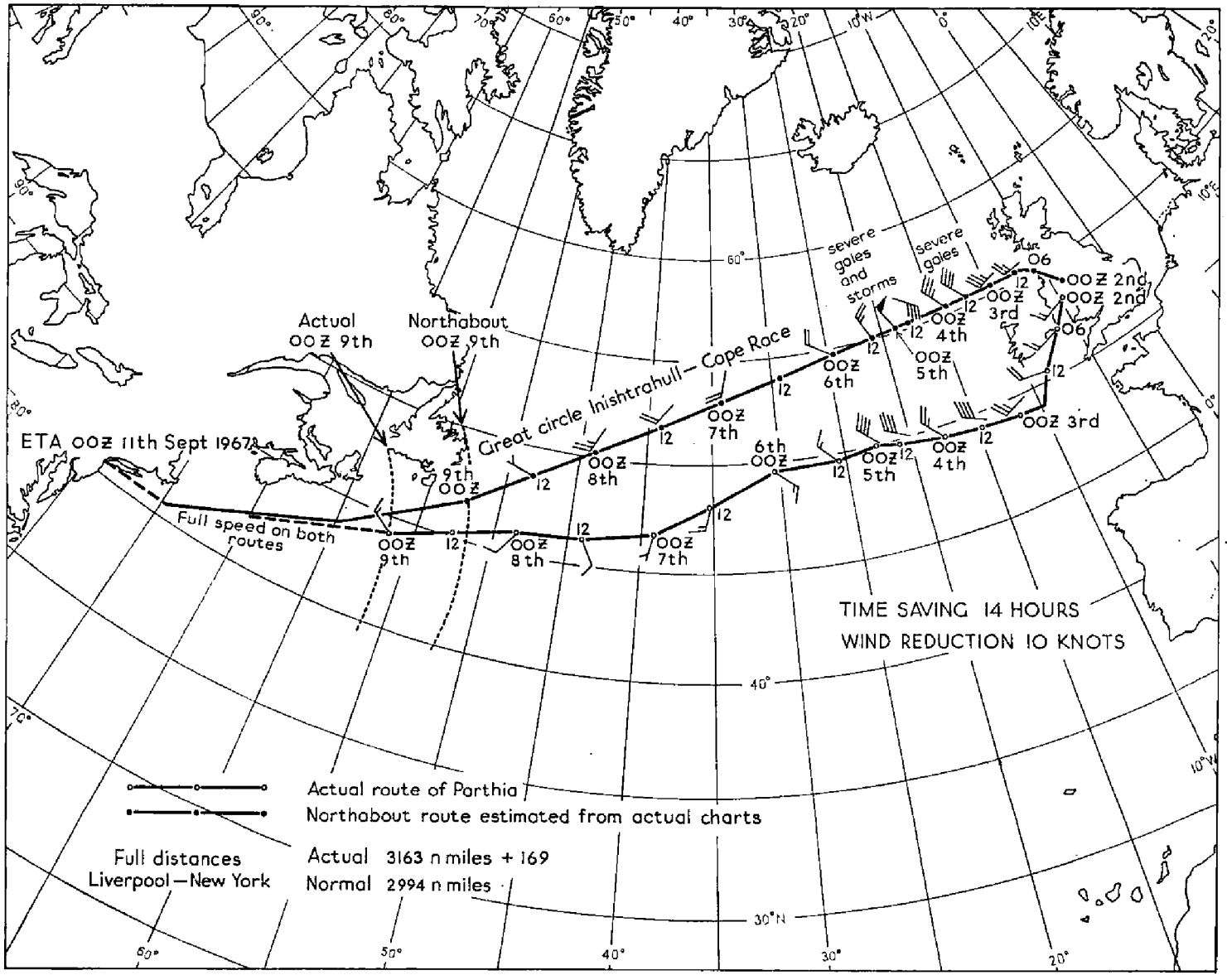


Fig. 2. Weather routeing of m.v. *Parthia* from Liverpool to New York, 1800 GMT on 1st September to 0001 GMT on 11th September 1967.

entirely dependent, in the first instance, upon the electronic computer. The wave forecasts are deduced from the wind field by the application of a relatively simple formula and are forecast for 12, 24, 36 and 48 hours ahead. This forecast wave information is studied by a meteorologist against the background of the surface analysis and forecast maps and upper-air maps as necessary and the meteorologist not only looks 48 hours ahead but he also 'peeps over the wall' against the background of the 72-hour prognostic charts to make a tentative estimate of conditions as far ahead as he can, on the basis of the general development.

The meteorologist has the assistance of a Nautical Officer who acts as an 'on the spot' liaison representative of the master of the ship. One of the more important jobs of the Nautical Officer is to find out, by some means or another, the speed reduction each ship is likely to suffer in waves of different heights from different directions relative to the ship and to construct the necessary speed/wave-height curves. Unfortunately, such information is not usually available very readily and it entailed a painstaking search through the deck logs and meteorological logs of the ships concerned. The ships involved in the experiment were all motor vessels and were all relatively 'light'—*Parthia*'s sailing draught, for example, was 15 feet forward and 20 feet aft (her maximum draught being about 27 feet) while *Sugar Carrier* was in ballast with a draught of only 10 feet forward and 18 feet aft. The lighter the draught the more a ship's speed is forcibly reduced by waves and, added to this, there is the voluntary reduction in speed made by the master of the ship in order to reduce risk of damage to the ship and cargo. Fig. 1 (*a*) and (*b*) show, respectively, the ship's speed/wave-height curves for a Victory ship at her loaded draught and for *Parthia* as she was during the experiment.

The next process in the weather-routeing procedure is to prepare 'least-time track curves', using surface wind and wave forecast charts in conjunction with the ship's speed/wave-height curves, for each 12-hour run of the ship up to the point on the 48-hour curve nearest to the destination, which is the position the ship would be advised to make for, having in mind other aspects such as currents, ice, fog and estimated synoptic development during a further 24 to 48 hours.

Before each ship sailed the Nautical Officer had consultation with the master and an initial route was given on the following day. For weather routeing it is essential that the ship sends radio weather messages and all the ships taking part in the experiment were Selected Ships. Recommended changes in the route during the voyage were sent to the ship by radio, according to pre-arranged schedules. The experiment was very successful; in each case some saving in time was achieved. Fig. 2 shows a 'picture' of the routeing of *Parthia*; the northern of the two routes is the one which it is assumed the Master would have taken if he had not been routed. The figures on this map confirm that in ocean navigation the shortest route isn't necessarily the quickest; adding 170 miles to the route (in better weather) saved almost 14 hours. Further study showed that in some cases one could add as much as 300 miles to a 3,000-mile passage and still save time and fuel as well as lessening the risk of damage to ship and cargo.

A further meeting was held aboard the *Wellington* on 1st February 1968 (with the kind permission of the Master of the Honourable Company of Master Mariners) to which all North Atlantic shipowners were invited, to discuss the results of our routeing experiment and to announce the intended launching of the official weather-routeing scheme. Our Director-General gave an introductory talk and this was followed by three speakers from the Meteorological Office who gave a detailed explanation of the experiment. There was a very good attendance and the discussion of the papers, which lasted nearly an hour, was very lively; general reaction to the scheme was favourable but some speakers inferred that masters of ships could do the routeing themselves just as well, with the aid of facsimile maps. Meteorologists at the meeting pointed out that it was true that a shipmaster can undoubtedly obtain some success with weather routeing himself, particularly in areas other than the North Atlantic where weather-routeing facilities from the shore are not practicable.

For the North Atlantic, however, there is little doubt that the professional meteorologist on shore, aided as he is with much forecasting experience and so many more facilities than can be made available to the master of a ship and able to take into account possible alternative developments, can achieve better weather-routeing results in the long run. Even if he had the same facilities and experience as the meteorologist, the shipmaster has many other duties and in bad weather he will be unable to spare much time for studying weather maps.

Immediately after the February meeting letters were sent to all British shipowners trading in the North Atlantic, giving details of the scheme and inviting them to avail themselves of the facilities.

This weather-routeing service is necessarily 'tailor-made' for the ship concerned and it is obvious that expense is involved. For example, three meteorologists and two Nautical Officers are employed on this work, not to mention use of the computer and its staff. Consequently it is unavoidable that there has to be a charge to the shipowner for the service and this is £50 per passage, plus the cost of advisory radio messages. However, if, for example, as a result of a successful weather routeing, half an hour's 'waiting time' for several gangs of stevedores is saved, the cost of weather routeing would probably be more than saved.

When a ship is weather-routed from the shore, all the meteorologist can do is to give advice; it was never intended that this system would take any responsibility from the master; he must decide as to whether he wishes to take the weather-routeing advice or not, or to depart from it on any particular occasion.

As mentioned before, the Nautical Officer is the link between the shipmaster and the meteorologist and he acts as nautical adviser to the meteorologist doing the weather routeing. Both our Nautical Officers are Chief Officers from the Ocean Weather Ships who have had experience in command and have been voluntary observers in cargo ships on the North Atlantic trade. Duties of the Nautical Officer are to establish personal contact with the master of the ship as far as possible, obtain details of the ship herself and about her performance, stability, fuel consumption, sailing draught, deck cargo and any peculiarities that she has. He also needs to find out the master's personal views about weather routeing and any special ideas he has about the avoidance of ice areas, extensive fog areas, etc. He also needs to know the owner's policy concerning such details as desirable time of arrival in harbour, etc. This question of time of arrival is often very important because of the stevedoring aspect. A further duty of the Nautical Officer is to do the navigational work connected with weather routeing, calculating distances to go on various alternative routes, the affect of adverse and favourable ocean currents, keep up to date about ice conditions and to make sure that any weather-routeing signals to a ship are unambiguous to the navigators.

Applications for this service need to be made in writing to the Meteorological Office—although it might be made by signal in some cases. On receipt of such a request the Meteorological Office contacts the owner as soon as possible to get details of the ship's schedule and other necessary information. Masters of west-bound ships need to telephone our Central Forecasting Office a few hours before sailing, giving details of sailing time, destination, draught, cargo, etc; general routeing advice is then given, covering the next 24 hours. A few hours after sailing a radio signal is sent to the ship indicating the recommended route and subsequent signals are normally sent every 48 hours or whenever it is considered necessary to send intermediate signals. For east-bound ships, the master needs to send a signal to Bracknell stating the position and time he wishes routeing to commence and giving his destination and other relevant details.

Communications obviously play an important part in weather routeing—the meteorologist does his best to avoid a heavy cost of messages, which have to be borne by the shipowner, by keeping them as brief as possible. For example, a message might read "Advise rhumb 47N 15W thence circle Cape Race". Supplementary information can also be supplied if required; for example, the reason might

be given for any particular routeing advice in the form of a synopsis of the weather situation and developments expected.

Most merchant ships likely to avail themselves of weather routeing carry only one radio officer. Special arrangements therefore need to be made to contact the ship at times least inconvenient to the radio officer and, as far as possible, when he is on watch. To make things easier for him, arrangements are made that he calls Portishead twice a day (at no cost to the ship) to enquire if there is any routeing advice for him. At the same time it will probably be convenient for him to send a radio weather message. If the vessel is neither a Selected nor Supplementary Ship she is recruited as an Auxiliary Ship during the period that she is being routed and special arrangements have been made that such ships send their radio weather messages direct to Portishead throughout the passage.

Between 11th March and 1st May, when this editorial was written, we have provided weather-routing advice on 11 passages, including 2 east-bound.

C. E. N. F.

EXCELLENT AWARDS, 1967–1968

The annual list of Excellent Awards, a feature of the July number of *The Marine Observer* for more than 40 years, appears on pages 109 to 112 of this number and once again we have the pleasure of congratulating the captains, principal observing officers and radio officers named therein. Once again, too, we must add a word of commiseration and encouragement to the masters and observing and radio officers who helped to compile more than 250 other meteorological logbooks classed as Excellent without being rated high enough to be placed in the first 100 to whom the Awards are given. All these officers, many of whom are undoubtedly disappointed, are reassured that the notation EX stands against the record of their book on their personal card and it is this assessment, whether or not an Award has been gained, that carries weight when an officer's long term record is worked out.

The assessing of all ships' meteorological logbooks and the placing of them in an order of merit continues to be done by the Nautical Officer at Bracknell and is a task which is not lightly undertaken, for the Voluntary Observing Fleet is a heterogeneous collection of ships, from the large passenger liner with two mates in each watch and a radio office manned 24 hours a day to the two-mate coaster where the deck officer not only makes the observation but transmits the radio weather message as well. The Nautical Officer feels justified in expecting fuller observations from the former than from the latter and due allowance is always made for the large range of circumstances which may affect observing facilities in different ships.

In the year which ended on 31st March 1968 the best books were received from the following nine ships:

1. *Logna* (Chr. Salvesen & Co. Ltd.), Captain D. I. Polson
2. *Bencleuch* (Ben Line Ltd.), Captain A. D. Hay
   Perseus (Ocean Fleets Ltd.), Captain D. D. McIntosh
3. F.R.S. *Explorer* (Department of Agriculture & Fisheries for Scotland), Captain A. A. Baxter
   Port Phillip (Blue Star Port Line Management Ltd.), Captain P. E. Packwood
   Port Vindex (Blue Star Port Line Management Ltd.), Captain A. J. Hawkins
   Ross Leonis (Ross Trawlers Ltd.), Skipper R. Waller
   St. Giles (Thos. Hamling & Co.), Skipper J. W. Humphrey
   Santona (G. Heyn & Sons Ltd.), Captain A. T. Johnston

This is the fourteenth year in which we have published a 'short list' and we must particularly congratulate F.R.S. *Explorer* who is making her fourth appearance whilst the *Logna*, *Port Vindex*, *Ross Leonis* and *St. Giles* are each appearing for the third time and *Santona* figured also in last year's list. The customary photographs of the three top ships appear opposite page 130.

The Awards List also includes four 'Marid' ships (vessels taking and transmitting sea temperatures only but with the addition of non-instrumental observations when in certain specified areas such as the North Sea or Arctic waters) and it may be noted that this year a trawler has a place in this list in addition to the three trawlers which figure in the main list. Also given are the names of the four skippers and four wireless operators sailing in trawlers which at present carry no instruments but make and transmit observations of wind and weather only from far northern waters. The tragedies which darkened the lives of so many of the Hull fishing community during the year cannot but underline the vital importance of steady meteorological observations from northern waters and we are glad to be able to acknowledge our thanks for them in this way though they can only be genuinely recognized by the fuller weather forecasts which more such observations will enable us to provide.

The recipients of the Awards will, as in past years, be individually notified by letter and asked for an address to which they would like us to send it; but if any officer sees his name in the Excellent Award list in this journal before the official letter reaches him, we would be glad if he would write to us, claiming the Award

EXCELLENT AWARDS (Year ended 31st March 1968)

Ship	Captain	Principal Observing Officer	Radio Officer	Owner/Manager
Achilles	R. C. Riseley	D. C. S. Thompson	J. B. Sergent	Ocean Fleets Ltd.
Afghanistan	W. J. Bie	J. P. Wood	A. E. Adams	Common Bros. Ltd.
Afric	W. A. Murison	K. Fuge	M. Murphy	Shaw Savill & Albion Co. Ltd.
Apollo	G. V. Barnes	W. G. Sommerfield	J. S. Earl*	Bristol S.N. Co. Ltd.
Astyanax	A. A. Rundle	M. J. Coventry	J. V. Morgan	Ocean Fleets Ltd.
Athenic	G. H. Heywood	D. M. MacGillivray	J. P. MacMahon	Shaw Savill & Albion Co. Ltd.
Baron Pentland	A. McKinlay, O.B.E.	J. R. C. Peterson	R. J. T. Hemmings	H. Hogarth & Sons Ltd.
Beaverbank	D. J. R. Davies	P. J. Harris	J. B. Keenan	Andrew Weir & Co. Ltd.
Benarmin	J. C. Harvey	J. Mackinnon	J. W. Kenny	Ben Line Steamers Ltd.
Benarty	C. Donnelly	T. Coulter	W. Paterson	Ben Line Steamers Ltd.
Bencleuch	A. D. Hay	J. L. Stoker	D. J. O'Brien	Ben Line Steamers Ltd.
Bristol City	F. W. Harris	W. A. Hursey	I. M. Jenkins, M.B.E.	Bristol City Line Ltd.
British Bombardier	J. R. Scott	A. N. Warren	T. C. Baldwin	B.P. Tanker Co. Ltd.
Calchas	H. K. Timbrell	P. J. Wood	D. Wilford	Ocean Fleets Ltd.
Caltex Edinburgh	R. G. A. Barnes	M. E. Linklater	N. A. O'Connor	Texaco Overseas Tankship Ltd.
Camellia	W. R. Hunter	T. B. A. Wyness	L. K. Livie	J. Robinson & Sons Ltd.
Cape Howe	T. C. D. Hogg	W. A. Andersen	H. A. Chambers	Lyle Shipping Co. Ltd.
Chantala	F. Bell	J. Craig	C. J. A. Jones	British India S.N. Co. Ltd.
City of Manchester	G. R. Jackson	T. F. Weale	M. H. Crocker	Ellerman Lines Ltd.
Clan Macgregor	T. R. Halliday	J. N. C. Greaves	J. K. Paterson	Clan Line Steamers Ltd.
Crystal Gem	D. Patrickson	E. G. Winsor	H. Foster	Sugar Line Ltd.
Crystal Sapphire	J. E. Leaver	P. G. S. Dove	M. J. Flood	Sugar Line Ltd.
Denbighshire	W. R. Willis	D. J. Tatham	J. Ramsey	Glen Line Ltd.
Dorset	C. A. Miller	P. E. Keyes	S. J. N. Griffith	Federal S.N. Co. Ltd.
Duhallow	E. D. Stewart	I. Smith	J. Mercer	Hain-Nourse Ltd.
Dukesgarth	N. Richardson	H. J. Summers	R. M. Stirling	W. Cory & Son Ltd.
Echo	J. L. Jenkins	A. Ford	H. H. Grant*	Bristol S.N. Co. Ltd.
Essex	A. B. Stalker	P. G. Starkey	S. Adams	Federal S.N. Co. Ltd.
Esso Pembrokeshire	E. W. Thomas	R. G. Leary	V. G. Merriott	Esso Petroleum Co. Ltd.
Explorer (F.R.S.)	A. A. Baxter	J. McBride	J. Steven	Dept. of Agric. & Fish., Scotland
Flintshire	R. G. Rippon	J. Walker	C. Branthwaite	Glen Line Ltd.
Georgina V. Everard	L. Andersen	D. G. Green	W. Arscott	F. T. Everard & Sons Ltd.
Glenalmond	N. Willis	P. A. Brown	A. Moloney	Glen Line Ltd.
Glenogle	I. R. Atkinson	D. G. Marsh	J. Meldrum	Glen Line Ltd.
Glenorchy	J. C. Liptrot	M. J. Hindley	S. Brannen	Glen Line Ltd.

* Deck Officer

Excellent Awards (*contd.*)

Ship	Captain	Principal Observing Officer	Radio Officer	Owner/Manager
Gloucester City	P. W. Doble	A. D. Garner	H. Roderick	Bristol City Line Ltd.
Gloucestershire	A. E. Young	H. Paulusz	D. Alcock	Bibby Line Ltd.
Gothic	H. O. V. Anderson, M.V.O.	M. Gochin	B. McGovern	Shaw Savill & Albion Co. Ltd.
Haparangi	W. J. T. Stevens	R. Longworth	J. B. Whiteley	New Zealand Shipping Co. Ltd.
Hauraki	J. S. Laidlaw	P. D. Middleton	L. K. Lambdin	New Zealand Shipping Co. Ltd.
Hector	S. S. Howie, M.B.E.	J. B. Pepper	G. R. Douglas	Ocean Fleets Ltd.
Helenus	N. O. Martin	P. A. Clements	W. C. A. Phillips	Ocean Fleets Ltd.
Iberic	J. Gunning	D. S. Sully	G. A. Kerr	Shaw Savill & Albion Co. Ltd.
Illyric	G. V. Conolly, D.S.C.	D. W. Owen	H. A. Sirett	Shaw Savill & Albion Co. Ltd.
Iron Horse	G. Black, O.B.E.	J. M. Allison	W. Ormerod	Common Bros. Ltd.
Jamaica Producer	G. A. Foulds	R. W. Warwick	K. R. Mugridge	Kaye Son & Co. Ltd.
John Biscoe	T. Woodfield	M. A. Fraser	H. O'Gorman	British Antarctic Survey
Kenya	I. K. Bowerman	G. F. Lack	H. O'Donnell	British India S.N. Co. Ltd.
Loch Loyal	G. C. W. Meldrum, M.B.E.	D. I. C. McNeil	J. McMillan	Royal Mail Lines Ltd.
Logna	D. I. Polson	J. W. T. Low	W. Findlay*	Chr. Salvesen & Co. Ltd.
Mahseer	A. B. Davies	A. H. Lord	G. Chorlton	Cunard Brocklebank Ltd.
Mangla	G. B. Thomas	M. R. N. James	G. Hazel	Cunard Brocklebank Ltd.
Maron	E. G. Painter	W. J. H. Percival	R. J. Leppard	Ocean Fleets Ltd.
Middlesex	K. Mayhew	P. M. Swan	W. J. R. Davenport	Federal S.N. Co. Ltd.
Montreal City	W. H. Stoodley	P. G. Bowditch	I. S. Humphrey	Bristol City Line Ltd.
Neleus	E. W. Alkin	D. A. Chambers	J. N. Nolan	Ocean Fleets Ltd.
New York City	A. F. Ashton	C. O. Thomas	J. Moody	Bristol City Line Ltd.
Northumberland	E. T. Rowland	H. J. Vercoe	A. M. Page	Federal S.N. Co. Ltd.
Orsova	S. Ayles, R.D.	D. P. Montgomery	R. H. C. Berry	P. & O. Lines Management Ltd.
Otaki	M. J. Heron	J. R. Jackson	A. McInnes	New Zealand Shipping Co. Ltd.
Paparoa	J. R. Hannah	R. T. Macnamara	R. R. G. Wood	New Zealand Shipping Co. Ltd.
Pendennis Castle	R. M. Wright	R. Bigwood	P. P. Williams	Union-Castle Mail S.S. Co. Ltd.
Perseus	D. D. McIntosh	D. J. H. Custance	P. M. Dolphin	Ocean Fleets Ltd.
Piako	I. C. Davison	R. A. Newnham	S. J. Braithwaite	New Zealand Shipping Co. Ltd.
Port Adelaide	E. R. Jenkins	D. A. Brown	B. E. Bromley	Blue Star Port Line Management Ltd.
Port Burnie	I. H. North	M. F. Bennett	H. B. Hughes	Blue Star Port Line Management Ltd.
Port Hobart	A. M. Downes	R. D. Roberts	R. T. Greer	Blue Star Port Line Management Ltd.
Port Lincoln	A. M. Davies	D. D. Taylor	R. A. Jones	Blue Star Port Line Management Ltd.
Port Lyttelton	D. Hart	J. Myers	D. R. Uglow	Blue Star Port Line Management Ltd.
Port Macquarie	A. J. Starkey	C. Allport	N. McDuffie	Blue Star Port Line Management Ltd.

Port Napier	J. G. A. Dunn	D. I. Rowland	J. E. Appleton	Blue Star Port Line Management Ltd.
Port Phillip	P. E. Packwood	G. D. Wilson	R. E. Maskell	Blue Star Port Line Management Ltd.
Port Sydney	L. W. Cady	D. S. Hughan	L. V. O'Sullivan	Blue Star Port Line Management Ltd.
Port Victor	R. A. Wight	D. N. Ford	T. J. Britt	Blue Star Port Line Management Ltd.
Port Vindex	A. J. Hawkins	G. G. Hunter	J. A. Foreman	Blue Star Port Line Management Ltd.
Port Wellington	R. A. Holmes	B. J. S. Tinling	R. Dawson	Blue Star Port Line Management Ltd.
Priam	W. T. D. McMillan, O.B.E.	R. N. Adams	D. Gunning	Ocean Fleets Ltd.
Prometheus	R. G. Boyd	A. R. Wilkinson	E. O. Roberts	Ocean Fleets Ltd.
Queensland Star	R. White, D.S.C.	D. E. Norman	F. Huggett	Blue Star Line Ltd.
Rangitoto	J. D. Guyler	G. W. Chatfield	W. F. Shepherd	New Zealand Shipping Co. Ltd.
Rathlin Head	F. R. N. Best	B. G. McShane	W. S. Steel	G. Heyn & Sons. Ltd.
Ross Leonis	R. Waller		R. R. N. Laing	Ross Trawlers Ltd.
Ruahine	R. G. Hollingdale	J. Gibbard	J. R. Birkinshaw	New Zealand Shipping Co. Ltd.
Ruysdael	J. Parsloe	W. J. Scouller	T. S. Kiely	Bolton S.S. Co. Ltd.
S.A. Oranje	J. P. Smythe, D.S.C., R.D.	N. M. Butterfield	G. Kilminster, M.B.E.	Union-Castle Mail S.S. Co. Ltd.
St. Gerontius	E. J. Johnson	J. Garton**	R. J. Murphy	T. Hamling & Sons Ltd.
St. Giles	J. W. Humphrey	T. Sawyer**	K. C. Stone	T. Hamling & Sons Ltd.
Santona	A. T. Johnston	J. M. Bryan	J. Stafford	G. Heyn & Sons Ltd.
Sicilia	R. W. L. Crawford	D. Wilson	N. MacLean	Anchor Line Ltd.
Somerset	I. Y. Batley	M. G. Smith	R. F. McManamon	Federal S.N. Co. Ltd.
Sugar Importer	J. Hunt	R. Martin	J. V. Reading	Sugar Line Ltd.
Sussex	R. E. Baker	A. R. Savill	R. B. Redhead	Federal S.N. Co. Ltd.
Tekoa	F. C. Taylor	M. J. Rowland-Hill	R. G. Heath	New Zealand Shipping Co. Ltd.
Theseus	I. Webster	J. W. Rigg	A. W. Jones	Ocean Fleets Ltd.
Turakina	R. B. Hood	G. D. Goldsbrough	D. J. Lendrum	New Zealand Shipping Co. Ltd.
Volvatella	T. Magee	B. D. Snazell	A. J. Norman	Shell Tankers (U.K.) Ltd.
Waroonga	P. H. Bidmead	P. J. Miller	J. M. Brogdon	British India S.N. Co. Ltd.
Welsh City	T. W. D. John	R. K. Stuart	E. W. Willcocks	Sir Wm Reardon Smith & Sons Ltd.
Welsh Herald	J. G. Tunnicliff	C. C. Davidson	M. J. O'Brien	Welsh Ore Carriers Ltd.
Westmorland	D. E. Moran	A. Leachman	D. L. Byne	Federal S.N. Co. Ltd.
'MARID' SHIPS†				
Corkbrook	C. W. L. Taylor	D. Branagh	R. Alexander‡	Comben, Longstaff & Co. Ltd.
Loch Seaforth	J. Smith	J. MacLean	N. Smith	David MacBrayne & Co.
St. Leger	J. Nelson		B. Jones	T. Hamling & Co. Ltd.
Sarnia	H. Walker	R. H. Rymill	G. A. Robinson	British Railways Board

* Deck Officer ** Relief Skipper † Vessels recruited for the purposes of observing and transmitting sea temperatures together with non-instrumental observations when in the North Sea or Arctic waters. ‡ Relief Master (no Radio Officer aboard).

TRAWLERS (non-instrumental)

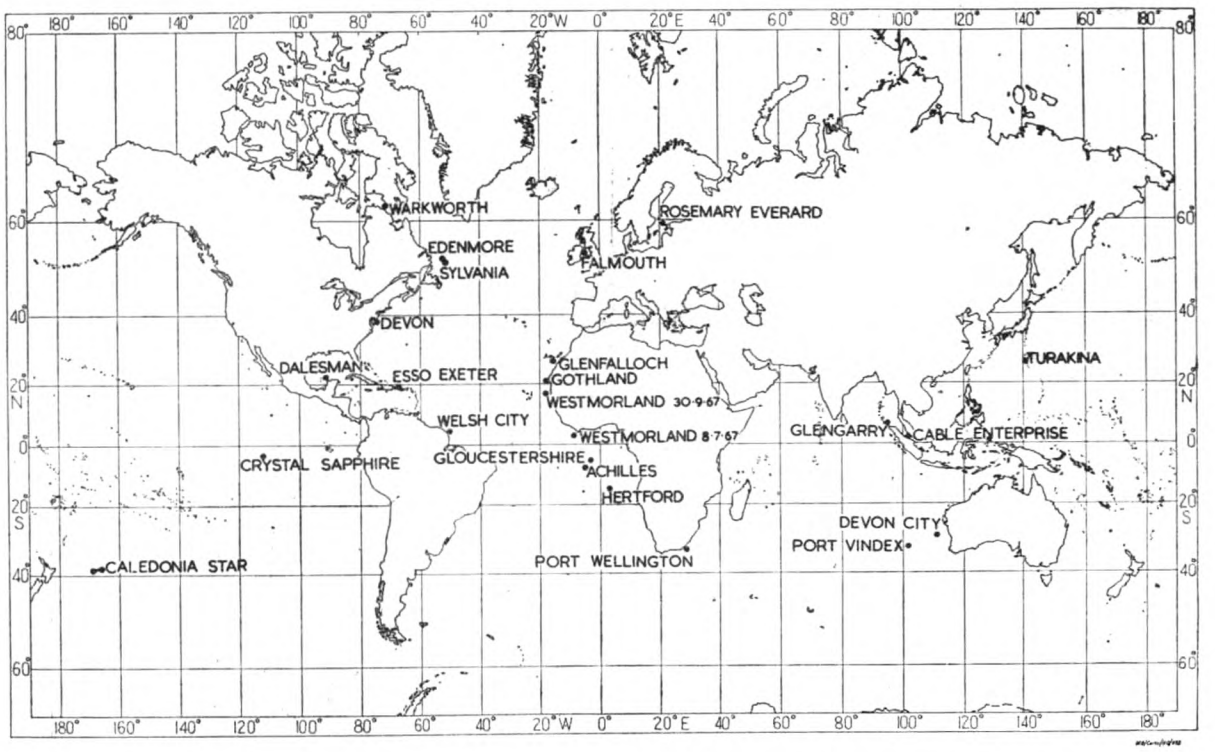
Skipper	Wireless Operator	Trawler Owners
B. A. Ashcroft ..	—	Hellyer Bros. Ltd.
W. Brettell.. ..	—	Newington Steam Fishing Co. Ltd.
P. Crane	—	Ross Trawlers Ltd.
J. O. Emmons ..	—	Ross Trawlers Ltd.
—	J. Blake	Newington Steam Fishing Co. Ltd.
—	J. Cockburn	Newington Steam Fishing Co. Ltd.
—	H. G. Pask	Hellyer Bros. Ltd.
—	B. E. K. Robinson..	Newington Steam Fishing Co. Ltd.

and giving us a forwarding address for it. The most popular Award still seems to be a world atlas and it is our normal practice to send one to any officer whose name appears in the list for the first time but if any such officer would prefer to have one of the alternatives, *Cassell's English Dictionary* or *Farming the Sea* (a book about under-sea research with a view to the welfare of future generations), we would endeavour to meet his request if he would please let us know.

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.

Observing officers are reminded that preserved samples of discoloured water, luminescent water, etc. considerably enhance the value of such an observation. Port Meteorological Officers in the U.K. will supply bottles, preservative and instructions on request.



Position of ships whose reports appear in "*The Marine Observers' Log*".

PRACTICAL USE OF WEATHER FORECASTS

Baltic Sea

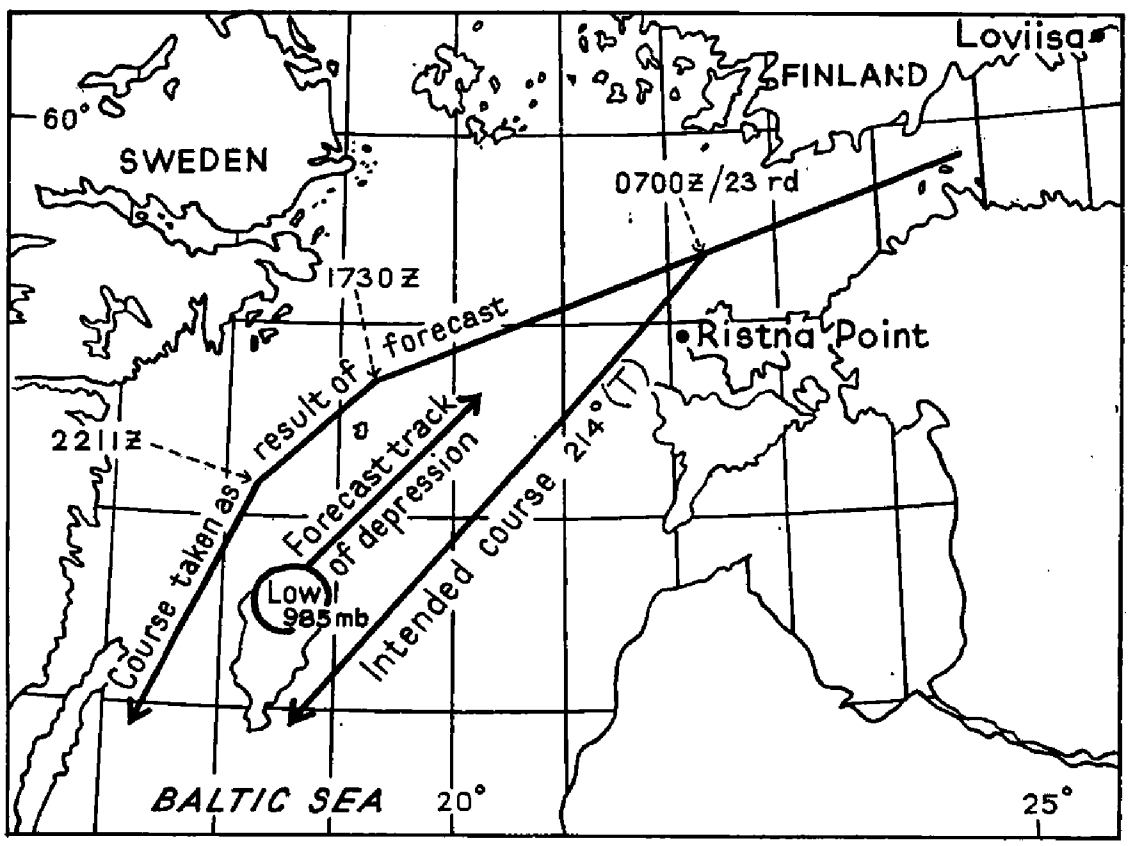
m.v. *Rosemary Everard.* Captain W. G. Hunt. Loviisa (Finland) to Grangemouth.

22nd–23rd September 1967. At 1540 GMT when the vessel sailed from Loviisa for Grangemouth the barometer began to fall rapidly, the local forecast for the Gulf of Finland predicting gales of force 8–9 from ESE. During the night the wind veered from ESE, force 5–6 to SSE, force 6, and by 0700 GMT on the 23rd it had steadied at SE'E, force 6. At that time, the intention was to alter course to 214° to pass to the east and south of Gotland, and also to keep in the lee of the Estonian and Latvian coasts for as long as possible, since the vessel had a big deck cargo of timber.

The Swedish shipping forecast transmitted at 0700 GMT on the 23rd on the National Broadcasting System referred to a depression of 985 mb centred over the northern part of Gotland and moving NE, which was expected to give severe SW–W gales to the south of the centre, and E'ly winds of force 5–6 to the north of the centre. These E'ly winds were later expected to back to the north, force 5–6.

As the vessel began to open out Ristna Point at the western extremity of Hiiumaa Island a very heavy and very steep SW swell was encountered and, as the Swedish coast station reports to the southwards of the centre of the low were giving SW–W winds of force 9 in places, it was decided to maintain the present course of 249° and pass north of Gotska Sandön so to keep as close as possible to the north side of the centre, and thereby retain the less strong winds from between E and N; also to get the benefit of the lee of the Swedish coast as the wind eventually backed towards the NW.

By noon the wind had backed to E'N, force 5, with heavy rain and less than 2 miles visibility. The barometer read 986·9 mb. The wind, blowing at force 5, continued to back and there was very heavy rain with poor visibility. At about 1400 GMT the sky cleared and the sun came out. The barometer, now at 985 mb, began to rise and the wind had become N'W, force 4–5. All the indications were that the vessel had, as was intended, passed very close to the north side of the centre of the depression.



The storm caused much damage in the south of Sweden and put ships in difficulty in the southern Baltic, and there is no doubt that the accurate weather information we received from the Swedish Weather Service enabled us to take a course which avoided the worst of the weather.

Position of ship at 1200 on 23rd: 59° 04′N, 20° 54′E.

