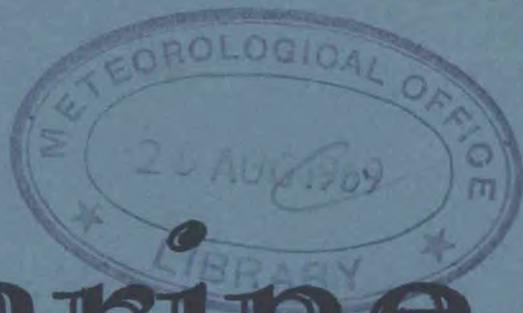


Met.O. 814

DUPLICATE



The Marine Observer

A quarterly journal of Maritime Meteorology



Volume XXXIX No. 225

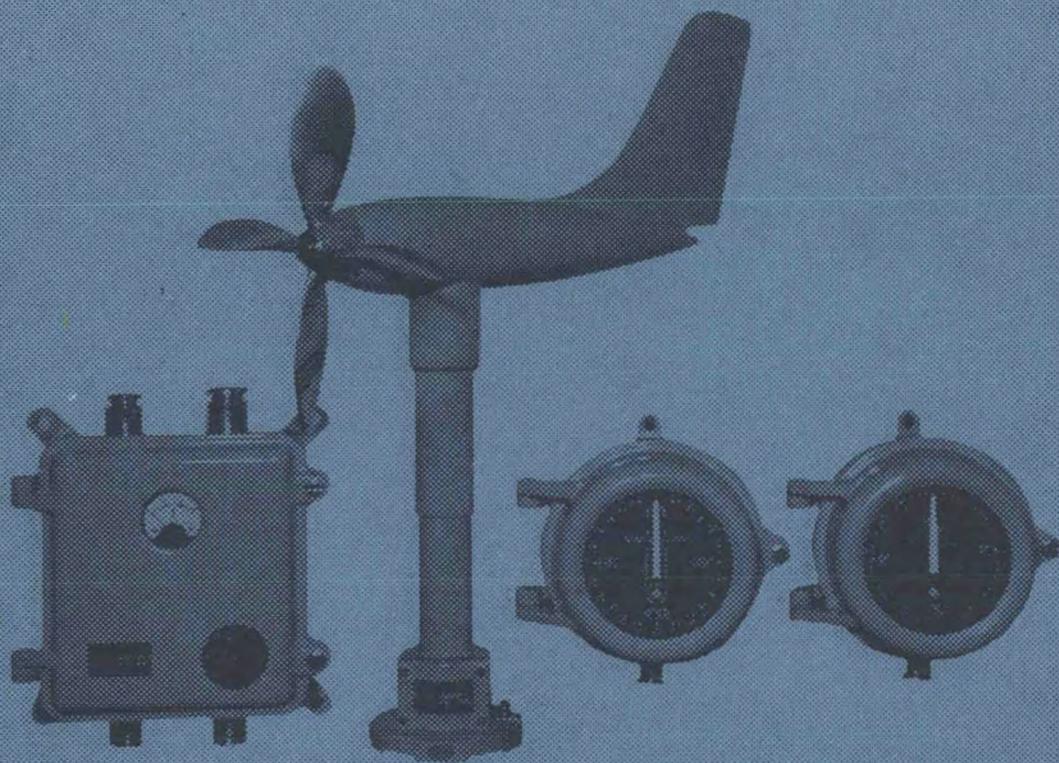
July 1969

DUPLICATE JOURNALS

PRICE 7s. od. NET

National Meteorological Library

FitzRoy Road, Exeter, Devon. EX1 3PB



THE BEST MARINE ANEMOMETER

Special features of B T W Marine Anemometer

Indication of wind speed completely linear.

Due to the low friction of the propeller shaft and large rudder action of the streamlined body it starts instantaneously to rotate at a low speed and follows the wind direction within less than three degrees.

Ask for detailed leaflet for this outstanding, robust, watertight and precise equipment:

BUREAU TECHNIQUE WINTGENS
EUPEN / BELGIUM
7-9, rue Neuve

Telex: 41-558

Cables: Preciwintgens

SPECIALISTS FOR METEOROLOGICAL, HYDROLOGICAL
AND OCEANOGRAPHICAL INSTRUMENTS

THE MARINE OBSERVER

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

VOL. XXXIX

No. 225

JULY 1969

CONTENTS

	<i>Page</i>
Editorial	98
Excellent Awards, 1968-69	100
The Marine Observers' Log—July, August, September	105
Historical Notes on the Original Beaufort Scale. BY BLAIR KINSMAN	116
The Work of a Meteorologist in a Weather Ship. BY H. J. FRECKLETON	125
A Sighting of Southern Right Whale Dolphins	128
Notes on Ice Conditions in Areas adjacent to the North Atlantic Ocean— January to March 1969	128
Book Reviews:	
<i>Windjammers of the Horn</i>	135
<i>Sea Navigation</i>	135
<i>Ocean Currents</i>	136
Personalities	137
Notice to Mariners	138
Fleet Lists	140

*Letters to the Editor, and books for review, should be sent to the Editor, "The Marine Observer,"
Meteorological Office, Eastern Road, Bracknell, Berkshire RG12 2UR*

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

© Crown copyright 1969

To be purchased direct from H.M. Stationery Office, at any of the following addresses: 49 High Holborn, LONDON, W.C.1; 13a Castle Street, EDINBURGH, EH2 3AR; 109 St. Mary Street, CARDIFF, CF1 1JW; Brazennose Street, MANCHESTER, M60 8AS; 50 Fairfax Street, BRISTOL, BS1 3DE; 258 Broad Street, BIRMINGHAM, 1; 7 Linenhall Street, BELFAST, BT2 8AY, or from any bookseller.