Note. Our synoptic weather charts show that at 1200 GMT on the 22nd September a rather intense depression was centred to the east of Malmö. It deepened and moved rather slowly in a NE'ly direction, reaching Gotland by 0600 on the 23rd. The centre continued to follow much the same track throughout the day and by evening it was in the Gulf of Finland, to the south of Helsinki. The Master of the vessel showed considerable enterprise in taking advantage, to such good effect, of this very accurate forecast.

EXCEPTIONAL STOR

South Pacific Ocean

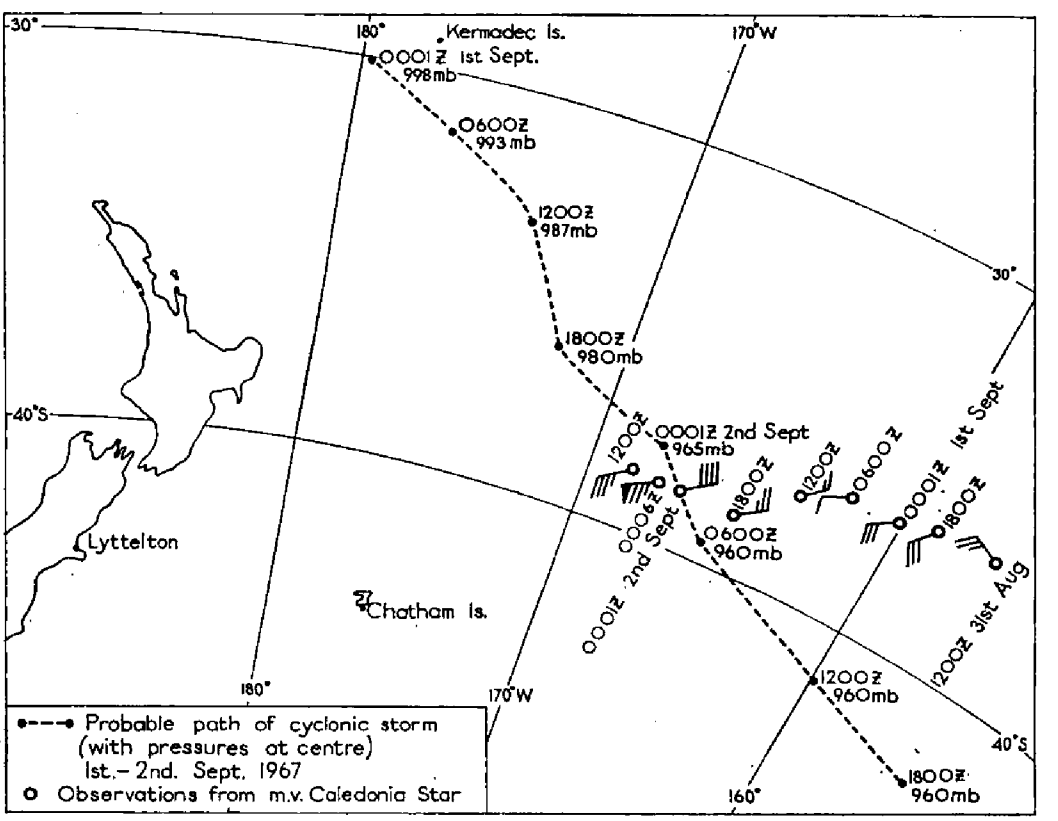
m.v. *Caledonia Star.* Captain R. H. Stark. Matarani (Peru) to Lyttelton (N.Z.). Observers, the Master and all officers.

1st–2nd September 1967. At 2300 GMT the wind was a steady force 10 from the NE and there was a very heavy SE'ly swell running. During the early part of the afternoon watch the wind began to back slowly and by 0300 on the 2nd it was N'ly, force 8. Frequent moderate rain showers persisted throughout the afternoon. Shortly after 0300 the wind began to back very sharply, being NW, force 6 at 0320 and WSW, force 10 by 0350. At this time the barometer, which had been falling very rapidly, steadied at 968·5 mb and began to rise suddenly. Almost immediately the wind steadied from the SW and began to increase in force until by 0430 its speed was estimated to be in excess of force 12. Shortly before 0500 the vessel, although making revolutions for 14½ kt, failed completely to answer the helm due to the force of the wind. An attempt was then made to heave the vessel to with the wind fine on the port bow by stopping the port engine; this also proved ineffective and the vessel was then brought round to a course of 020° to lessen the effect of the very heavy

sw'ly swell. Visibility throughout the period was virtually nil, due largely to driving spray and heavy rain showers. It was not until 0815 that the vessel was able to resume her original course and then only on reduced revolutions. By this time the wind had moderated to force 10. Pressure continued to rise rapidly and it was not until 1800 that it began to level off at 998 mb. This was accompanied by a decrease of the wind to force 6–7. Although only minor damage to deck fittings was sustained, the wind force was greater than any previously experienced by the Master in the southern hemisphere.

Position at 2300 on 1st by D.R.: 38° 18'S, 166° 18'W.

Position at 1630 on 2nd by observation: 38° 24'S, 169° 20'W.



Note. The following comments and the plotted chart were received from the Director, New Zealand Meteorological Service:

"It is evident from the synoptic reports received, the logbook and a copy of the ship's barograph trace that was made available to the New Zealand Meteorological Service, that the *Caledonia Star* passed just north of the centre of a rapidly-developing cyclonic storm.

"On 31st August 1967 a frontal zone extended from New Caledonia to the Kermadec Islands and then continued in an east-south-east direction. (The *Caledonia Star* passed through this frontal zone between 1200 and 1800 GMT on 31st August.) By 0001 on 1st September a depression had developed on the front in the vicinity of the Kermadec Islands. This depression moved south-east and deepened. At 1800 the m.v. *Antrim*, at 38° 24'S, 172° 48'W, had a 30 kt SE'ly wind with rain and a pressure of 990·5 mb. The depression probably passed about 150 miles north of this ship at this time. Meanwhile the *Caledonia Star* had passed through a ridge of high pressure with a change to north-east winds and at 1800 was already experiencing heavy rain with the pressure falling rapidly.

"The barograph trace and the sequence of wind changes described by the Master indicate that the *Caledonia Star* passed just north of the storm centre in the afternoon of the 2nd September. After this no further surface observations were available near the centre of the storm but a satellite photograph at 2312 GMT on 2nd September indicated that the storm centre had moved to about 47°S, 155°W.

"In this area, far from land, synoptic analysis is entirely dependent on ship's reports and satellite photographs. Unfortunately in this period satellite photographs were not routinely available at the National Weather Forecasting Centre, Wellington. Indeed, had it not been

for the reports from the *Caledonia Star*, the presence of such a severe storm in the area would have been undetected.

"The rapid south-eastward movement and deepening of the depression was associated with a strong upper-level north-westerly air flow—a jet stream—extending from the area between New Caledonia and the Kermadec Islands over the area traversed by the storm.

"The intensity of this storm was most unusual for a mid-latitude depression. The greatest wind strength reported by the *Caledonia Star*—75 kt—is exceptional in these waters in September. Winds of this magnitude are normally expected in the area from December to April with storms of tropical origin."

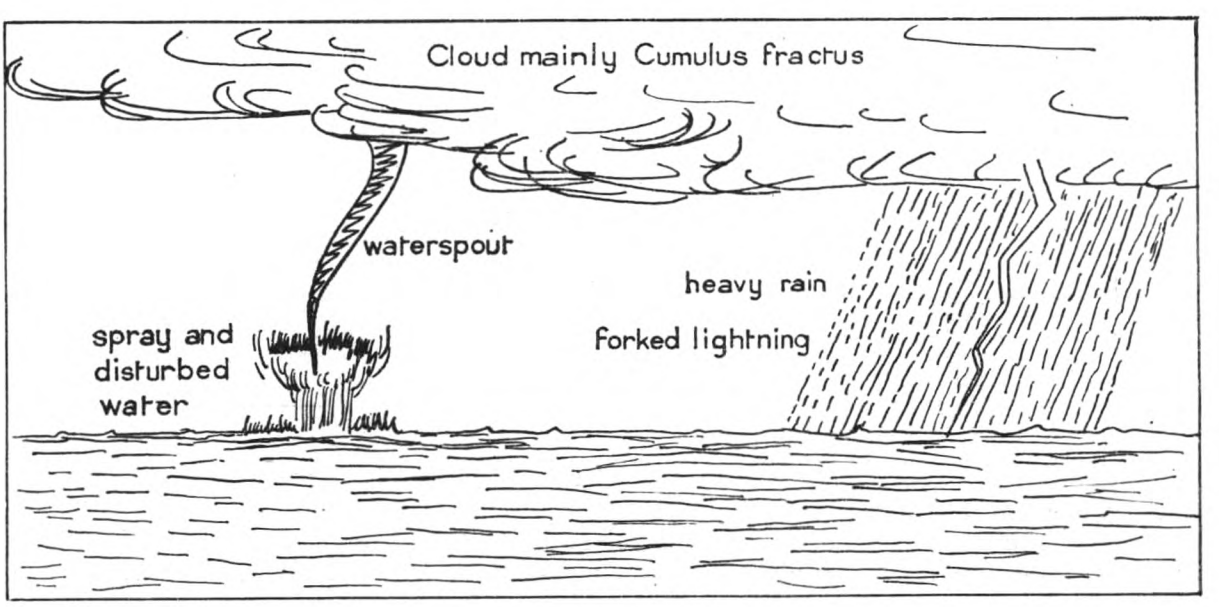
WATERSPOUTS

Strait of Malacca

m.v. *Cable Enterprise*. Captain G. T. Robinson. Singapore to Bombay. Observers, Chief Officer, 2nd and 3rd Officers.

17th August 1967. At 0415 GMT, when the vessel was in the Straits of Malacca, a 6-mile-long belt of rain was seen crossing from NW to SE at about 10 kt. There was precipitation in sight, thunder heard, and vivid lightning seen ahead of the vessel. The rain belt appeared to stop moving and a well-defined waterspout formed from the base of the cloud and extended below towards the sea. The spout lasted 7 min. Spray from the sea arising aloft to at least 100 ft momentarily connected the spout. The spout then receded into the cloud and the spray died down.

Position of ship: 03° 03′N, 100° 39′E.



Note 1. The Meteorological Service, Singapore comments as follows:

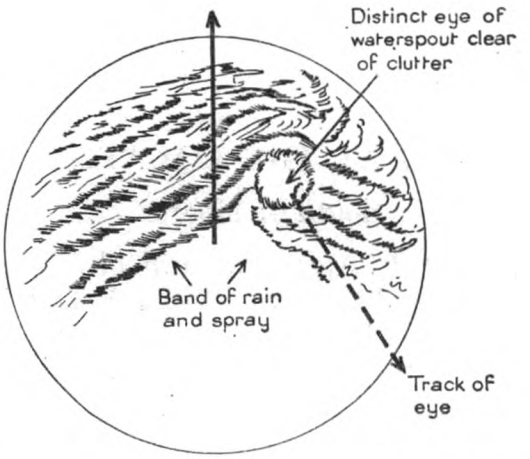
"The synoptic situation at 0001 GMT on the 17th indicated a weakening convergence zone in the Malacca Straits. There were frequent and widespread thunderstorms which became occasional and scattered after 0000 GMT. The low-level prevailing winds were SSW in the south and W in the north. The NNE surface wind reported was probably a local wind associated with the observed thunderstorm cloud. The air temperature of 77°F was probably due to rain-cooled air—other ships elsewhere in the Straits reported air temperatures of 80–82°F and sea temperatures of 82–83°F at 0000 GMT."

Note 2. m.v. *Cable Enterprise* is a Singapore Selected Ship.

Vicinity of East London

m.v. *Port Wellington*. Captain R. A. Holmes. Durban to Genoa. Observers, the Master, Mr. K. Spiers, 2nd Officer, Mr. B. Tinling, 3rd Officer and Apprentices P. Johnston and L. Dove.

3rd July 1967. A well-defined waterspout was sighted at 1358 GMT within 1 mile



of the vessel, bearing 182° and moving in a NE'ly direction. The funnel extended vertically downwards to the sea from the base of a heavy Cb cloud, the height of the column being estimated as 350 ft and the diameter about 80 ft. The sea was agitated and was whipped up to form a cloud of spray which was carried aloft. The direction of rotation was anticlockwise. The spout became bent towards the direction it was travelling before dissipating at 1416 when the column quickly retracted to the cloud base. Immediately on sighting the waterspout the radar was switched on and at 1405 a second spout was seen, as shown in the accompanying sketch. It was observed visually only for a very short time because, soon afterwards, the vessel was enveloped in heavy rain which lasted for 5 min. As the rain began the wind backed from SW, force 6 to S, force 8. Soon afterwards it became SE'ly, force 6. The second waterspout was judged to be moving in the same direction and at a similar speed to the first one. Its diameter was about 200 ft and the radar display showed that the eye of the spout had split into two parts before disappearing. Air temp. 60°F, wet bulb 59·5°.

Position of ship: 33° 30′S, 27° 37′E.

Note. The synoptic weather chart for 1200 GMT issued by the South Africa Weather Bureau shows that a cold front, orientated W–ESE and moving in a NE'ly direction, lay across the vessel's track. The changes in wind direction and force and the development of the waterspouts appear to have occurred as the ship passed through the front. The anticlockwise rotation of the first waterspout is thought to be rather unusual in the southern hemisphere.

EXCEPTIONAL VISIBILITY

Irish Sea

m.v. *Falmouth.* Captain G. W. Sayer, Londonderry to Liverpool. Observers, Mr. T. G. Galloway, Chief Officer and Mr. W. Aikin, A.B.

23rd July 1967. At 0330 GMT the weather was fine and clear with precipitation in sight to the south and west. Buildings in Liverpool and Blackpool (80 and 70 miles away respectively) were plainly visible, also shipping and light floats in the Mersey Approaches over 65 miles away. These all appeared to lie slightly above the horizon. At the same time the mountains in Wigtownshire and Kirkcudbrightshire (38 to 56 miles distant) and in North Wales (40 miles) were clearly seen along the horizon. Nothing was visible towards the west due to a darkened sky. As the vessel proceeded on its course, 120° at 12½ kt, only the mountains continued to be visible. The horizon in the direction of Liverpool was clear. Air temp. 58°F. Wind N'ly, force 3.

Position of ship: 54° 00′N, 5° 00′W.

Note. At the Skulmartin L.V. (54° 32′N, 5° 26′W) the air and sea temperatures read at 0600 GMT were 58°F and 54° respectively, the air temperature being the same as that observed by the observers on m.v. *Falmouth.* If the sea temperature of 54° can be taken as being representative of the north Irish Sea, the surface air overlying this area would appear to have been

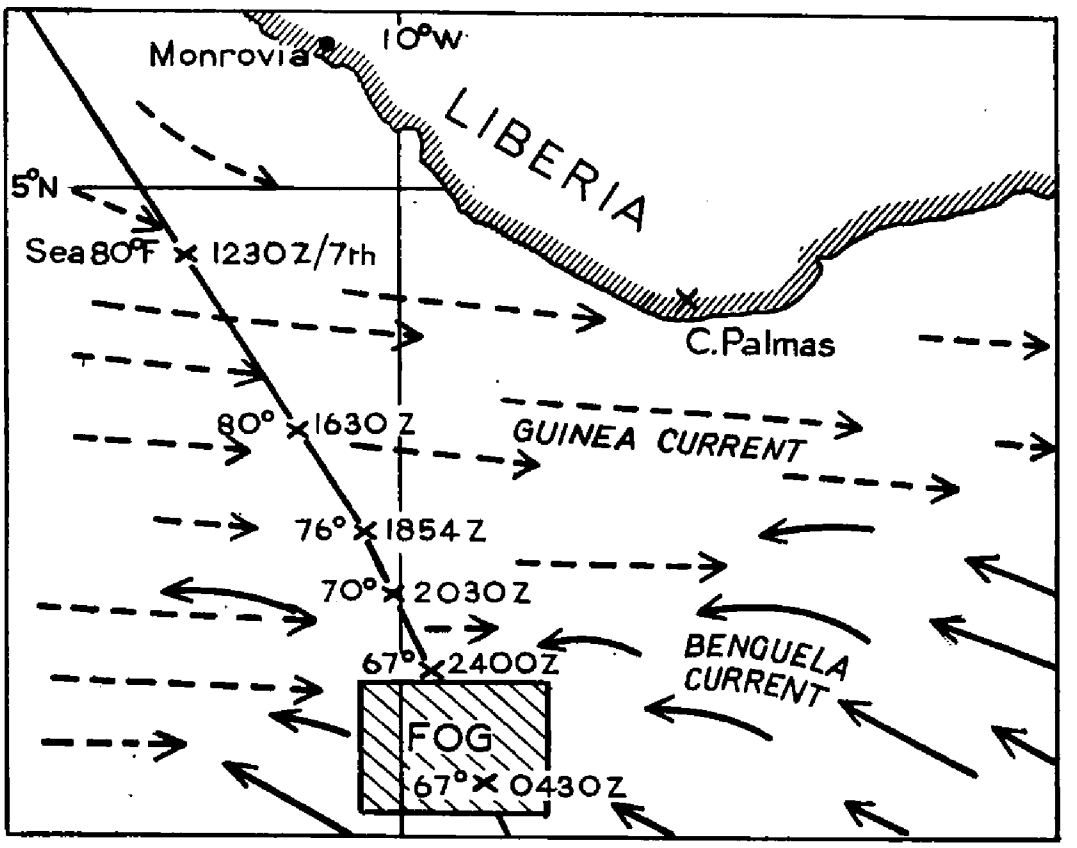
some 4° warmer than the sea. In such conditions light rays from distant objects tend to follow the earth's curvature and thereby allow objects lying out of sight beyond the horizon to become visible. Nevertheless this seems to be quite an exceptional case.

FOG AT THE EQUATOR

South of Liberia

m.v. *Westmorland*. Captain D. E. Moran. Liverpool to Fremantle. Observers, the Master, Mr. S. N. A. Wells, 2nd Officer and Mr. A. Leachman, 3rd Officer.

7th–8th July 1967. Between 1800 GMT on the 7th and 0001 on the 8th the sea temperature fell from 80°F to 70°. During this period the vessel crossed from the



Guinea Current into the Benguela Current. By 0350 the air temp., wet bulb and sea temp. all read 67° and dense fog was encountered. Wind SSE, force 1. The fog became patchy by 0640 and cleared at 0850.

Position of ship at 0350 on 8th: 0° 48'N, 10° 30'W.

TIDE RIPS

off French Guiana

m.v. *Welsh City*. Captain T. W. D. John. Karachi to Houston (Texas). Observers, Mr. N. Brown, Chief Officer, Mr. R. Stuart, 2nd Officer and Apprentices Asquith and Dixon.

21st August 1967. When approaching Cayenne at 1815 GMT the vessel experienced heavy tide or current rips which lay in a 150–330° direction and were very pronounced. There were several parallel bands of alternating smooth and slight sea. The sea waves could be seen running in practically opposite directions on each side of the vessel. In the smooth water the ripples were moving westwards but in the rougher patches the waves were definitely breaking from the NW and running towards the SE. The wind was E'ly, force 2. The swell waves which had been very low all day became quite well defined and appeared to be moving rather slowly from

NE to SW. Difficulty was experienced with the steering of the vessel which was pushed off course by up to 6°. It was usual for the bow to swing to starboard as each smooth patch was entered. Earlier in the day the vessel had been in a very strong WNW'ly current, but later most of this current was lost. The echo-sounder gave a steady reading of 50 fm. No difference in the taste or colour of the water in the different patches could be discerned, neither was there any change in the sea temperature which remained at 83°F. Air temp. 88°.

Position of ship: 4° 34′N, 50° 20′W.

CALM PATCHES

Indian Ocean

m.v. *Glengarry*. Captain R. J. Paterson. Penang to Trincomalee. Observer, Mr. P. Wakeley, 4th Officer.

10th July 1967. At 1030 GMT a rough sea, running 235°, was interrupted by five successive bands of calm water each about half a mile wide and all parallel to one another. They were orientated in a 150–330° direction. There was no change in the wind which was SW'ly, force 4. It is perhaps possible that these were tide rips or currents of some sort as the mainland bore 150° × 30 miles from the ship at the time, and the coastline runs in an approximately SE'ly direction.

The calm bands were plainly seen on the radar and the dividing lines between the rough and calm seas were very clearly defined. The vessel was not set off course on meeting these changes in the sea surface. Sea temp. 86°F. W'ly swell with waves 5 ft high.

Position of ship: 6° 13′N, 94° 47′E.

Note. Dr. L. H. N. Cooper of the Marine Biological Association of the United Kingdom at Plymouth comments:

"m.v. *Glengarry* observed an internal wave breaking the surface of the sea, as explained by Dr E. C. LaFond in the January 1967 issue of *The Marine Observer*, pp. 10–11. In the Andaman Sea and Bay of Bengal the phenomenon is often seen. Sooner or later a research ship in this area will make a thorough study of it because there is much that is not understood. Such an investigation is not easy to plan because events are not predictable.

"*Glengarry*'s observation was made over the dissected sill which links Great Nicobar Island to Sumatra at a depth of 600–1000 fm. Even sills as deep as this may possibly force internal waves to surface. Ships which carry an echo-sounder could include the depth of water in their log or, even better, submit an annotated echo-sounding record to the Marine Branch. An estimate of wave-length is always of value.

"Masters need not feel that the law of diminishing returns yet applies to these observations of internal waves breaking surface. With many records available, scientists can look for the common factors and direct their work accordingly."

DISCOLOURED WATER

Western Pacific

m.v. *Turakina*. Captain R. B. Hood. Kobe to Guam. Observers, Mr. G. D. Goldsbrough, 3rd Officer and Mr. R. K. Young, 2nd Officer.

13th July 1967. Between 0330 and 0430 GMT the vessel passed through numerous bands of discoloured water lying along the wind in an 090–270° direction. The bands were bright yellow in colour and appeared to be comprised of much smaller organisms than previously seen.

Position of ship: 20° 37′N, 141° 21′E.

Gulf of Mexico

m.v. *Dalesman*. Captain I. Mitchell. Kingston (Jamaica) to Vera Cruz. Observer, Mr. N. Johnson, 2nd Officer.

15th August 1967. At 2100 GMT an area of discoloured water was observed. It

took the form of bands of dark, rusty-red water approximately 50 ft wide and stretching as far as the eye could see, lying in a 150–330° direction. The area was swarming with jellyfish. A sample of water was taken but no foreign matter found. Air temp. 83·8°F, sea 83·5°. Wind variable. Sky cloudless.

Position of ship: 21° 27′N, 90° 56′W.

South Pacific Ocean

m.v. *Crystal Sapphire.* Captain J. E. Leaver. Panama to Auckland. Observers, Mr. P. G. S. Dove, 2nd Officer, Mr. T. M. Tait, 3rd Officer and Mr. D. C. T. Amos, Navigating Apprentice.

8th September 1967. At 2115 GMT a large streak of vivid yellow-green discoloration was observed in the sea close to the ship. It was about 10 yd wide and extended as far as the eye could see in a SE–NW direction. It was thought at first to be rusty oil slops such as are discharged from a tanker or similar vessel. Shortly afterwards many more of these streaks of varying sizes were seen, which on closer inspection proved to consist of small particles grouped closely together, about 1–2 fm in depth, and having the appearance of some kind of marine growth. They continued to be seen until 2330. The sea temperature at 1800 was 67·3°F, rising to 71·8° by midnight. Wind SE'ly, force 3. Sea slight, but swell from SE, height about 8 ft.

Position of ship: 3° 15′S, 111° 30′W.

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

"From the most excellent colour photos alone I would say this was a *Trichodesmium* bloom but diatoms are also a possibility and one can only try to make an 'informed guess' without microscopic confirmation. The presence of extensive blooms far from land (as in the SE Trade area in the Atlantic) is always difficult to understand, as the oceanic surface waters are normally extremely poor in the nutrients needed for a rich growth of algae, such as must precede their aggregation into the characteristic 'wind-rows'. This is now believed to be a physical process due to 'micro-advection cells'—small-scale diverging currents set up within the surface layers by the prevailing meteorological conditions.

"A possible source of enrichment from below, about the line region of the eastern South Pacific, is the recently rediscovered sub-surface Cromwell Current, which may encroach upon the surface layers seasonally, wherever the prevailing wind slackens off markedly. The boundary of the equatorial (surface) current might also be involved, but we have little information as to how its position oscillates seasonally."

ICE

Hudson Strait

m.v. *Warkworth.* Captain K. B. Jewell. South Shields to Port Churchill.

22nd–26th July 1967. At 1345 GMT on the 22nd, the vessel was stopped 10 miles off Resolution Island awaiting entry into the Hudson Strait for the 'Ice Race'. A large field of pack-ice was sighted in Ungava Bay with limits across the entrance of the Strait to within 11 miles of Resolution Island. At 0500 on the 23rd dense fog set in and the vessel was manoeuvred with caution into the Strait. Many bergs and growlers were observed by radar. At 1119 the fog cleared and shortly afterwards a heavy concentration of ice was sighted and appeared to stretch along the length of the southern shore. At 1800 the vessel was skirting the edge of the main pack on the northern shore moving through loose ice abeam of Big Island. The ice gradually thickened and by 0100 on the 24th the vessel was stopped. Very severe refraction was noticed and thin ice formed on the ship. At 0835 passage was resumed but 4 hours later the vessel was stopped due to the thickness of the ice. Strong currents were causing the ice floes to move in an E–W direction, then reversing direction every 5–10 min. The currents were estimated to be approximately 3 kt. At 0148 on the 25th an ice-breaker joined the ship and a helicopter was launched for reconnaissance. After following the breaker at a distance of ¼ mile for an hour, engines were

put full astern to avoid collision with the breaker which had become stuck in heavy ice. Due to engine movements the ice was caused to move very quickly and the vessel was soon surrounded. It was obvious that without the ice-breaker the vessel would have been unable to carry on. One large piece of ice that was seen was ¾ mile long and 1 mile wide which seemed rather unusual for this time of year when the ice is breaking up. By 0500 on the 26th both vessels were clear of the heavy ice and proceeding through loose pack and 6 hours later were in clear water.

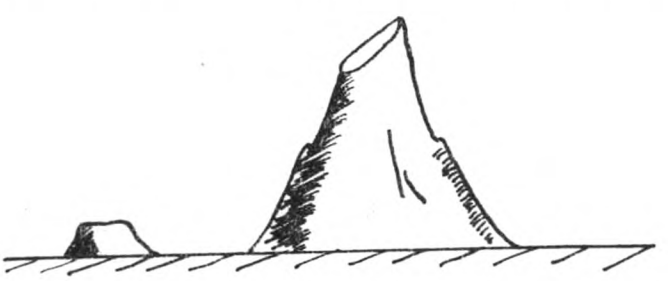
Position of ship at 0001 GMT on 24th: 62° 48′N, 71° 30′W.

ICEBERG

East of Belle Isle

R.M.S. *Sylvania*. Captain H. L. de Legh, R.D. Quebec to Cobh. Observers, Mr. G. Buckley, Sen. 1st Officer and Mr. J. R. D. Hall, Sen. 3rd Officer.

13th August 1967. A very large iceberg was observed at 1440 GMT at a distance of 18 miles and course was altered so as to pass 6 miles to the northward.



At 7 miles' distance, vertical sextant angles were taken and a height of approximately 250 ft was obtained. The berg was cone-shaped and had a large spur to windward (see sketch). Only the flat top was white; the sides appeared to be very heavily discoloured with brown streaks. Air temp. 55°F, wet bulb 53°, sea 48°. Wind NW, force 3.

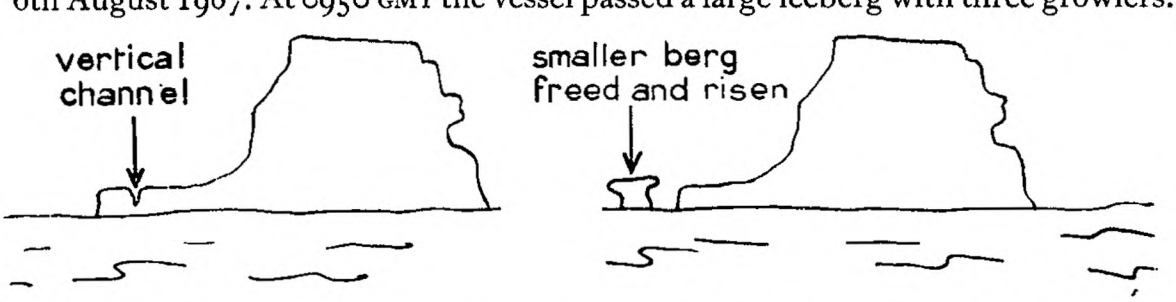
Position of ship: 52° 06′N, 51° 52′W.

ICEBERG CALVING

East of Belle Isle

m.v. *Edenmore*. Captain A. L. Wiles. Birkenhead to Seven Islands. Observers, the Master and Mr. A. C. Collop, Chief Officer.

6th August 1967. At 0950 GMT the vessel passed a large iceberg with three growlers.



From the main part of the berg a spur of ice, in which there was a V-shaped vertical channel, extended eastwards. This channel was seen to widen and a small section of ice broke away from the main berg. As soon as it was released from the underwater part of the berg it rose higher in the sea and became a new small berg in its own right. The general appearance is shown in the accompanying sketches. At 0600: Air temp. 53·7°F, sea 48·0°. Wind SW, force 4. Sea waves 3 ft high from SW. Swell from NE′N, 6–7 ft high.

Position of ship: 52° 25′N, 51° 59′W.

ALBATROSS

South Atlantic Ocean

m.v. *Hertford.* Captain P. Lay. Las Palmas to Durban. Observers, the Master, all deck officers and cadets.

10th July 1967. A large albatross was seen flying around the ship at midday. This is considered worthy of comment as no one on board had seen one of these birds so far north.

Position of ship: 15° 00′S, 2° 12′E.

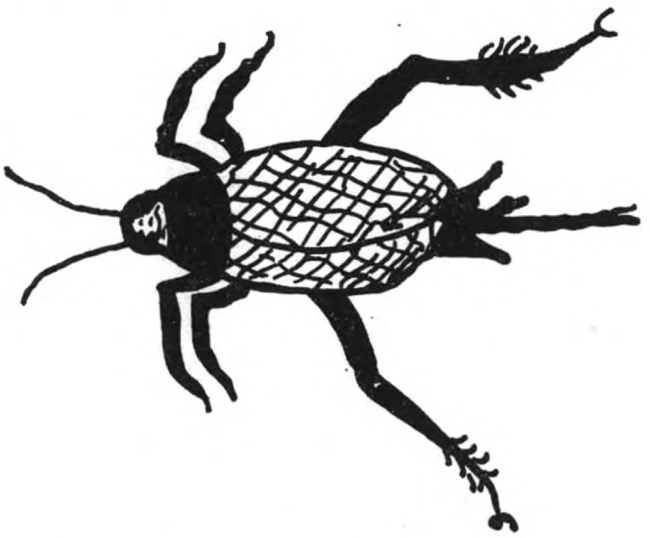
CRICKET

West African waters

m.v. *Westmorland.* Captain D. E. Moran. Adelaide to Las Palmas. Observers, the Master and Mr. A. Leachman, 3rd Officer.

30th September 1967. When we were 80 miles from the coast, at 1300 GMT, the rather large, black insect, shown life-size in the sketch, was seen hopping on the deck, rather in the manner of the common cricket. Unfortunately it was extensively damaged while attempting to preserve it. Wind ESE, force 3.

Position of ship: 17° 02′N, 17°42 ′W.



Note. Dr. D. R. Ragge of the Department of Entomology, Natural History Museum comments:

"From the drawing and description I think the insect must have been a cricket. It is impossible to be certain of the species but the most likely one is *Gryllus bimaculatus*, which is of the right size and colour and is common in Africa and southern Asia."

SQUID

West Indies

s.s. *Esso Exeter.* Captain E. W. Thomas. Aruba to New York. Observer, Mr. J. E. Bean, 2nd Officer.

3rd July 1967. During the hours of darkness a small squid landed on the starboard side of the poop deck. It was 4½ inches in length and the body was of a semi-transparent nature with dark spots along the sides. It had a fluted tail and large blue-black eyes. Allowing for the following sea and swell, the probable self-ejected distance from the water would be approximately 8 ft. Wind E'ly, force 4.

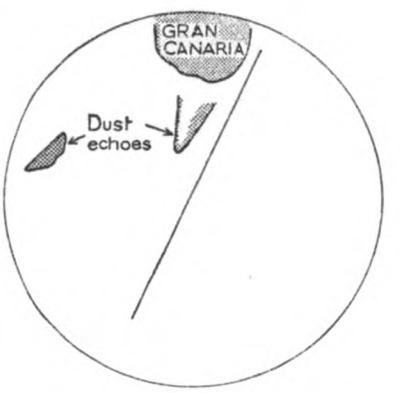
Position of ship at 1800 GMT: 19° 12′N, 68° 24′W.

RADAR ECHOES FROM DUST

Canary Isles

m.v. *Glenfalloch.* Captain P. H. Edwards. Dakar to London. Observer, Mr. E. N. Greenwood, 3rd Officer.

23rd–24th August 1967. At 2120 GMT faint radar echoes were picked up at a range of 32 miles. Later these became very strong and were thought to be Gran Canaria.



However the echoes turned out to be from some other source because land echoes came up clearly at a range of 40 miles. The false echo, which was presumed to be due to dust, was 20 miles long and V-shaped. A further, less strong echo was seen at 20 miles to the west. On approaching the echo area it became less distinct and finally vanished at a range of about 4 miles. Next day, deposits of fine brown soil or dust were found on the ship's structure. Wind NNE, force 6. Visibility 8–9 miles. No cloud.

Position of ship: 26° 57′N, 15° 44′W.

ANOMALOUS RADAR PROPAGATION

approaching Philadelphia

s.s. *Devon.* Captain J. D. Hellings. Montreal to Philadelphia. Observers, Mr. C. Francis, 3rd Officer and Mr. C. Hughes, Chief Radio Officer.

17th July 1967. When approaching Philadelphia (Delaware Pilot Station) at 0300 GMT an excellent target of the land was seen on the PPI at the extreme range of 50 miles, the lightship and other similar small targets showing up well at that range. On switching down to the 6-mile range scale, a perfect double echo of the land was observed which showed up only on this particular range.

Radar particulars: A.E.I. transistorized radar, Type 654.

Scanner height: 85 ft.
12 ft slotted wave-guide scanner.
Pulse-length on 12, 24 and 48-mile ranges: 1μ sec.
Pulse-length on 6-mile range: 0·25μ sec.
Peak power output: 20 kW.
p.r.f.: 2000 pulse/sec on 6 miles, 1000 pulse/sec on 48 miles.

Wind SSW, force 5. Frequent rain showers. Air temp. 70·8°F, wet bulb 70·4°, sea 67°.

Note. Mr David Deacon, Radio Advisory Service of the Chamber of Shipping of the United Kingdom, comments:

"This is an interesting and valuable report as it contains all the information needed to draw a firm conclusion on the cause and effects of the phenomena. Quite clearly anomalous propagation (super-refraction) was present, especially with the lightship returning a radar echo from 50 miles.

"The height of scanner, 85 ft, and the height of the lantern on the lightship, 65 ft, together

(150 ft) give a radar horizon range of only 12 miles under normal atmospheric conditions. (*The Use of Radar at Sea*, Appendix IV.)

"The appearance of these long-range targets on the 6-mile range scale is attributable to what is known as 'second-trace' echoes (ibid., Chapter 7 and Table V).

"The radar pulse repetition frequency (p.r.f.) is useful in determining the range at which second-trace echoes commence. When super-refraction is present and echoes are being returned from extremely long ranges, or when a particularly high p.r.f. is in use, it is perfectly feasible for echoes to be displayed as second-trace and in exceptions as third- or even multiple-trace echoes.

The following table, therefore, may be of general interest in this connection.

RANGES (MILES) AT WHICH MULTIPLE-TRACE ECHOES COMMENCE

p.r.f.	SECOND-TRACE	THIRD-TRACE	FOURTH-TRACE
250	324	648	1296
500	162	324	648
750	108	216	432
1000	81	162	324
1200	68	136	272
1500	54	108	216
1800	45	90	180
2000	40	80	160
2400	34	68	136
6000	13·6	27·2	54·4

"Thus on the A.E.I. Type 654 radar in this instance, with a nominal p.r.f. of 2000, in use on a range scale of 6 miles, the second trace would show on the display echoes between 40 and 46 miles true range. This immediately raises the question, how then can one see an echo at 50 miles?

"Here again it should be obvious that if the true range of the echo was 50 miles, then the p.r.f. on the 6-mile range scale from the above table is more certain to have been about 1800 pulses per second, in which case the second trace would be capable of displaying echoes between 45 and 51 miles.