PRICE 7s. od. NET or £1 9



3 8078 0003 1673 9

Editorial

Oceanology International '69. A few years ago many of us would have wondered what this meant, but Expo '67 introduced us to this cryptic form of nomenclature for an International Exhibition. Oceanology International '69, which took place at the Metropole Hotel in Brighton from 17th to 21st February, was described as the world's first International Commercial/Scientific Exhibition and Conference dealing with the exploration of the sea and the sea bed, through the co-operation of experts from 14 nations. Even the word 'oceanology', which appears in *Cassell's English Dictionary* of 1962 but not in the *Concise Oxford*, 1964 edition, is unfamiliar, we have all got so used to 'oceanography'. The suffix '-graphy' is defined in the dictionary as "a descriptive science (e.g. geography, bibliography, selenography)", whereas '-ology' is defined as "any science" (e.g. geology being the science of earth's crust). Dr. Deacon, Director of the National Institute of Oceanography, is of the opinion that 'oceanography' will continue to be the term used for the traditional scientific study of the oceans whereas 'oceanology' will apply more to the more technological and commercial aspect of the subject, embracing ocean engineering, design and use of underwater vehicles, underwater communication and the economic exploitation of the oceans' resources.

The conference and exhibition was sponsored by the Society for Underwater Technology, whose President, Rear-Admiral Edmund Irving, a former Hydrographer of the Navy, played a very active part in the proceedings. It says much for the courage and enterprise of that Society, which has only been in existence since 1965, that this ambitious project was such a success. It was fitting that this first International Oceanology Meeting did take place in the United Kingdom in view of the pioneer work in oceanographic research carried out by this country when H.M.S. *Challenger* did her famous round-the-world expedition in 1872-76.

The conference programme each day was divided into two parts—a major session and parallel technical sessions—and over 100 papers were read. The major sessions were split into four sections beginning with papers on national programmes from eight countries, including the United Kingdom; industrial programmes and problems; organization problems, market assessment etc.; and, finally, international collaboration which produced papers from the Food and Agriculture Organization (FAO), Intergovernmental Oceanographic Commission (IOC), Inter-Governmental Maritime Consultative Organization (IMCO) and a paper from the U.S.A. about their proposed International Decade of Ocean Exploration. The subjects discussed at the technical sessions included oceanographic instrumentation and data handling, engineering in the ocean, underwater observation and communication, off-shore mineral technology, fishing technology, underwater power sources, diving technology, pollution and submarine vehicles and operations.

The Exhibition emphasized the astonishing advances that have been made in oceanology during recent years and would have warmed the heart of Jules Verne. Countries participating at the Exhibition were Canada, France, Holland, Italy, Federal Republic of Germany, Japan, Norway, United Kingdom, U.S.A. and U.S.S.R. There were exhibits from about 150 individual firms. The products and equipment on display included deep diving equipment, submersibles and wheeled underwater vehicles, oceanographical/meteorological buoys, underwater power systems, sea structures, decompression chambers, underwater communication systems, specialized cables, fuel storage, position fixing systems and instrumentation for providing surface and sea-bottom information.

The U.S.A., as might be expected in view of their great activity in oceanology, had the largest display at the exhibition and, although certain other countries, notably the U.S.S.R., are probably devoting more effort to oceanology than this country at present, the United Kingdom display was very impressive and varied. It included an underwater vehicle with wheels somewhat similar to a tractor, with an umbilical cord connecting it to a surface vessel; a fully independent underwater

habitat accommodating up to six men; oceanographic/meteorological buoys suitable for use in mid-ocean; submerged current meters; wave and tide measuring systems; communication and navigation equipment; oil-drilling rigs and equipment; and displays by Government Departments engaged in oceanology in one way or another. At the Conference about 35% of the papers were presented by British experts. Those who initiated oceanographic research aboard H.M.S. *Challenger* would have no cause to feel ashamed of the work being done by their modern colleagues in this country with the limited funds available to them.

The number of countries which participated in Oceanology '69, the number and variety of products on show at the Exhibition and of the papers presented at the Conference provide striking evidence that mankind has suddenly woken up as to the resources that the oceans have to offer. Presumably the population explosion and the rapidity with which we are using up the mineral resources on land have had a lot to do with this. And there seems little doubt that the sport of skin-diving has played its part in encouraging interest in underwater exploration.

The specialized agency of United Nations responsible for oceanography/oceanology is the Intergovernmental Oceanographic Commission, which is under the direction of the United Nations Educational, Scientific and Cultural Organization (UNESCO). Other international bodies (not under Governmental control) directly concerned with oceanography include the International Association of Physical Oceanography, the International Council for the Exploration of the Sea, and the Scientific Committee on Oceanic Research.

The close relationship between oceanography and meteorology is fairly obvious and has often been referred to in *The Marine Observer*. The influence that the oceans have upon the atmosphere and vice versa are so intimate that it is difficult to separate them; our British climate is a fairly good example of this. Oceanographers are vitally interested in sea-surface temperatures, air temperatures near the surface, wave data, sea ice and surface currents, for example, while the meteorologist is indirectly interested in such oceanographic parameters as the upper sub-surface temperatures, sub-surface currents and salinity variation. It is essential, therefore, that meteorologists and oceanographers collaborate both nationally and internationally. On the international level this is accomplished by close liaison between representatives of the international bodies concerned, particularly WMO and IOC, and by the establishment of joint Working Groups. There is also close contact with other interested international bodies such as the FAO, IMCO and (from the communication viewpoint) ITU. One of the main objects of this liaison is to make sure that there is not duplication of effort nor rivalry between the organizations concerned. For example, it is important that automatic buoys and newly-established weather ships, such as are envisaged under World Weather Watch, should report meteorological and oceanographic data. This is already being done by the existing weather ships and, to some extent, by the automatic buoys established by the U.S.A. in the Caribbean. The question of the frequencies to use for transmission of data from automatic stations has already been settled as a result of consultation with ITU and IMCO. It is hoped that all countries will make special efforts to increase their oceanographic effort during the International Decade of Ocean Exploration, referred to earlier, which is planned to take place during the 1970s.

Every voluntary meteorological observer aboard ship is in fact a voluntary oceanographic observer. Not only does he take regular sea-surface temperatures and visual wave observations but he is almost the sole source of information about the surface currents of the oceans. A glance at The Marine Observers' Log shows enormous variety of other oceanographic observations he makes. For example, the marine bioluminescence observations published in *The Marine Observer* are unique.

When discussing observations at sea one always seems to come back to Maury and one finds that ships' officers have been making these oceanographic observations for over a hundred years. The first international logbook (1853) provided for observations of surface currents, sea-surface temperature and specific gravity,

water temperatures at various depths (by using a special instrument or by taking the temperature at the "ship's cock beneath the water line"), wave heights, tide drifts, discoloured water, deep-sea soundings and nature of bottom, sea ice, appearance of fish and seaweed and tidal observations when at anchor. Maury might well have lectured at Oceanology '69.

C. E. N. F.

Excellent Awards 1968-69

On pages 101 to 103 in this issue of *The Marine Observer* appears the list of ships, masters and officers who have gained Excellent Awards for the quality of their meteorological logbooks received during the year which ended on 31st March 1969 and once again we have the pleasure of congratulating the masters and officers named in it. Once again, too, we must commiserate with the many officers whose meteorological logbooks have been assessed as Excellent but which at the same time lack that little something extra which will lift them into the top hundred; it may be some consolation to them to know that the notation EX appears against the record of their logbook on their personal record card which is kept in this office and that it is this assessment which counts when their long-term record is worked out, whether an award has been gained or not.

Below is the fifteenth 'short list' of those ships who sent us the best meteorological logbooks during the year. They are:

1. *Cape Franklin* (Lyle Shipping Co. Ltd.), Captain C. G. Mallett
Glenorchy (Ocean Fleets Ltd.), Captain T. W. Willows
Hurunui (New Zealand Shipping Co. Ltd.), Captain S. G. Robinson, M.B.E.
2. *Chantala* (British India S.N. Co. Ltd.), Captain F. Bell
Northumberland (Federal Line), Captain E. T. Rowland
Westmorland (Federal Line), Captain D. E. Moran
3. *Baharistan* (F. C. Strick & Co. Ltd.), Captain J. F. Ockleford
Glitra (Chr. Salvesen & Co. Ltd.), Captain J. Duncan

We congratulate *Cape Franklin* on her third appearance in our annual short list whilst *Glenorchy* is appearing for the second time. The customary photographs of the three top ships appear opposite page 129 and here again special mention must be made of *Cape Franklin* whose photograph was also thus published in 1965.

Awards to 'Marid' ships for their consistent help in sending radio messages of sea temperatures around the home coasts, and to skippers and radio officers of trawlers making non-instrumental observations, often under conditions of acute discomfort, in the Arctic are listed on pages 103 to 104. The work of these ships is unspectacular but has nevertheless been a great help to the meteorologist, both at home and in countries bordering the northern waters in the preparation of forecasts for the benefit, not only of shipping, aviation and other forms of transport but also of the general public. It will be noticed also that the main Excellent Award list contains the names of trawlers; these ships are, of course, equipped with instruments and their presence in the list shows that, in spite of invariable bad weather and cramped working conditions, they are well able to hold their own in keenness and enthusiasm with their somewhat more lucky brethren whose work lies in kinder waters.

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 letters sometimes take a long time to reach ships and if any master or officer sees his name in the list in this journal or, perhaps in his own Company's house journal, before the official letter reaches him, we would be glad if he would write to us claiming the award and giving us his forwarding address.

EXCELLENT AWARDS (Year ended 31st March 1969)

SHIP	CAPTAIN	PRINCIPAL OBSERVING OFFICER	RADIO OFFICER	OWNER/MANAGER
<i>Achilles</i>	W. R. Willis	D. C. S. Thompson	J. B. Sergeant	Ocean Fleets Ltd.
<i>Apollo</i>	G. V. Barnes	A. S. Phillips	L. J. Pippett*	Bristol S.N. Co. Ltd.
<i>Astyanax</i>	A. A. Rundle	J. E. Tumilty	J. V. Morgan	Ocean Fleets Ltd.
<i>Athenic</i>	G. H. Heywood	J. A. Gover	J. Lamb	Shaw Savill & Albion Co. Ltd.
<i>Baharistan</i>	J. F. Ockieford	J. H. McMurren	T. P. Ryan	Frank C. Strick & Co. Ltd.
<i>Bandoran</i>	R. Griffiths	N. M. Wight	D. Taylor	Ben Line Steamers Ltd.
<i>Brandon Priory</i>	P. Hector	D. M. C. Allan	T. Murphy	Warwick Tankers Ltd.
<i>Bristol City</i>	A. F. Ashton	A. E. R. Burton	J. T. W. Moody	Bristol City Line Ltd.
<i>British Bombardier</i>	A. C. Browne	D. J. Mackenzie	M. G. Spencer	B.P. Tanker Co. Ltd.
<i>Camellia</i>	W. R. Hunter	T. B. A. Wyness	P. Hennessey	J. Robinson & Sons Ltd.
<i>Cape Franklin</i>	C. G. Mallett	W. A. Anderson	W. MacLeod	Lyle Shipping Co. Ltd.
<i>Cardiganshire</i>	C. S. Mackinnon	J. L. R. Saverimutto	D. Sibley	Ocean Fleets Ltd.
<i>Chantala</i>	F. Bell	J. Craig	C. J. A. Jones	British India S.N. Co. Ltd.
<i>Clan Matheson</i>	J. G. Smith	R. A. G. Simmons	G. McGarrigle	Clan Line Steamers Ltd.
<i>Crystal Sapphire</i>	D. Patrickson	W. Brothers	P. Gardner	Sugar Line Ltd.
<i>Cumberland</i>	C. P. Robinson	R. C. Sclater	M. J. Morrall	Federal S.N. Co. Ltd.
<i>Cymric</i>	C. R. Downes	D. Marr	J. J. Cameron	Shaw Savill & Albion Co. Ltd.
<i>Demodocus</i>	W. J. S. Eynon	G. J. J. Mansfield	R. A. Browne	Ocean Fleets Ltd.
<i>Devon</i>	J. D. Hellings	C. J. Francis	C. E. Hughes	Federal S.N. Co. Ltd.
<i>Echo</i>	J. L. Jenkins	R. B. Shurnell	W. G. Sommerfield*	Bristol S.N. Co. Ltd.
<i>English Star</i>	G. J. A. Seaye	D. S. Fforde	J. A. Barry	Blue Star Line Ltd.
<i>Essex</i>	H. C. R. Dell	A. D. Evans	R. Birkinshaw	Federal S.N. Co. Ltd.
<i>Explorer (F.R.S.)</i>	A. A. Baxter	J. McBride	J. Steven	Dept. of Agriculture & Fisheries for Scotland
<i>Flintshire</i>	R. G. Rippon	D. J. H. Custance	C. Branthwaite	Ocean Fleets Ltd.
<i>Geestcape</i>	D. N. Boon	R. E. Baker	G. M. Parsons	Geest Industries Ltd.
<i>Glenalmond</i>	N. Willis	J. N. Michael	A. Moloney	Ocean Fleets Ltd.
<i>Glenearn</i>	G. I. Wright	S. M. Ledger	A. Brown	Ocean Fleets Ltd.
<i>Glenfalloch</i>	P. H. Edwards	E. N. Greenwood	W. W. Beebee	Ocean Fleets Ltd.
<i>Glenfinlas</i>	G. W. Povey	D. Laing	J. P. R. Binding	Ocean Fleets Ltd.
<i>Glenogle</i>	D. H. Stewart, R.D.	C. W. Macdonald	D. P. Stoker	Ocean Fleets Ltd.
<i>Glenogle</i>	R. C. Riseley	C. I. Cunningham	J. Meldrum	Ocean Fleets Ltd.
<i>Glenorchy</i>	T. W. Willows	R. M. Walker	R. Buckles	Ocean Fleets Ltd.
<i>Glitra</i>	J. Duncan	J. W. T. Low	T. Adamson*	Chr. Salvesen & Co. Ltd.
<i>Gloucester City</i>	J. R. Campbell	A. Garner	H. Roderick	Bristol City Line Ltd.