"From the above explanation it will be clear that the presence of second- or multiple-trace echoes could be positively established if it were possible to vary the p.r.f. by some small amount, say 10% of the nominal. Reducing the p.r.f. would decrease their indicated range and vice-versa. This would in no way affect the true range of echoes on the first or primary scan."

LUMINESCENCE

South Atlantic Ocean

m.v. *Achilles*. Captain R. C. Riseley. Durban to Las Palmas. Observer, Mr. C. M. Poynter, 3rd Officer.

2nd July 1967. At 2100 GMT occasional blobs of luminescence were observed in the ship's wake. These gradually increased and were observed ahead of the vessel. As they passed into the bow wave they exploded into blobs approx. 2 ft in diameter and brilliant-green in colour. By 2215 large streaks were observed in a NW to SE'ly direction all around the horizon, while the ship's wake was a solid mass of brilliant-green sufficient to cast a green glow on the ship's white paintwork. During this time the Aldis was shone over the surface of the sea and numerous red and orange specks could be seen. There were also green objects approximately 6 inches long which darted about and apparently cleared the water at times. At 2225 a white haze appeared round the horizon. This was at first thought to be a fog bank about 2–3 miles ahead of the vessel as the surrounding sea was now a solid dull green. At 2235 the luminescence began to break up into streaks and the haze and clouds started to disperse. Wind SE'E, force 5. Air temp. 72·8°F, sea 75·8°.

Position of ship: 7° 52'S, 4° 33'W.

m.v. *Gloucestershire*. Captain A. E. Young. Cape Town to Las Palmas. Observers, Mr. K. McLeod, 2nd Officer and Mr. R. R. Baker, Cadet.

18th July 1967. At 0230 GMT the vessel entered an area in which there were very large amounts of green luminescence in the form of long streaks lying in a 310–130° direction. On closer observation these were seen to be patches of milky-white water dotted with scores of small, brilliant-green marine objects.

While using the Aldis lamp to inspect the streaks more closely, the beam showed up vast quantities of what appeared to be dust suspended in the atmosphere. This lasted for 2½ hours. Air temp. 72°F, sea 71°. Wind SE'S, force 2, Course 323° at 17½ kt.

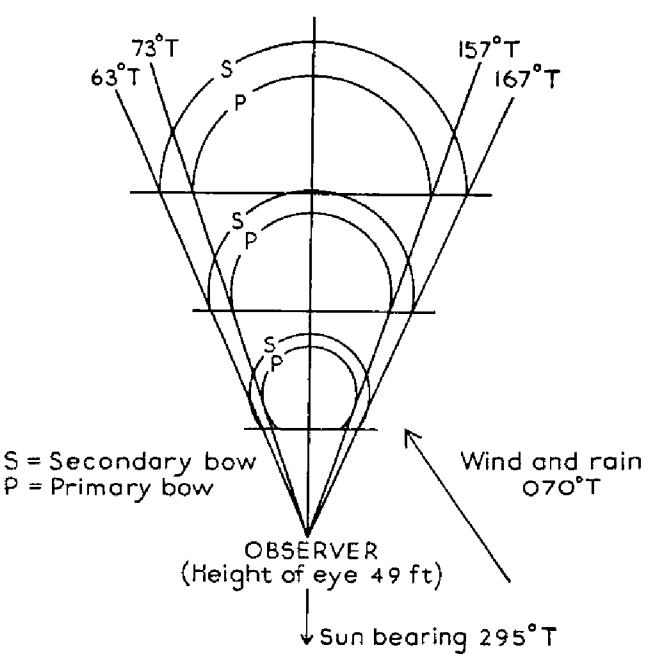
Position of ship: 6° 20'S, 3° 18'W.

RAINBOWS

South Indian Ocean

m.v. *Port Vindex*. Captain A. J. Hawkins. Durban to Adelaide. Observer, Mr. C. G. W. Hunter, 3rd Officer.

14th August 1967. When a shower of rain, moving towards the ENE, passed over the vessel at 0943 GMT primary and secondary rainbows were seen, both very bright, the secondary being somewhat weaker. At first, when the rain was at the ship, the primary bow was almost a complete circle, each end of the bow finishing at sea-level only a few feet from the ship's sides. As the shower moved ahead the two bows became brighter and progressively larger, taking on a semicircular appearance, until they disappeared at 0950.



Measurements taken showed that the angles subtended by both bows at the observer's eye (49 ft above the sea) remained unchanged as they increased in distance from the ship (see sketch). Air temp. 58°F, wet bulb 57°. Wind WSW, force 6.

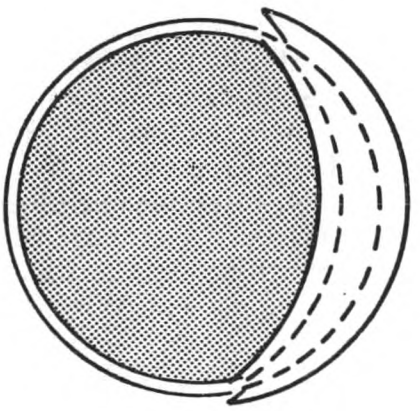
Position of ship: 33° 47'S, 101° 25'E.

DOUBLE CRESCENT MOON

off Cap Blanc

m.v. *Gothland*. Captain J. M. Laing. Monrovia to Glasgow. Observers, the Master and Mr. P. C. Mackay, 3rd Officer.

10th August 1967. At 2130 GMT the moon was observed to have a double image.



It had two separate and distinct crescents superimposed upon each other. Due to the presence of a narrow ring of light round the circumference, the entire circle of the moon was also visible although it was only in its 3rd day. The sky was completely cloudless apart from a few scattered patches of Cumulus fractus. Air temp. 72°F, sea 72°. Wind N'E, force 5.

Position of ship: 21° 17'N, 17° 41'W.

Note. Observations of double crescents have been reported from time to time in *The Marine Observer*. The phenomenon is an interesting one and is due to discontinuities of temperature and therefore of the densities of the air, which cause the rays of light from the moon to reach the observer's eye from different angles.

EXCEPTIONAL VHF RECEPTION

off S.W. Australia

m.v. *Devon City*. Captain D. L. G. Jones. Geraldton to Fremantle. Observers, the Master, Mr. J. Cann, Chief Officer and Mr. J. J. Kalnins, 2nd Officer.

20th September 1967. On leaving Geraldton at 0800 GMT, VHF contact was established with Fremantle Port Radio. At this time the vessel was approximately 210 n. miles north of the latter, well outside normal VHF range. Reception at both ends was loud and clear and free from interference or distortion. These conditions lasted for some time. At 1100, m.v. *Centaur* was spoken to at normal range and the message was intercepted by Fremantle who re-established contact with this vessel also well outside normal range. The radio used was a Marconi Argonaut. Air temp. 67·1°F, wet bulb 67°. Bar. 1017·8 mb. No cloud.

Position of ship: 29° 30'S, 114° 36'E.

AURORA

The following notes have been received from Mrs. Mary Hallissey of the Aurora Survey:

"Below are listed briefly the auroral observations for July–September 1967 as well as some for earlier dates but only recently received. From the Balfour Stewart Auroral Laboratory of the University of Edinburgh we once more send our thanks to the Meteorological Office for their help in furthering our cause with observers in ships regularly using routes at higher latitudes, and to all involved in such careful recording of the data. Sketches are very welcome—even if they cannot always have the delightful touch of those adorning the report from *Weather Surveyor*'s observers for 3rd September.

"Auroral activity still continued at a low level although the September chart showed an equinoctial increase, so that the mean geomagnetic figure for the month was twice as high as that for July or August.

"The highest figures of geomagnetic activity were in the period 19th–21st September, when observers in ships near the Newfoundland coast reported vivid auroral displays.

"We are grateful to the officer on watch in m.v. *Logna* for managing to record aurora while carrying out navigational duties in fjords (13th–14th September) and to the observer who provided a very detailed report of the brilliant display on 28th–29th September—an active

period which continued to the end of the month, when observers in m.v. *Redcar* reported an impressive display on the other side of the Atlantic.

"The observing season for noctilucent clouds is again approaching. These clouds are sometimes confused with high cirrus but are known to be situated at altitudes of about 50 miles, their characteristic billows, whirls and veils remaining sunlit long after sunset. Please note any possible sightings of these clouds so that their behaviour and extent may be charted. It is important to us to know the elevations and azimuths of the boundary of the portion of the sky containing such cloud."

Date	Ship	Geographic Position	Λ	Φ	I	Time (GMT)	Forms
1966							
24th Aug.	H.M.S. *Vidal*	50°03′N 53°03′W	020	61	+74	0050	HA
3rd Sept.	H.M.S. *Vidal*	58°00′N 34°00′W	050	67	+75	2245	RR
1967							
11th Feb.	*Weather Monitor*	59°03′N 19°24′W	070	65	+72	0545–0610	RR, N
1st Apr.	*Volo*	57°30′N 07°00′E	090	59	+71	1900–2300	HA, N
25th May	*Apollo*	English Channel	080	54	+65	2345–2400	RR
26th July	*Weather Reporter*	62°06′N 33°40′W	060	70	+76	0220–0225	RB
11th Aug.	*Weather Adviser*	59°04′N 19°16′W	070	65	+72	0050–0245	RB, N
12th	*Weather Adviser*	59°02′N 19°06′W	070	65	+72	0115–0235	N
14th	*Cape Howe*	52°08′N 52°45′W	020	63	+75	0120–0605	RR, N
	Dukesgarth	50°06′N 66°11′W	010	62	+76	0400	HA
15th	*Weather Adviser*	58°50′N 18°32′W	070	65	+72	2330–0200	N
17th	*Weather Monitor*	58°48′N 18°27′W	070	65	+72	0155–0230	HB
	Weather Surveyor	61°43′N 32°36′W	060	70	+76	0300–0400	HB, P
18th	*Weather Monitor*	58°54′N 19°04′W	070	65	+72	0120–0340	HA, RA, RR, P
	Weather Adviser	55°20′N 05°20′W	080	59	+70	0300	N
27th	*Weather Surveyor*	61°36′N 32°30′W	060	70	+76	0245–0300	RB
1st Sept.	*Weather Surveyor*	61°50′N 32°58′W	060	70	+76	2330–2355	HB, R, P
3rd	*Weather Surveyor*	61°47′N 33°15′W	060	70	+76	0215–0440	HB, HA, RR, N
9th	*Weather Adviser*	52°33′N 20°04′W	060	59	+69	0355–0445	RR
13th	*Sylvania*	52°35′N 51°44′W	020	63	+74	0600	RB
	Logna	63°39′N 10°44′E	100	63	+74	2108–0140	All forms
19th	*Longstone*	51°56′N 52°15′W	020	63	+75	0001–0012	RB, R
20th	*Sylvania*	Belle Isle Str.	020	63	+75	2300–0800	All forms
21st	*Scotia*	46°30′N 52°30′W	020	58	+73	0300–0430	HA, RA, RB, P
28th	*Logna*	61°53′N 03°52′E	090	63	+74	1915–0215	All forms
30th	*Redcar*	52°36′N 52°45′W	020	63	+75	0525–0815	HA, RB

Key: Λ = geomagnetic longitude; Φ = geomagnetic latitude; I = inclination; HA = homogeneous arc; HB = homogeneous band; RA = rayed arc; RB = rayed band; R(R) = ray(s); P = patch; V = veil; N = unidentified auroral form.

551.574.42:629.124.72

Icing on Fishing Vessels due to Spray

By Dr. Hans Otto Mertins
(Marine Weather Section, German Weather Service)

Note. This article was written before the tragic loss of the trawlers *Ross Cleveland* and *Kingston Peridot* off the Icelandic coast and the *Romulus*, probably in the North Sea.

Disasters at sea can be caused not only by severe storms, collisions due to fog, stranding and fires, but also by heavy icing on a ship's superstructure which can be very dangerous and has already led to the capsizing of many vessels. We know that in earlier times sailing ships rounding Cape Horn in the cold part of the year became iced up aloft during heavy weather, making it difficult for the seamen to furl the sails. As a result there were cases when such ships lost so much stability due to this heavy icing that they capsized and were lost with all hands. Norwegian sealers have told me that whaling boats and seal catchers were sometimes lost in Arctic waters because of icing.

Before World War I and up till about 1930 relatively small, low-powered steam trawlers fished mainly in the North Sea and in the fishing grounds off Iceland and the Lofoten Islands which are off the Norwegian coast and are washed by the Norwegian Atlantic Current.

During a storm these trawlers used to run for shelter along the coast and only put out to sea to start fishing again after the storm was over. On the other hand, trawlers operating in the Barents Sea have always been exposed to icing, and many trawlers missing in that region must have been lost because of heavy icing. When a ship becomes unstable because of icing she often capsizes too quickly to leave any survivors who could report on the catastrophe.

After 1930 trawlers kept getting bigger and more powerful so the danger of icing disasters decreased but, more recently, large modern fishing vessels have been operating in Arctic fishing grounds in the region of cold water masses of polar origin, e.g. in the Denmark Strait, the Davis Strait, off the coasts of Greenland and Labrador, often near large land masses which are greatly cooled in winter. When these large, modern vessels and, to an increasing extent, stern trawlers, visit these new fishing grounds, they are exposed to much danger from icing during intrusions of freezing polar air in storms over the cold sea water. The problem of icing on ships has thus increased in importance recently and we have seen in the last few years that icing has led to disasters at sea involving trawlers.

On 26th January 1955 the English trawlers *Lorella* and *Roderigo* overturned north-east of the North Cape of Iceland in freezing conditions during a storm in which 40 men died.[1,2]

On 8th February 1959 the Icelandic steam trawler *Juli* was lost with her entire crew on the Newfoundland Banks because of icing. At the same time a Canadian fishing vessel was lost off Newfoundland. The Icelandic steam trawler *Thorkell Mani* was within a hair's breadth of capsizing, and a number of other trawlers, including several German ones, struggled against the storm, drifting ice and, above all, heavy icing on board.

There are two types of icing. Much the most frequent form is icing due to spray (sea-water icing). In strong or gale-force winds the ship takes on water, and the spray coming over freezes on the ship's superstructure if the air temperature is lower than the freezing-point of sea water. The freezing-point of sea water in the North Atlantic fishing grounds, where the salt content is 30–35‰, is −1·9°C. The greater the wind speed and the lower the air and water temperatures, the greater the icing due to spray. Severe storms and especially low air and water temperatures produce severe icing. The second, much rarer type of icing is fresh-water icing, 'black frost'. It occurs in Arctic frost-smoke and can likewise be dangerous.[3]

In this article only icing due to spray will be discussed.

Since the loss of the trawlers *Lorella* and *Roderigo* I have collected information

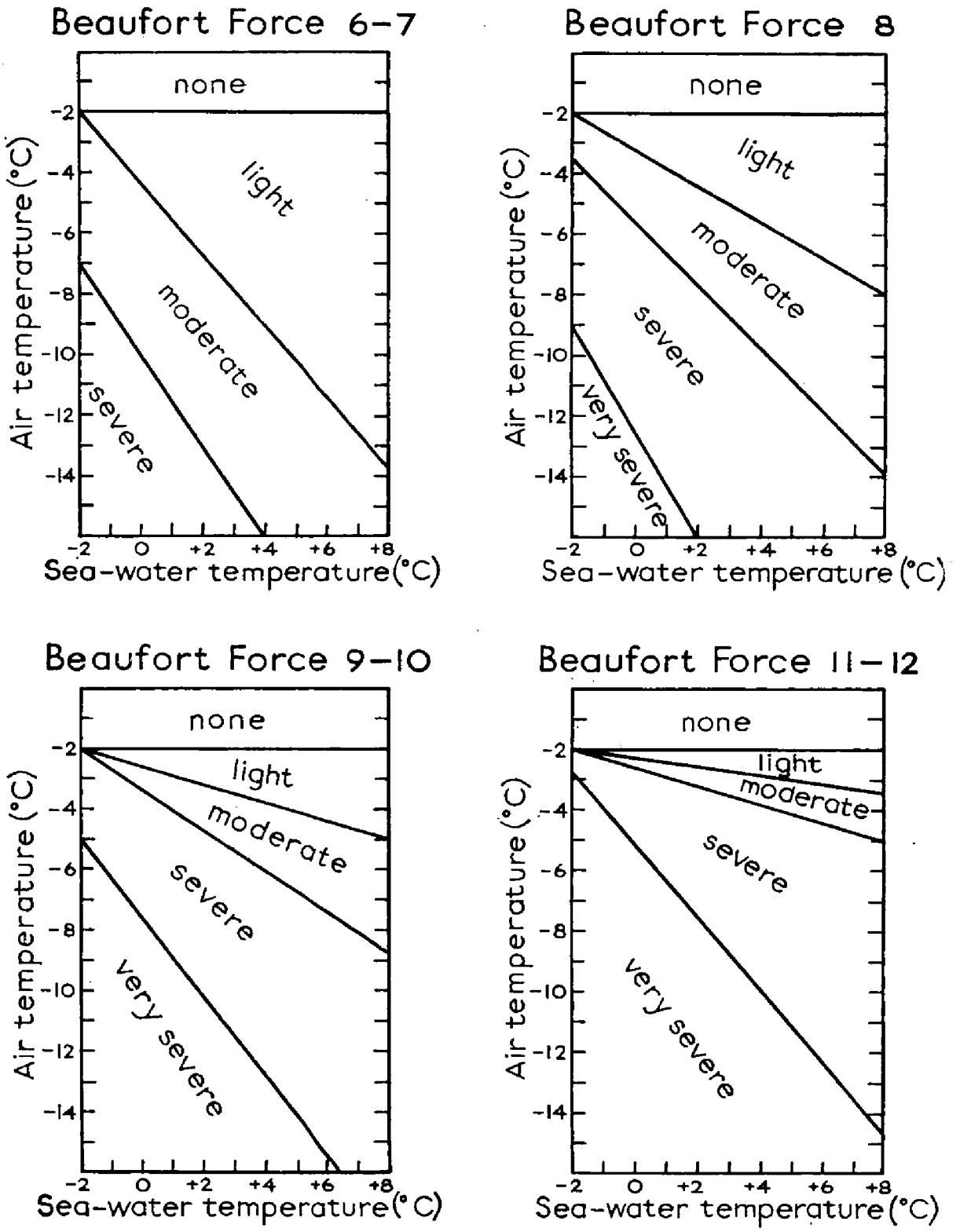


Fig. 1. Icing on fishing vessels at low speeds in winds of Beaufort force 6-12.

on all the occurrences of icing I could find. When I was serving as meteorologist on board the German fishing protection boats *Meerkatze* and *Poseidon* and on the fishing research ship *Anton Dohrn* I obtained icing observations from German and English trawlers. For 10 years the Marine Weather Section in Hamburg has distributed forms for recording icing observations to German ships operating in areas in which icing on ships can occur. Altogether I have now available about 400 observations of icing due to spray, mostly from the sea areas around Iceland, Greenland and Labrador and the Barents Sea, but some from the Baltic Sea.

The amount of icing due to spray depends on a whole series of factors. The most important are air temperature, water temperature and wind force and sea disturbance which, in turn, is closely related to wind force. The colder the air and water and the greater the wind force and thus the sea disturbance, the greater the icing due to spray. In high wind speeds and big seas a ship takes aboard a lot of spray, part of which freezes on the deck; snowfalls can lead to even greater icing. Finally, the speed of the ship and the inclination of her course to the prevailing wind direction play their part. Other hydrographical and meteorological conditions being equal, a ship running with the wind in freezing conditions will be iced up much less than one steaming at full speed against it. Finally, the construction of the ship and the duration of icing play their part. Nor can the salt content of the sea be neglected. In the relatively fresh water of the Baltic Sea, water freezes only just below 0°C, compared with $-1{\cdot}9$°C in the Atlantic.

The most important regions for icing in the Atlantic occur where, as already stated, the water has a freezing point of $-1{\cdot}9$°C. Irrespective of the design of the ship (some ships are so designed that they take little water aboard in storm conditions while others take on a lot), the extent of icing due to spray can be seen in its relationship to wind force, air and sea-water temperature and the speed at which the vessel is moving relative to wind and sea. There are only a few observations for trawlers moving at speed. For trawlers moving at low speeds, the observational material was sufficient for the construction of the accompanying icing diagrams.

In these diagrams the degree of icing can be read off in its relationship to wind force, air temperature and sea-water temperature. For example, heavy icing is to be expected on a trawler in Atlantic waters when the wind is Beaufort force 9 or 10, the air temperature -8°C and the sea-water temperature $+4$°C, i.e. an ice deposit of about 7–14 cm/24 hours on the bows and superstructure (see the Degree of Icing under Fig. 1). A vessel operating in the Baltic Sea in similar conditions will be iced even more than shown in the diagram, because of the low salt content of the water of the Baltic.

Using these icing diagrams the Marine Weather Section in Hamburg have prepared forecasts of icing on ships for its sea weather bulletins, especially for the fishing grounds off the Norwegian coast and off Iceland, Greenland and Labrador.

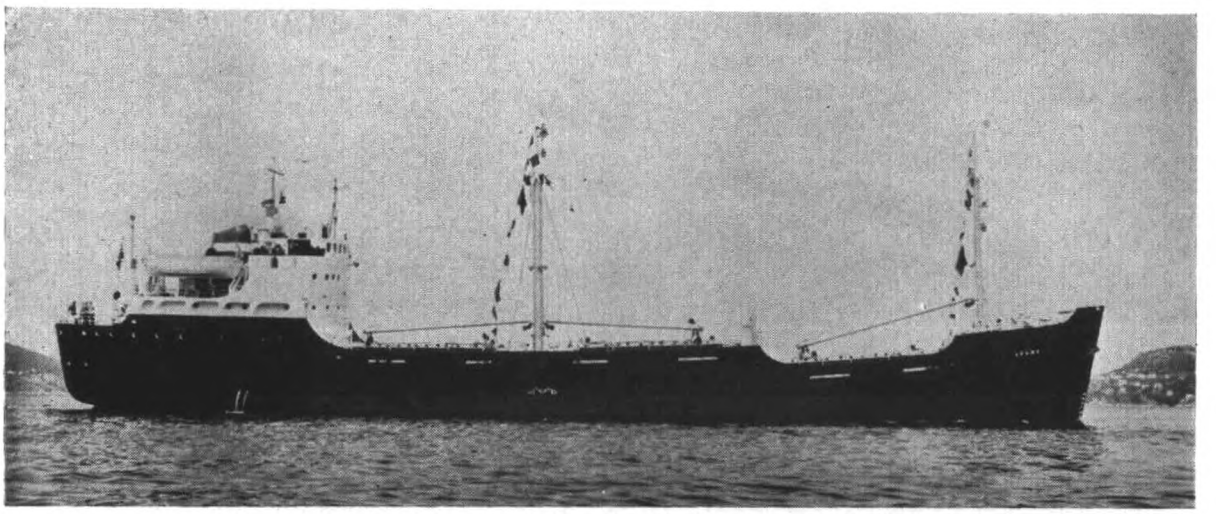
These icing diagrams make it possible even for meteorologists with little experience at sea to attempt a forecast of the extent of icing due to spray to be expected, after estimating the wind force and air temperature anticipated in the sea area and using the existing sea-water temperature.

I have access to many weather and icing observations, and both oral and written descriptions of these dangerous icing situations, from German steam trawler captains. One of the most severe situations for icing on ships in the last 10 years, on the 7th–11th February 1959 on the Labrador coast and the Newfoundland Banks, will be the subject of a later article.

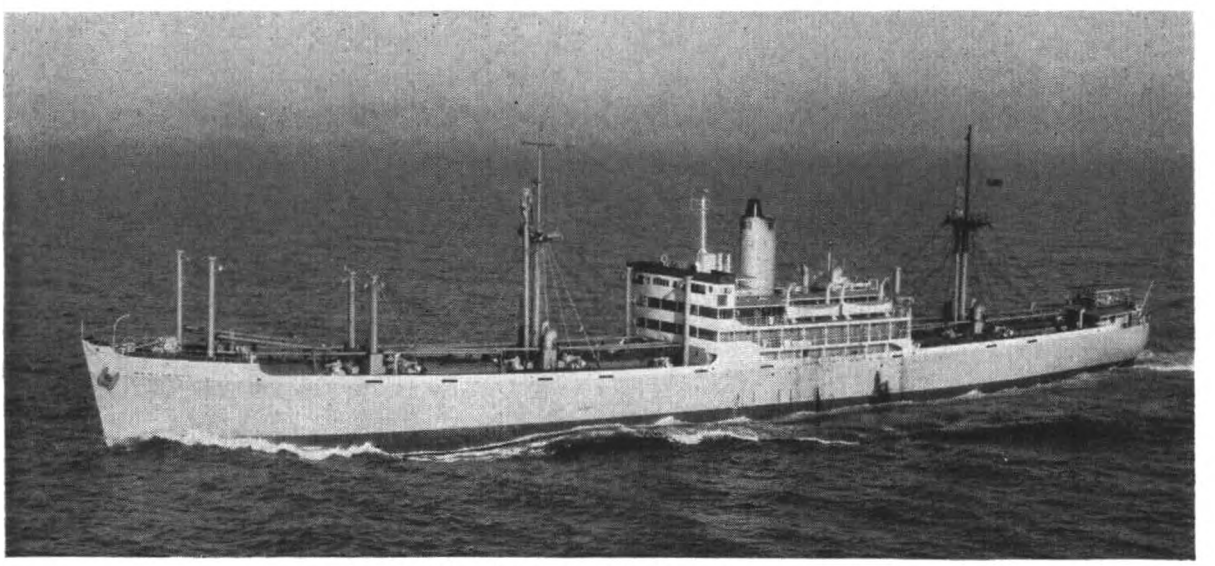
REFERENCES

1. HAY, R. F. M. Meteorological aspects of the loss of *Lorella* and *Roderigo*. *Mar. Obsr., London*, **26**, No. 172, 1956, pp. 89–94.
2. RODEWALD, M. The end of *Roderigo* and *Lorella*. *Wetterlotse*, Hamburg, No. 84/85, March 1955, pp. 56–66.
3. MERTINS, H. O. On icing on steam trawlers in the Denmark Strait. *Seewart*, Hamburg, Band 19, Heft 1, February 1958, pp. 19–26.

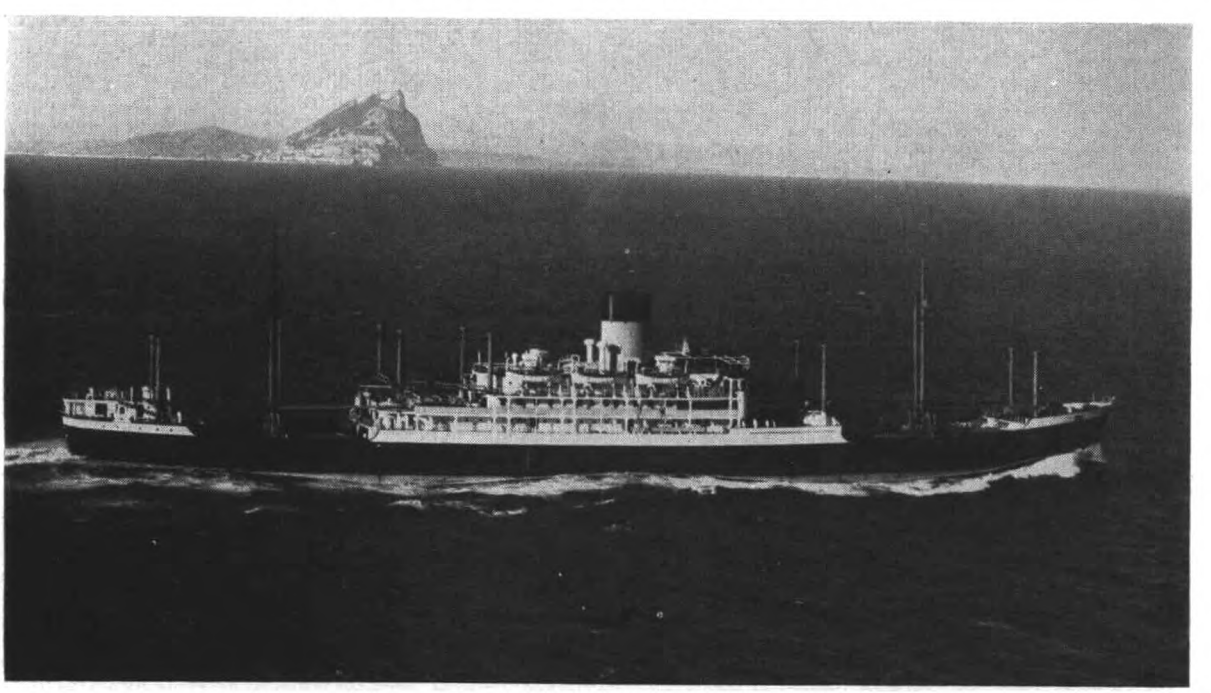
(*Opposite page* 130)



Logna (Chr. Salvesen & Co. Ltd.), Captain D. I. Polson.

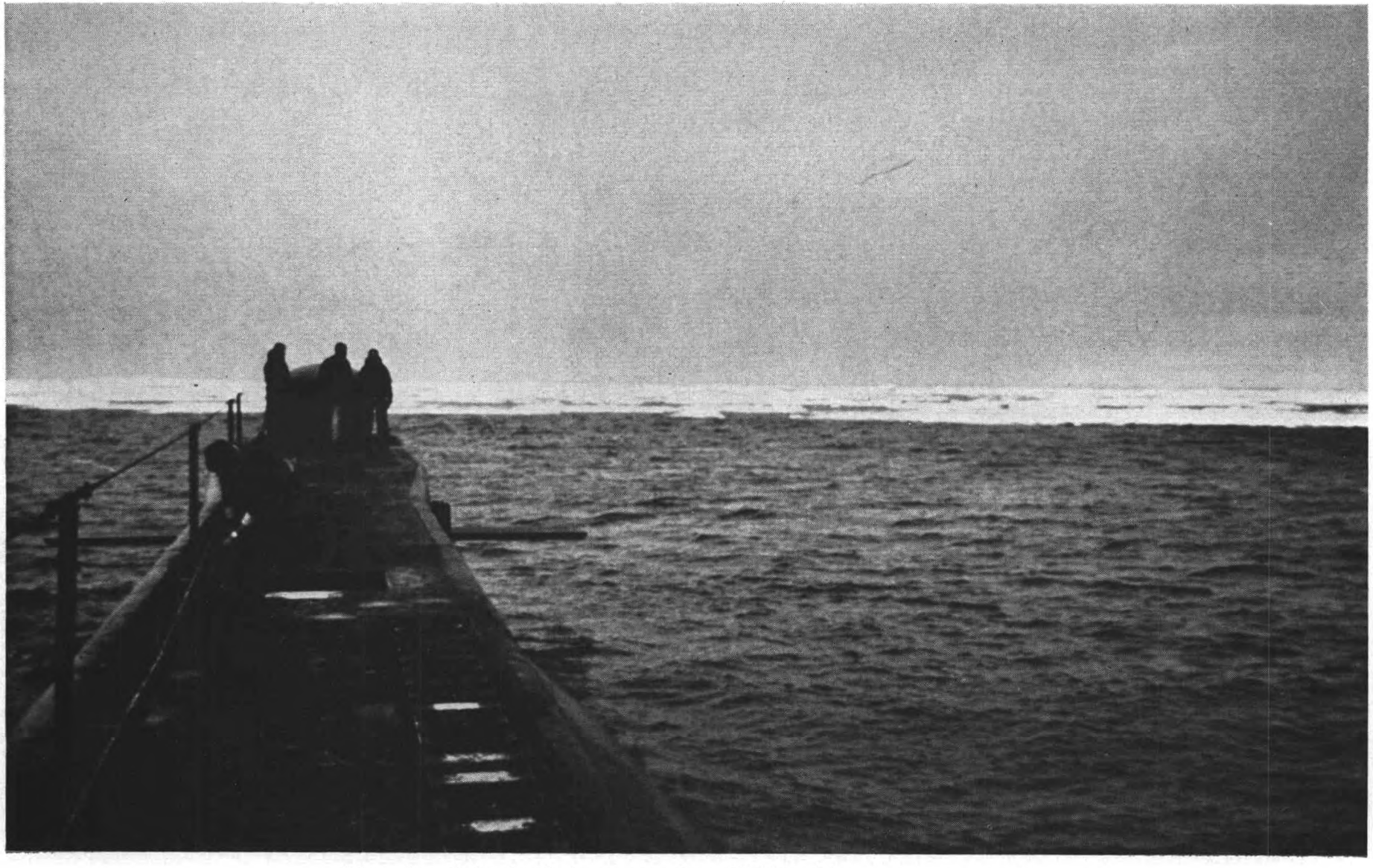


Bencleuch (Ben Line Ltd.), Captain A. D. Hay.



Perseus (Ocean Fleets Ltd.), Captain D. D. McIntosh.

THE THREE SHIPS WHICH GAINED THE HIGHEST MARKINGS FOR THEIR METEOROLOGICAL LOGBOOKS DURING THE YEAR ENDED 31st MARCH 1968 (*see* page 108).



The edge of the Arctic ice as seen from H.M.S. *Olympus* (*see* page 131).

Arctic ice: mainly snow-covered multi-year ice. New ice is forming on the polynyas and leads
(*see* page 131).

(*Opposite page* 131)

A closer view of the multi-year ice showing grounded hummocks and rotten ice, with new ice on the open water (*see* page 131).

551.5:551.46:629.127

A Voyage to the Arctic by Submarine

By Instr.-Lt. R. F. Lovett, B.Sc., R.N.

Last year I was fortunate enough to be chosen to go with H.M. Submarine *Olympus* on a voyage to the Arctic ice. H.M.S. *Olympus*, a conventional submarine with a crew of about 60 officers and men, is an Oberon or 'O' class submarine of 2,240 tons displacement submerged and was completed in 1962. In this age of nuclear power conventional submarines still play a vital role and the 'O' Boats are, in fact, probably the most advanced conventional submarines in the world, with a formidable performance.

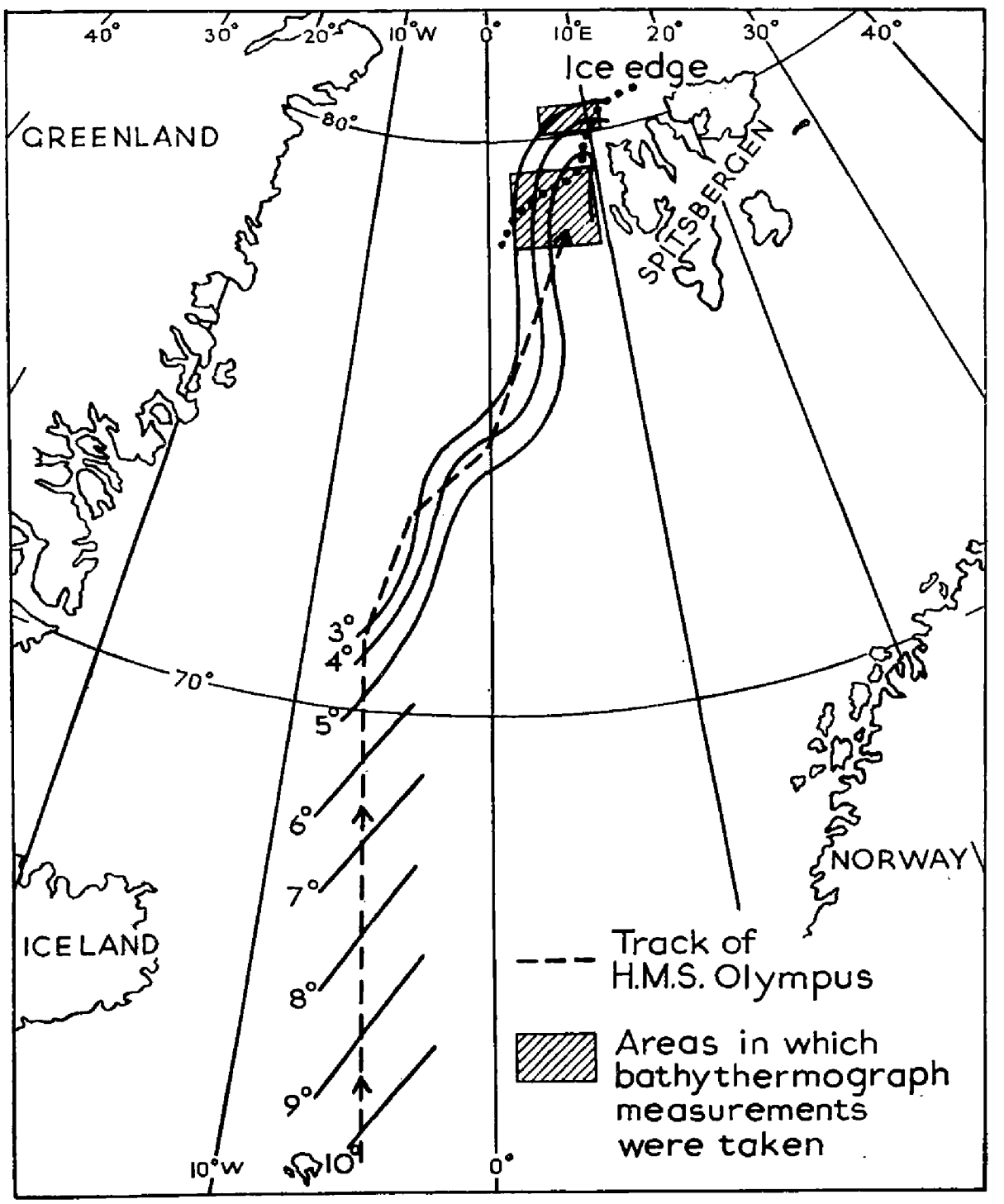


Fig. 1. Track of H.M.S. *Olympus* and approximate isotherms drawn from sea-surface temperature measurements taken en route.