* Deck Officer

Excellent Awards (contd.)

SHIP	CAPTAIN	PRINCIPAL OBSERVING OFFICER	RADIO OFFICER	OWNER/MANAGER
<i>Gloucestershire</i> ..	L. H. Shel Drake	N. H. Malpass	R. J. Daniels ..	Bibby Line Ltd.
<i>Gorjistan</i> ..	D. F. J. de Neumann	T. Chantler ..	R. Milner ..	Frank C. Strick & Co. Ltd.
<i>Gothic</i> ..	G. Campbell ..	F. C. Watkins	B. McGovern..	Shaw Savill & Albion Co. Ltd.
<i>Halifax City</i> ..	E. Irish ..	A. Downing ..	R. J. Rumble ..	Bristol City Line Ltd.
<i>Haparangi</i> ..	J. M. Burn ..	P. G. Starkey ..	E. Lamb ..	New Zealand Shipping Co. Ltd.
<i>Hauraki</i> ..	J. S. Laidlaw ..	P. J. R. Manson	J. W. J. Hollands	New Zealand Shipping Co. Ltd.
<i>Hector</i> ..	J. Chapman ..	M. A. Cully ..	G. R. Douglas	Ocean Fleets Ltd.
<i>Hertford</i> ..	A. B. Stalker ..	R. K. Blake ..	A. F. Holmes ..	Federal S.N. Co. Ltd.
<i>Hinakura</i> ..	N. L. Warren ..	P. D. Middleton	W. F. Law ..	New Zealand Shipping Co. Ltd.
<i>Huntingdon</i> ..	T. F. J. Alderman	J. D. Beeby ..	S. A. Brown ..	Federal S.N. Co. Ltd.
<i>Hurunui</i> ..	S. G. Robinson, M.B.E.	M. J. Sutherland	C. J. Elliott ..	New Zealand Shipping Co. Ltd.
<i>Jason</i> ..	J. Petticrew ..	J. E. McGregor	B. R. Epps ..	Ocean Fleets Ltd.
<i>John Biscoe</i> ..	T. Woodfield ..	R. G. MacKean	H. O'Gorman..	British Antarctic Survey
<i>John Murray</i> ..	M. J. Perry ..	J. E. Higham ..	G. M. Brown*	Natural Environment Research Council
<i>Joseph Conrad</i> ..	R. Taylor ..	—	B. E. K. Robinson	Newington Trawlers Ltd.
<i>Kerya</i> ..	I. K. Bowerman..	G. F. Lack ..	J. D. Masterman	British India S.N. Co. Ltd.
<i>Logna</i> ..	W. P. Watt ..	A. Sinclair ..	S. McGillivray*	Chr. Salvesen & Co. Ltd.
<i>Mareta</i> ..	S. Crisy ..	—	J. Hind ..	J. Marr & Sons Ltd.
<i>Middlesex</i> ..	W. F. T. Dan ..	R. Hoare ..	R. Comrie ..	Federal S.N. Co. Ltd.
<i>Maron</i> ..	R. M. McWilliam	C. Dalton Jones	R. J. Leppard..	Ocean Fleets Ltd.
<i>Milo</i> ..	E. H. Jones ..	K. Krutainis ..	J. Earl*	Bristol S.N. Co. Ltd.
<i>Northumberland</i> ..	E. T. Rowland ..	J. W. Spence ..	W. Kay ..	Federal S.N. Co. Ltd.
<i>Nottingham</i> ..	J. A. North ..	D. W. Viner ..	J. E. Hocking..	Shaw Savill & Albion Co. Ltd.
<i>Otaki</i> ..	M. J. Heron ..	J. M. McWilliam	I. R. Smith ..	New Zealand Shipping Co. Ltd.
<i>Pacific Reliance</i> ..	C. G. Killick ..	R. E. Burdett ..	S. Walsh ..	Furness Withy & Co. Ltd.
<i>Pacific Stronghold</i> ..	H. J. Pirie ..	M. J. Rasor ..	D. Briggs ..	Furness Withy & Co. Ltd.
<i>Paparoa</i> ..	J. Reid ..	D. R. Embery ..	L. A. Ryan ..	New Zealand Shipping Co. Ltd.
<i>Pegu</i> ..	J. C. Morris ..	D. M. Lucey ..	D. Mackay ..	Ocean Fleets Ltd.
<i>Pembrokeshire</i> ..	R. B. Tiplady ..	A. J. Palmer ..	H. N. Kinley ..	Glen Line Ltd.
<i>Perseus</i> ..	D. D. McIntosh	D. G. Marsh ..	C. W. Hughes	Ocean Fleets Ltd.
<i>Piako</i> ..	H. J. D. Sladen..	M. R. Doyland	S. Braithwaite	New Zealand Shipping Co. Ltd.
<i>Pipiriki</i> ..	W. F. D. Cooper	L. Ellis ..	W. R. Parsons	New Zealand Shipping Co. Ltd.
<i>Port Adelaide</i> ..	B. Collier ..	A. Craigie-Lucas	J. Kelly ..	Blue Star Port Lines Ltd.
<i>Port Burnie</i> ..	M. L. Coombs ..	R. S. Bolton ..	W. Cummings	Blue Star Port Lines Ltd.
<i>Port Chalmers</i> ..	J. G. A. Dunn ..	F. P. L. Onslow-Free	S. A. White ..	Blue Star Port Lines Ltd.
<i>Port Lincoln</i> ..	M. H. C. Twomey	B. Money ..	R. A. Jones ..	Blue Star Port Lines Ltd.