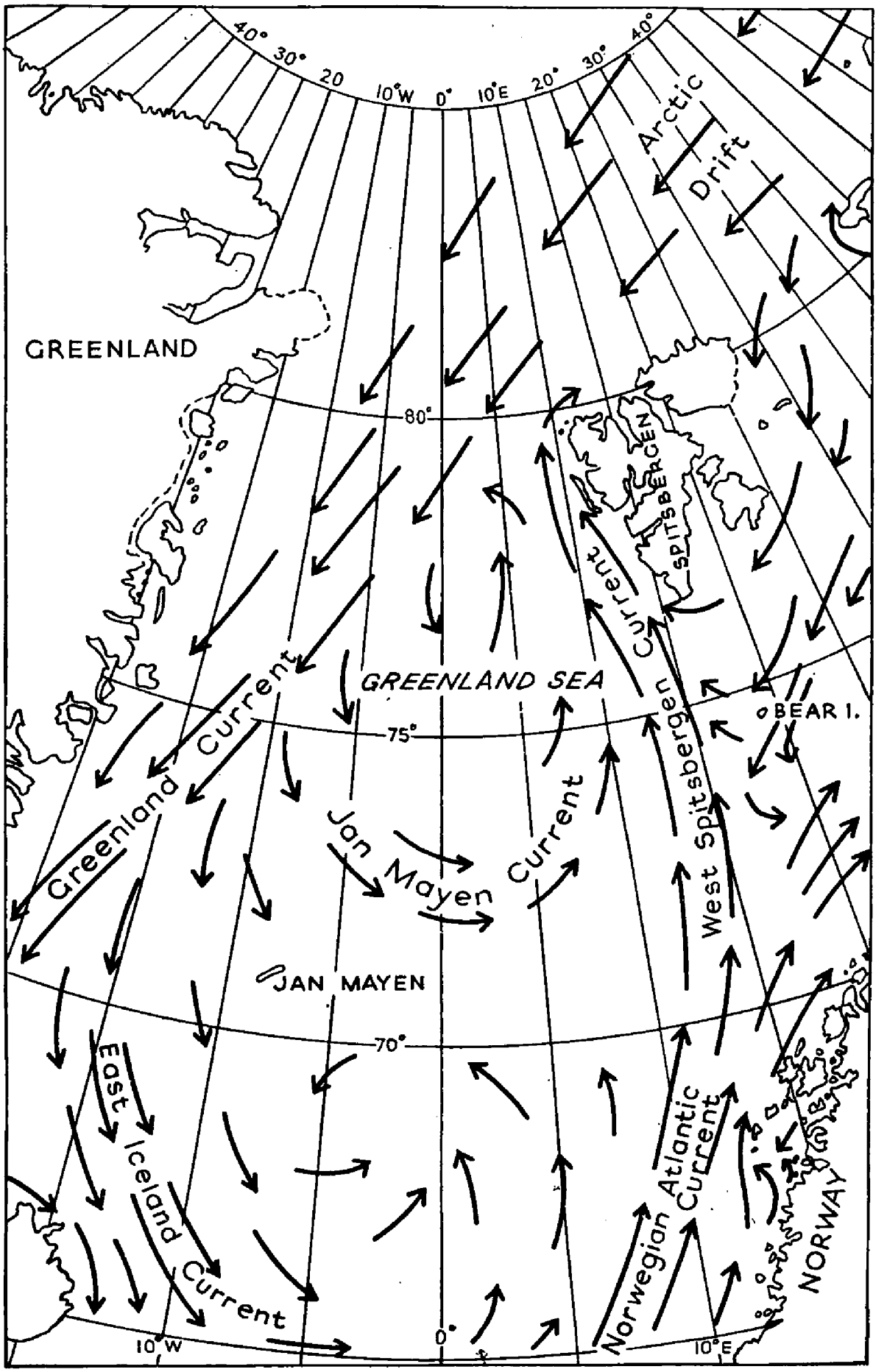


Fig. 2. Sea-surface currents in the Greenland Sea.

The primary purpose of the exercise was to give submariners experience of operating near and under the Arctic ice and also of testing equipment under these arduous conditions but, as a meteorologist, my task was to be the collection of meteorological and oceanographic data, mainly on an opportunity basis. The exercise was of approximately two weeks' duration, one week in transit from Faslane to the ice and one week near the close pack-ice. We were actually at sea for about three weeks, the remaining week being on passage to the northern Norwegian port of Harstad.

We left the Scottish base, Faslane near Helensburgh, on 12th August and sailed towards our destination, the ice edge to the north-west of Spitsbergen. Our route, which took us close to the east coast of Jan Mayen Island, is shown on Fig. 1.

The meteorological instruments which we carried were a hand anemometer, aspirated pyschrometer and a precision aneroid barometer. In addition we had a sea-surface temperature bucket and an electrical temperature bridge mounted on the forward casing for obtaining bathythermograph measurements. I am indebted to the Coxswain for providing me with a home-made Secchi disc (for measuring transparency of sea water) to complete the list of instruments, but unfortunately this could only be used on three occasions.

I was soon able to start taking weather observations but this proved to be more difficult than it appeared at first sight. In a relatively calm sea and wearing a life-jacket I was allowed on to the submarine casing, but this was impossible with more than a slight swell running and consequently I had to take all observations from the bridge on top of the fin. This involved taking the instruments up a 20-foot ladder and using them in the confined space on the bridge which was designed to take two people. It was actually possible to take sea-surface temperatures from the bridge by using the rubber bucket suspended in the water by a length of cod-line. This was fairly easy if the sea was sufficiently disturbed so that water continuously washed over the side of the submarine, but was otherwise difficult. One thermometer was broken while attempting to get the bucket into the water when the sea was calm but, wherever possible, the sea-temperature and weather observations were taken from the casing in such conditions. It was only possible to use the Secchi disc on three occasions, mainly because it was necessary for the submarine to be completely stopped. It was possible to judge the colour of the disc at the recommended depth of half the maximum visible depth.

However, the primary interest was in sub-surface conditions and the nature of the bathythermograph traces. These were taken on every possible occasion, usually when the submarine dived to more than 300 feet. Altogether more than 15 traces were obtained, a third of these being on passage across the Greenland Sea along the track shown in Fig. 1.

The Greenland Sea is of considerable interest oceanographically because it is the region of the main inflow of water into the Arctic Ocean and also of the main outflow. The chief part of the circulation is formed by the north-flowing West Spitsbergen Current and the south-flowing East Greenland Current (see Fig. 2). Two surprising results emerged from the bathythermograph traces. Firstly it was found that in transit across the Greenland Sea big changes in thermocline occurred within relatively small areas. Secondly the presence of comparatively warm water both on the surface and below the surface was discovered at high latitudes well to the north of the ice edge.

Unfortunately, owing to the submarine's very full programme, we were unable to devote as much time as we would have liked to oceanographic work. Thus the information we collected is of a rather scant nature. However, the bathythermographs did tend to confirm the importance of ocean currents in the oceanography of the Greenland Sea. This is not to say that insolation does not have an effect, but probably on the warm north-flowing West Spitsbergen Current it is only marginal. In any case the maximum theoretical insolation is very small. The elevation of the sun

is never very great in the Greenland Sea area and it is one of the cloudiest regions in the world.

The few sea-surface temperatures that were observed gave no guide to the layer depth or magnitude of the thermocline. Whilst the West Spitsbergen Current was indicated reasonably well by the general form of the sea-surface isotherms these gave no indication of the extent to which the cold south-flowing water was undercutting the warmer water.

Bathythermograph measurements taken 60 miles east of the Faeroes and a further 150 miles to the north show the first phenomenon clearly. The first has a comparatively small thermocline from the surface to 300 feet with a gradual fall of 2 degc; the actual water temperature below the gradient was 8°c (A of Fig. 3). The second has a large thermocline with a fall of approximately 6 degc from 80 to 150 feet (B of Fig. 3). This change in temperature structure with increasing latitude is probably due to the presence of cold water from the East Iceland Current. A series of bathythermograph readings taken from 40 miles east of Jan Mayen to a position 400 miles to the north-north-east similarly showed very cold water below the thermocline with temperatures between 0° and 1·5°c. The lowest recorded was actually −1·7°c at 100 feet at 73°N, 3°W.

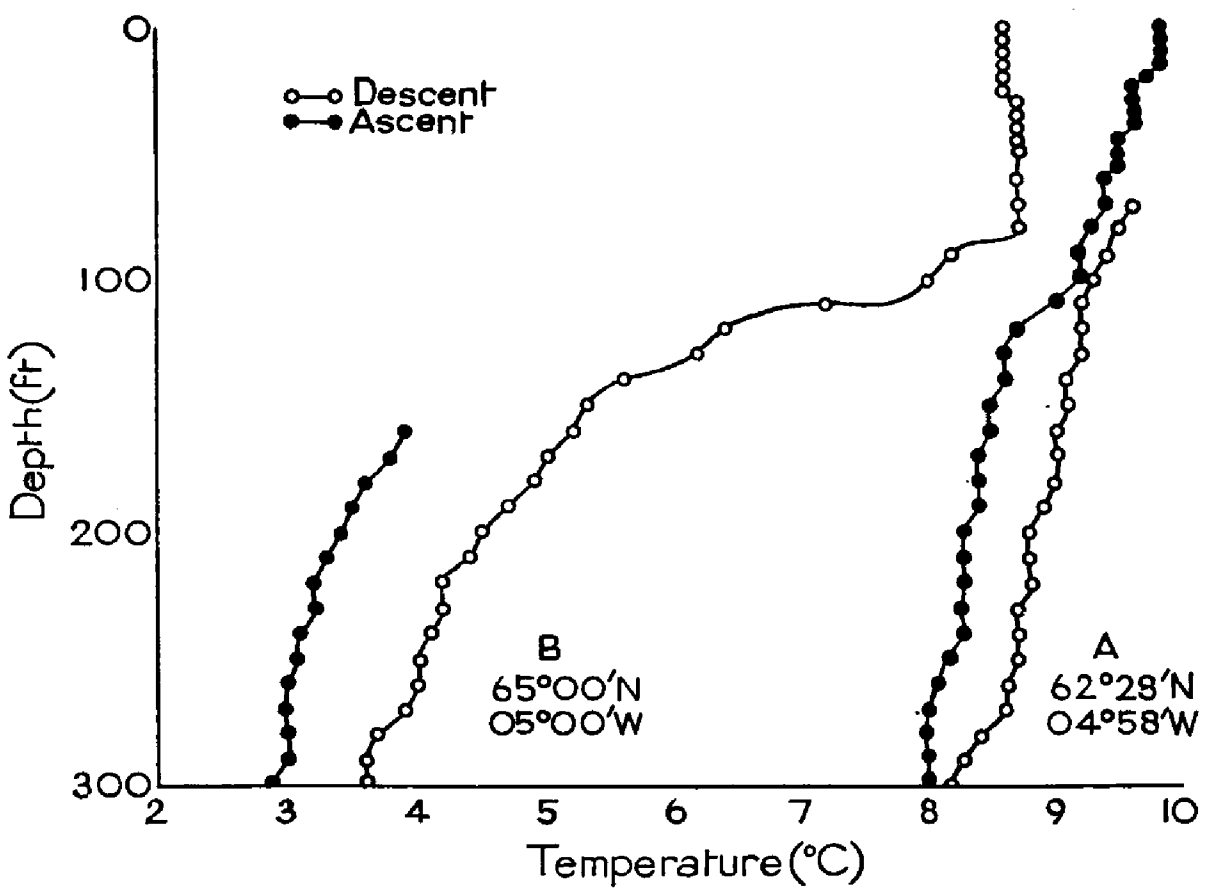


Fig. 3. Bathythermograph profiles.

The remaining bathythermograph observations were all taken in the vicinity of ice. They all showed relatively warm water from between 50 to 190 feet down to 300 feet or more with either an isothermal layer in the first 50 to 100 feet or a strong positive gradient (Fig. 4). The reason for this cold surface layer is open to discussion but is probably due to the effect of the melting ice. The ambient sea-surface temperature near the ice edge was generally between 3°c and 5°c so that the ice was continually melting. As a result the surface temperature in some cases was reduced to between 0°c and −2°c, resulting in large positive gradients to between 50 and

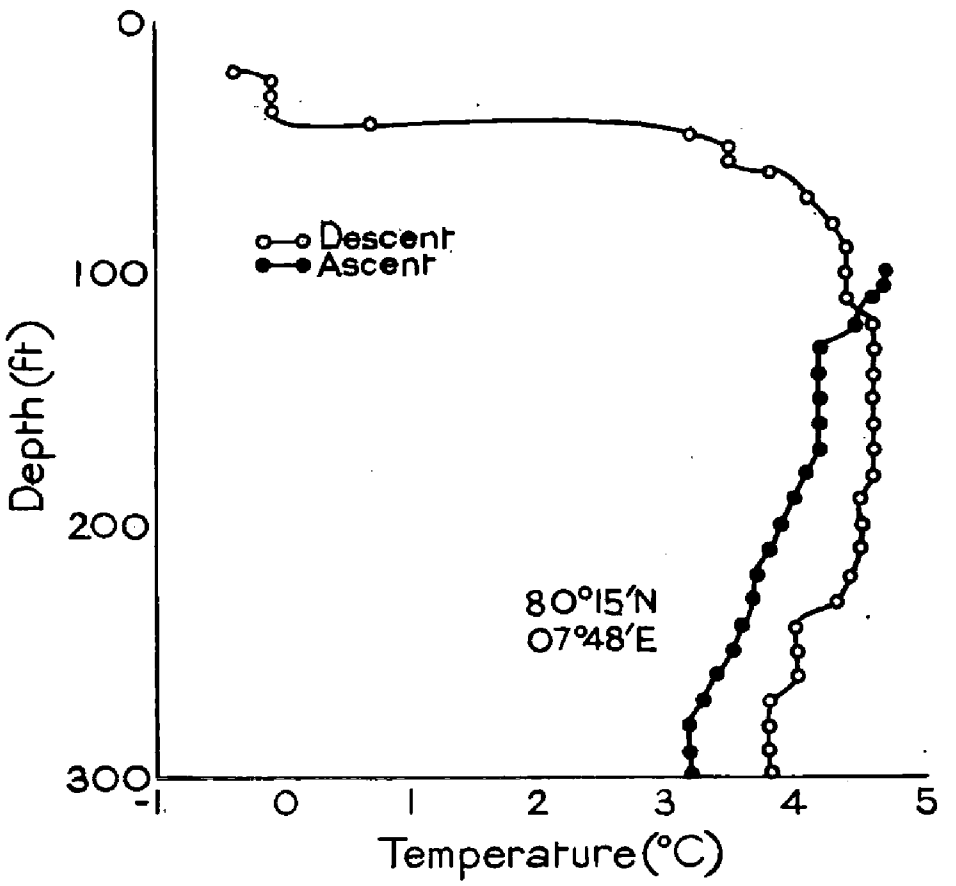


Fig. 4. Bathythermograph profiles.

100 feet. It is interesting to note that near the ice edge to the north-west of Spitsbergen the bathythermograph traces showed much warmer water below 200 feet than those taken to the east and north-east of Jan Mayen.

Two of the traces showed well-defined cold and warm sub-surface layers. At 77°N, 4°E there was a warm layer between 150 and 250 feet while at 79°N, 6°E there was a cold layer between 150 and 250 feet (A and B, Fig. 5). These layers can be explained by differences in density caused by salinity differences. The warm West Spitsbergen Current is generally of higher salinity than the Arctic Basin water and so tends to sink below it on account of its higher density. However, these layers proved to be small in horizontal extent and extremely isolated and, furthermore, it was not possible to establish whether they were in equilibrium with the ambient water or whether they were of a transient nature.

The sea-surface temperatures themselves were of considerable interest. I was told of a positive temperature anomaly near Spitsbergen when I visited the Marine Branch of the Meteorological Office at Bracknell for an ice brief a few days before we sailed, but the temperatures we measured were even higher than those expected. At 70°N, 6° 30'E the sea-surface temperature was 5°C at a distance of 2,500 yards from the ice edge but it fell to 1·5°C at the edge. Also the warm water under the ice sometimes reached a temperature of 5°C. The surface temperatures were plotted on a chart and approximate isotherms were drawn (*see* Fig. 1). It is interesting to observe that the 5°C line extends almost to 80°N at 8°E and yet at 8°W extends only as far as 70°N.

The first sighting of ice on 20th August was rather spectacular and the cause of some excitement aboard the submarine. Initially it appeared as a thin line of glistening white specks on the horizon (*see* photograph between pages 130 and 131). On approaching closer we saw a well-marked ice edge, the ice itself being 3/10–4/10 loose rotting pack. Later that day we received a detailed chart of the ice in the vicinity from a French Atlantique aircraft and this showed that the edge we had encountered

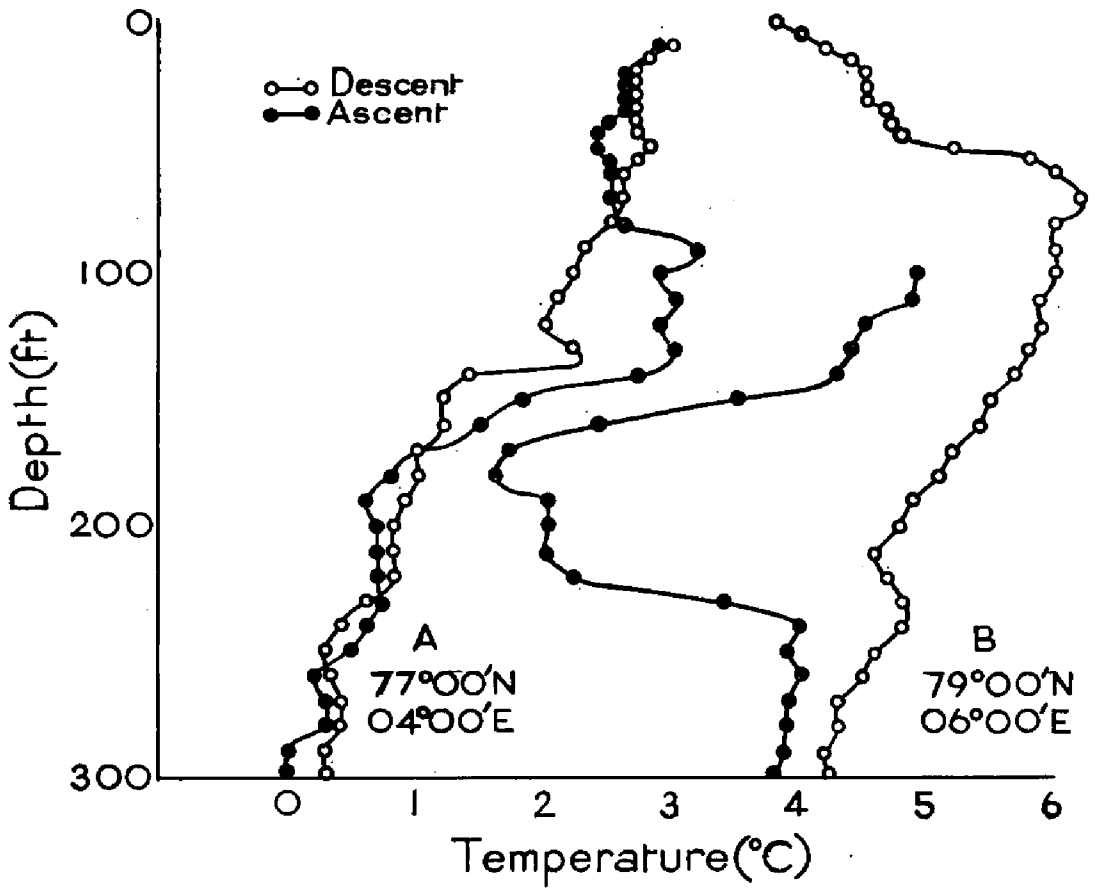


Fig. 5. Bathythermograph profiles.

was a spur extending eastwards from the main body of the ice and that the nature of the ice boundary was far more complicated than we had expected. Later that day we dived under the spur and proceeded northwards on the surface, navigating through clear water and avoiding the isolated ice-fields consisting of 2/10–3/10 rotting pack-ice.

The next day we dived and went northwards under the main body of the pack-ice. In the afternoon we charged batteries in a polynya and the next day we reached our furthest point north; at this point, unable to find a suitable polynya, we turned south and later surfaced in a large one, some 200–300 yards across. With the bows nosed into the ice we were all able to leave the boat and walk 'ashore'. The ice itself was 8/10–9/10 melting pack with extensive ridging and presented a truly magnificent sight (*see* photographs between pages 130 and 131). This was probably the climax of the whole exercise and is the occasion which will be most remembered by the crew members.

The weather on the whole was kind to us with the exception of a few days towards the end of the exercise when we were plagued with persistent low cloud and poor visibility, particularly near Spitsbergen. During the passage from Jan Mayen to the ice edge the wind remained force 1–2 with smooth seas and good visibility and during the rest of the voyage the wind rarely exceeded force 5. The lowest air temperature we recorded was 0·4°C and throughout the exercise we never experienced less than 6/8 cloud and usually 7/8–8/8.

The experience of seeing the Arctic ice was something I would not like to have missed. To travel submerged beneath solid pack-ice in a submarine with its special capability for oceanographic measurements made the voyage particularly interesting and worthwhile.

ROYAL NAVAL BIRDWATCHING SOCIETY

For many years all ornithological observations recorded in the meteorological log-books of voluntary observing ships have been sent to the Royal Naval Birdwatching Society. Sometimes an observation has been published in the *Marine Observers' Log* with a comment but, in any case, all the observations have been studied and the records ultimately deposited at the Natural History Museum.

We are glad to be able to give a little publicity to this growing Society by condensing their prospectus below.

Bird-watching on land had caught the public imagination well before the second world war, but next to nothing had been done to stimulate interest in bird-watching on the high seas.

Early in 1946 a small group of naval officers decided to form a Naval Birdwatching Society and so, in 1947, the RNBWS came into being.

In 1956, the Society extended its membership to include personnel of the British Merchant Navy and, in 1963, further extended membership to the British Fishing Fleets.

Today, its members are covering all the principal ocean routes of the world, providing unique opportunities for collecting and disseminating information of the sea and land birds observed during their travels.

The aims of the Society are firstly the encouragement and promotion of bird study amongst its members with special reference to bird-watching at sea; secondly co-operation with other ornithological societies in investigations connected with birds and bird movements at sea; thirdly, co-operation with the British Trust for Ornithology in its special enquiries and fourthly, to make available to other ornithological societies and interested bodies such information arising from its activities as may be of interest to them.

The RNBWS, which is governed by an Executive Council and under the patronage of H.R.H. The Duke of Edinburgh, welcomes to its membership every person eligible under its constitution who is genuinely interested in bird study, however inexperienced in ornithology. Its object is to help all members in increasing their knowledge of bird life.

The Society has built up a world-wide system of reporting the position and identity of sea and land birds at sea by means of special report forms, and encourages members to take part.

To help members, experienced ornithologists in various ports throughout the world act as local RNBWS representatives and welcome visits from members.

Members are encouraged to develop an interest in bird photography when serving at sea. A library of bird photographs and slides is kept at RNBWS headquarters and additions are welcomed.

The Society is in touch with a number of eminent overseas ornithological societies with whom it is glad to exchange information. It is affiliated to the International Council for Bird Preservation (British Section) and the British Trust for Ornithology.

Whilst its interests lie chiefly in the study of birds at sea, it is always interested to receive reports from its members on bird study ashore.

Finally, the Society has its own member's tie, small sea-swallow motifs on a dark blue background.

Ordinary members are eligible from:

(*a*) Serving and retired personnel of the Royal Navy, Royal Marines, Women's Royal Naval Service and Queen Alexandra's Royal Naval Nursing Service together with its reserves and auxiliaries.
(*b*) Personnel of Commonwealth Navies, their reserves and auxiliary services.
(*c*) Civil Servants serving, or who have served, in a Ministry of Defence (Naval) Establishment.

(*d*) Serving and retired personnel of the Merchant Navy and Fishing Fleets and British Ocean Weather Ship service.

The present rate of subscription is 15*s*. annually and this includes a supply of forms, periodical bulletins concerning the Society's work and their Annual Report, *Sea Swallow*, a journal about the size of *The Marine Observer*.

The Honorary Secretary of the Society is: Lt. Cdr. E. S. W. Maclure, R.N., "Melrose", 23 St. Davids Road, Southsea, Hants.

L. B. P.

NOTES ON ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM JANUARY TO MARCH 1968

JANUARY

An intense low pressure area stretched across the North Atlantic from Newfoundland to Novaya Zemlya with an extension north of Franz Josef Land to the North Pole. A deep depression also governed air movements in the Bering Sea but circulations over northern Canada and again over Asiatic Russia were anticyclonic. This distribution resulted in an almost uninterrupted flow of mainly cold north-easterly winds over much of the whole area. Temperatures were lower than usual except to the south-west of Iceland and in the east of the Barents Sea.

Canadian Arctic Archipelago. Mainly northerly light to moderate winds predominated with temperatures as much as 8 degC below normal, so there was no relaxation of the complete ice cover expected at this time of year.

Baffin Bay. Winds were extremely variable but mainly with a northerly component. Although it was relatively warm at the beginning of the month the air steadily cooled and finished up about 5 degC below normal. Ice cover was roughly as usual.

Foxe Basin. A northerly airstream lowered the already subnormal temperatures to about 8 degC below average. As usual, the sea was completely iced up.

Hudson Bay and Hudson Strait. Moderate north-westerly winds, occasionally backing westerly, had the surprising effect of bringing in much warmer air to replace the extremely cold airmass remaining at the end of the previous month. Temperatures, in some places as much as 14 degC below normal early in the period, steadily rose and finished up near the seasonal average. All areas were completely frozen.

Davis Strait. Early in the month temperatures were average or slightly above but they fell to about 5 degC below average under the influence of northerly or north-easterly winds. The sea was slightly cooler than usual but off the extreme south-west of Greenland there was a slight positive temperature anomaly with ice roughly normal but elsewhere, in the west and north, it was greatly in excess, in some places the outer edge of the pack being 100 to 150 miles further out than usual.

Labrador Sea. Strong north-westerly winds resulted in steadily lowering air temperatures—from 2 degC above to just about normal. The sea temperature pattern was extremely patchy but by the end of the month the surface water was generally cooler than average in the north but still warm, by about 4 degC, in the south. Ice coverage generally was on the low side but there was considerable movement and a tendency for the pack to accumulate just north of Belle Isle Strait where at one time the edge was 100 miles further out than usual.

Great Bank. Winds blowing generally from between south-west and north brought in somewhat warmer air and temperatures rose from 5 degC below to about 2 degC above normal. The sea remained comparatively warm, 2 to 3 degC higher than usual. Pack was extremely variable, sometimes 50 miles narrower or 50 miles wider than normal.

South Newfoundland Sea. Here again north-westerlies had the effect of raising the temperature which at the beginning of the month was about 6 degC below and by the end was a little above average. The sea remained slightly on the warm side. A little pack emerged from the Cabot Strait.

River and Gulf of St. Lawrence. Conditions were much colder than usual at the beginning of the month. Although temperatures tended to rise later and became even slightly above the seasonal average (in spite of northerly winds), ice amounts remained in excess, there being only a small area of open water in the extreme north-east of the Gulf.

Greenland Sea. Strong north-easterly or easterly winds affected this area throughout the

month with resulting intense cold in most places. Near Jan Mayen, for example, temperatures were often 10 degC below those usual for January. South of 65°N, it is true, conditions were not quite so frigid and at the end of the month the temperature had recovered from about 6 degC below to normal or just above, but this amelioration was not experienced elsewhere. North of the Arctic Circle the sea temperature, in the few places where open water still remained, was lower than usual and so the ice cover was much above average. In the Jan Mayen area, in particular, the edge of the pack was at times 100 to 200 miles further out than usual and a little more south, north of Iceland, was 30 to 50 miles to the east of its average position. South of the Denmark Strait the sea retained some of its earlier warmth and ice amounts were generally about normal, the occasional very strong easterly winds driving the pack back near to the coast.

Spitsbergen. A very cold north-easterly airstream during most of the month kept both air and sea much cooler than usual—a negative air temperature anomaly of 14 degC was recorded over one ten-day period—and consequently pack ice was excessive, at one time by a width of 150 miles near Bear Island.

Barents Sea. This area, being affected by the eastern end of the pressure trough mentioned earlier, had extremely variable winds with resulting large changes in temperature. On the western side it was very cold at the beginning of the month, air temperature being 10–12 degC below normal. It was also cold in the extreme south-east but in the north-east, between Franz Josef Land and Novaya Zemlya, it was 4 degC warmer than usual. In the absence of reports it was difficult to assess sea temperature but it was believed to be on the cold side. Ice was certainly in excess, the southern edge of the polar pack extending 100–200 miles south of its normal position. Along the west coast of Novaya Zemlya, however, it was less concentrated and probably thinner than usual. In the south, along the Russian shores, ice was normal.

White Sea. The air over this area was extremely cold and at times the temperatures were 16 degC lower than the seasonal mean, the result of a well-maintained airstream from central Siberia, although locally the wind direction was south-west. Ice cover was approximately normal.

Baltic. The extreme cold of December lasted into January and became for a time even more intense, an anomaly of −19 degC over ten days in the middle of the month being recorded over the Gulf of Finland and −14 degC in other branches of the Baltic. Where there was open water the seas were a degree or so cooler than usual and so ice generally was in excess, the Gulf of Bothnia being completely covered. Along the north German and Polish coasts, however, where temperature locally climbed slowly to just above the seasonal average, there was rather less ice than usual.

North Sea. Light to moderate north-westerly winds kept the air somewhat colder than usual but, although the sea cooled down somewhat it still remained slightly warmer than average. Very small amounts of ice were reported in a few places in the inlets of the German Bight.

February

As in the previous month a low pressure area extended from Newfoundland across the Atlantic to Novaya Zemlya, the centre of greatest activity being centred over the southern part of the Barents Sea. South-east of Greenland, however, cyclonic circulation was somewhat less than usual. The anticyclones over northern Canada and Asiatic Russia persisted and together with an intense depression over the northern Pacific maintained very strong easterly winds over Alaska, the Bering Sea and the Sea of Okhotsk.

Canadian Arctic Archipelago. Northerly winds again prevailed over this area except in the extreme south-west where light southerlies somewhat ameliorated the overall severity of the winter; air temperatures generally were from 5 degC to 9 degC below normal and, naturally, all the surrounding seas were ice-bound.

Baffin Bay. Over most of the area west of 60°W the airflow was from the north-east with consequent temperatures about 4 degC below normal. In the Home Bay region of Baffin Island and along the west coast of Greenland, however, winds were more variable and temperatures ended slightly higher than average. The ice situation seemed much as usual.

Foxe Basin and Hudson Bay. In spite of consistent and often strong northerly winds there was a marked tendency, except in the James Bay area and in the Fury and Hecla Strait, for the air to warm up and to finish some 3–4 degC warmer than normal. In the two excepted areas, however, there was a slight cooling over the month. Ice cover and thickness showed nothing unusual.

Hudson Strait. Winds between easterly and north-easterly, increasing from light to strong,

Table 1. Icebergs sighted by aircraft and merchant ships within latitudes 40°N–65°N and longitudes 40°W–65°W

(This does not include growlers or radar targets)

Limits of Latitude and Longitude		Degrees North and West												
		66	64	62	60	58	56	54	52	50	48	46	44	42
Number of bergs reported south of limits	Dec.	72	55	29	5	0	0	0	0	0	0	0	0	0
Number of bergs reported east of limits	Dec.	72	63	44	35	35	35	35	19	19	4	2	0	0
Extreme southern limit	Dec.	58° 04′N, 60° 53′W on 7.12.67												
Extreme eastern limit	Dec.	59° 24′N, 45° 18′W on 12.12.67												

Limits of Latitude and Longitude		Degrees North and West												
		66	64	62	60	58	56	54	52	50	48	46	44	42
Number of bergs reported south of limit	Jan.	5	5	5	5	5	0	0	0	0	0	0	0	0
	Feb.	652	> 649	> 637	> 564	> 350	> 211	> 155	0	0	0	0	0	0
	Mar.	12	12	12	12	12	12	12	12	0	0	0	0	0
	Total	669	> 666	> 654	> 581	> 367	> 223	> 167	12	0	0	0	0	0
Number of bergs reported east of limit	Jan.	5	5	5	5	4	4	4	3	0	0	0	0	0
	Feb.	652	> 646	> 540	> 337	> 247	> 197	> 164	> 103	> 13	> 10	> 6	> 6	2
	Mar.	12	12	12	12	12	12	12	8	2	0	0	0	0
	Total	669	> 663	> 557	> 354	> 263	> 213	> 180	> 114	> 15	> 10	> 6	> 6	2
Extreme southern limit	Jan.	56° 30′N, 58° 06′W on 26.1.68												
	Feb.	52° 02′N, 55° 18′W on 25.2.68												
	Mar.	51° 17′N, 50° 03′W on 6.3.68												
Extreme eastern limit	Jan.	56° 34′N, 50° 49′W on 9.1.68												
	Feb.	57° 26′N, 40° 23′W on 10.2.68												
	Mar.	51° 40′N, 49° 42′W on 6.3.68												

> ('greater than') has been inserted where there is some doubt as to the actual number of icebergs at some of the sightings, but the true value is probably greater than the value given.
Extreme limits during the 3-month period are underlined.

had the effect of bringing in slightly warmer air, a negative anomaly of 1 degC turning into a similar positive one; in the Ungava Bay region, indeed, there was a period when the air temperature was as much as 3 degC higher than average. Leads developed along the north shores and, generally speaking, ice cover was less than normal.

Davis Strait. In the west and north the wind was mainly north-easterly and varied between moderate and strong. Air temperatures, at first on the low side, steadily rose and at the end of the period were a little higher than usual. Sea temperatures were variable, tending to rise as warmer Atlantic water was pushed in by consistent southerlies further south. Ice which was very much in excess at the beginning of the month tended to disperse and the situation was roughly normal at the end. In the south-eastern section of the Strait winds were very variable but gradually settled down to moderate south-easterlies, while the warmer conditions of late January were maintained and even accentuated, temperatures 8 degC above normal being recorded. The sea off the extreme south-west of Greenland also tended to warm up. Although the ice pack tended to creep into the area round Cape Farewell and reached as far north as 61°N, amounts generally were as would be expected by late February.

Labrador Sea. Strong, mainly south-easterly winds helped to keep air temperatures during the first three weeks about 6 degC above normal but later, as they became variable in direction, conditions were average. The sea was generally warm but ice amounts were excessive (probably due to movements during the previous month), the edge off southern Labrador being 120 miles further out than usual.

Great Bank. Variable winds were experienced here and temperatures fluctuated from 4 degC above average with easterlies to 4 degC below when they were off-shore. Sea temperature in the south was slightly higher than usual but in the north was on the cool side with a noteworthy 'cold pool' round about 50°N, 45°W. Ice cover was also very variable but the eastward extension of the pack was as much as 50 miles more than normal.

South Newfoundland Sea. Here again it was noticeable how wind direction affected temperatures, easterlies at the beginning and end of the month bringing in air 4 degC warmer than usual while the north-westerlies in the middle period brought in air 7 degC cooler. At first the sea was slightly warmer than normal but later cooled down, especially near the Nova Scotia coast. Ice off the Cabot Strait was fully 70 miles further out than usual, the maximum during the last 6 years.

River and Gulf of St. Lawrence. The temporary milder spell of the end of January soon gave way to intense cold, the over-all temperatures being about 7 degC below average as winds swung from light easterly to strong north-westerly. Ice was probably more extensive and thicker than usual except for a small area just south-west of Belle Isle Strait.

Greenland Sea. North of the Arctic Circle (66½°N) consistently strong north to north-east winds kept temperatures well on the low side, the air being as much as 9 degC below normal and the sea temperature 2 degC below. There was, therefore, much more ice than in most years, in many places the edge being 200 miles to the south-east of its normal position. There was an exception to this near Jan Mayen and just to the south where the ice limits were about normal, probably as the result of some warmer Atlantic water brought in by local southerly winds. South of the Arctic Circle, although there were moderate northerlies near the Greenland coast and very strong east-north-easterlies off the north-west of Iceland, winds were generally easterly or even had a southerly component. Air temperatures were low at first, 5 degC sub-normal, but tended to rise slightly above average while the sea was mostly on the warm side apart from a 'cold pool' near o.w.s. 'Alfa'. In the Denmark Strait pack-ice reached the north-west coast of Iceland and was 30 miles wider than usual but further south, close to the Greenland coast, amounts were nearer normal. There was, however, a striking exception to this in that the pack drifted well south of Cape Farewell, there being two highly unusual reports of icebergs. On the 8th a Lufthansa pilot reported a large berg at 56° 47′N, 42° 00′W and on the 10th a tabular berg was sighted at 56° 05′N, 37° 05′W, an extreme southerly position for these waters.

Spitsbergen. Strong north-easterlies ensured that temperatures remained low, that of the air being as much as 7 degC below average while that of the sea, at least in the north, also remained sub-normal. Ice was greatly in excess and in the Bear Isle region extended at times 80 miles beyond the usual position.

Barents Sea. There was a vigorous circulation over this sea during the month, resulting in very cold air, 7 degC below average, with strong north-easterly winds in the north and north-westerly winds in the west. In these areas ice was much further south than usual; satellite photographs are not very definitive so far north in February, so the exact edge could not be precisely defined. However, in the east and south, winds were mainly southerly and south-westerly and therefore temperatures were much higher, positive anomalies of 8 degC being recorded, and ice, particularly off the south-west of Novaya Zemlya and along the coastline east of the Kanin Peninsula, very much less than in most years.

White Sea. Strong westerly winds, strangely enough, brought in colder air and air temperatures, although on the high side early in the month, finished up rather lower than usual. The wind, however, was strong enough to open up leads along the western shores and to drive pack out into the southern Barents Sea where it tended to break up.

Baltic. Winds generally, particularly in the south and west, were very variable but over north of the Gulf of Bothnia veered from strong south-south-westerly to moderate north-west. Air temperatures fluctuated, being much below average over most of the area following a brief mild spell south of 60°N at the beginning of the month. Sea surface temperature was probably slightly higher than usual in the extreme south and in the Kattegat but it was relatively cool elsewhere. There were also alternations in the ice cover with frequent openings of leads along the north Swedish coast succeeded by equally rapid freezing. In the Gulf of Finland ice was probably in excess early in the month but about normal at the end.

North Sea. There were variable winds, on the whole not very strong, and air temperatures never far from the seasonal mean. On the other hand the sea itself was comparatively warm, as in January. Ice was only reported in the shallow water of a few inlets.

March

The pressure pattern of the two earlier months continued into March, the main centre of intense cyclonic circulation being over the southern Barents Sea. This helped to maintain a strong westerly airstream over Scandinavia and European Russia.

Canadian Arctic Archipelago. Northerly winds gave way once again, especially in the south-west, to light south-easterlies so that at times temperatures were several degrees above the seasonal average. Ice cover, however, was normal, the sea being still ice-bound.

Table 2. Baltic Ice Summary: January–March 1968

No ice was reported at the following stations during the period: Visby, Flensburg, Kiel, Aarhus, Copenhagen, Kristiansundfjord, Oslo.

Station	January									February								March							
	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Leningrad	1	31	31	31	0	0	31	0	881	1	29	29	29	0	0	29	0	1084	1	31	31	25	0	6	25	0	1116
Riga	1	31	30	16	3	24	0	0	502	1	29	22	8	5	10	9	0	618	1	31	25	19	2	0	21	0	612
Pyarnu	1	31	31	31	0	0	31	0	585	1	29	29	29	0	0	29	0	729	1	31	31	31	0	0	31	0	786
Viborg	1	31	31	31	0	0	13	18	—	1	29	29	29	0	0	0	29	—	1	31	31	31	0	0	5	26	—
Klaipeda	1	28	23	0	4	18	0	0	331	8	28	18	0	0	8	0	0	453	1	26	12	0	1	3	1	0	436
Ventspils	1	31	26	0	7	16	0	0	—	1	29	24	0	7	23	0	0	—	1	31	27	1	6	20	0	0	—
Tallin	13	25	13	0	11	12	1	0	—	7	29	17	0	9	8	4	0	—	1	28	28	0	23	0	23	0	—
Helsinki	1	31	31	31	0	1	30	0	798	1	29	29	29	0	0	29	0	957	1	24	22	13	0	4	16	0	985
Mariehamn ..	10	30	21	16	0	20	0	0	397	9	29	19	0	0	13	2	0	524	1	6	6	3	0	0	6	0	543
W. Norrskar ..	2	31	22	0	6	16	4	0	—	6	29	24	0	19	10	19	0	—	1	31	31	0	31	0	31	0	—
Turku	1	31	31	31	0	31	0	0	727	1	29	29	29	0	29	0	0	884	1	24	24	19	0	21	0	0	919
Mantyluoto ..	1	31	31	4	0	28	0	0	—	1	29	29	14	4	1	28	0	—	1	31	31	31	0	0	31	0	—
Vaasa	1	31	31	31	0	0	31	0	875	1	29	29	29	0	0	29	0	1149	1	31	31	31	0	0	31	0	1248
Oulo	1	31	31	31	0	0	14	17	—	1	29	29	29	0	0	0	29	—	1	31	31	31	0	0	0	31	—
Roytaa	1	31	31	20	11	0	16	15	—	1	29	29	26	3	0	0	29	—	1	31	31	31	0	0	0	31	—
Lulea	1	31	31	31	0	0	4	27	1001	1	29	29	29	0	0	0	29	1431	1	31	31	31	0	1	0	30	1584
Bredskar	1	31	31	18	0	14	17	0	—	1	29	29	29	0	0	29	0	—	1	31	31	6	0	29	2	0	—
Alnosund	1	31	31	31	0	31	0	0	545	1	29	29	29	0	28	1	0	702	1	27	27	27	0	27	0	0	682
Stockholm.. ..	1	31	31	31	0	31	0	0	424	1	29	21	21	0	21	0	0	547	1	31	31	27	0	30	0	0	507
Kalmar	1	31	31	6	16	31	0	0	221	1	29	29	0	26	29	0	0	304	1	9	9	0	8	9	0	0	231
Skellefteå	1	31	31	31	0	0	8	23	—	1	29	29	29	0	0	0	29	—	1	31	31	31	0	0	0	31	—
Göteborg	9	10	2	0	0	0	0	0	159	0	0	0	0	0	0	0	0	231	0	0	0	0	0	0	0	0	172
Tönning	8	19	12	0	1	12	0	0	—	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—
Husum	10	17	8	4	3	7	1	0	—	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—
Emden	11	16	7	0	7	7	0	0	—	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—
Lübeck	14	15	2	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—
Gluckstadt ..	10	25	16	0	6	16	0	0	—	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—
Bremerhaven ..	12	16	5	0	0	1	0	0	—	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—
Stettin	7	23	10	0	0	3	2	0	48	26	26	1	0	0	0	0	0	41	3	4	2	0	0	0	0	0	—
Gdansk	13	16	4	0	0	3	0	0	121	26	26	1	0	0	0	0	0	141	0	0	0	0	0	0	0	0	20

CODE:
A First day ice reported. C No. of days that ice was reported. E No. of days of pack-ice. G No. of days assistance required.
B Last day ice reported. D No. of days continuous land-fast ice. F No. of days dangerous to navigation, but assistance not required. H No. of days closed to navigation.
I Accumulated degree-days of air temperature (°C) where known.*

* These figures give a rough measure of first the probability of the formation of sea ice, and later the progress of the growth and of its thickness. They are derived from daily averages of temperature (00 + 06 + 12 + 18 GMT) and are the sum of the number of the degrees Celsius below zero experienced each day during the period of sustained frost.

Baffin Bay. In the north and west moderate winds blew chiefly from a north-easterly direction but in the south-east the flow was mainly from just south of east. Temperatures fluctuated but were on the low side, ranging from 7 degC below to 1 degC above normal. There was nothing unusual in the amount or thickness of the ice.

Foxe Basin. During the month the wind changed from northerly to south-south-easterly with a corresponding rise in the temperature from 6 degC below to about 4 degC above the average. There appeared to be no breaks in the ice.

Hudson Bay. Moderately-strong northerlies gave way during the month to relative mild south-westerlies. Temperatures oscillated, being a few degrees higher than usual early in the period, then falling briskly to several degrees below but finishing up to 8 degC above. Ice cover was complete.

Hudson Strait. Moderate northerlies with temperatures 9 degC below the seasonal mean were succeeded by south-westerlies and the temperature rose substantially to about 2 degC above. There were signs of leads along the south shore of the Strait west of 70°W.

Davis Strait. Mainly north to north-easterly winds predominated with mostly subnormal air temperatures, 9 degC below average, recorded over the western half of the area but the positive anomaly in the sea temperature of February was largely maintained. Ice amounts however once again became excessive, the edge in some places being between 60 and 120 miles beyond the usual limit, probably due to greater mobility of the pack.

Labrador Sea. Under the combined effects of moderate to strong north-westerly winds with air temperatures 6 degC below the mean at times, and in spite of the sea being still comparatively warm, ice pack covered a bigger area than usual; in the south it was more extensive than in any March of the present decade.

Great Bank. Over the northern half of this area the prevailing west-north-west wind brought in air colder by about 4 degC than average. The sea was cooler than usual, especially near Belle Isle and at about 50°N, 45°W. Further south conditions were nearer normal, being slightly on the warm side. As a result the pack tended to spread outwards towards the east and reached a point 140 miles further from the coast than the average limit. On the other hand extension southwards was less than usual.

South Newfoundland Sea. South-westerlies now helped to raise both air and sea temperatures to normal or a little above, but the ice in and just outside the Cabot Strait was still excessive.

River and Gulf of St. Lawrence. Variable winds and temperatures were never far from the seasonal average. Ice was also normal apart from slightly more open water than usual along the north shore of the Gulf.

Greenland Sea. During the first week or so there were very strong south-westerly winds along the east coast of Greenland from Cape Farewell as far north as the Denmark Strait and consequently both sea and air temperatures were then somewhat on the high side. Later over this area, and throughout the month elsewhere, exceptionally strong north-easterly winds brought in polar air which at times was 10 degC colder than that expected in March. Ice amounts in the extreme south were roughly normal but, late in the month, with a tendency for an unusually far southerly drift south-east of Cape Farewell. Immediately north of Iceland there was a great excess of ice, the edge being 100 miles beyond the usual limit. Curiously, however, to the north of Jan Mayen there were some signs of a deficiency, possibly caused by an intrusion of warm and saline water from the Norwegian Sea.

Spitsbergen and northern part of Barents Sea. Very strong east-north-easterly winds kept air temperatures 12°C below normal, the ice pack over most of the area being in excess. Just south-west of Spitsbergen and to the north-west of Novaya Zemlya, however, there was more open water than expected, probably the result of the northward surge of Atlantic water close to the Norwegian coast.

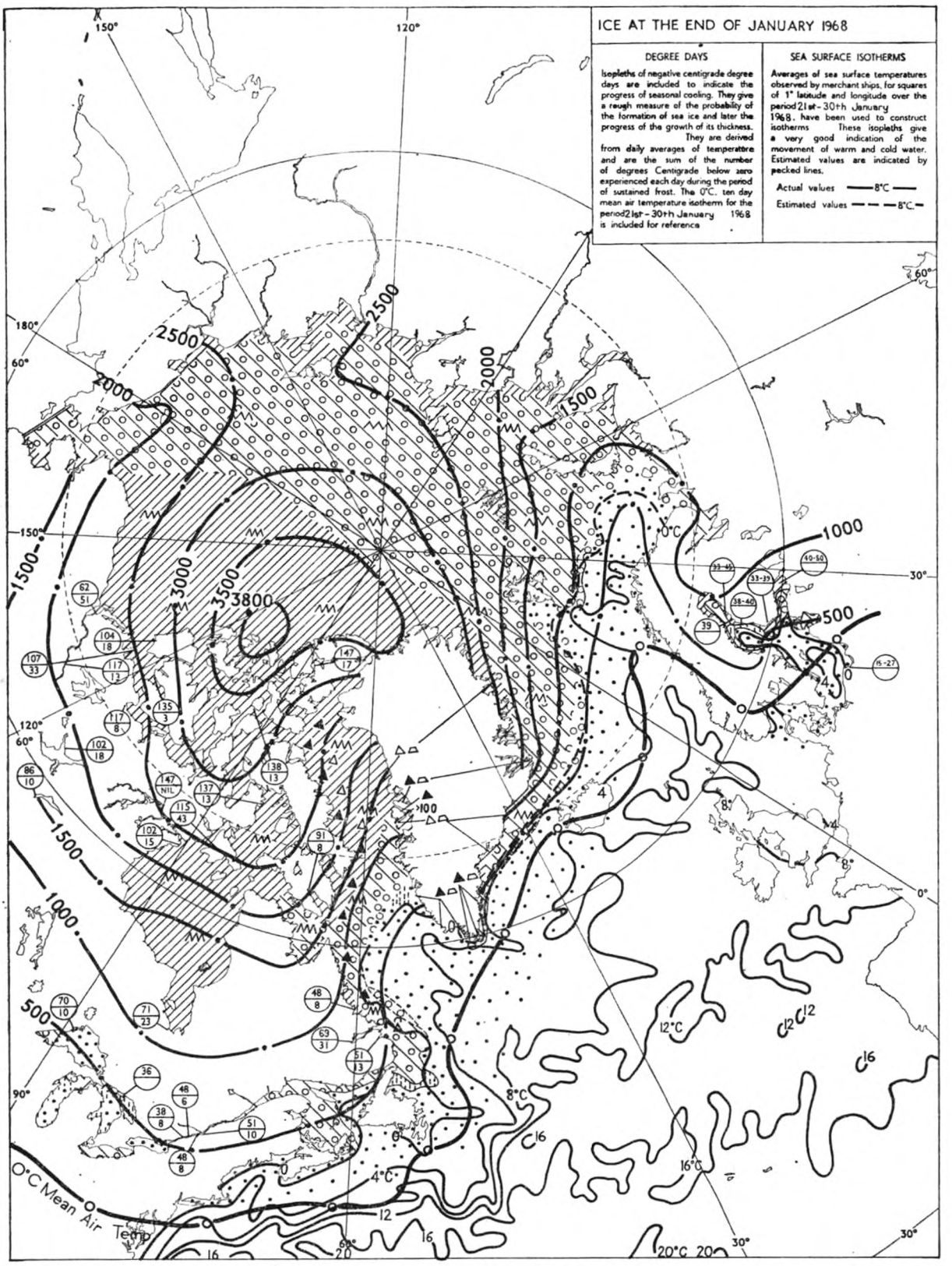
Barents Sea south of 73°N. Variable winds with air and sea temperatures mainly higher than usual caused ice coverage to be reduced, particularly in the extreme south-east.

White Sea. West-south-westerly winds raised the air temperature to 5 degC above normal so there was less ice than usual, with pronounced leads on the western side.

Baltic. Strong westerly winds prevailed and temperatures were mainly on the mild side, reaching 6 degC above normal. Ice cleared rapidly, especially from the Swedish coast and at the western end of Gulf of Finland, while even in the middle of the Gulf of Bothnia there were large expanses of open water.

North Sea. There was no ice; winds were variable with mild air temperatures and the sea slightly warmer than usual.

N. B. M.



Open water
Lead
Polynya
New or degenerate ice
Very open pack-ice (1/10 - 3/10 inc.)
Open pack-ice (4/10 - 6/10 inc.)
Close or very close pack-ice (7/10 - 9+/10 inc
Land-fast or continuous field ice (10/10) (no open water)

Ridged ice
Rafted ice
Puddled ice
Hummocked ice
(The symbols for hummocked and ridged ice etc., are superimposed on those giving concentration)
Extreme southern or eastern iceberg sighting
120 Ice depths in centimetres
14 Snow depths in centimetres

Y Young ice (2"-6" thick)
W Winter ice (6"-6½' thick)
P Polar ice (> 6½' thick)
A suffix to Y W P indicates the predominating size of ice floes
s small (11-220yd.)
m medium (220-880yd.)
b big (½-5miles)
v vast (>5miles)
c ice cake (<11yd.)
Known boundary

Few bergs (<20)
Many bergs (>20)
Few growlers (<100)
Many growlers (>100)
Radar target (probable ice)
The 'number observed' may be put below the iceberg, growler, or radar target symbol
Radar boundary
Assumed boundary
Cracks

Isopleths of degree days
0°C. air temperature isotherm
Estimated general iceberg track. Very approximate rate of drift may be entered
6 Observed track of individual iceberg.
Approximate daily drift is entered in nautical miles beside arrow shaft
Note:-
The plotted symbols indicate predominating conditions within the given boundary. Data represented by shading with no boundary are estimated.

Note. The notes in this article are based on information plotted on ice charts similar to the map shown opposite but on a much larger scale (39 in × 27 in). These charts are published at ten-day intervals and are available at the price of reproduction on application to the Director General, Meteorological Office (Met.O.1), Eastern Road, Bracknell, Berks. Alternatively, they may be seen at any Port Meteorological Office or Merchant Navy Agency. Up-to-date ice charts are broadcast daily by facsimile.

Book Reviews

The Torrey Canyon. Report of the Committee of Scientists on the Scientific and Technological Aspects of the *Torrey Canyon* Disaster. 9½ in × 6 in, pp. 48, *illus.* Her Majesty's Stationery Office, London, 1967. Price 5*s.* 9*d.*

Everyone interested in the sea, its inhabitants and its boundaries, or only mildly interested in sea bathing, could get some benefit from reading this excellent and informative little book. It is almost worth it for the tragic photographs of the ship after her stranding.

The drama of the stranding itself is summarized in three short sentences. The report concentrates on a description of the steps taken to deal with the 119,000 tons of crude oil which was originally aboard the ship and in making recommendations on how to deal with a similar problem in the future. There is an excellent historical introduction to the subject in which are discussed the general problem of oil pollution and the efforts being made by the Inter-Governmental Maritime Consultative Organization (IMCO) to deal with it by international legislation. It is mentioned, incidentally, that prior to the *Torrey Canyon* incident there have only been nine major shipping casualties involving a vast escape of oil, and the largest single quantity which escaped was only 2,600 tons. It goes on to point out, however, that "bearing in mind the expected increase in the amount of oil imported into Europe and in the size of tankers, there is a very real possibility, whatever precautions may be taken, that another incident involving a tanker of over 30,000 tons deadweight will occur in the next ten years or so around our coasts". (We are told that during the period 1961–1965 400 of the 780 new tankers brought into service were over 30,000 tons.) In reaching this conclusion the authors had in mind that the sea lanes round our coasts are the busiest in the world and the fact that an analysis of past records suggests that about one in ten of all accidents at sea occurs in these waters each year! We are also reminded that "we were lucky to have got off as lightly as we did"; if the tanker had been damaged through collision in, say, the Thames Estuary, bombing to ignite the oil would not have been practicable and although salvage might have been easier than off the Cornish coast, it might have taken a very long time. It is pointed out that "a thousand tons of crude oil washed on to a beach 30 feet wide could form a layer half-an-inch thick for 20 miles"! Need anything more be said about the risk?

The racy style of this scientific report is most refreshing and it makes almost exciting reading.

The various possible ways of disposal of oil in a damaged ship are gone into with considerable care, then the treatment of oil floating on the sea and finally the treatment of oil on the beaches. The effects on marine life and other wild life are discussed with considerable and sympathetic detail. The booklet finishes with conclusions and recommendations, the most important one of which seems to be that "the Torrey Canyon incident revealed a painful ignorance about a number of matters which should now be urgently enquired into if oil is to be more rapidly, safely and efficiently disposed of in any future incident". This seems to provide enough problems to keep a number of people very busy for an appreciable time—and there surely are not many problems that are more urgent or more important.

C. E. N. F.

Ocean Wave Statistics. A statistical survey of wave characteristics estimated visually from Voluntary Observing Ships sailing along the shipping routes of the world, by N. Hogben and F. E. Lumb. 17 in × 13½ in, pp. xiii+263, H.M. Stationery Office, London, 1967. Price: 120*s*.

In addition to its large length and breadth this book is about 1¼ inches thick, so it is not very handy for reading in trains or in bed! It is, however, unique as a source of information about wave conditions in the major shipping routes of the world and it is, in fact, a monument to the work done by voluntary observers aboard British Selected ships in making visual wave observations in all oceans during the eight-year period 1953–1961.

The Foreword tells us that the purpose of the book, which was conceived in the Ship Division of the National Physical Laboratory, is to provide systematic information about wave data for research on the seagoing qualities of ships. It points out that "this book would not have been possible without the efforts of the many ships' officers who made wave observations at sea".

About two million sets of observations were used, taken from punched cards prepared in the Meteorological Office from data contained in the logbooks of British Selected Ships. The introductory text reminds us that all these observations were visual estimates and it gives details of a comparative study made between visual observations from Selected Ships and those from Weather Ships and of a similar comparison between visual observations aboard the Weather Ships and measurements made aboard one of them on a wave recorder. The broad conclusions derived from these results are that, aboard the Weather Ships, visual estimates of height are reasonably accurate but the estimates of period are rather crude compared with the observations from the wave recorder. Assuming the Weather Ships' wave height estimates are reasonably accurate, these comparisons indicate that the Selected Ship observations of high waves are under-estimated but, for waves between about 7 and 14 feet, the percentage frequencies are 'about the same'. As the Weather Ships spend most of their time lying stopped on station, it seems reasonable to suppose that their observations should be fairly accurate. A note by Dr. Hogben giving some details of these comparisons and about the preparation of this book generally appeared in the April 1965 number of *The Marine Observer*.

The book contains a map showing the oceanic areas for which these data were prepared. The author tells us that the selection of these areas was based upon the number of observations available in the areas concerned and obviously they depend largely upon the normal trading routes of shipping. Unfortunately shipping routes across the North Pacific are not dealt with since very few British Voluntary Observing ships ply these particular routes. The whole of the North Atlantic between about 20°N and 60°N is covered, the whole of the Mediterranean, all the coasts of Africa, much of the Indian Ocean, coasts of the eastern and western North Pacific and a fairly large area in the southern Pacific, including the route from Panama to Australia and New Zealand.

All the data are arranged in tables, wave heights and periods being given for various areas, in the first instance for all seasons and all directions. Each area is then sub-divided and data are given for various seasons of the year and various wave directions. Sea and swell waves are not listed separately; when both sea and swell were reported, the group with the greater height was used (or the longer period if two observations of equal height were given).

The information contained in this book, in such a convenient manner, will fill a long-felt want, for it has been very difficult to get hold of accurate data about wave conditions from the oceans. These statistics will undoubtedly be of considerable value to many users. Making visual observations of the waves from a moving ship is a difficult job and requires much patience and practice; by the publication of this book the observers can feel that their efforts have been well worthwhile.

C. E. N. F.

INDIAN EXCELLENT AWARDS

(From the Deputy-General of Observatories (Forecasting), India)

India's Meteorological Department had 49 Selected and 89 Supplementary ships in their Voluntary Observing Fleet during the year ending 31st March 1967; 1,177 logs consisting of 14,233 meteorological observations were received in the Department from these ships during the year. The weather observations recorded and transmitted by these ships were of great value in the day-to-day forecasting work of the Department and, in particular, for issuing warnings to ships.

This Department wishes to convey its appreciation to all the officers concerned for their valuable co-operation.

Awards are offered in the form of books to the Captains, Observing Officers and Radio Officers of the ships whose meteorological work has been adjudged to be 'excellent' and the following ships have been selected for such Excellent Awards for the year 1966–67:

NAME OF VESSEL	OWNER
Jalamani ..	Scindia S.N. Co. Ltd.
Karanja	British India S.N. Co. Ltd.
Kampala ..	British India S.N. Co. Ltd.
Jaladhanya ..	Scindia S.N. Co. Ltd.
Deshbandhu ..	Shipping Corporation of India Ltd.
Jalaveera ..	Scindia S.N. Co. Ltd.
Jalakrishna ..	Scindia S.N. Co. Ltd.
Jalamaya ..	Scindia S.N. Co. Ltd.
Rajula	British India S.N. Co. Ltd.
Maha Jag Tara	South East India Shipping Co. Ltd.

In addition to the ships mentioned above, the following have been awarded a Certificate of Merit for commendable work done during the same year:

Indian Resolve	*Jag Kisan*	*Saudi*
Indian Strength	*Jag Vishnu*	*State of Bombay*
Vishva Pratap	*Vishva Prem*	*State of Maharashtra*

Fleet Lists

GREAT BRITAIN (Information dated 31.3.68)

The following is a list of British ships which have been equipped with instruments and which voluntarily co-operate with the Marine Branch of the Meteorological Office.

The names of the Captains, Observing Officers and Senior Radio Officers are given as ascertained from the last written returns received. The date of receipt of the last return received is given in the second column; an asterisk indicates a new recruitment who has not yet sent in a logbook.

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

The Port Meteorological Officer and Merchant Navy Agents 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 a Port Meteorological Officer or Merchant Navy Agent, or to the Marine Superintendent of the Meteorological Office at Bracknell.

Captains and Officers are invited 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
Achilles	27.12.67	R. C. Riseley	D. C. S. Thompson, J. D. Read, R. F. Williams	J. B. Sergent	Ocean Fleets Ltd.
Adelaide Star	18.12.67	C. R. Horton, D.S.C.	P. R. Madge, R. Murch, P. Suckling	W. Patterson	Blue Star Line Ltd.
Adventurer	28.2.68	R. H. K. Ledger	D. Skillander, B. Crook, D. McFarlin, T. M. Fitzpatrick	M. Donaldson	T. & J. Harrison Ltd.
Afghanistan	17.7.67	W. J. Bie	J. P. Wood, J. Thwillier, S. Baker, D. Hinchliff	A. E. Adams	Common Bros. Ltd.
Alaunia	1.2.68	A. M. Thomson	C. Allport, B. C. Gouldthorpe, J. G. Parry, A. J. Wilson	A. J. Selman	Cunard S.S. Co. Ltd.
Albany	1.2.68	G. Chatterley	J. Patmore, H. G. N. Lloyd, A. J. Love, W. Image	E. Matthews	Royal Mail Lines Ltd.
Albistan	1.11.67	J. E. B. Belt	P. J. Strachan, R. Bevin, A. McKendrick	J. Kidd	Frank C. Strick & Co. Ltd.
Aldersgate	25.10.67	J. W. H. Whitelaw	J. D. Robinson, J. M. Mathieson, R. MacLachlan	E. L. Fatherley	Silver Line Ltd.
Alert	31.1.68	J. P. Ruddock, O.B.E.	R. G. Dawson, A. Fulton, K. J. Mair, R. A. Neill	R. M. D. MacDonald	H.M. Postmaster General
Alinda	1.2.68	W. B. Cairns	D. F. Cammish, G. O. Okaroh, J. McCormick	A. Bevan	Shell Tankers (U.K.) Ltd.
Alva Bay	1.2.66	L. L. Wellings	W. Kraemer	—. Jones	Alva S.S. Co. Ltd.
Amalric	11.5.67	J. R. Richmond	J. C. Blake, I. S. M. Condie, J. R. A. Pepper	J. Ryan	Shaw Savill & Albion Co. Ltd.
Amastra	31.5.67	J. Campkin	D. Spence, R. G. Stollery, R. J. White, M. M. Patterson	—. Jackson	Shell Tankers (U.K.) Ltd.
Amazon	29.1.68	R. D. Jones	J. A. Boyd, J. C. Jardine, B. Dyson, G. McDonald	R. A. Petch	Royal Mail Lines Ltd.
Amoria	16.11.66	D. Cooper	I. M. Brown, R. S. Francis, P. A. Cocker, J. V. Oliver	C. Grayson	Shell Tankers (U.K.) Ltd.
Andania	9.1.68	J. B. Mort	A. W. Blackwood, J. Colquhoun, H. Dormer, B. C. Gouldthorpe	F. A. Dunn	Cunard S.S. Co. Ltd.
Andes	21.12.67	A. J. G. Barff, R.D.	J. R. B. Harding, M. R. B. Childs, S. Uminski	J. Hands	Royal Mail Lines Ltd.
Apapa	26.2.68	A. C. Sparks	H. J. Hathway, E. C. Metham	R. W. Brackenbridge	Ocean Fleets Ltd.
Aragon	5.1.68	W. A. Kennedy	J. P. Hunt, G. Suthers	J. Barter	Royal Mail Lines Ltd.
Araluen	10.8.66	H. G. Chafer	J. D. Inwood	D. Cameron	Trinder Anderson & Co. Ltd.
Aramaic	21.3.68	B. A. Mills	J. S. Merrells, R. Griffin, D. Sweet, J. Cherry	J. Kirk	Shaw Savill & Albion Co. Ltd.
Argentina Star	21.12.67	E. R. Pearce, O.B.E.	R. G. Woods, D. J. H. Vann, G. R. Henderson	G. Scott, T. Regan, D. Hill	Blue Star Line Ltd.
Argyllshire	4.3.68	A. S. Palethorpe-May			Clan Line Steamers Ltd.

Arlanza	19.2.68	G. A. Gibbon			Royal Mail Lines Ltd.
Armanistan	*	L. Seddon	A. C. McCulloch, J. J. Woodmass, C. Sabine		Frank C. Strick & Co. Ltd.
Arthur Albright	2.1.68	J. H. Kitching		M. R. B. Simpson	James Fisher & Sons Ltd.
Asprella	9.2.68	M. J. G. Goddard	A. R. Mitchell, B. E. Yendell, J. E. Avery	P. J. Monaghan	Shell Tankers (U.K.) Ltd.
Astyanax	23.2.68	A. A. Rundle	M. J. Coventry, J. C. R. Jones, D. Gow, S. P. C. Saverimutto	J. V. Morgan	Ocean Fleets Ltd.
Athelcrest	20.3.68	T. Fairclough	W. K. Bradley	P. Shine	Athel Line Ltd.
Athelmere	18.3.68	D. Elliott	J. R. Sensier, E. Kennard, H. Sutton		Athel Line Ltd.
Athenic	9.1.68	G. H. Heywood	T. O. Griffiths, A. W. Lavey		Shaw Savill & Albion Co. Ltd.
Aureol	21.3.68	C. S. H. O'Sullivan	G. Peters, A. Frost, P. Willerton	J. Noonan	Ocean Fleets Ltd.
Australia Star	12.2.68	D. M. McPhail	D. H. Hulme, A. W. Kinghorn, P. Howorth	B. Williams	Blue Star Line Ltd.
Australind	15.5.67	T. S. Hastings	B. J. Thompson, E. G. Marshall	R. Sykes	Trinder Anderson & Co. Ltd.
Author	28.2.68	L. J. Sharman	R. Herbert	J. Farrer	T. & J. Harrison Ltd.
Baharistan	*	S. A. Booker	D. E. Walshe, C. Baker, A. A. Sahhab	T. Ryan	Frank C. Strick & Co. Ltd.
Baltistan	3.8.67	D. Calvert	A. C. McCulloch, D. Golightly, A. Gunner, M. Lafferty	J. C. Kirkpatrick	Frank C. Strick & Co. Ltd.
Bamburgh Castle	7.12.67	J. Conn	R. J. Murdy, D. Newham, D. Mawhinney, M. Bentley	D. E. Brown	W. A. Souter & Co. Ltd.
Bankura	22.1.68	D. A. C. Windle	R. Choppin, I. Marr, G. C. Ruaux, A. D. Horscroft		British India S.N. Co. Ltd.
Baron Maclay	15.3.68	G. Towers			H. Hogarth & Sons Ltd.
Barrister	8.3.67	J. W. Cubbin	D. Eastgate, C. Cobb, R. Wilson, T. G. Oxley	B. Boynes	T. & J. Harrison Ltd.
Beaverash	15.1.68	J. Waling	J. Moynet	R. A. Cockett	Canadian Pacific Steamships Ltd.
Beaverbank	4.3.68	D. J. R. Davies	P. J. Harris, R. D. Turner	J. B. Keenan	Bank Line Ltd.
Beaverelm	26.9.67	C. Beck	R. W. Grice, D. Slater, J. Findlay	J. Martin	Canadian Pacific Steamships Ltd.
Beaveroak	15.1.68	J. D. S. Smythe	E. W. Jones, P. R. Thompson, G. A. Jenkins	R. J. Dixie	Canadian Pacific Steamships Ltd.
Beaverpine	4.3.68	E. F. Aikman	P. Adair	D. M. McDonald	Canadian Pacific Steamships Ltd.
Benalbanach	4.3.68	S. Murray	G. Byers, P. I. Ewart, R. T. Dorris	B. J. O'Dowd	Ben Line Steamers Ltd.
Benarmin	25.1.68	R. L. Bruce			Ben Line Steamers Ltd.
Benarty	25.3.68	A. Sinclair	E. G. Corkhill, P. J. Williamson, J. N. Nash	J. Duncan	Ben Line Steamers Ltd.
Benattow	23.2.68	A. S. Hamilton	P. G. Thompson	K. H. Sellar	Ben Line Steamers Ltd.
Bencleuch	13.3.68	J. Ritchie	W. Alexander, A. Hitcham	D. J. O'Brian	Ben Line Steamers Ltd.
Benhope	22.11.67	R. A. Lymn	N. K. Yip, P. Anell, T. K. Meikle, W. L. Wood	N. Whitehead	Ben Line Steamers Ltd.
Benlomond	28.2.68	D. S. Sinclair	D. M. Wohlgemuth, N. M. Duncan, C. A. Swanson	J. E. Morton	Ben Line Steamers Ltd.
Benrinnes	13.3.68	J. R. Muir	D. A. Graham, T. S. Sutherland, A. J. Sandison	W. Parkinson, M.B.E.	Ben Line Steamers Ltd.
Benvannoch	25.3.68	C. P. Browne			Ben Line Steamers Ltd.
Bhamo	27.12.67	J. C. Gibson	R. Finlayson, J. G. Melia, E. D. Somes, J. Ratcliffe, D. M. Lucey	D. P. Woods	Ocean Fleets Ltd.
Bishopsgate	30.1.68	J. R. Jenkins	H. D. M. Glennie	K. Mutimear	Silver Line Ltd.
Black Prince	29.11.66	E. A. Kemp	J. Barton, B. V. W. Roberts, M. Sangster	L. Porter	Prince Line Ltd.
Bombala	5.5.67	A. Dennison	A. D. Horscroft, G. R. Davidson, J. P. Butler	E. Rogers	British India S.N. Co. Ltd.
Booker Vanguard	20.12.66	S. Armitage	J. B. Fillingham, R. Williams, C. C. Morris	A. P. Moss	Booker Line Ltd.
Booker Venture	21.3.68	S. Armitage	G. R. Cowap, R. Bracewell, S. D. Wood	A. P. Moss	Booker Line Ltd.
Brandon Priory	29.8.67	J. H. Taylor	R. E. Watson, D. Buckingham, P. J. E. Charman	N. G. Calder	Warwick Tankers Ltd.
Brasil Star	28.9.67	L. Vernon	M. Thompson, N. Ianson, T. Black, I. Wingate	O. O'Shaughnessy	Blue Star Line Ltd.
Brecon Beacon	11.9.67	G. A. Austen	R. Hewitt, G. Ireland, J. Ward	I. Dyer	Medomsley S.S. Co. Ltd.
Bretwalda	*	I. W. Jackson	J. K. Cheesman, J. S. Brown, —. Patrick		Hall Bros. S.S. Co. Ltd.
Brighton	4.9.67	W. A. Watson	R. F. Flood, L. Chapman, W. K. Jones	J. Schuster	Chapman & Willan Ltd.
Bristol City	1.2.67	N. P. Childs	A. E. R. Burton, M. J. Winter, D. Flower	C. Wordsworth	Bristol City Line Ltd.
British Ambassador	18.8.67	E. W. Shingler	A. H. McGregor, C. Wood, D. Cowell	R. Gittos	B.P. Tanker Co. Ltd.
British Bombardier	31.1.68	J. R. Scott	R. Stevens, G. B. Sinclair, J. E. Edwards, M. J. Lazonby	T. C. Baldwin	B.P. Tanker Co. Ltd.
British Oak	4.9.67	F. A. Frost			B.P. Tanker Co. Ltd.
British Resource	8.2.68	K. H. Lewis	J. L. Stewart, R. Jarrett	M. Gale	B.P. Tanker Co. Ltd.
British Sailor	3.3.67	N. Michaels	C. Kelly, T. Marrs, G. Waite	P. Williams	B.P. Tanker Co. Ltd.
British Splendour	5.10.67	A. Hendry	P. Stewart, J. Shields, C. Raywood	M. T. Smith	B.P. Tanker Co. Ltd.
British Trust	31.7.67	R. M. Jary	D. W. Batchelor, G. Fletcher, M. J. Berry	S. R. Penn	B.P. Tanker Co. Ltd.
Buccleuch	15.3.68	J. Downard	K. N. Metcalfe, C. B. Thorpe, R. Donaldson, M. J. Ingamells	D. Drummond	Hain-Nourse Ltd.
Bulimba	13.2.67	D. P. Barry	T. R. Young, E. K. Bushnell	C. J. A. Voutt	British India S.N. Co. Ltd.