<i>Port Lyttelton</i> ..	D. Hart ..	J. E. B. Simpson	D. R. Uglow ..	Blue Star Port Lines Ltd.
<i>Port Napier</i> ..	F. M. Barton	R. N. Wheelhouse	—	Blue Star Port Lines Ltd.
<i>Port Nelson</i> ..	V. A. Hunt	K. P. G. Bowers	J. M. Lyons ..	Blue Star Port Lines Ltd.
<i>Port Nicholson</i> ..	L. W. Cady	A. D. Piqué ..	H. T. Grey ..	Blue Star Port Lines Ltd.
<i>Port Pirie</i> ..	W. J. Williams	D. J. Plume ..	A. M. Worthington	Blue Star Port Lines Ltd.
<i>Port Wellington</i>	A. M. Downes	M. F. Bennett	J. E. Appleton	Blue Star Port Lines Ltd.
<i>Potosi</i> ..	R. T. Riley	C. G. G. Hawken	F. J. Curran ..	Blue Star Port Lines Ltd.
<i>Priam</i> ..	I. R. Atkinson	R. W. Bristow	A. G. Thomson	Pacific S.N. Co. Ltd.
<i>Prometheus</i> ..	R. G. Boyd	A. R. Wilkinson	E. O. Roberts ..	Ocean Fleets Ltd.
<i>Rakata</i> ..	J. Cosker ..	M. L. Martin ..	T. H. Webb ..	Ocean Fleets Ltd.
<i>Rangitoto</i> ..	J. D. Guyler	G. W. Chatfield	W. F. Shepherd	New Zealand Shipping Co. Ltd.
<i>Raphael</i> ..	S. M. Williams	C. Bufton ..	D. J. Buchan ..	New Zealand Shipping Co. Ltd.
<i>Regent Pembroke</i>	G. L. Munday ..	P. T. Norrman	W. Limpert ..	Lampport and Holt Line Ltd.
<i>Ross Orion</i> ..	R. Waller	—	R. R. N. Laing	Regent Petroleum Tankship Co. Ltd.
<i>Ruahine</i> ..	R. G. Hollingdale	J. Gibbard ..	G. A. Parker ..	Ross Trawlers Ltd.
<i>Sarpedon</i> ..	A. S. Thompson	J. P. Duncan ..	W. C. Phillips	New Zealand Shipping Co. Ltd.
<i>Silverbeach</i> ..	M. R. Duke	B. R. Stevens ..	N. G. Calder ..	Ocean Fleets Ltd.
<i>Somerset</i> ..	J. H. B. Weston ..	D. Scott ..	R. F. McManamon	Silver Line Ltd.
<i>Southern Cross</i>	D. T. Mouldley ..	R. Griffin ..	R. Day ..	Federal S.N. Co. Ltd.
<i>Sugar Producer</i>	J. R. L. Atkinson	E. McEwen ..	N. J. L. Johns	Shaw Savill & Albion Co. Ltd.
<i>Surat</i> ..	L. C. Kingswood	J. M. G. Temple	D. E. Hicks ..	Sugar Line Ltd.
<i>Surrey</i> ..	P. Lay ..	P. J. Donaldson	J. Y. Diggle ..	P. & O. Lines Management Ltd.
<i>Susex</i> ..	S. W. Lambrick ..	A. Bignall ..	R. B. Redhead	Federal S.N. Co. Ltd.
<i>Tekoa</i> ..	F. C. Taylor	M. J. Rowland-Hill	R. G. Heath ..	Federal S.N. Co. Ltd.
<i>Theseus</i> ..	I. Webster	W. E. L. Godsell	W. Jones ..	New Zealand Shipping Co. Ltd.
<i>Tongariro</i> ..	J. D. Bennett	R. I. Duce ..	D. L. Byne ..	Ocean Fleets Ltd.
<i>Trebartha</i> ..	E. D. Stewart	I. Smith ..	M. Booth ..	New Zealand Shipping Co. Ltd.
<i>Turakina</i> ..	R. B. Hood	G. D. Goldsbrough	J. P. Whiteley	Hain-Nourse Ltd.
<i>Westmorland</i> ..	D. E. Moran	A. Leachman ..	W. J. R. Davenport	New Zealand Shipping Co. Ltd.
<i>Woosung</i> ..	J. R. Kidd	T. P. Cox ..	Wong Kam Hung	New Zealand Shipping Co. Ltd.
'MARID' SHIPS†				China Navigation Co. Ltd.
<i>Duke of Argyll</i>	L. C. Mills	R. Daley ..	D. A. Greenwood	British Railways Board
<i>Oliver Bury</i> ..	D. Battle	A. Paaver ..	G. Prow ..	Stephenson Clarke Ltd.
<i>Oreitan</i> ..	C. J. Welch	M. G. Harrison	D. Owen ..	Ore Carriers Ltd.
<i>Plover</i> ..	L. Horsham, L. A. Buntayne	M. Shaw ..	—	General S.N. Co. Ltd.