Selected Ships (*contd.*)

Name of Vessel	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Cairngowan	28.2.68	J. Lobban	J. Stanford, J. Craigan, I. McRae, I. White.	R. Marshall	Cairns Noble & Co.
Calchas	7.12.67	H. K. Timbrell	P. J. Wood, C. D. Elton, P. C. Ninnes	D. Wilford	Ocean Fleets Ltd.
Caledonia Star	26.2.68	L. Allsford	W. R. Houghton Boreham, M. A. Fraser	W. A. Fitzgerald	Blue Star Line Ltd.
California Star	23.2.68	F. Wood			Blue Star Line Ltd.
Caltex Canberra	15.3.68	N. E. Nute	D. T. Smith, A. MacDonald, P. W. Foot	A. O'Brien	Texaco Overseas Tankship Ltd.
Caltex Edinburgh	30.1.68	T. Kennington	M. E. Linklater, P. H. Morgan, N. Morrice	N. A. O'Connor	Texaco Overseas Tankship Ltd.
Caltex Saigon	20.11.67	E. H. Adams	M. D. Robinson, R. A. Stallard	M. Berne	Texaco Overseas Tankship Ltd.
Camito	29.2.68	A. Thomson	J. Masson, P. N. Cumbers, M. R. Curtis	G. R. McCarroll	Elders & Fyffes Ltd.
Canadian Star	22.3.68	A. H. White	P. Holtby, M. Dunn, A. Goodman	R. M. Makepeace	Blue Star Line Ltd.
Canara	27.3.68	R. C. Old	R. A. McK. Leighton, C. J. Fox, H. P. Baroni	M. Nash	British India S.N. Co. Ltd.
Cannanore	10.1.68	R. N. Firth	R. P. Priestley, F. H. Feasey, G. T. Dickens	C. Gurman	P. & O. Lines Management Ltd.
Canopic	8.3.67	M. Larrive	R. Ashton, C. Davis, R. Wooding	K. Beman	Shaw Savill & Albion Co. Ltd.
Canterbury Star	23.3.65	T. A. Ireland	R. Johnston, C. D. Churcher, D. Wale	G. Arnup	Blue Star Line Ltd.
Cape Franklin	15.2.68	T. P. Edge	H. S. Taylor	B. Breslin	Lyle Shipping Co. Ltd.
Cape Howe	19.1.68	A. M. Fraser	P. Hewitt	H. A. Chambers	Lyle Shipping Co. Ltd.
Cape Nelson	19.1.68	D. Sinclair	C. Bush, J. Hetherington	J. Chamberlain	Lyle Shipping Co. Ltd.
Cardiff City	4.9.67	F. J. Johns	D. A. Wilkinson, T. R. McNulty, D. J. Mockett	G. Davies	Sir Wm. Reardon Smith & Sons Ltd.
Cardiganshire	21.3.68	C. S. MacKinnon	J. L. R. Saverimutto, J. P. May, D. A. Kehl, P. F. Robinson	D. Sibley	Ocean Fleets Ltd.
Carmania	9.10.67	H. A. Stonehouse, D.S.C., R.D.	K. H. Stanley, I. A. M. Watt, A. T. Willy, R. G. Southern	D. Letcher	Cunard S.S. Co. Ltd.
Carrigan Head	25.1.68	T. Sellers	D. T. Alexander, G. Knight, H. O'Byrne, J. Jenkinson	E. Dalton	G. Heyn & Sons Ltd.
Caxton	11.8.67	J. G. Wilson	B. Malinowski	W. P. Edmunds	Transatlantic Carriers Ltd.
Ceramic	14.2.68	N. S. Milne, O.B.E.	R. M. Baddeley, R. W. Joughin, J. W. Neil	F. E. Page	Shaw Savill & Albion Co. Ltd.
Chakla	22.11.67	H. N. Severs	G. C. Hatcher, R. H. Small, A. J. Ketoyo, L. A. Bowman	C. W. Cameron	British India S.N. Co. Ltd.
Chantala	27.12.67	F. Bell	J. Craig, A. W. Watson, D. P. Hall	C. J. A. Jones	British India S.N. Co. Ltd.
Cheshire	24.4.67	J. W. Waldie	A. H. Peters, K. Arthur, G. F. Dobson, S. R. Dyer	W. S. Hopwood	Bibby Line Ltd.
Cheviot	23.5.67	G. Robison	W. F. Firman, R. Wilson, W. Robinson, R. I. Crawford	R. J. Morrow	Bamburgh Shipping Co. Ltd.
Chicanoa	*	P. A. Chubb	K. W. Gordon, C. J. Gilbert, J. C. Twite	J. N. MacDonald	Elders & Fyffes Ltd.
Chindwara	20.3.68	J. A. McCowan	P. D. Davies, D. H. Brown, A. R. Jones	J. F. Keohane	British India S.N. Co. Ltd.
City of Birmingham	4.3.68	T. Lovell	B. K. Keith, C. W. Rapley		Ellerman Lines Ltd.
City of Brisbane	7.9.67	K. B. James	C. K. Nelson, P. D. Murphy, H. M. Townsend, P. D. Lester	B. J. Brown	Ellerman Lines Ltd.
City of Canberra	1.7.66	T. Rigg	P. D. Murphy, R. Bloss, J. Anderson	S. J. Duffy	Ellerman Lines Ltd.
City of Chester	1.3.68	N. A. Perry	G. G. McLeod, M. J. Raison, D. J. T. Davies	R. Sykes	Ellerman Lines Ltd.
City of Eastbourne	*	G. G. Francis	R. M. Herring, C. Hainsworth, E. S. Fowler	—. Brereton	Ellerman Lines Ltd.
City of Glasgow	22.11.67	R. K. Walker	A. D. Brown, A. Comrie, C. Bunt	D. F. Wilson	Ellerman Lines Ltd.
City of Johannesburg	1.2.68	F. C. O'Neill	J. M. Waller, D. R. Harman	P. G. Roscoe	Ellerman Lines Ltd.
City of Karachi	*	R. H. Broadbent	J. Parker, C. D. Royse, M. G. Robertson	D. Tremayne	Ellerman Lines Ltd.
City of Khartoum	13.11.67	K. C. Powell	M. E. Harris, C. Baxter, G. Watt	P. Precious	Ellerman Lines Ltd.
City of Manchester	7.6.67	G. R. Jackson	T. F. Weale, D. Cullen, T. D. Parkhouse	M. H. Crocker	Ellerman Lines Ltd
City of Melbourne	28.8.67	R. Frame	M. J. M. Stewart, B. W. Noble, H. E. Rowlands, P. D. Kimber	P. J. Ryan	Ellerman Lines Ltd.
City of Oxford	26.1.68	B. T. Wortley	E. W. Webster, D. D. Jamieson, R. G. Matson, R. P. Sargent	J. Brierley	Ellerman Lines Ltd.
City of Swansea	1.2.68	J. S. Grant			Ellerman Lines Ltd.
City of Wellington	26.4.67	H. Lewis	B. C. Spaven, M. P. Lamble, P. A. Marcon	M. Ley	Ellerman Lines Ltd.

City of Winchester	13.2.67	H. Swinney	D. J. Baird, P. Kimber, D. C. Butcher	D. A. Holmes	Ellerman Lines Ltd.
Clan Macdonald	8.1.68	D. H. MacMillan	G. D. Bowie, T. Aitchison, D. Johnson	G. Gascoyne	Clan Line Steamers Ltd.
Clan Macdougall	15.3.68	R. Wise	Tet-Tun, M. A. T. MacMillan, J. Simpson	J. H. Williams	Clan Line Steamers Ltd.
Clan Macgillivray	28.12.67	A. Crawford	T. Hazelton, E. Martin, J. S. Howett	J. Wright	Clan Line Steamers Ltd.
Clan Macgowan	26.4.67	W. H. Bosanquet	P. H. Dathan, W. Walker, P. Flatau	G. L. MacIndoe	Clan Line Steamers Ltd.
Clan Macgregor	5.2.68	T. R. Halliday	J. N. C. Greaves, R. W. D. Kenyon, R. A. Hunter	J. K. Paterson	Clan Line Steamers Ltd.
Clan Macilwraith	27.3.68	P. N. V. Rewell	R. D. Williams, J. H. Apsey, I. C. Cameron	E. I. Kelly	Clan Line Steamers Ltd.
Clan Macindoe	17.7.67	T. Coats	C. J. Green, R. E. Todd, R. A. Slack, K. J. Barry	N. Birnie	Clan Line Steamers Ltd.
Clan Maclaren	31.1.68	S. Hagan			Clan Line Steamers Ltd.
Clan Maclay	4.3.68	R. Harber			Clan Line Steamers Ltd.
Clan Maclean	20.12.66	J. M. Lycett	R. B. Robertson	N. Sherrin	Clan Line Steamers Ltd.
Clan Macleod	23.2.68	T. H. Graham			Clan Line Steamers Ltd.
Clan Macnab	18.1.68	T. R. Kendra	C. H. Vickers, P. Lightbody	D. McNeil	Clan Line Steamers Ltd.
Clan Macnair	18.12.67	C. C. Atkinson	T. Harris, R. B. Reid	M. MacDonald	Clan Line Steamers Ltd.
Clan Mactavish	27.12.67	W. J. Freestone, M.B.E.	E. N. Perera	T. R. Seddon	Clan Line Steamers Ltd.
Clan Ramsay	7.6.67	A. M. Kennedy	R. A. Hobson, M. Forster, P. Austin, A. A. Graham		Clan Line Steamers Ltd.
Clan Sutherland	27.3.68	F. J. Pye, M.B.E.			Clan Line Steamers Ltd.
Corinthic	15.1.68	W. Newport	P. Simmonds, D. Pearse, J. Kluka, C. V. Farrant	N. Boyd	Shaw Savill & Albion Co. Ltd.
Cotopaxi	19.2.68	L. W. Cooper, O.B.E.	S. Copeland, P. R. Brown, W. Jenkins	P. Lyons	Pacific S.N. Co. Ltd.
Cotswold	6.6.67	J. M. Downard	M. G. Keates, J. Armstrong, D. J. Daniel	C. J. Smyth	Hain-Nourse Ltd.
Coventry City	8.1.68	M. J. Butler	M. A. Jones, M. J. Tyrell, T. N. Morris, M. T. Reeves	W. Hopwood	Bibby Line Ltd.
Cretic	21.7.67	V. H. Vizer	R. J. Eastwood, D. Pearse, D. Williams	E. Cathcart	Shaw Savill & Albion Co. Ltd.
Crinan	4.3.68	G. J. McIntosh	B. E. Davies, A. Murray, V. Wallace, N. Morrison	A. J. Davies	J. & J. Denholm (Management) Ltd.
Crofter	29.9.67	R. Sutcliffe	S. Fraser, F. Curry, K. Kitchen	K. Greene	T. & J. Harrison Ltd.
Crystal Crown	14.12.67	F. Bowden	J. F. Allen, J. E. Sherwood, J. W. Johnstone	N. M. O'Doherty	Sugar Line Ltd.
Crystal Diamond	26.2.68	D. Patrickson	C. E. Houghton, M. H. Case, J. King, G. P. Colebrook	D. Panton	Sugar Line Ltd.
Crystal Gem	24.1.68	B. Evans	E. D. Want, W. C. Cowan, I. Spence	C. Ride	Sugar Line Ltd.
Crystal Jewel	20.2.68	N. S. Lancaster	E. McEwen, D. Mustarde, C. S. D. Wright	R. G. Hollett	Sugar Line Ltd.
Crystal Sapphire	8.12.67	J. E. Leaver	P. G. S. Dove, B. Cole, P. F. Curry, T. M. Tait	M. J. Flood	Sugar Line Ltd.
Cumberland	27.12.67	C. P. Robinson	R. C. Sclater, J. R. Collins, J. P. Paling	A. Titley	Federal S.N. Co. Ltd.
Cymric	24.1.68	G. V. Conolly, D.S.C.	G. N. Davis, T. N. O'Driscoll, M. Gochin	J. J. Cameron	Shaw Savill & Albion Co. Ltd.
Daghestan	*	G. Sharpe	R. Wynd, J. Wood, W. Graham	P. Williams	Common Bros. Ltd.
Dalesman	2.2.68	A. Sutherland	M. G. Bolland, J. B. Turnbull, L. R. Christansen, J. Blackley	E. Forrest	T. & J. Harrison Ltd.
Dartwood	25.1.68	A. Dover			Wm. France Fenwick & Co. Ltd.
Delphic	28.8.67	B. H. Agnew	D. J. Barrett, R. J. O. Kent, J. W. Herring, A. Brundish	A. Carrigan	Overseas Containers Ltd.
Denbighshire	29.11.67	W. R. Willis	D. J. Tatham, G. Patterson-Mandagie, J. A. Davison	J. Ramsay	Ocean Fleets Ltd.
Devis	28.2.68	J. I. Jones	R. Jones	J. Lee	Lamport & Holt Line Ltd.
Devon	18.12.67	J. D. Hellings	C. J. Francis, C. Greenwood, R. W. Briggs, R. G. J. Davis	C. E. Hughes	Federal S.N. Co. Ltd.
Devon City	12.2.68	D. L. G. Jones	J. J. Kalnins, J. Cann, C. F. Baxter	B. Williams	Sir Wm. Reardon Smith & Sons Ltd.
Diomed	22.11.67	M. G. Thomas	P. M. MacWilliam, D. A. MacMahon, A. Hamilton, —. McMagill	T. F. Scott	Ocean Fleets Ltd.
Discovery	15.1.68	R. H. A. Davies			National Institute of Oceanography
Donegal	5.3.68	J. M. Peirce	J. D. Inwood, E. Williams, C. A. Baker	P. McNally	Trinder Anderson & Co. Ltd.
Dorset	21.12.67	C. A. Miller	P. E. Keyes, A. J. Fulton, B. Trevorrow	S. J. N. Griffith	Federal S.N. Co. Ltd.
Duhallow	11.1.68	G. A. McKay	R. A. Woof, M. Tregoning, M. R. Cowton, J. C. M. Herbert	G. W. Shaw	Hain-Nourse Ltd.
Dukesgarth	8.12.67	N. Richardson	R. Reay	J. Stephen	Wm. Cory & Son Ltd.
Dunedin Star	4.12.67	E. J. Jones	C. Jackson, R. Landahl, P. Smell	B. D. McSweeney	Blue Star Line Ltd.
Eden	5.9.67	F. M. Dickenson	M. J. Kenyon, J. L. Frain, J. L. Buckett	E. Smith, E. H. R. Dickson	Royal Mail Lines Ltd.
Edenmore	21.3.68	A. L. Wiles	D. Bowman, J. Rutherford, A. Tilmouth, J. H. Bletsoe	J. Prudhoe	Furness Withy & Co. Ltd.
Edinburgh Castle	21.12.67	D. W. Sowden, R.D.	D. W. Fellowes, J. Grundy, C. Bunyan, A. Slater	H. Liggins	Union-Castle Mail S.S. Co. Ltd.
Edward Wilshaw	23.11.67	J. Reilly	I. R. Bosworth, G. Thomas	J. Gallagher	Cable & Wireless Ltd.
Egton	2.1.67	S. Jackson	W. Colquhoun, R. Ridsdale, M. Phillips	S. Lefabre	Roland & Marwood S.S. Co.
Elmbank	15.6.67	T. Walton	A. P. Watson, J. Gardner, R. B. Booth	C. R. Hill	Bank Line Ltd.
Empire Star	27.12.67	G. T. King	M. A. E. Delany, D. McNeil, P. Anstis	B. Williams	Lamport & Holt Line Ltd.

Selected Ships (*contd.*)

Name of Vessel	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Empress of Canada	27.9.66	F. W. S. Roberts	T. Parker, W. Watterson, P. Adair, A. Morris.	P. McNab	Canadian Pacific S.S. Ltd.
Empress of England	31.3.66	R. Walgate			Canadian Pacific S.S. Ltd.
English Star	8.1.68	G. J. A. Seaye	D. S. Fforde, H. N. Owen, A. W. Kinghorn	J. A. Barry	Blue Star Line Ltd.
Ernest Holt	18.11.66	E. A. Binnington		R. W. J. Gregory	Ministry of Agriculture & Fisheries
Essequibo	19.3.68	J. M. F. Anderson	M. Fenwick, M. A. Hobbs, D. Mortimore	P. Hennessey	Royal Mail Lines Ltd.
Essex	6.7.67	A. B. Stalker	P. G. Starkey, M. K. Handfield, J. Beeby	S. Adams	Federal S.N. Co. Ltd.
Esso Exeter	21.9.67	E. W. Thomas	T. S. Joyce, H. N. McQuaid, I. McD. Campbell	P. A. Barrett	Esso Petroleum Co. Ltd.
Esso Hampshire	7.3.68	A. W. Eadie	P. A. Kearney, G. Daykin, J. Way	R. Kimberley	Esso Petroleum Co. Ltd.
Esso Pembrokeshire	8.1.68	R. E. Smith	S. J. Green, G. Ashworth, E. J. Baines, J. G. Riddell	C. M. Dunwoody	Esso Petroleum Co. Ltd.
Esso Warwickshire	19.10.67	T. Jemison	K. E. Stacey, J. A. Haswell, G. F. Thomas	F. Jones	Esso Petroleum Co. Ltd.
Esso York	18.1.68	F. Verbist	S. Allerston	T. F. Pearson	Esso Petroleum Co. Ltd.
Explorer (F.R.S.)	29.1.68	A. A. Baxter	J. McBride, J. Steven, J. Craig	J. Steven	Dept. of Agriculture & Fisheries for Scotland
Explorer (m.v.)	2.2.68	G. Sigsworth			T. & J. Harrison Ltd.
Farsistan	26.10.67	R. B. Arthur, M.B.E.	G. C. Insh, R. Ling, I. Stroud, D. M. Foster	W. Williams	Frank C. Strick & Co. Ltd.
Fidra	10.1.68	G. A. Walterson	C. McLeod	A. Nicolson	Chr. Salvesen & Co. Ltd.
Firbank	23.6.66	W. Watson	R. A. Bazaire, A. K. Gillespie, E. Irvine	D. Wilson	Bank Line Ltd.
Flintshire	27.3.68	R. G. Rippon	D. J. H. Custance, R. K. MacDonald, J. A. Davison, A. E. J. Coates	C. Branthwaite	Ocean Fleets Ltd.
Floristan	11.1.68	P. W. Filcek	J. W. Wightman, M. H. Wilson, D. K. Crabb	R. P. Tomalin	Frank C. Strick & Co. Ltd.
Forthfield	24.11.67	L. Abuelo	D. G. Evans, W. R. Pugsley, A. D. Jones	J. F. L. Stephen	Hunting & Son Ltd.
Fourah Bay	28.2.68	R. G. Williams			Ocean Fleets Ltd.
Franconia	29.12.67	G. E. Smith	G. R. E. Yeatman, P. Carling, A. Dunster, M. Macleod	A. Henderson	Cunard S.S. Co. Ltd.
Galway	28.2.68	E. J. Ridout			Trinder Anderson & Co. Ltd.
Geestbay	11.1.68	O. Springett	J. M. R. Skinner, B. Thomas	J. F. Maulkin	Geest Industries Ltd.
Geestcape	8.1.68	P. W. Groves	N. Cooper, K. Waters, M. McLeod	J. Kennedy	Geest Industries Ltd.
Geesthaven	2.1.68	D. G. Powell	R. Cole, L. Heywood Jones	R. F. Collins	Geest Industries Ltd.
Geestport	17.1.68	A. McNeil	R. E. Baker, L. Heywood Jones, M. MacLeod, G. de F. Foster	C. J. Beckett	Geest Industries Ltd.
Georgina V. Everard	27.3.68	J. McNab	D. G. Green, J. Massie, G. McLeod, J. Wilson	W. Arscott	F. T. Everard & Sons Ltd.
Glanely	8.6.67	R. G. Ogden	R. H. Murray, J. R. Warlow, F. Kinnersley		W. J. Tatem Ltd.
Glenalmond	18.12.67	N. Willis	J. M. Wilson, G. A. Berry, D. McLaren, J. Stewart	A. Maloney	Ocean Fleets Ltd.
Glenearn	8.12.67	G. I. Wright	H. G. S. Davies, J. P. A. Clarke, J. B. Lloyd	A. Brown	Ocean Fleets Ltd.
Glenfalloch	28.12.67	P. H. Edwards	E. N. Greenwood, N. G. Simpson, D. Hall	W. W. Beebee	Ocean Fleets Ltd.
Glengarry	24.1.68	R. J. Paterson	G. K. Thomson, G. C. Vickery	R. P. R. Sibley	Ocean Fleets Ltd.
Glengyle	18.12.67	D. H. Stewart	P. Barlow-Morris, J. Maine, J. Hill, C. Hampson, J. Spain, J. Fisher	D. P. Stoker	Ocean Fleets Ltd.
Glenlyon	22.11.67	R. C. L. Laxton	I. H. Morris, V. Geddie, W. R. C. Butler	R. Westwood	Ocean Fleets Ltd.
Glenmoor	27.12.67	A. Fielding	J. H. Burn, D. Robinson, L. McKenzie	J. White	Walter Runciman & Co. Ltd.
Glenogle	29.1.68	I. R. Atkinson	J. W. P. Kemp, P. R. Lyon, J. S. W. Hogarth	J. Meldrum	Ocean Fleets Ltd.
Glenorchy	23.10.67	J. C. Liptrot	M. J. Hindley, D. A. Kehl, P. J. Povall, K. D. Campbell	S. Brannen	Ocean Fleets Ltd.
Glenpark	30.10.67	H. MacDonald	T. M. P. Thomas, I. G. Robertson, T. K. Corbett, E. Miller	J. Hitchen	Ocean Fleets Ltd.
Gloucester City	24.1.68	J. R. Campbell	A. D. Garner, J. W. Rogers, P. Hickling	H. Roderick	Bristol City Line Ltd.
Gloucestershire	27.12.67	A. E. Young	H. Paulusz, D. I. Jones, K. McLeod, R. R. Baker	D. Alcock	Bibby Line Ltd.
Gloxinia	16.10.67	J. E. Shaw	W. Fallon	A. Hughes	Stag Line Ltd.
Golfito	7.3.67	E. Whitehouse			Elders & Fyffes Ltd.

Good Hope Castle	25.3.68	A. Freer		R. Mercer	Union-Castle Mail S.S. Co. Ltd.
Gorjistan	18.12.67	D. F. J. de Neumann	T. Chantler, S. T. S. Household, K. H. Gear.	R. Milner	Frank C. Strick & Co. Ltd.
Gothic	22.11.67	H. O. V. Andersen, M.V.O.	M. Gochin, A. Cope, P. Stockings	B. McGovern	Shaw Savill & Albion Co. Ltd.
Gothland	4.3.68	J. M. Laing		J. R. Jackson	Currie Line Ltd.
Governor	30.3.67	G. A. Cain	M. J. Bottomley, I. Barber, K. Leckie	T. Parker	T. & J. Harrison Ltd.
Halifax City	13.2.68	E. Irish	A. Downing, D. Simpson, M. J. Pain, D. M. Watchorn	R. J. Rumble	Bristol City Line Ltd.
Haparangi	7.12.67	I. Y. Batley	P. G. Starkey, A. Robinson, R. A. Cooke, N. Miller	J. P. Whiteley	New Zealand Shipping Co. Ltd.
Hauraki	4.3.68	J. S. Laidlaw	P. J. R. Manson, P. Storm, J. D. Beeby	T. H. Webb	New Zealand Shipping Co. Ltd.
Hazelmoor	17.8.67	T. R. Rowe	G. Turnbull, A. Johnston, G. T. Parker	A. Thomson	Walter Runciman & Co. Ltd.
Hector	19.2.68	J. Petticrew	J. E. Tumility, D. R. Smith, D. F. Duffin, J. M. Terry	G. R. Douglas	Ocean Fleets Ltd.
Hector Heron	20.12.66	S. Hay	M. Donkin, J. Conacher, J. Berry	J. Sandison	Hector Whaling Ltd.
Helenus	28.12.67	N. O. Martin	P. A. Clements, R. A. Mason, A. K. Turner, D. Macleod, D. J. Shute	W. C. A. Phillips	Ocean Fleets Ltd.
Helisoma	19.3.68	G. M. Sutherland	J. P. Briand	L. J. Elderfield	Shell Tankers (U.K.) Ltd.
Hemimactra	10.11.67	G. Anderson	N. A. Brocklesby, L. J. Walton, M. B. Harvey	C. Keohane	Shell Tankers (U.K.) Ltd.
Herefordshire	28.9.67	A. N. Williamson			Bibby Line Ltd.
Hertford	25.3.68	A. B. Stalker	M. G. Smith, P. T. Clegg, J. McEwan	A. F. Holmes	Federal S.N. Co. Ltd.
Himalaya	8.2.68	M. R. Prowse	P. R. Simmonds, G. A. Burton, C. J. C. Johnston	C. Jameson	P. & O. Lines Management Ltd.
Hinakura	15.12.66	N. L. Warren	R. J. Ayers, B. R. Baggott, C. J. Brownings, P. C. Hornett	W. F. Law	New Zealand Shipping Co. Ltd.
Hinea	15.1.68	J. A. Potts	G. R. Howe, B. M. Davison, C. J. Whitton, N. Woodhouse	P. J. McGill	Shell Tankers (U.K.) Ltd.
Horomya	19.2.68	C. C. Waugh	D. Still, B. Loly, W. F. Brierley, A. M. Wineberg	G. P. Blennerhassett	Shell Tankers (U.K.) Ltd.
Hororata	4.5.67	J. M. Ramsay	M. H. Lawrence, R. A. Cooke, M. Austin	J. Hibbert	New Zealand Shipping Co. Ltd.
Humilaria	28.11.67	J. A. Forbes	I. S. Walker, J. B. Leach, A. Lamb	D. C. Simon	Shell Tankers (U.K.) Ltd.
Huntingdon	19.2.68	T. F. J. Alderman	P. S. Massey, D. R. Mountford, R. K. Blake	B. T. Davis	Federal S.N. Co. Ltd.
Huntsland	*	F. B. Cocking	L. G. Keizer, B. Wright, R. S. James	J. Mathers	O. Gross & Sons Ltd.
Hurunui	7.12.67	S. G. Robinson, M.B.E.	M. C. Payze, M. Elsam, A. MacKinnon, A. Evans	W. Kay	New Zealand Shipping Co. Ltd.
Hyala	20.2.68	G. Griffiths	W. E. E. Lake, R. Palmer, M. Morris, T. Kingston	T. P. Furey	Shell Tankers (U.K.) Ltd.
Iberic	27.10.67	J. Gunning	D. S. Sully, A. G. Evans, F. E. Beer	J. C. Ryan	Shaw Savill & Albion Co. Ltd.
Illyric	5.3.68	G. V. Conolly, D.S.C.	D. W. Owen, M. J. Collins, P. J. Marchbank	H. A. Sirett	Shaw Savill & Albion Co. Ltd.
Imperial Star	22.3.67	E. C. Laidlaw	P. C. Nicholls, J. Hall, P. Buffett	R. Durston	Blue Star Line Ltd.
Indus	18.12.67	J. E. Sellars	M. A. Paddon, J. C. Abbot, C. Maciver	M. Anderson	Hain-Nourse Ltd.
Ingleton	5.4.67	C. C. Brown	C. Thompson, T. L. Newton, K. Corcoran	M. H. Stalker	Chapman & Willan Ltd.
Inishowen Head	6.3.68	A. Fee	W. M. Morrison		G. Heyn & Sons Ltd.
Inverbank	29.1.68	G. W. Patterson	D. H. Tiles	J. Tyndall	Bank Line Ltd.
Inverewe	*	J. Nichol	J. Holroyd, M. Thorp, P. Kilvington		J. & J. Denholm (Management) Ltd.
Ionic	22.1.68	B. Hinderwell	T. R. Falk, M. Murray, R. Batchelor	I. Adamson	Shaw Savill & Albion Co. Ltd.
Iron Barque	21.6.67	J. H. Reay	J. Gyte, R. Wood, N. F. Harris, G. Thompson	T. D. Walker	Common Bros. Ltd.
Iron Crown	27.3.68	J. W. Wright			Common Bros. Ltd.
Iron Horse	23.1.68	M. T. Richardson	D. Falconar, R. Childerstone	K. Reynolds	Common Bros. Ltd.
Iron Ore	16.10.67	I. S. Taylor	R. B. Crosby, W. Graham, E. Jones	B. Jones	Common Bros. Ltd.
Ixion	19.3.68	F. N. Curphey	I. P. Teale, D. W. Bunyon, J. H. W. Whitaker	G. Clark	Ocean Fleets Ltd.
Ivernia	27.12.67	J. W. Killan	B. Hird, D. Potter	E. MacKinnon	Cunard S.S. Co. Ltd.
Jamaica Planter	12.2.68	M. C. Harper	G. T. Bell, B. Youles	F. G. Huggett	Kaye Son & Co. Ltd.
Jamaica Producer	27.12.67	G. A. Foulds	R. J. Banks, E. K. Rutherford, D. McDonald, R. G. Smith	K. R. Mugridge	Kaye Son & Co. Ltd.
Jason	16.11.67	H. S. Clarke, M.B.E., D.S.C.	D. M. Richards, H. W. Simmonds, R. A. Jones	P. J. A. Connell	Ocean Fleets Ltd.
John Biscoe	5.6.67	T. Woodfield	M. A. Fraser, E. M. Phelps, P. Hay, B. Joubert	H. O'Gorman	British Antarctic Survey
John Murray	23.10.67	M. J. Perry	P. H. Maw, J. E. Higham		Natural Environment Research Council
Jumna	22.3.68	M. Ryan	B. V. Purvis, —. Bettles, S. R. Milburn	A. L. Dobson	Hain-Nourse Ltd.
Karaghistan	1.2.67	H. D. Quick	J. Ridout, S. T. S. Household, J. W. Wightman, M. Saunders	J. Morrison, M. P. J. Davis	Frank C. Strick & Co. Ltd.
Kenuta	8.3.68	A. Maclean	S. McCollin, S. E. Chapman	H. G. Burton	Pacific S.N. Co. Ltd.
Kenya	12.2.68	I. K. Bowerman	G. F. Lack, R. A. Childs, J. A. Tanner	J. D. Masterman	British India S.N. Co. Ltd.
King Arthur	15.1.68	I. M. Shearer			King Line Ltd.
Kinnaird Castle	16.6.67	D. T. Griffiths	A. E. Mellon, I. Berry, P. A. Laurie, J. Madge	G. K. Emmett	Union-Castle Mail S.S. Co. Ltd.

Selected Ships (*contd.*)

Name of Vessel	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Kinpurnie Castle	13.10.67	H. Lockyer		J. Pedre	Union-Castle Mail S.S. Co. Ltd.
Kohistan	29.9.67	W. H. D. Marker	C. J. Bush, B. J. Toft, M. J. Sterland, B. J. Bartlett	J. Duignan	Frank C. Strick & Co. Ltd.
Laganbank	29.11.67	T. D. Scott	J. C. E. Stuart, D. Stewart, F. A. Skinner	G. B. Randall	Bank Line Ltd.
Laksa	20.11.67	W. G. Ross			Chr. Salvesen & Co. Ltd.
Lancashire	28.8.67	R. Weir	K. R. Kumarasinghe, A. Preshaw, M. Kingsmill	J. Scorgie	Bibby Line Ltd.
Limerick	7.6.67	J. D. Blake	M. R. Emerson, N. Luck, D. Maeer	R. Nolan	Trinder Anderson & Co. Ltd.
Lindisfarne	24.1.68	P. Gardiner	W. F. Firman, D. A. Walker, R. Cordon, T. E. Wilson	D. Denisoff	W. A. Souter & Co. Ltd.
Linkmoor	25.8.67	R. R. Jordan	K. Grierson, T. Hall, K. R. Wind	A. Cruden	Walter Runciman & Co. Ltd.
Loch Gowan	26.2.68	M. B. Wingate	S. Uminski	W. Doyle	Royal Mail Lines Ltd.
Loch Loyal	24.1.68	G. C. W. Meldrum, M.B.E.	G. A. Bateman, D. A. Allin, R. C. Phillips	J. McMillan	Royal Mail Lines Ltd.
Loch Ryan	*	A. H. Cooke	B. M. Bowden, J. Gray, J. Usher	J. Shand	Furness Withy & Co. Ltd.
Logna	15.3.68	P. H. Telfer	S. McGillivray		Chr. Salvesen & Co. Ltd.
Longstone	22.1.68	H. Dishman	M. Cantin, J. Walker, G. W. Robinson, A. Jameson	A. D. Easton	W. A. Souter & Co. Ltd.
Lord Strathcona	8.2.68	J. Wyllie	J. B. Jones, B. Elson, R. Wright	C. Brown	Canadian Pacific (Bermuda) Ltd.
Mabel Warwick	12.2.68	A. Fowler	M. P. O'Shea, G. Walterson, W. Nicol	N. O'Callaghan	Houlder Bros. Co. Ltd.
Magdapur	24.1.68	J. C. Long	D. Byrne, A. Bassi, M. W. Young, A. R. Anderson	R. Davis	Cunard-Brocklebank Ltd.
Mahout	19.3.68	S. Baxter	A. A. Smith, C. P. Margeson, C. S. Kingston	J. Fuller	Cunard-Brocklebank Ltd.
Mahseer	11.10.67	A. B. Davies	A. H. Lord, K. J. G. Bell, E. Walter, T. Williams	G. Chorlton	Cunard-Brocklebank Ltd.
Makrana	14.8.67	P. D. McKenzie	D. B. Cox	J. M. Scarratt	Cunard-Brocklebank Ltd.
Manchester City	27.12.67	A. Starmer, J. Illingworth	D. Geddes, R. A. Brown	P. A. Byrne	Manchester Liners Ltd.
Manchester Commerce	12.5.67	J. E. Askew	A. Scotland, F. J. Shepherd, S. Baker, G. Hughes-Jones	D. Hodgson	Manchester Liners Ltd.
Manchester Exporter	5.6.67	L. C. Taylor	W. H. Jackson, J. Baker, G. Shadbolt, W. R. Donaldson	F. M. Berry	Manchester Liners Ltd.
Manchester Faith	4.3.68	J. Illingworth	L. Street, D. Smith, G. Hughes-Jones	J. Patterson	Manchester Liners Ltd.
Manchester Fame	28.2.67	J. Illingworth	R. Galloway, A. Milroy	E. Dickson	Manchester Liners Ltd.
Manchester Freighter	23.1.68	J. Hogg	K. D. Hunter, M. Robson, L. Rowse, G. A. Mackay	R. Stewart	Manchester Liners Ltd.
Manchester Mariner	31.3.67	A. Cookson	D. Pickles, J. Williamson, D. R. Perry, D. Morton	T Berry	Manchester Liners Ltd.
Manchester Merchant	21.3.68	D. S. Millard	B. A. Nelson, G. B. Hannaford, C. J. Hunt, S. J. Owen	T. Berry	Manchester Liners Ltd.
Manchester Miller	28.3.66	E. W. Espley	F. Shepherd, D. W. Whitworth, R. Woods, J. Chapman	E. Heywood	Manchester Liners Ltd.
Manchester Port	26.7.67	P. N. Fielding	C. J. Hunt, P. Humphreys, D. Deer	W. Stirling	Manchester Liners Ltd.
Manchester Progress	*	A. Cookson	R. Galloway, K. W. Rourke, D. Perry	—. Berry	Manchester Liners Ltd.
Manchester Renown	30.6.66	W. E. G. Oliver	J. H. Cryer, C. N. McLean, L. Clark, J. Williamson	V. Dalton	Manchester Liners Ltd.
Manchester Shipper	26.2.68	J. M. Rushworth			Manchester Liners Ltd.
Manchester Spinner	28.2.68	J. E. Jones	M. Wilkinson, A. S. Bashford, T. B. Hancock, G. S. Shadbolt	C. Holbrook	Manchester Liners Ltd.
Manchester Trader	5.3.68	J. R. Stephens	D. J. Burton, P. L. Goodwin, D. Garside	J. MacCarthy	Manchester Liners Ltd.
Marabank	29.1.68	J. B. Mitchell	I. C. Murray, W. Geddes	J. Kwiatkowski	Bank Line Ltd.
Maron	30.10.67	H. S. Taylor	C. D. Jones, J. M. Irvine, M. Tomlinson	R. J. Leppard	Ocean Fleets Ltd.
Matina	3.10.66	N. W. Thomas	P. G. Pinkerton, A. Ditchfield	H. Burton	Elders & Fyffes Ltd.
Mawana	12.2.68	J. P. Jackson	R. Winn, A. G. M. Ward, M. J. Agnew	C. Watson	Cunard-Brocklebank Ltd.
Media	18.12.67	A. Bull	J. H. Duncan, R. B. Bradbury, J. C. Parry	C. C. Connerty	Cunard S.S. Co. Ltd.
Melampus	6.2.67	H. K. Martin	P. Dawson, P. J. Hamilton, D. J. Metcalf, D. J. Tatham	E. O. Barnfather	Ocean Fleets Ltd.
Melbourne Star	8.2.68	G. Bowden	M. McDowall	D. Warner	Blue Star Line Ltd.
Mercury	17.1.68	P. B. Henderson			Cable & Wireless Ltd.
Middlesex	29.12.67	R. E. Baker	J. M. McWilliam, C. Whale, M. F. Keat, J. A. Henderson	M. J. Morrall	Federal S.N. Co. Ltd.
Monarch	28.3.67	O. R. Bates, O.B.E.	C. J. Willard, G. R. Plummer	A. Hindmarsh	H.M. Postmaster General
Montreal City	21.12.67	W. H. Stoodley	P. G. Bowditch, W. Coombes, I. Brinsmead Williams	T. M. Jenkins, M.B.E.	Bristol City Line Ltd.

Neleus	4.1.68	E. W. Alkin	D. Alexander, E. J. Watterson, A. D. Pocket, S. W. Wright	R. J. Daniels — Ocean Fleets Ltd.
Nestor	21.4.66	J. T. Knox	J. Bindon, S. P. Khong, B. Hammond, R. Mason	A. K. Dickins — Ocean Fleets Ltd.
Nevasa	27.6.67	J. D. Hamilton	C. A. H. Blake, A. Woods, A. Tanner, A. Bernthall	W. C. G. Sturgess — British India S.N. Co. Ltd.
Newcastle Star	8.2.68	J. G. King	R. C. Ray, J. R. Kennedy	E. I. Bell — Blue Star Line Ltd.
Newfoundland	23.2.67	J. T. Sheffield, M.B.E.	P. J. Hockaday, J. A. Ramsay, P. Hammond, D. Milliken	F. Murrant — Furness Withy & Co. Ltd.
Northern Star	31.1.68	L. H. Edmeads	J. B. Brown, P. Buckley, P. Hornett, P. Fry	C. L. Carpenter — Shaw Savill & Albion Co. Ltd.
Northumberland	30.11.67	E. T. Rowland	H. J. Vercoe, P. Scarrott, J. F. Pollard	P. Lockitt — Federal S.N. Co. Ltd.
Nottingham	3.7.67	J. A. North	E. F. Lowe, D. R. J. Plimsaul, D. A. Pidgeon	K. W. W. Dougall — Shaw Savill & Albion Ltd.
Nova Scotia	30.11.67	R. I. Heys	B. Brocklesby, N. R. Land, J. Gray, W. Taylor	G. Burke — Furness Withy & Co. Ltd.
Nurmahal	30.10.67	J. J. Reilly	R. J. Smith, D. A. Field, L. J. Jones	E. P. Rockett — Hain-Nourse Ltd.
Obuasi	24.1.68	D. G. Brown		Ocean Fleets Ltd.
Orcades	26.3.68	J. D. O'Green	D. H. Willis, P. L. Morris, B. V. Chipperfield	P. & O. Lines Management Ltd.
Orcoma	9.2.68	A. A. Lang	A. M. S. Baker, J. Smith, G. Roe	J. R. V. Winchester — Furness Withy & Co. Ltd.
Orita	*	J. Leddra	N. Lester, T. Lawrence, P. Chadwick	Pacific S.N. Co. Ltd.
Orna	15.2.68	P. D. Low	W. J. Woodward, R. Wilson, J. Appadurai	R. F. Johnson — British India S.N. Co. Ltd.
Oronsay	4.1.68	R. T. H. Cutler	R. Coldham, C. Larkin, R. Hallmark	J. French — P. & O. Lines Management Ltd.
Orsova	25.3.68	M. A. Trenfield	D. P. Montgomery, R. Andrews, R. C. Ellison	H. Burch — P. & O. Lines Management Ltd.
Otaio	13.10.67	F. S. Angus	M. H. Lawrence, L. E. Howell, D. A. Fyson, P. H. Milburn	L. H. Sutton — New Zealand Shipping Co. Ltd.
Otaki	18.3.68	M. J. Heron	B. J. Prince, A. Ward, G. Stalker, A. Jagger, P. Phillips	A. MacInnes — New Zealand Shipping Co. Ltd.
Otra	16.1.67	J. Nicholson		Chr. Salvesen & Co. Ltd.
Pacific Northwest	6.3.68	M. Musson	I. P. Dalgarno, P. Burns, E. H. Gregson, R. Brinkworth	B. McGarry — Furness Withy & Co. Ltd.
Pacific Reliance	6.3.68	C. G. Killick	R. E. Burdett, B. Norton, M. Condon, K. Row	C. M. Airey — Furness Withy & Co. Ltd.
Pacific Stronghold	19.1.68	G. Brown	J. E. Huddleston, A. P. Jones, G. Anderson	S. Marchant — Furness Withy & Co. Ltd.
Paparoa	18.1.68	M. J. Burn	J. R. Jackson, J. Hutson, I. G. W. Griffith, S. A. Mieszkowski	M. J. Atkinson — New Zealand Shipping Co. Ltd.
Parthia	23.1.68	B. L. O'Brien	H. V. Anguish, B. C. Goldthorpe	P. M. Madagan — Cunard S.S. Co. Ltd.
Pegu	13.3.68	M. Sheridan	J. R. Bell, J. West, K. Elias	D. McKay — Ocean Fleets Ltd.
Peisander	13.3.68	M. Auchterlonie	A. C. Jenkins, J. Geddie, J. O. Bromfield	A. White — Ocean Fleets Ltd.
Pendennis Castle	3.1.67	R. A. D. Cambridge, D.S.C., R.D.	M. G. Williamson, J. H. Edmond, J. Grundy	D. G. Bristow — Union-Castle Mail S.S. Co. Ltd.
Pennyworth	22.1.68	I. B. Gault		R. S. Dalgliesh Ltd.
Perseus	19.2.68	D. D. McIntosh	J. McPherson, B. G. Ball	C. Hughes — Ocean Fleets Ltd.
Persic	5.1.68	T. de M. Orgier	L. R. Dick, M. Howse, W. J. Donnan	W. J. Peat — Shaw Savill & Albion Co. Ltd.
Photinia	17.3.67	R. J. Freeman		Stag Line Ltd.
Piako	17.1.68	I. C. Davison	R. A. Newnham, E. Fawcett, J. Parker, M. R. Doyland	S. J. Braithwaite — New Zealand Shipping Co. Ltd.
Picardy	28.2.68	J. G. Street	A. C. Downing, A. Milward, D. McNeil	M. Davies — Furness Withy & Co. Ltd.
Pipiriki	20.11.67	W. D. F. Cooper	L. Ellis, J. Withington, P. Simpson, J. H. Read	J. E. Hocking — New Zealand Shipping Co. Ltd.
Pizarro	25.3.68	R. K. C. Thomas	P. W. Howes, T. J. Sax, C. O. Gill	A. Carrigan — Pacific S.N. Co. Ltd.
Port Adelaide	19.3.68	E. R. Jenkins	D. A. Brown, J. W. Johnston, F. P. L. Onslow-Free	B. E. Bromley — Blue Star Port Line (Management) Ltd.
Port Auckland	15.1.68	A. S. McClounan	A. D. Pique, P. M. P. Muirhead, T. H. Oliver	E. G. Hutchinson — Blue Star Port Line (Management) Ltd.
Port Brisbane	1.12.67	E. J. Arnold	D. C. Ray, J. L. Robertson, W. J. Brooks	J. Lyons — Blue Star Port Line (Management) Ltd.
Port Burnie	12.1.68	M. L. Coombs	R. S. Bolton, J. P. B. Snape, C. R. Law	W. Cummings — Blue Star Port Line (Management) Ltd.
Port Hobart	29.1.68	A. M. Downes	J. Myers, R. O. Roberts, P. J. Bamber	R. T. Greer — Blue Star Port Line (Management) Ltd.
Port Invercargill	28.8.67	H. B. Conby	R. G. Howell, O. G. Barry, E. R. Bacon	M. M. Garrett — Blue Star Port Line (Management) Ltd.
Port Launceston	18.12.67	G. Carling	N. Johnson, R. S. Butler, R. D. Theobald	P. Henderson — Blue Star Port Line (Management) Ltd.
Port Lincoln	5.1.68	L. J. Brown	B. Money, D. Parsons, K. P. G. Bowers	R. A. Jones — Blue Star Port Line (Management) Ltd.
Port Lyttelton	18.3.68	J. R. dit-Leschery	A. J. Kennedy, C. N. Bates, J. C. Hopkin	D. R. Uglow — Blue Star Port Line (Management) Ltd.

Selected Ships (*contd.*)

Name of Vessel	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Port Macquarie	30.5.67	A. J. Starkey	C. Allport, J. W. Johnson, R. T. Dann	N. McDuffie	Blue Star Port Line (Management) Ltd.
Port Napier	5.3.68	F. M. Barton	R. N. Wheelhouse, R. N. Barnes, A. Craigie-Lucas		Blue Star Port Line (Management) Ltd.
Port Nelson	21.12.67	V. A. Hunt	R. H. Givan, T. Balfour, D. W. Ross	J. Quirke	Blue Star Port Line (Management) Ltd.
Port Nicholson	4.10.67	L. W. Cady	E. T. Watkins, E. L. G. Nightingale, N. B. Bamford	H. T. Grey	Blue Star Port Line (Management) Ltd.
Port Phillip	13.10.67	A. J. L. Smith	P. V. P. Holmes, C. H. Boyd, T. S. Crawford	R. Maskell	Blue Star Port Line (Management) Ltd.
Port Pirie	4.10.67	W. J. Williams	R. N. Cubin, C. L. Oxonham, A. J. Kennedy	A. M. Worthington	Blue Star Port Line (Management) Ltd.
Port Sydney	11.9.67	R. H. Finch	D. S. Hughan, M. G. Mills, M. W. F. Phillips	L. V. O'Sullivan	Blue Star Port Line (Management) Ltd.
Port Townsville	5.6.67	M. L. Coombs	R. S. Bolton, D. A. Brown, T. J. Balfour	J. A. Duignan	Blue Star Port Line (Management) Ltd.
Port Victor	30.11.67	R. A. Wight	D. N. Ford, J. E. Crowsley, J. E. B. Simpson	T. J. Britt	Blue Star Port Line (Management) Ltd.
Port Vindex	24.11.67	A. J. Hawkins	C. G. W. Hunter, P. J. Dewar, R. A. Cunningham	J. A. Foreman	Blue Star Port Line (Management) Ltd.
Port Wellington	23.2.68	R. A. Holmes	B. J. S. Tinling, K. Speirs, I. Ross	A. Hudson	Blue Star Port Line (Management) Ltd.
Potosi	18.12.67	P. D. O'Driscoll	P. Fogarty, J. Hurley, D. C. Tripp	F. Curran	Pacific S.N. Co. Ltd.
Priam	20.10.67	W. T. D. McMillan, O.B.E.	R. N. Adams, P. W. D. Norbury, P. J. Scott, P. Johnson	D. Gunning	Ocean Fleets Ltd.
Prometheus	5.2.68	R. G. Boyd	A. R. Wilkinson, J. Bathgate, R. L. Lough	E. O. Roberts	Ocean Fleets Ltd.
Queen Elizabeth	7.3.68	W. J. Law, R.D.	J. M. Corlett, D. J. Roberts, R. Dootson, R. Griffin	W. MacDonald	Cunard S.S. Co. Ltd.
Queensland Star	29.2.68	R. S. Hopper, D.S.C.	J. D. McGill, S. J. Bunney, D. Corrie	A. Irwing	Blue Star Line Ltd.
Rakaia	9.8.67	J. Cosker	G. F. Everitt, J. Thompson, T. Hughes, R. Hoare	M. Moore	New Zealand Shipping Co. Ltd.
Ramon de Larrinaga	27.12.67	M. J. Ross			Larrinaga S.S. Co. Ltd.
Rangitane	21.12.67	K. Barnett, R.D.	A. Marshall, A. J. Davies, G. K. Hawkes, C. S. Baugh	C. Lambe	New Zealand Shipping Co. Ltd.
Rangitoto	1.2.68	J. D. Guyler	G. W. Chatfield, I. Thomson, M. J. Sutherland, C. J. Esdale-Peason	W. F. Shepherd	New Zealand Shipping Co. Ltd.
Rapallo	8.1.68	F. Metham	J. H. Randell, D. Hallett, T. Hooley, D. Johnson	R. P. Limbert	Ellerman's Wilson Line Ltd.
Raphael	23.10.67	S. M. Williams	C. Bufton, M. J. Cawood, C. B. Middleton	J. K. Dunham	Lamport & Holt Line Ltd.
Rathlin Head	17.1.68	T. McI. Hamill	F. P. Gunning, J. D. Savage, D. N. Barr, D. G. Bryan	W. H. Wheeler	G. Heyn & Sons Ltd.
Redcar	17.1.68	J. E. Riekstins	M. Pitick, D. W. Parry, R. M. Wilson	K. Green	Bolton Steam Shipping Co. Ltd.
Regent Eagle	15.12.67	B. S. Goodland	M. T. Hutton, D. A. Romeril, J. H. Leggett	J. S. Robertson	Regent Petroleum Tankship Co. Ltd.
Regent Falcon	2.5.67	G. Munday	R. Tullock, P. Norman		Regent Petroleum Tankship Co. Ltd.
Regent Pembroke	29.11.67	R. Armstrong	I. C. Millar, P. W. Roberts, R. Watson	B. Benyon	Regent Petroleum Tankship Co. Ltd.
Regent Royal	26.10.67	R. S. Hawkins	R. Watson	W. H. McAllister	Regent Petroleum Tankship Co. Ltd
Registan	15.1.68	R. L. Cain	G. S. Oakley, J. Frost, D. W. Parke	P. L. Cox	Frank C. Strick & Co. Ltd.
Renoir	*	H. Smith	V. B. Webster, D. H. Wells, E. Dowell	J. Jackson	Booth S.S. Co. Ltd.
Rialto	8.2.68	N. O. Cook	A. Cowie	T. C. Barry	Ellerman's Wilson Line Ltd.
Richard de Larrinaga	14.12.67	W. McKechanie	G. T. S. Mahon, P. M. C. Morris.	M. J. Foran	Larrinaga S.S. Co. Ltd.
Richmond Castle	16.10.67	E. Everitt	M. C. Banbury, D. M. Hawker	H. Chesters	Union-Castle Mail S.S. Co. Ltd.
Rievaulx	*	J. Parsloe	T. M. Pimbley, G. M. Long, A. S. Young	M. Sullivan	Bolton Steam Shipping Co. Ltd.
Ripon	18.3.68	J. J. Grugan	W. C. Ogle, H. Thomas, J. T. Brown	R. Morrow	Bolton Steam Shipping Co. Ltd.

Romanby	15.3.68	E. A. Snaith	J. Harty, G. Bowman, M. A. Chaplin		Sir R. Ropner & Co. Ltd.
Romanic	13.6.67	C. L. Earl	D. W. Owen, G. B. Ward, J. W. Simpson	J. W. Hunter	Royal Mail Lines Ltd.
Roonagh Head	20.11.67	R. Harris	F. P. Gunning, M. Cavanagh, H. Thompson	R. Shepherd	G. Heyn & Sons Ltd.
Rosemary Everard	14.4.67	H. O. Brown	J. P. Skinner, H. Taw		F. T. Everard & Sons Ltd.
Rossetti	*	E. D. Spooner	D. Rayner, J. MacLeod, D. Ganderton	C. Hawkridge	Lamport & Holt Line Ltd.
Rowallan Castle	25.3.68	W. Anson	M. Waite, M. Guy, I. Irving	H. Chesters	Union-Castle Mail S.S. Co. Ltd.
Ruahine	21.3.68	R. G. Hollingdale	J. Gibbard, A. M. Doig, B. O'Dea, A. C. Patterson	G. A. Parker	New Zealand Shipping Co. Ltd.
Runswick	14.9.67	S. Ward	A. Fairclough, T. Winstanley, P. S. Harris	K. Kirtley	Headlam & Son Ltd.
Rushpool	28.9.66	E. Dunn	P. R. Agar, C. W. Duncan	A. G. Turner	Sir R. Ropner & Co. Ltd.
Ruysdael	12.1.68	G. D. Leith	M. A. Gater, K. W. Fulker, C. John, H. J. Pratley	D. Slowey	Bolton S.S. Co. Ltd.
S.A. Oranje	18.3.68	J. P. Smythe, D.S.C., R.D.	B. F. Fountain, C. Green, N. Martin	R. Everett	Union-Castle Mail S.S. Co. Ltd.
S.A. Vaal	2.1.68	N. M. Lloyd, R.D.	C. D. Gibson, G. King, P. Wakely	J. Eager	Union-Castle Mail S.S. Co. Ltd.
St. Margaret	23.1.68	V. J. Owen	D. C. Lewis	W. Mills	Houlder Bros. & Co. Ltd.
St. Merriel	*	C. G. Wells	C. Lewis, J. D. Bailey, H. Craig	T. Holt	Houlder Bros. & Co. Ltd.
Sagamore	24.1.68	R. J. Coyle	D. A. Boffey, D. Aitcheson	P. Regan	Furness Withy & Co. Ltd.
Salmela	6.2.68	D. S. Archibald	R. Mullen	G. Smethurst	Chr. Salvesen & Co. Ltd.
Samaria	25.1.68	D. E. James	N. H. Osborne, J. H. Hobbs, C. C. Axford, S. Dobell	A. Holmes	Cunard S.S. Co. Ltd.
Santona	15.2.68	R. Harris	W. J. Birch, R. Copeland, F. Shepherd	K. Rennison	G. Heyn & Sons Ltd.
Saxonia	12.2.68	N. Jones	I. F. McRae, T. H. Owen, R. M. M. Hall, M. W. Wadsworth	F. White	Cunard S.S. Co. Ltd.
Scotia	23.2.68	R. O. Venn	J. C. Roberts, P. J. R. Lawley, N. H. Osborne, J. T. West	B. Nichol	Cunard S.S. Co. Ltd.
Scottish Star	16.2.67	M. R. Bremberg	A. L. MacLeman, E. G. Bee, J. McNeill	J. Hunter	Blue Star Line Ltd.
Scythia	27.11.67	G. E. Thornton	J. B. Wilson, C. C. Walker, J. S. Wolstencroft	P. I. Kent	Cunard S.S. Co. Ltd.
Serbistan	31.1.68	R. Connacher	J. C. Jones, G. Andrews, P. Huxham, B. J. Toft	T. D. Ogbourne	Frank C. Strick & Co. Ltd.
Serenia	8.2.68	J. Kell, M.B.E.			Shell Tankers (U.K.) Ltd.
Shackleton	30.5.67	D. H. Turnbull	B. J. Bromby, M. J. Cole, D. F. Potter	M. A. Crockford	British Antarctic Survey
Shahristan	2.10.67	D. R. Carden	N. R. Peckham, G. C. Insh, D. M. Bridge, L. Lumley	N. Samuel	Frank C. Strick & Co. Ltd.
Sheaf Tyne	*	J. Walker	B. MacLean, I. D. Pattison, R. Wilson	G. Gray	W. A. Souter & Co. Ltd.
Shropshire	22.3.68	E. H. Jones	R. J. Morris, H. A. Scott, D. R. Clayton	I. Gall	Bibby Line Ltd.
Sicilia	27.3.68	W. MacVicar	W. Sawyers, G. Ivens, W. G. King-Wood, P. Southcombe	N. MacLean	Anchor Line Ltd.
Silksworth	17.3.67	A. Hurst	M. K. Thet, G. Davies, A. Walker	J. J. Flanagan	R. S. Dalgliesh Ltd.
Silverbeach	*	M. R. Duke	N. Lawson, D. Day, J. E. Garner	P. Scott	Silver Line Ltd.
Silvercrag	12.2.68	J. C. W. Barney		R. W. Spence	Silver Line Ltd.
Silversand	8.1.68	P. J. Cornelius			Silver Line Ltd.
Sir Galahad	3.1.67	D. Reynolds	P. G. Carr, M. J. Bellamy, A. R. Walsh	D. E. Drage	British India S.N. Co. Ltd.
Sir Lancelot	6.2.68	A. J. Walker	R. Thake, T. J. Bearder	R. Cooper	British India S.N. Co. Ltd.
Sir William Hardy	30.1.68	A. W. Whittleton	A. W. Stephen		Torry Research Station
Somerset	20.2.68	J. H. B. Weston	D. Scott, E. S. Jones, I. S. Roberts, D. E. Spencer	R. F. MacManamon	Federal S.N. Co. Ltd.
Southern Cross	4.3.68	D. T. Mouldey	R. Griffin, M. Wilkie, A. Hooper, N. Sadd	R. Day	Shaw Savill & Albion Co. Ltd.
Staffordshire	26.3.68	N. F. Fitch, M.B.E.	P. H. S. Coventry, S. W. Gibson	C. Beyer	Bibby Line Ltd.
Stephano	*	W. P. Tait	T. S. Morrow, M. G. Staub, R. A. Johnson	J. J. Mahony	Bowring S.S. Co. Ltd.
Suevic	28.2.68	B. Hammon	I. N. Fraser, W. G. Lockie, D. J. Stansbury	J. Wallwork	Shaw Savill & Albion Co. Ltd.
Suffolk	13.9.67	H. J. D. Sladen	A. M. Coates, N. M. Parry, J. B. F. Hill	C. J. Elliott	Federal S.N. Co. Ltd.
Sugar Carrier	5.1.68	E. Moses	W. Brother, C. N. L. Davies, B. L. Thomas	H. J. Myhill	Sugar Line Ltd.
Sugar Crystal	*	S. Gorrell	E. A. Duffield, W. Shirref, K. R. Morris	R. Dawson	Sugar Line Ltd.
Sugar Exporter	15.1.68	J. R. L. Atkinson	J. H. Tier, I. Cleaver, M. Murphy	G. Wade	Sugar Line Ltd.
Sugar Importer	18.12.67	A. F. Lunn	S. S. Keeble, G. R. Hemnell, B. Evans, C. R. Wilbourne, G. V. Stamp	D. P. Hammond	Sugar Line Ltd.
Sunda	25.10.67	C. B. Cooke	M. J. Fatchen, G. A. Stokoe, D. W. Syrett	A. J. McQuater	P. & O. Lines Management Ltd.
Sunek	4.1.68	A. Pakri	J. C. Michaud, J. Noel, R. Fielder	T. O'Donnell	John Kilgour & Co. Ltd.
Surrey	3.7.67	F. J. Milner	P. Storm, T. Gibson, J. Zealley, I. MacMurray	J. Y. Diggle	Federal S.N. Co. Ltd.
Sussex	12.2.68	S. W. Lambrick	A. J. H. Milne-Holme, J. Gill, W. A. F. Killackey, A. R. Penney	R. B. Redhead	Federal S.N. Co. Ltd.
Sylvan Arrow	19.2.68	J. McCormack	H. M. Armitage, J. G. Quinn, M. Spencer-Smith	P. J. Rose	Mobil Shipping Co. Ltd.
Sylvania	9.1.68	H. L. De Legh	C. G. Briggs, D. B. Gunn, J. R. D. Hall, E. H. Bockling	A. MacPherson	Cunard S.S. Co. Ltd.
Tactician	14.12.67	H. G. Skelly	A. N. Wills, J. Maddison, A. V. Carrington	F. P. Lawton	T. & J. Harrison Ltd.

Selected Ships (*contd.*)

Name of Vessel	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Tantallon Castle	7.3.68	S. Hay	C. N. Isaac, A. J. Ireland, G. Brice	R. Gorton	Union-Castle Mail S.S. Co. Ltd.
Tasmania Star	4.9.67	D. J. Thomas	P. A. Heathcote, S. Bunney, M. Clare	A. Colquhoun	Blue Star Line Ltd.
Tekoa	12.2.68	F. C. Taylor	M. J. Rowland-Hill, C. J. Roberts, M. B. Turner	R. G. Heath	New Zealand Shipping Co. Ltd.
Theseus	22.1.68	I. Webster	J. W. Rigg, M. Knight, K. Millar	A. W. Jones	Ocean Fleets Ltd.
Tongariro	24.1.68	J. D. Bennett	R. I. Duce, J. Hook, A. Chisholm	A. Harris	New Zealand Shipping Co. Ltd.
Toronto City	20.3.68	M. C. Mills	D. M. Dye, J. R. Taylor, E. T. Parr, C. W. Fyans	W. Ferry	Bibby Line Ltd.
Torr Head	6.3.68	E. G. Davey	H. Stewart, R. Flanigan, M. B. Connor	C. E. Jones	G. Heyn & Sons Ltd.
Tourmaline	*	T. Barry	A. H. Brines, J. Macinnes		Gem Line Ltd.
Tower Bridge	5.12.66	J. Kennar	R. F. Harrison, H. N. Lawson, C. Forth	M. M. W. O'Gorman	Silver Line Ltd.
Trebartha	31.1.68	C. E. Pratt	R. L. Mitchell, B. Newlove, G. A. Alexander	R. P. Fitzgerald	Hain-Nourse Ltd.
Trecarne	6.11.67	W. J. Perkins	C. L. Girdlestone, P. Montgomery, A. Tannock	R. Hunter	Hain-Nourse Ltd.
Trecarrell	2.1.68	R. B. Oliver	J. Davies, I. A. Wingate, D. K. Murray	J. W. Bolton	Hain-Nourse Ltd.
Trefusis	17.7.67	L. J. Annett	S. R. E. Pardon, T. E. Clark, B. C. Smith, W. V. Venning	N. W. Perry	Hain-Nourse Ltd.
Tremeadow	1.2.68	F. M. Marchant	K. G. James, C. V. Umrigar	D. Cooper	Hain-Nourse Ltd.
Treneglos	26.10.67	W. H. Whitaker	T. Raddings, R. C. Lister, F. Garfit	A. R. Watt	Hain-Nourse Ltd.
Trevalgan	17.10.67	W. S. Counsell	M. Ball, J. Fox, B. Miller	A. J. Davies	Hain-Nourse Ltd.
Trevaylor	12.2.68	J. O. Spence	J. H. Bache, W. Dwelly, R. M. Atkins	T. O'Neill	Hain-Nourse Ltd.
Trewidden	27.3.68	T. Robinson	G. B. Baxter, E. F. R. Rickard, C. J. Pike	J. A. Wrafter	Hain-Nourse Ltd.
Turakina	15.1.68	R. B. Hood	G. D. Goldsbrough, R. K. Young, C. C. Wood	D. J. Lendrum	New Zealand Shipping Co. Ltd.
Turkistan	26.6.67	W. Outhwaite	B. J. Bartlett, E. W. Wells, M. Robinson	D. Loughran	Frank C. Strick & Co. Ltd.
Uganda	*	E. P. Plowman	D. M. Ledger, T. J. Ridge, M. S. Wheeler, L. Johnson	J. F. Mennell	British India S.N. Co. Ltd.
Velletia	13.2.67	P. A. Thompson	D. Leaford, M. G. Foster, T. M. Logan, P. C. Widd	A. U. Cochrane	Shell Tankers (U.K.) Ltd.
Venassa	23.1.68	D. K. Rutherford	A. R. Watson, P. Rowe, P. R. Calvert, K. Fennick	J. MacGregor	Shell Tankers (U.K.) Ltd.
Volvatella	3.4.67	T. Magee	B. D. Snazell, J. K. Dickson, W. N. Saint, D. Martin	A. J. Norman	Shell Tankers (U.K.) Ltd.
Warkworth	25.8.67	K. B. Jewell			R. S. Dalgliesh Ltd.
Waroonga	27.3.68	P. H. Bidmead	R. J. P. Bleackley, D. K. Karonjo, P. Howells, G. P. Young	W. S. McCulloch	British India S.N. Co. Ltd.
Wanliu	12.1.67	J. W. G. Wilby	J. N. Bolton, J. Milward, D. R. Parkinson	Tang Yuen	China Navigation Co. Ltd.
Warwickshire	14.2.68	J. J. Butterworth	P. D. Gow, R. J. E. Clarkson, C. R. Tiller	B. A. Mullan	Bibby Line Ltd.
Welsh Herald	8.1.68	A. C. H. Allerston	C. C. Davidson, S. Stone, N. Bowring, R. Burt	M. J. O'Brien	Welsh Ore Carriers Ltd.
Westmorland	13.10.67	D. E. Moran	A. Leachman, S. N. A. Wells, R. Michael, T. J. Oakshott	D. L. Byne	New Zealand Shipping Co. Ltd.
Windsor Castle	30.1.68	A. J. Hort		R. A. Wilson	Union-Castle Mail S.S. Co. Ltd.
Woo Sung	12.6.67	F. Cunningham	J. G. Baker, G. A. Drewery	Lee Hon Lui	China Navigation Co. Ltd.
Yorkshire	19.2.68	P. Saunders	B. P. Fyans, M. R. Nisbet, M. Kingsmill	H. Jones	Bibby Line Ltd.
Zaphon	17.1.68	S. F. Darroch	M. J. Whichelow, W. N. Saint, P. C. Davidson	R. P. Sarginson	Shell Tankers (U.K.) Ltd.

Supplementary Ships

Name of Vessel	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Aaro	18.1.68	A. T. Jardine	F. A. Pearson, H. Blahdon, R. Ward	F. Nicoll	Ellerman's Wilson Line Ltd.
Apollo	19.12.67	G. V. Barnes	W. G. Sommerfield, R. Chamberlain, J. S. Earl, B. Cole		Bristol S.N. Co. Ltd.
Arctic Freebooter	*	R. S. Bryant	R. Price	R. Price	Boyd Line Ltd.
Baltic Importer	17.5.67	J. C. Purdy	C. J. Woodall, D. Menzies, P. Wearing, I. W. Stockbridge	W. Godden	United Baltic Co. Ltd.
Bendoran	8.2.68	R. Griffiths	C. D. MacRae, R. Shaw, J. Quinn, S. A. Bakar	D. Taylor	Ben Line Steamers Ltd.
Benmacdhui	15.1.68	J. G. Adamson	M. S. Suhaimi, J. B. W. Edgar, I. T. Taylor		Ben Line Steamers Ltd.
Benvorlich	7.12.67	J. Main	A. Lim, A. Milligan, K. J. Gray	M. Bunce	Ben Line Steamers Ltd.
Border Shepherd	18.11.66	R. G. Bell	M. C. Walshaw	A. Arena	Common Bros. Ltd.
Boston Viscount	*	V. E. Crisp	G. Goock		Boston Deep Sea Fisheries Ltd.
Boston Widgeon	*	W. A. Deacon	P. Cullin		Boston Deep Sea Fisheries Ltd.
British Chivalry	6.3.68	A. G. M. Ferguson	J. Taylor, R. L. Walker, P. Brownlee	R. J. Spence	B.P. Tanker Co. Ltd.
British Destiny	29.2.68	J. L. Ramsay	J. A. Wallwork, J. Thompson, K. E. Peacock	A. Williams	B.P. Tanker Co. Ltd.
British Energy	25.10.67	J. Hunter	D. W. Powell, J. L. Gillan, B. S. Hope	J. Barlow	B.P. Tanker Co. Ltd.
British Patrol	5.1.68	W. V. Frost	A. D. Hibberd, M. J. Simpson	J. Mulligan	B.P. Tanker Co. Ltd.
British Reliance	19.2.68	G. S. Willis	D. I. Barnes, R. Taylor, N. G. Westbrook	W. J. Hornsby	B.P. Tanker Co. Ltd.
British Robin	10.11.66	A. D. Browne	J. R. Pilliner, A. D. Roberts, J. W. Crosbie	P. S. Stewart	B.P. Tanker Co. Ltd.
Byland Abbey	8.2.66	W. White			Associated Humber Lines Ltd.
Camellia	15.1.68	W. R. Hunter	E. A. Lamb, J. C. Gemmeken, R. Breckell, S. D. Hyland	P. J. Hennesey	J. Robinson & Sons Ltd.
Cicero	25.5.67	W. Walker	J. E. Scholey	J. Prudhoe	Ellerman's Wilson Line Ltd.
Ebro	15.1.68	J. K. Chester	K. O. Avery		Royal Mail Lines Ltd.
Echo	22.1.68	J. L. Jenkins	I. Reed-Boulton	A. S. Phillips	Bristol S.N. Co. Ltd.
Esso Lancashire	15.8.67	R. S. Hawkins	B. Westwater, R. Hyam, W. Porritt, G. Rowe	P. O'Callaghan	Esso Petroleum Co. Ltd.
Esso Westminster	6.11.67	K. Mackenzie	R. Mackinnon, A. Fry, A. Kehoe, P. Weinberg	T. F. Pearson	Esso Petroleum Co. Ltd.
Glitra	8.3.68	G. Waterson	A. Hamil, F. Wilson		Chr. Salvesen & Co. Ltd.
Hudson Deep	12.3.68	J. Cunningham			Hudson S.S. Co. Ltd.
Junella	20.11.67	R. Hatfield		J. Kitt	J. Marr & Sons Ltd.
Kirkella	22.2.68	C. Drever	J. A. McCarroll	J. A. McCarroll	J. Marr & Sons Ltd.
Kirkham Abbey	5.2.68	B. Waldie	D. Matingly	D. Matingly	Ellerman's Wilson Line Ltd.
Lady Parkes	9.2.68	P. E. Craven		C. Sheen	St. Andrews Steam Fishing Co. Ltd.
Lord Nelson	4.12.67	N. E. Longthorp		G. W. Taylor	Hellyer Bros. Ltd.
Mangla	15.1.68	G. B. Thomas	M. R. N. James, G. F. Kay, C. D. Croall, T. W. Dudman	G. Hazel	T. & J. Brocklebank Ltd.
Marbella	19.1.68	A. Eagle	G. R. Smith	G. R. Smith	J. Marr & Sons Ltd.
Maskeliya	15.1.68	W. H. C. Hicks	D. I. Moore	J. J. Neary	T. & J. Brocklebank Ltd.
Methane Princess	1.1.68	P. J. Clark	B. P. A. Cork, B. Glass	M. MacManus	Shell Tankers (U.K.) Ltd.
Methane Progress	15.1.68	W. W. Gibb	A. D. S. Hamilton, T. Cracknell, C. J. Selfe, J. C. Beaumont	P. E. D. Harris	Shell Tankers (U.K.) Ltd.
Milo	8.1.68	E. Jones	K. Krutainis, A. Philipps, J. Earl		Bristol S.N. Co. Ltd.
Mobil Acme	8.3.68	J. Millar	T. H. Purvis, R. Newnham, D. H. Chatterton		Mobil Shipping Co. Ltd.
Mobil Apex	1.2.68	O. Breeze		B. Saggers	Mobil Shipping Co. Ltd.
Mobil Endeavour	29.11.67	J. Pawlowicz	C. N. McCarthy, R. C. Barker, D. L. Holland, A. F. Marston	J. S. Kirkwood-Hackett	Mobil Shipping Co. Ltd.
Mobil Endurance	29.1.68	V. W. B. Davies	J. A. Reedman, I. H. Purvis, D. H. Chatterton, I. M. Keeble	R. C. Earle	Mobil Shipping Co. Ltd.
Mobil Enterprise	11.1.68	G. K. Billett	D. J. Read, R. Ashton, J. Hunter	P. T. Mangleshott	Mobil Shipping Co. Ltd.
Northella	15.3.68	A. Ness	R. Baillie		J. Marr & Sons Ltd.
Ross Intrepid	*	K. Neilson	J. Renfrew	J. Renfrew	Ross Trawlers Ltd.
Ross Leonis	18.1.68	R. Waller		R. R. N. Laing	Ross Trawlers Ltd.
Ross Orion	20.11.67	G. Whur	A. Ramsay	A. Ramsay	Ross Trawlers Ltd.