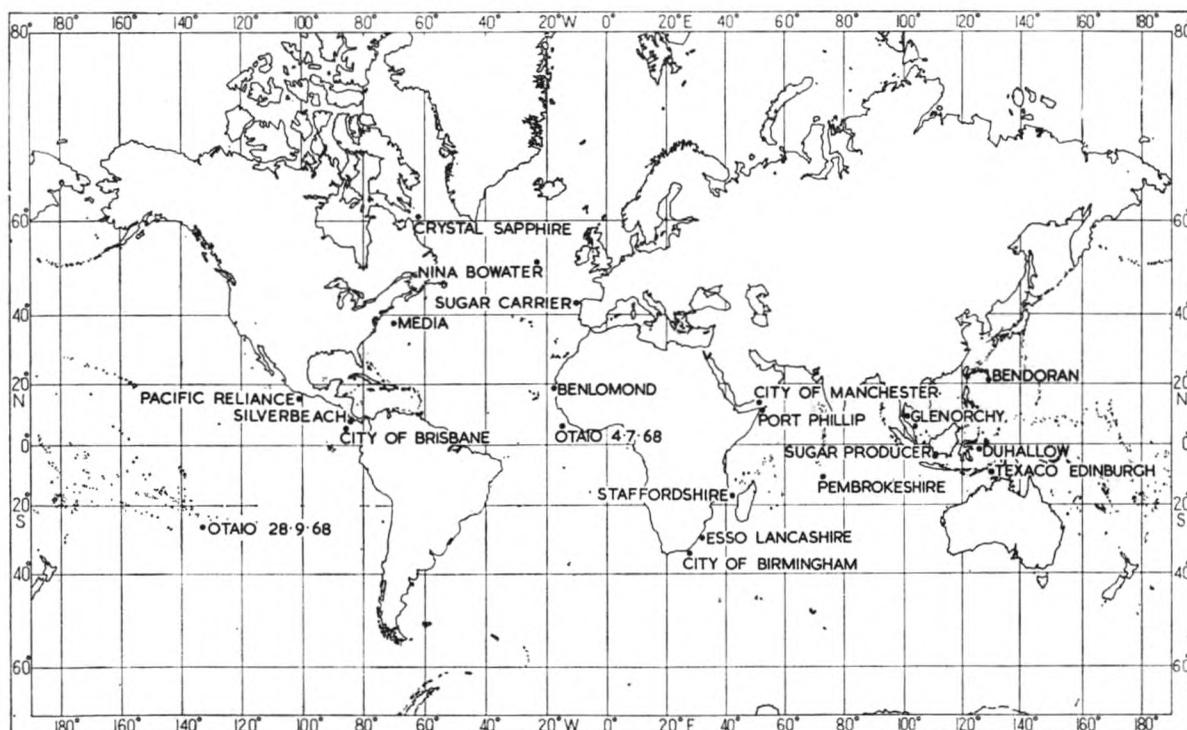
* Deck officer † Vessels recruited for the purposes of observing and transmitting sea temperatures together with non-instrumental observations when in the North Sea or Arctic waters.

TRAWLERS (non-instrumental)

SKIPPER	WIRELESS OPERATOR				TRAWLER OWNERS
W. Brettell	—				Newington Trawlers Ltd.
D. Cawood	—				Newington Trawlers Ltd.
W. Harris	—				Northern Trawlers Ltd.
A. Osler	—				Hellyer Bros. Ltd.
J. W. Russell	—				Hellyer Bros. Ltd.
—	S. B. Barr .. ..	..	..	..	Northern Trawlers Ltd.
—	J. E. Billany .. ..	..	..	..	Hellyer Bros. Ltd.
—	J. Cockburn .. ..	..	..	..	Hellyer Bros. Ltd.
—	E. D'Constantine .. ..	..	..	..	Newington Trawlers Ltd.
—	A. J. Nettleship .. ..	..	..	..	Hellyer Bros. Ltd.

The most popular award still seems to be a world atlas and this is closely followed in popularity, oddly enough, by a dictionary; we endeavour therefore to send an atlas to every officer whose name appears in the list for the first time and a dictionary when it appears for the second time. If, however, any such officer would prefer to have the alternative award, a book, we should be able to meet his request if he will kindly let us know.

L. B. P.



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



July, August, September

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

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.

TROPICAL STORM 'TRIX'

Western Pacific Ocean

s.s. *Bendoran*. Captain R. Griffiths. Hong Kong to Yokohama. Observers, Mr. J. Fleming, 1st Officer, Mr. N. M. Wight, 2nd Officer, Mr. D. Duncan and Mr. A. Begg, Cadets.

25th August 1968.

GMT

0830: Position of ship: $22^{\circ} 16' N$, $121^{\circ} 35' E$. Course 070° at 17.5 kt. Wind wsw, force 5. Pressure 1002.5 mb. Air temp. $84^{\circ} F$.

26th

0001: Position of ship: $24^{\circ} 00' N$, $125^{\circ} 18' E$. Course 070° at 17.5 kt. Wind NW, force 8. Pressure 999.7 mb. Air temp. 82° . Heavy rain squalls. Moderate to good visibility. Vessel altered course to 090° on hearing reports that tropical storm Trix was apparently stationary approx. 80-90 miles to the north.

0600: Position of ship: $24^{\circ} 00' N$, $128^{\circ} 18' E$. Course 090° at 17.5 kt. Wind NW'w, force 8. Pressure 988.1 mb. Air temp. 82° . Frequent heavy rain squalls. Visibility reduced to 2 miles.

0800: Position of ship: $24^{\circ} 00' N$, $129^{\circ} 18' E$. During the next hour the wind lulled, then backed sharply to sw, force 8, increasing. Ship's speed reduced to 9 kt and course was altered to 180° . Continuous heavy rain and visibility reduced to 1,100 yd. It was estimated at this time that the vessel passed close to the eye of the storm. Both Hong Kong and Tokyo radio stations were broadcasting the position of Trix and at 0900 gave the position as $25^{\circ} 24' N$, $129^{\circ} 12' E$, approx. 70-80 miles north of the ship's position.

0900: During the next 2 hours the wind speed increased to force 12, and was estimated at times to have a mean speed of 100 kt. Vessel was hove to and pitching very heavily in very rough seas with short, very steep swell. Heavy

spray and continuous heavy rain. Visibility 2 miles. Pressure 991.0 mb. Air temp. 78°.

1200: During the next 7 hours the wind continued from ssw, force 12 but decreasing latterly to force 9-10. Pressure 997.0 mb. Air temp. 78°.

27th

0300: Position of ship: 21° 11'N, 129° 40'E. Vessel altered course to 045° at 14.5 kt. Pressure 1003.0 mb. Air temp. 80°. During the next 12 hours the wind continued from ssw, backing slowly to s, force 8-9 and finally decreasing to force 7.

[For 24 hours, from 0600 on the 26th, observations were made every 3 hours and transmitted to Hong Kong.]

Note. Comments from the Royal Observatory, Hong Kong are still awaited.

VAPOUR TRAILS

North Atlantic

m.v. *Nina Bowater*. Captain G. B. Thomson. Rouen to Newfoundland. Observers, Mr. P. B. Bagley, Chief Officer and Mr. V. Bracegirdle, Radio Officer.

26th July 1968. At 1849 GMT an aircraft passed directly overhead eastbound leaving a dense white vapour trail behind. A black vapour trail seemed to appear in the path ahead of the aircraft. Cloud 2/8 Ci.

Position of ship: 52° 11'N, 23° 10'W.



Note. A likely explanation of this phenomenon is that the black vapour trail seen ahead of the aircraft was in fact the shadow of the white vapour trail cast on the cirrus cloud. The aircraft was probably flying at about 35,000 ft with the cirrus below this level. The setting sun behind the aircraft could give this effect.

RAIN-WATER SAMPLE

Pacific Ocean

m.v. *Otaio*. Captain F. S. Angus. Auckland to Balboa.

27th-29th September 1968. As the vessel was in the vicinity of Mururoa Atoll during this period, samples of rain-water were collected and bottled with a view to testing for radioactivity. At 1200 GMT on the 28th: Air temp. 64.4°F, wet bulb 60.8°, sea 65.3°. Wind E's, force 7.

Position of ship at 1200 on 28th: 26° 48'S, 133° 24'W.

Note. Mr. R. S. Cambray of the Health Physics and Medical Division of the Atomic Energy Research Establishment at Harwell comments:

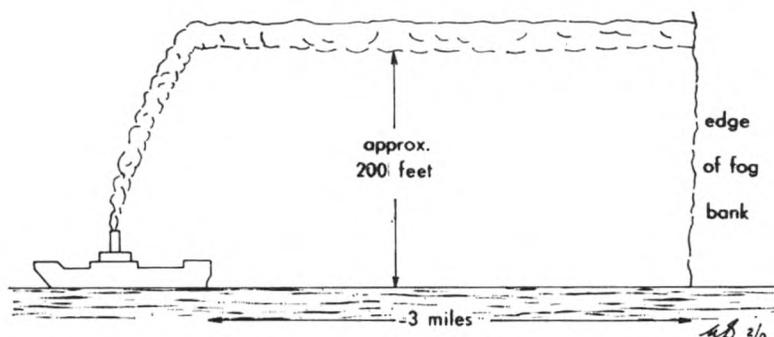
"We have analysed the rain-water samples which were collected in the vicinity of Mururoa Atoll. We were not able to detect any radioactivity. The samples were quite small (about 5 ml) and we counted them by gamma-ray spectrometry for caesium-137, barium-140, zirconium-95, cerium-144, ruthenium-106, ruthenium-103, cerium-141 and iodine-131. The fact that we were not able to detect any radioactivity could be partly because the samples were small but it does indicate that the activity concentrations in the rain-water were not very high. The last explosion of the French test series took place on 8th September so that any atmospheric radioactivity would be well dispersed by 27th September."

TEMPERATURE INVERSION

off Cape Finisterre

m.v. *Sugar Carrier*. Captain J. E. Leaver. Immingham to Las Palmas. Observers, Mr. P. Spink, Chief Officer, Mr. W. Brothers, 2nd Officer and Mr. I. C. Gravatt, 3rd Officer.

25th September 1968. At 0900 GMT the vessel was approximately 10 miles NW of Cape Finisterre and a fog bank could be seen ahead. The ship entered the fog bank at 0924 and visibility dropped to zero. The wind was sw'ly, force 4, with air temp. 62.8°F and wet bulb 62.6° . The fog persisted with visibility never more than 400 yd until 1500 when it began to disperse and only dense patches were experienced. At 1600 the fog bank was finally cleared and visibility ahead was very good. At this



time another ship was observed 5 miles to starboard. The funnel smoke from this vessel was rising almost vertically and then lying horizontally back into the fog bank. At 1600: Air temp. 65.2°F , wet bulb 64.4° . Wind variable, force 2.

Position of ship at 1200: $42^{\circ} 48' \text{N}$, $9^{\circ} 36' \text{W}$.

UNUSUAL WAVES

off Durban

s.s. *Eso Lancashire*. Captain W. Brians. Mina' al Ahmadi to Cagliari, Sardinia.

5th August 1968. At 0845 GMT the vessel entered a wave at an altitude of approx. 20 ft and emerged seconds later very much the worse for wear. If Cdre. W. S. Byles, R.D. has any idea where "The One from Nowhere" went, we found the wave that should be with his trough! The wave passed unbroken over the monkey island (a height of about 60 ft) and we struck it well above the trough. It was preceded by a wave slightly larger than the usual and we rode that one fairly comfortably but the wave lengths to the big one appeared much less and we just did not make it.

Position of ship: $29^{\circ} 20' \text{S}$, $32^{\circ} 00' \text{E}$.

Note. "The One from Nowhere" concerns a similar experience in the *Edinburgh Castle* off Port St. Johns in August 1964, published in *The Marine Observer*, October 1965. In the same issue there was an article on 'Freak' Ocean Waves by Mr. L. Draper of the National Institute of Oceanography. Both articles are well worth re-reading.