Supplementary Ships (*contd.*)

Name of Vessel	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Royal Arrow	15.8.67	V. W. B. Davies	P. Callaghan, A. Aitchison, T. J. Chapman	B. McDonald	Mobil Shipping Co. Ltd.
St. Gerontius	16.10.67	E. J. Johnson	R. T. Murphy	R. T. Murphy	T. Hamling & Co. Ltd.
St. Giles	21.2.68	J. W. Humphrey	K. C. Stone	K. C. Stone	T. Hamling & Co. Ltd.
St. Jason	*	T. Sawyers	R. Murphy	R. Murphy	T. Hamling & Co. Ltd.
Sea Captain	25.4.67	R. E. Huggins	A. A. Makhija, W. I. Morrison, B. P. Kelly	P. J. Skelton	Vergocean S.S. Co. Ltd.
Soutra	31.1.68	W. P. Watt			Chr. Salvesen & Co. Ltd.
Streambank	29.12.65	P. Smith			Bank Line Ltd.
Swanella	9.2.68	L. Fewster	D. W. Mansell	D. W. Mansell	J. Marr & Sons Ltd.
Tolsta	13.3.67	J. B. Kerr	J. Kelly, W. C. Coull	W. Anderson	Chr. Salvesen & Co. Ltd.
Truro	11.1.67	A. Skelton	C. Waters	P. Kenneally	Ellerman's Wilson Line Ltd.
Tudor Prince	3.5.67	J. L. Gilzean	P. Howe, G. A. Wilson, A. C. Collop, C. Robbins	R. J. Merry-West	Prince Line Ltd.
Volo	8.1.68	H. W. Whitfield	P. Ramsay, R. Taylor, D. Mitchell	J. B. Anderson	Ellerman's Wilson Line Ltd.
York	1.2.68	J. W. Laverack	F. W. Cooper	J. E. Boswell	Associated Humber Lines Ltd.

Trawlers

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

Skipper	Radio Operator	Trawler Owner/Manager
B. A. Ashcroft	H. G. Pask	Hellyer Bros. Ltd.
G. B. Boyce	J. Cockburn	Hellyer Bros. Ltd.
J. W. Boyle	C. Bird	Boyd Line Ltd.
W. Brettell	F. Booth	Newington Steam Fishing Co. Ltd.
R. Bunce	M. Stephenson	Hellyer Bros. Ltd.
P. Crane	J. D. Lester	Ross Trawlers Ltd.
F. Drewery	K. W. Trotter	Hellyer Bros. Ltd.
J. O. Emmons	L. Bacon	Ross Trawlers Ltd.
H. S. Ford	C. Hodder	Hellyer Bros. Ltd.
J. Gibson	K. Massey	T. Hamling & Co. Ltd.
C. K. Gill	G. Webster	Boyd Line Ltd.
H. Hall	G. V. Lane	Northern Trawlers Ltd.
W. Harris	S. B. Barr	Northern Trawlers Ltd.
F. Kirby	L. Bacon	Ross Trawlers Ltd.
E. J. Johnson	K. Ward	T. Hamling & Co. Ltd.
B. Joss	G. A. Osborne	T. Hamling & Co. Ltd.
B. Lee	M. Stephenson	Hellyer Bros. Ltd.
A. Osler	J. Cockburn	Hellyer Bros. Ltd.
H. Peterson	F. Booth	Newington Steam Fishing Co. Ltd.
J. Russell	G. B. Thompson	Hellyer Bros. Ltd.
J. G. Sleigh	K. C. Lax	Ross Trawlers Ltd.
P. Skipworsh	M. Winter	Firth Steam Trawling Co. Ltd.
A. Weatherall	M. E. Morrow	T. Hamling & Co. Ltd.
W. Wilson	J. Blake	J. Marr & Sons Ltd.

'Marid' Ships

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

Name of Vessel	Captain	Owner/Manager
Adriatic Coast	O. Evans	Coast Lines Ltd.
Amsterdam	H. Jennings	British Railways Board
Arnhem	C. Witchell	British Railways Board
Ashington	T. W. Pilbin	Stephenson Clarke Ltd.
Avalon	S. E. Dale	British Railways Board
Bardic Ferry	C. Hughey	Atlantic S.N. Co. Ltd.
Brenda	J. Henderson	Dept. of Agriculture & Fisheries for Scotland
Caesarea	V. Newton	British Railways Board
Caledonian Coast	C. Sudlow	Coast Lines Ltd.
Cambria	W. J. Roberts	British Railways Board
Cardiffbrook	J. K. Frost	Comben Longstaff & Co. Ltd.
**Cerdic Ferry*	P. Goodwin	Atlantic S.N. Co. Ltd.
Claymore	N. Campbell	David MacBrayne Ltd.
Clupea	J. Jappy	Dept. of Agriculture & Fisheries for Scotland
Corbrae	J. Sharp	Wm. Cory & Sons Ltd.
Corkbrook	C. Taylor	Comben Longstaff Ltd.
Darlington	G. Shipley	Associated Humber Lines Ltd.
Dido	N. J. Llewellyn	Bristol S.N. Co. Ltd.
Doric Ferry	T. J. Morgan	Atlantic S.N. Co. Ltd.
Dorset Coast	R. H. Jones	British Railways Board
Dryburgh	J. Murray	G. Gibson & Co. Ltd.
Duke of Argyll	J. B. Williams	British Railways Board
Duke of Lancaster	D. A. Ponting	British Railways Board
Elk	C. F. Creed	British Railways Board
Elwick Bay	W. G. Dennison	Elwick Shipping Co.
Ettrick	G. Patience	G. Gibson & Co. Ltd.
Fallowfield	R. Saunders	Coast Lines Ltd.
**Fernhurst*	J. Marshall	Stephenson Clarke Ltd.
Ferryhill	J. Innes	Aberdeen Coal & Shipping Co. Ltd.
Fingal	R. McEachern	Northern Lighthouse Board
**Fulham X*	R. A. Wright	Stephenson Clarke Ltd.
Hamble	H. Jack	Shell-Mex & B.P. Ltd.
Harrogate	J. R. Rowlands	British Railways Board
**Hebrides*	J. C. Hodgson	Northern Lighthouse Board
**Helmsdale*	A. F. Ross	Northern Trading Co. Ltd.
Hero	W. Kays	Bristol S.N. Co. Ltd.
Heron	A. Neale	General S.N. Co. Ltd.
**Hesperus*	D. MacCorquodale	Northern Lighthouse Board
Hibernia	R. Roberts	British Railways Board
**Ian Fleming*	D. Cawood	Newington Steam Trawling Co. Ltd.
**Innisfallen*	F. G. Devaney	City of Cork Steam Packet Co.
Ionic Ferry	W. Close	Atlantic S.N. Co. Ltd.
Irish Coast	J. McKinnon	Coast Lines Ltd.
**Joseph Conrad*	R. Taylor	Newington Steam Trawling Co. Ltd.
Kelvin	H. A. Matheson	Wm. Sloan & Co. Ltd.
**Killingholme*	W. J. Mair	Shell-Mex & B.P. Ltd.
**Kingston Jacinth*	J. Russell	Kingston Steam Trawling Co. Ltd.
Lairdscrest	J. M. Sinclair	Burns & Laird Line Ltd.
Lairdsglen	G. Bain	Burns & Laird Line Ltd.
**Lairds Loch*	F. Flint	Burns & Laird Line Ltd.
Lancashire Coast	A. Cochrane	Belfast S.S. Co. Ltd.
**Leinster*	P. McCullen	Coast Lines Ltd.
Loch Ard	D. McKinnon	David MacBrayne Ltd.
Loch Carron	R. Johnston	David MacBrayne Ltd.
**Loch Seaforth*	J. Smith	David MacBrayne Ltd.
Lord Tedder		Lord Line Ltd.
Mountstewart	H. G. Keilit	Coast Lines Ltd.
Mytongate	F. Williams	Hull Gates Shipping Co.
Netherland Coast	H. C. Haxell	Tyne-Tees Shipping Co. Ltd.
Oliver Bury	D. Battle	Stephenson Clarke Ltd.
Oredian	C. J. Welch	Ore Carriers Ltd.
Oreosa	A. Kirby	Houlder Bros. Ltd.
Oriole	D. Cockrill	General S.N. Co. Ltd.
Orselina	T. M. Jarvis	Continental Cargoes Ltd.
**Pharos*	C. Campbell	Northern Lighthouse Board
Pointer	R. Bruce	Burns & Laird Lines Ltd.
**Pole Star*	A. W. Walker, M.B.E.	Northern Lighthouse Board
St. Andrew	H. H. Coney	British Railways Board
St. Clair	J. Johnston	North of Scotland Shipping Co.
**St. Leger*	B. Joss	T. Hamling & Co. Ltd.
St. Patrick	N. Deadman	British Railways Board
Sandringham Queen	A. Fleet	Comben Longstaff Ltd.
Sarnia	H. Walker	British Railways Board
**Scotia*	A. M. Finlayson	Dept. of Agriculture & Fisheries for Scotland
**Scottish Coast*	A. S. Nicholson	Coast Lines Ltd.
Selby	C. D. Cush	British Railways Board
Slieve Bawn	J. R. Rowlands	British Railways Board
Slieve Bearnagh	J. D. Nash	British Railways Board
Slieve Donard	K. Sharples	British Railways Board
**Spray*	J. Andrews	Ellis & McHardy Ltd.
Stormont	P. A. Johnson	Belfast S.S. Co. Ltd.
**Superiority*	J. Floody	F. T. Everard & Sons Ltd.

*These ships report wind and weather.

'Marid' Ships (*contd.*)

Name of Vessel	Captain	Owner/Manager
**Taliskar*	C. Mackenzie	Burns Laird Line Ltd.
Tay	C. Mackenzie	Wm. Sloan & Co. Ltd.
**Teano*	R. Whittleton	Ellerman's Wilson Line Ltd.
Torquay	G. Proctor	J. D. Davidson Ltd.
Treviscoe	H. S. Shugar	Channel Shipping Ltd.
Ulster Queen	W. Lucas	Belfast S.S. Co. Ltd.
**Warwickbrook*	J. Simpson	Comben Longstaff & Co. Ltd.
Westminsterbrook	J. Shaw	Comben Longstaff & Co. Ltd.
Winchester	G. Manning	British Railways Board
**Whitby Abbey*	J. Collier	Associated Humber Lines Ltd.
Yarvic		Zodiac Shipping Ltd.

*These ships report wind and weather.

Light-vessels

Name of Vessel	Masters
Abertay Bar	N. S. Burns, A. Woodhall
Dowsing	R. Halfnight, A. S. Richards
East Goodwin	G. F. Bailey, J. H. Wilson
Galloper	G. H. Lennard, E. Marsden
Humber	D. A. Beacon, T. W. Grice
Longstone (Lt. Ho.)	R. D. Ewens
Newarp	G. A. Harris, W. E. Fenn
North Carr	G. Rosie
Royal Sovereign	B. J. Key, G. Davies
St. Gowan	E. L. Jaegar, E. G. Begley
Seven Stones	A. S. Richards, F. George
Shambles	H. Price
Shipwash	S. Goose, J. Goldsmith
South Rock	E. McGee, D. Hawkins
Smith's Knoll	F. Harrison, B. E. Cunham

Training Establishments

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

Establishment	Captain/Superintendent
Conway, H.M.S.	E. Hewitt, R.D. Capt. R.N.R.
Pangbourne Nautical College	A. F. P. Lewis, C.B.E. Capt. R.N. (Retd.)
Reardon Smith Nautical College	J. N. Rose, R.D., Lt. Cdr. R.N.R. (Retd.)
Warsash School of Navigation	G. W. Wakeford, M.B.E.
Worcester, H.M.S.	L. W. L. Argles, O.B.E., D.S.O., R.N. (Retd.)

BRITISH COMMONWEALTH

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

Information for these lists is required by 20th April each year. Information for the January corrective lists is required by 20th October each year.

INDIA (Information dated 12.3.68)

Name of Vessel	Owner/Manager
Selected Ships:	
Andamans	Shipping Corporation of India Ltd.
Bahadur	Asiatic S.N. Co. Ltd.
Bharatmitra	Bharat Line Ltd.
Bharatratna	Bharat Line Ltd.
Dumra	British India S.N. Co. Ltd.
Dwarka	British India S.N. Co. Ltd.
Indian Exporter	India S.S. Co. Ltd.
Indian Merchant	India S.S. Co. Ltd.
Indian Pioneer	India S.S. Co. Ltd.
Indian Reliance	India S.S. Co. Ltd.
Indian Renown	India S.S. Co. Ltd.
Indian Security	India S.S. Co. Ltd.
Indian Shipper	India S.S. Co. Ltd.
Indian Success	India S.S. Co. Ltd.
Indian Trader	India S.S. Co. Ltd.
Jaladhan	Scindia S.N. Co. Ltd.
Jaladhanya	Scindia S.N. Co. Ltd.
Jaladharma	Scindia S.N. Co. Ltd.
Jaladhruv	Scindia S.N. Co. Ltd.
Jaladuhita	Scindia S.N. Co. Ltd.
Jalaganga	Scindia S.N. Co. Ltd.
Jalamudra	Scindia S.N. Co. Ltd.
Jalaputra	Scindia S.N. Co. Ltd.
Jalavihar	Scindia S.N. Co. Ltd.
Jalawahar	Scindia S.N. Co. Ltd.
Jalazad	Scindia S.N. Co. Ltd.
Kampala	British India S.N. Co. Ltd.
Karanja	British India S.N. Co. Ltd.
Mohammedi	Mogul Line Ltd.
Mozaffari	Mogul Line Ltd.
Nicobar	Shipping Corporation of India Ltd.
Rajula	British India S.N. Co. Ltd.
Saudi	Mogul Line Ltd.
Sirdhana	British India S.N. Co. Ltd.
State of Assam	Shipping Corporation of India Ltd.
State of Bihar	Shipping Corporation of India Ltd.
State of Bombay	Shipping Corporation of India Ltd.
State of Gujarat	Shipping Corporation of India Ltd.
State of Kutch	Shipping Corporation of India Ltd.
State of Madras	Shipping Corporation of India Ltd.
State of Maharashtra	Shipping Corporation of India Ltd.
State of Orissa	Shipping Corporation of India Ltd.
State of Tr. Cochin	Shipping Corporation of India Ltd.
State of Uttar Pradesh	Shipping Corporation of India Ltd.
Vishva Prabha	Shipping Corporation of India Ltd.
Vishva Sudha	Shipping Corporation of India Ltd.
Supplementary Ships:	
Akash	Apeejay Line Ltd.
Ashok Jayanti	Jayanti Shipping Co. Ltd.
Bande Nawaz	Sukh Sagar Shipping Co. Ltd.
Chanakya Jayanti	Jayanti Shipping Co. Ltd.
Damodar Mondovi	Damodar Bulk Carriers Ltd.
Desh Bandhu	Shipping Corporation of India Ltd.
Gandhi Jayanti	Jayanti Shipping Co. Ltd.
Garib Nawaz	Sukh Sagar Shipping Co. Ltd.
Indian Industry	India S.S. Co. Ltd.
Indian Resolve	India S.S. Co. Ltd.
Indian Resource	India S.S. Co. Ltd.
Indian Splendour	India S.S. Co. Ltd.
Indian Strength	India S.S. Co. Ltd.
Indian Tradition	India S.S. Co. Ltd.
Indian Triumph	India S.S. Co. Ltd.
Indian Trust	India S.S. Co. Ltd.
Jag Jiwan	Great Eastern Shipping Co. Ltd.
Jag Kisan	Great Eastern Shipping Co. Ltd.
Jag Laxmi	Great Eastern Shipping Co. Ltd.
Jag Manek	Great Eastern Shipping Co. Ltd.
Jag Mitra	Great Eastern Shipping Co. Ltd.
Jag Rahat	Great Eastern Shipping Co. Ltd.
Jag Ratna	Great Eastern Shipping Co. Ltd.
Jag Shanti	Great Eastern Shipping Co. Ltd.
Jag Vijay	Great Eastern Shipping Co. Ltd.
Jaladharati	Scindia S.N. Co. Ltd.
Jaladhir	Scindia S.N. Co. Ltd.

INDIA (*contd.*)

Name of Vessel	Owner/Manager
Jaladurga	Scindia S.N. Co. Ltd.
Jaladuta	Scindia S.N. Co. Ltd.
Jalagomati	Scindia S.N. Co. Ltd.
Jalagopal	Scindia S.N. Co. Ltd.
Jalagouri	Scindia S.N. Co. Ltd.
Jalagovind	Scindia S.N. Co. Ltd.
Jalajyoti	Scindia S.N. Co. Ltd.
Jalakala	Scindia S.N. Co. Ltd.
Jalakanta	Scindia S.N. Co. Ltd.
Jalakendra	Scindia S.N. Co. Ltd.
Jalakirti	Scindia S.N. Co. Ltd.
Jalakrishna	Scindia S.N. Co. Ltd.
Jalamani	Scindia S.N. Co. Ltd.
Jalamanjari	Scindia S.N. Co. Ltd.
Jalamaya	Scindia S.N. Co. Ltd.
Jalamayur	Scindia S.N. Co. Ltd.
Jalapalak	Scindia S.N. Co. Ltd.
Jalapankhi	Scindia S.N. Co. Ltd.
Jalarajan	Scindia S.N. Co. Ltd.
Jalarashmi	Scindia S.N. Co. Ltd.
Jalavijay	Scindia S.N. Co. Ltd.
Jalavikram	Scindia S.N. Co. Ltd.
Jalavishnu	Scindia S.N. Co. Ltd.
Jalaveera	Scindia S.N. Co. Ltd.
Krishna Jayanti	Jayanti Shipping Co. Ltd.
Laxmi Jayanti	Jayanti Shipping Co. Ltd.
Maha Vikram	South East Asia Shipping Co. Ltd.
Maha Raja	South East Asia Shipping Co. Ltd.
Rajah	Asiatic S.N. Co. Ltd.
Rama Jayanti	Jayanti Shipping Co. Ltd.
Ranee	Asiatic S.N. Co. Ltd.
Ratna Manjushree	Ratnakar Shipping Co. Ltd.
Ratna Usha	Ratnakar Shipping Co. Ltd.
Shompen	Shipping Corporation of India Ltd.
Sushma	Apeejay Lines Ltd.
State of Andhra	Shipping Corporation of India Ltd.
State of Haryana	Shipping Corporation of India Ltd.
State of Kerala	Shipping Corporation of India Ltd.
State of Madhya Pradesh	Shipping Corporation of India Ltd.
State of Mysore	Shipping Corporation of India Ltd.
State of Punjab	Shipping Corporation of India Ltd.
State of Rajasthan	Shipping Corporation of India Ltd.
State of West Bengal	Shipping Corporation of India Ltd.
Vishva Jyoti	Shipping Corporation of India Ltd.
Vishva Kalyan	Shipping Corporation of India Ltd.
Vishva Kanti	Shipping Corporation of India Ltd.
Vishva Kirti	Shipping Corporation of India Ltd.
Vishva Mahima	Shipping Corporation of India Ltd.
Vishva Mangal	Shipping Corporation of India Ltd.
Vishva Maya	Shipping Corporation of India Ltd.
Vishva Nidhi	Shipping Corporation of India Ltd.
Vishva Pratap	Shipping Corporation of India Ltd.
Vishva Prem	Shipping Corporation of India Ltd.
Vishva Shanti	Shipping Corporation of India Ltd.
Vishva Tilak	Shipping Corporation of India Ltd.
Vishva Usha	Shipping Corporation of India Ltd.
Vishva Vibhuti	Shipping Corporation of India Ltd.
Vishva Vir	Shipping Corporation of India Ltd.

NEW ZEALAND (Information dated 30.3.68)

Name of Vessel	Owner/Manager
Selected Ships:	
City of Auckland	Ellerman & Bucknall S.S. Co. Ltd.
Holmborn	Holm Shipping Co. Ltd.
Kaimiro	Union S.S. Co. of New Zealand Ltd.
Kaitangata	Union S.S. Co. of New Zealand Ltd.
Kaitoa	Union S.S. Co. of New Zealand Ltd.
Kaitoke	Union S.S. Co. of New Zealand Ltd.
Kaituna	Union S.S. Co. of New Zealand Ltd.
Karamu	Union S.S. Co. of New Zealand Ltd.
Karepo	Union S.S. Co. of New Zealand Ltd.
Karetu	Union S.S. Co. of New Zealand Ltd.
Katea	Union S.S. Co. of New Zealand Ltd.
Kawaroa	Union S.S. Co. of New Zealand Ltd.
Kawatiri	Union S.S. Co. of New Zealand Ltd.
Kawerau	Union S.S. Co. of New Zealand Ltd.
Konui	Union S.S. Co. of New Zealand Ltd.
Koraki	Union S.S. Co. of New Zealand Ltd.
Koranui	Union S.S. Co. of New Zealand Ltd.
Kowhai	Union S.S. Co. of New Zealand Ltd.
Kurutai	Union S.S. Co. of New Zealand Ltd.
Matua	Union S.S. Co. of New Zealand Ltd.
Maurea	Shell Oil New Zealand Ltd.
Moana Roa	New Zealand Government
Navua	Union S.S. Co. of New Zealand Ltd.
Ngahere	Union S.S. Co. of New Zealand Ltd.
Ngakuta	Union S.S. Co. of New Zealand Ltd.
Ngapara	Union S.S. Co. of New Zealand Ltd.
Ngatoro	Union S.S. Co. of New Zealand Ltd.
Saracen	Crusader Shipping Co. Ltd.
Sea Harvester I	New Zealand Sea Products Ltd.
Sea Harvester II	New Zealand Sea Products Ltd.
Taranui	South Seas Shipping Co. (Suva) Ltd.
Tarawera	Union S.S. Co. of New Zealand Ltd.
Tofua	Union S.S. Co. of New Zealand Ltd.
Waikare	Union S.S. Co. of New Zealand Ltd.
Waimate	Union S.S. Co. of New Zealand Ltd.
Waimea	Union S.S. Co. of New Zealand Ltd.
Wainui	Union S.S. Co. of New Zealand Ltd.
Waitaki	Union S.S. Co. of New Zealand Ltd.
Supplementary Ships:	
Aramoana	New Zealand Government Railways Department
Aranui	New Zealand Government Railways Department
Hawea	Union S.S. Co. of New Zealand Ltd.
Maori	Union S.S. Co. of New Zealand Ltd.
Wahine	Union S.S. Co. of New Zealand Ltd.

Auxiliary Ships:
New Zealand also has a fleet of 10 Auxiliary Ships currently reporting.

PAKISTAN (Information dated 1.1.68)

Name of Vessel	Call Sign
Selected Ships:	
Abasin	AQVO
Anwar-baksh	AQAM
Fatehabad	AQEM
Mustali	AQLY
Safina-e-Arab	AQVA
Safina-e-Hujjaj	AQLW
Safina-e-Nusrat	AQLM
Shams	AQLN
Supplementary Ships:	
Bagh-e-Karachi	AQVM
Dacca City	AQEO
Harringhata	AQMG
Jahangirabad	AQEN
Karnaphuli	AQVP
Ocean Energy	AQVB
Sadaqat	AQVK
Surma	AQGL

Auxiliary Ships:
Pakistan has 14 Auxiliary Ships.

HONG KONG (Information dated 29.2.68)

Name of Vessel	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Anking	M. T. Anderson	A. R. Pearce, R. E. Herman, S. C. Lam	Leung Man Hin	China Navigation Co. Ltd.
Anshun	R. Kennett	T. S. Payne, R. B. Cornell, Y. Y. Chan, J. G. Baker	Li San Kau	China Navigation Co. Ltd.
Cape St. Mary	Fu Chiu Wan	Chan Hok-min, Kwok Yung-sing (Boatswain)	Wong Kam Tin	Agriculture & Fisheries Dept, H.K. Govt.
Carl Offersen	R. Feldtmann	J. I. Toennesen, F. Nolte, G. Flems	Tan Tee-tee	Jebsen & Co.
Changsha	J. F. O'Connor	W. F. Jeffrey, R. S. Newman, R. L. Staker	Tsui See Man	China Navigation Co. Ltd.
Chefoo	C. G. Cocksedge	C. G. Murray, D. W. Tucker, C. K. Lai	Tsang Pui Leung	China Navigation Co. Ltd.
Chekiang	W. B. Jones	J. A. Derrick, K. G. C. Troughton, P. F. Buffett	Wai Pun Un	China Navigation Co. Ltd.
Chengtu	M. J. Tidey	B. Keeble, M. Williams, C. J. Langford	Chung Cheuk Keung	China Navigation Co. Ltd.
Chungking	M. D. Burbidge	C. J. R. Metcalf, D. M. Simpson, R. B. Crick	Tang Yuen	China Navigation Co. Ltd.
Dana	J. Johnsen	O. N. Roeli, J. R. Sandal, A. Birkeland	Sung Heung Wing	Karsten Larssen & Co. (H.K.) Ltd.
Eastern Argosy	P. J. Sullivan	P. M. Wheeler, D. C. Butcher, K. R. Atkinson	P. Bailey	Indo-China S.N. Co. Ltd.
Eastern Cape	R. M. F. Bertram	N. A. H. Funston, P. McGovern, J. W. Dale, H. N. P. Aplin	M. R. Weaver	Indo-China S.N. Co. Ltd.
Eastern Cliff	J. G. Boyle	T. D. Wood, N. C. E. Cook, G. Bell	J. B. Hands	Indo-China S.N. Co. Ltd.
Eastern Maid	D. N. Greenhalgh	P. W. Campbell, F. Fernandez, J. W. Burton	A. Cardona	Indo-China S.N. Co. Ltd.
Eastern Moon	G. C. Taylor	A. H. Dalton, W. M. J. Lee-Emery, J. W. Benton	W. B. Campbell	Indo-China S.N. Co. Ltd.
Eastern Muse	G. T. Colbeck	M. K. Montgomery, C. F. Toomey, D. M. Healey	E. A. Dunford	Indo-China S.N. Co. Ltd.
Eastern Queen	W. E. Reeve	W. J. M. Attril, B. L. Ballantyne, J. M. Stanaway	H. D. Bray	Indo-China S.N. Co. Ltd.
Eastern Ranger	T. H. Nichols	M. J. Kearney, F. L. Pickering, M. A. Smith	M. M. B. Philpott	Indo-China S.N. Co. Ltd.
Eastern Rover	D. R. Cole	J. Elliot, C. J. Pinto, T. L. Casey	H. W. Fingerhut	Indo-China S.N. Co. Ltd.
Eastern Star	B. O. Jensen	D. P. Gibbons, P. D. Thomas, M. S. Wilkinson	W. D. O'Keefe	Indo-China S.N. Co. Ltd.
Eastern Trader	W. G. White	P. E. H. Piriou, A. R. Moses, J. M. Joyce, P. M. Swan	T. G. White	Indo-China S.N. Co. Ltd.
Foh Kim	D. R. Camplejohn	P. J. Mooney, Ng Sung Chi, Lam Lung Ki	Wong Che Ying	Lai Fook Kim Shipping Co. Ltd.
Francis Drake	G. Gatehouse	W. Millar, S. Dobson, C. Vaughan, S. Ballantyne	F. Issac	Indo-China S.N. Co. Ltd.
George Anson	P. Carlson	W. Byers, P. Fox, M. Cobal, H. Dunsford	D. Murphy	Indo-China S.N. Co. Ltd.
Hai Hing	H. Yndestad	T. Monsen, H. O. Isaksen, H. Haugen	Chung Yeuk	Thoresen & Co. Ltd.
Hai Meng	Arne Johnsen	A. Oyen, T. Sydnes, T. Kiil	M. L. Narasimhan	Thoresen & Co. Ltd.
Hallborg	A. Sjøberg	O. Stromsnes, Leif O. Bang, S. Sivertsen	Chan Siu Ming	Thoresen & Co. Ltd.
Halldis	A. Gronvik	R. L. Andersen, E. F. Andreasen, J. Lorentzen, Helge Lund	Yung Wing Ching	Thoresen & Co. Ltd.
Halldor	N. Soelberg	H. Vossi, K. Olsen, A. Bakke	Lau Kam Pui	Thoresen & Co. Ltd.
Hallvard	O. Schibsted	R. Frydenlund, Rolf Rasmussen, S. T. Thorsen	Lai Kwong Yin	Thoresen & Co. Ltd.
Hang Sang	J. B. Skerritt	M. J. Sawyer, I. J. H. Alexander, Clinton F. H. To	J. P. Robertson	Indo-China S.N. Co. Ltd.
Helios	Odd Andreassen	J. Riverud, T. Pedersen, M. Rossehaug	Ip Yuk Fai	Thoresen & Co. Ltd.
Hermod	O. J. Apold	T. Egeland, J. E. Hermansen, Kjell Johansen	Poon Chee Pooi	Thoresen & Co. Ltd.
Hero	A. Solbak	L. Røsvik, F. Schulze, K. Øi	Tam Chung Mo	Thoresen & Co. Ltd.
Ho Sang	R. G. Macdonald	I. G. Tew, A. Hollidge, Ho King Yu	B. W. Holmes	Indo-China S.N. Co. Ltd.
Hoi Kung	O. Oftedal	B. Vold, L. Moen, M. Vold	P. W. J. Joubert	Karsten Larssen & Co. (H.K.) Ltd.
Hoi Wong	J. Bjerkenes	W. Brandvik, T. Johannessen, A. Langeland	K. Haakonsen	Karsten Larssen & Co. (H.K.) Ltd.
Hunan	B. G. D. Ward	D. H. Norcott, D. Nicolson, R. F. D. Davies W. M. Gregory	Zimmon Marr	China Navigation Co. Ltd.
Hupeh	G. Cornforth	R. M. Mitchell, A. C. Davidson	Hu Chun Yee	China Navigation Co. Ltd.
Jacob Jebsen	F. Nissen	F. Poulsen, T. K. Madsen	Tam Chik	Jebsen & Co.
Kuala Lumpur	R. C. W. Gorman	M. R. Coyne, D. R. Walker, O. A. Overland	Omar Ismail	China Navigation Co. Ltd.
Kwangsi	R. E. Brooks	I. D. Goddard, W. J. B. Hibberdine, D. A. Edge	Lo Kin Chek	China Navigation Co. Ltd.
Kwangtung	D. W. Boys	P. Ellis, S. K. Toon, P. Gardener	Chau Wing	China Navigation Co. Ltd.
Kweilin	V. R. Woolfe	J. N. Bolton, N. H. Lee, D. G. Falkner	Leung Ching	China Navigation Co. Ltd.
Ninghai	C. J. N. Darch	H. Davis, E. J. Potter, N. R. Howlett	Edmund Ma	China Navigation Co. Ltd.
Norman	R. J. Shipp	D. A. Daish, R. B. Gifford, D. R. Ewings	Kwong Shek Hee	China Navigation Co. Ltd.

HONG KONG (*contd.*)

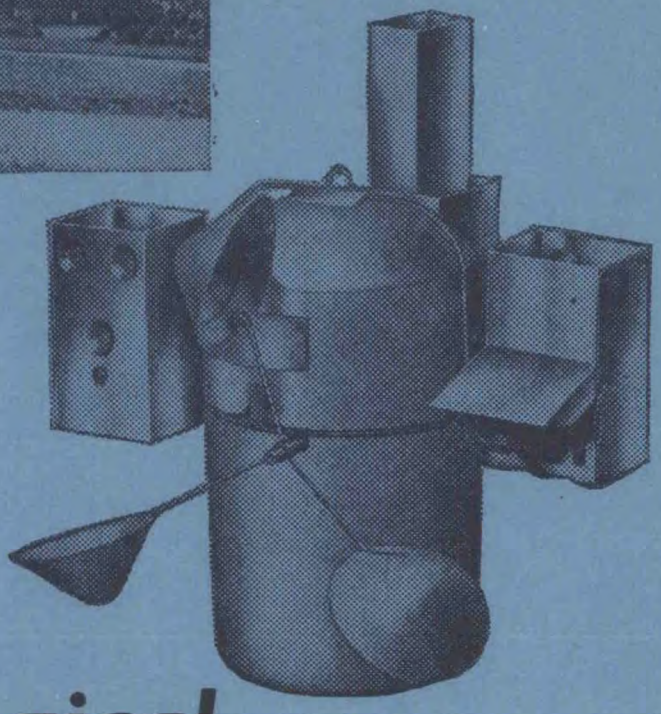
Name of Vessel	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Red Dragon	A. W. McLauchlan	K. G. Price, V. Sikland, Lui Wing Yiu	Ng Tat Chuen	Ankan Shipping Co. Ltd.
Star Alcyone	Franz A. J. Hartmann	Karl B. V. Magnusson, Leif Bertil Hovenas, Nils G. V. Petersson	B. O. Johnsson	Everett S.S. Corporation S/A
Star Antares	Roland Fredriksson	Theodor Wiidik, Lars Forsberg, Lars-Axel Wahren	Ragnar Reslow	Everett S.S. Corporation S/A
Star Betelgeuse	Tore N. Soderstrom	Kai Thomsen, Lars Olof Sandstrom, B. R. Skaglund	S. L. B. Davidson	Everett S.S. Corporation S/A
Tai Lung Shan	A. C. Tai	J. Downie, Li Yat-wa, Wong Tak-choi	Cheung Chun-lun	Shun Cheong S.N. Co. Ltd.
Tai Wah Shan	Ko Keng-jan	Yu Chi-tai, Lee Siu, Chan Hoi	Choi Chung-shu	Shun Cheong S.N. Co. Ltd.
Taiyuan	D. A. Hutchinson	N. R. Masterson, D. J. Taylor, D. R. Parkinson	Yeung Chark Sing	China Navigation Co. Ltd.
Wenchow	J. M. Wigham	T. J. Wilson, M. J. Butcher, J. C. S. Hensford, R. M. Post	Li Ping Kei	China Navigation Co. Ltd.
Yochow	B. A. Owen	D. J. Wellington, H. J. Conybeare, R. B. Hodges	Koo Hai Ping	China Navigation Co. Ltd.
Yunnan	D. T. Hollands	A. M. Allcott, B. N. Whitehead, J. Vaughan	Leung Kwok Ming	China Navigation Co. Ltd.

SINGAPORE (Information dated 1.4.68)

Name of Vessel	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Bidor	Yahya bin Bachok	R. Gomez and W. K. Teow, Nemat	Sa'at bin Sutiman	Straits Shipping & Co. Ltd.
Cable Enterprise	G. T. Robinson	J. G. Paterson, D. E. Rickards, G. R. Plummer	P. P. E. Bennet	Guthrie Boustead Shipping Agencies Ltd.
Golden Spring	R. Podesta	R. Martin, Quek Soo Seng, Khoo Tee Tuck	Fong Pai Liat	Guan Guan Shipping Ltd.
Golden Wonder	T. A. Sheppard	Carmichael, Lim Ong Tong, Tein Yeong Cheng	Chua	Guan Guan Shipping Ltd.
Kah Poh	Budin bin Ahmad	Wan Ahmad bin Dollah, Noor bin Lanang	Nik Ismail bin Nik Sar	Ho Chiang Shipping Co. Ltd.
Katong	G. C. Carter	A. Chan Eng Lock, Sahak bin Yasim	Yue Fook Wing	Straits Shipping & Co. Ltd.
Kemingau	R. C. Barker	B. Summerill, Yeoh See Peng	T. V. Abraham	Straits Shipping & Co. Ltd.
Kimanis	J. F. A. Scott	T. J. Frawley	Tan Yee Seng	Straits Shipping & Co. Ltd.
Kim Hock	J. H. Davies	R. Teo Boon Suan, Cham Tshoong Kuok, Wee Ah Sai	Chan Kian Beng	Guan Guan Shipping Ltd.
Kinabalu	R. E. Davies	C. R. Rankine	Lee Yuen Fatt	Straits Shipping & Co. Ltd.
King Bay	W. E. Roberts	Lim Theng Toon, G. Oliveiro	Wong	Guan Guan Shipping Ltd.
Kota Naga	Abdul Latiff bin Omar	Mohd. Said bin Mat, Mohd. Hassim	Hew Yoong Sang	Pacific International Lines
Kunak	E. E. Fenwick	I. D. Campbell, H. D. Mandon, Omar bin Ali	Tan Chong Huan	Straits Shipping & Co. Ltd.
Perak	C. J. Brazier	W. L. G. Frith	Mohd. Hussain bin Sahari	Straits Shipping & Co. Ltd.
Perlis	P. Ho Kia Tuang	Omar bin Mohd.	S. Fernandez	Straits Shipping & Co. Ltd.

Dd. 137764. K.16. 6/68
Printed in England for Her Majesty's Stationery Office by William Clowes and Sons Ltd., London and Beccles

As supplied to the British Meteorological Office and many foreign governments



RADIO SONDE

Meteorological Transmitter

The WB Radio Sonde can be supplied either complete with battery, aerial parachute, radar reflector and battery, or the transmitter with met. elements can be supplied as a single unit.

WHITELEY ELECTRICAL RADIO COMPANY LTD.

MANSFIELD - NOTTS - ENGLAND

SBN 11 400012 3