Note 2. Mr. Draper (at present Director, Wave Climate Study, Department of Public Works, Ottawa) comments:

"Reports of such unusual or 'freak' waves are very interesting. As we are most unlikely to have a wave recorder in operation in a vessel when it meets such a wave we shall have to rely on visual observations if we are to have any information at all, and it would be appreciated if other similar occurrences could be reported. It would help considerably if reports could contain as much supporting information as possible. The additional information should include, if available, estimates of wave conditions over the preceding and following few hours, together with wind, current and any other relevant data.

"In the *Eso Lancashire's* logbook the previous wind and wave information is recorded but, because of damage during the incident, meteorological observations were discontinued for

about 9 hours. The notes include '0745, heavy swell apparent, period 12 sec, height 20 ft' and yet a wave of 60 ft (or was it 80?) in height could appear an hour later, presumably without significant change in the weather.

"If such 'freak' waves can be reported in as much detail as possible, it will help us to build up a picture of their occurrence. If the phenomenon is due purely to waves, and it is explicable in such terms, then 'freak' waves can form almost anywhere in the world, but it is perhaps in southern areas, where relatively smooth but high swells exist, that the most spectacular results are likely to occur."

West African waters

s.s. *Benlmond*. Captain A. McKenzie. London to Durban. Observers, Mr. D. M. Wohlgemuth, 2nd Officer and Mr. A. C. Hitcham, 3rd Officer.

8th August 1968. At 0001 GMT, after completion of the weather report, it was observed on the radar that six large waves were approaching the ship from a direction of 230° which was contrary to the 030° direction of the swell. From the radar, the wave crests appeared to be about half a mile apart. Upon actually meeting the waves no real effect was felt by the ship as the wave height was only 6–8 ft. It seemed rather odd that these waves should appear out of the blue for only a short period and travel in almost the opposite direction to the swell. Air temp. 70.9°F , wet bulb 68.5° , sea 70.2° . Wind NE'N, force 4. Visibility $4\frac{1}{2}$ miles.

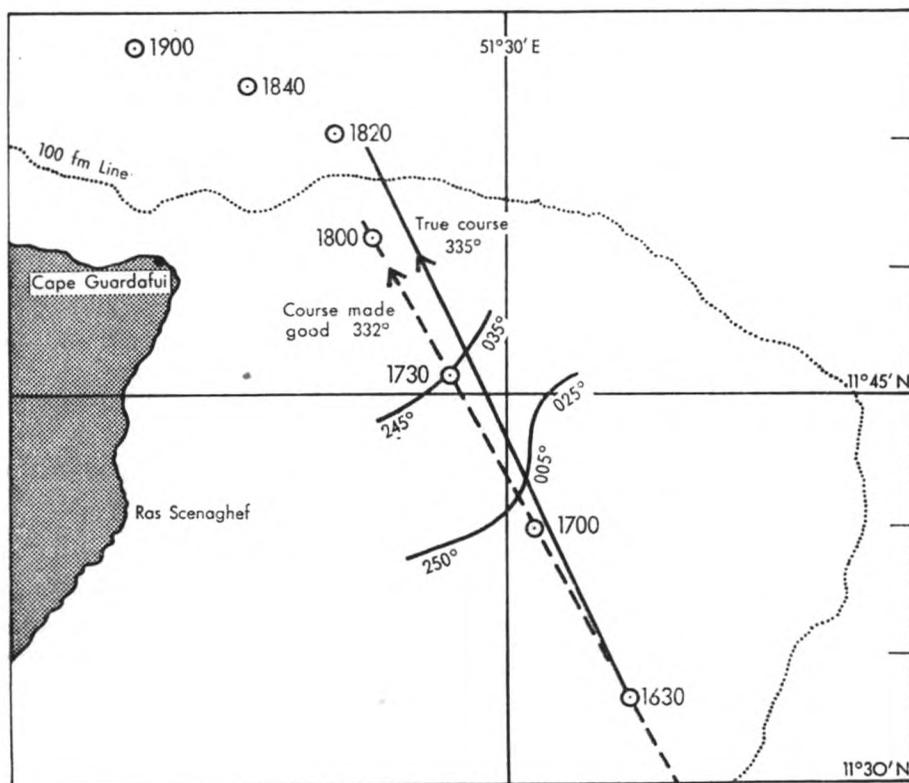
Position of ship: $19^\circ 21'N$, $17^\circ 35'W$.

CURRENT RIP

Arabian Sea

m.v. *Port Phillip*. Captain W. J. North. Dakar to Aden. Observers, the Master and Mr. D. C. Ray, 2nd Officer.

26th August 1968. The vessel was proceeding on a course of 335° to make Cape Guardafui. At 1607 GMT the 100 fm line was crossed and at 1630 a good fix was obtained of Cape Guardafui and Ras Scenaghef. At about 1650 an echo on the radar appeared about 4 miles ahead and was shown as a line cutting the ship's intended course approximately at right angles. The line was eventually observed to be a current



rip. At 1700, a few minutes before crossing the rip, the sea temp. was 69°F but 10 min later after crossing the rip it had risen to 74.5°. At 1730, just before crossing another rip, the sea temp. was 77° but 10 min later it had fallen to 75.5°. Other changes noted were the wind direction which backed from wsw, force 3-4 at 1700 to s'ly, force 4-5 at 1745. From 1630 to 1800 there was a w'ly set of 3° but from 1800-1820 an E'ly set was experienced.

TIME (GMT)	DRY (°F)	WET (°F)	SEA (°F)	WIND	
				DIRECTION	FORCE
1700	-	-	69.0	WSW	3-4
1710	-	-	74.5	-	-
1730	74.0	70.5	77.0	-	-
1740	-	-	75.5	-	-
1745	75.0	71.8	-	S	4-5
1850	77.2	74.8	-	-	-
1940	82.0	77.0	84.5	-	-

Position of ship at 1800: 12° 00'N, 51° 42'E.

UNDER-SEA VIBRATIONS

Eastern Pacific Ocean

s.s. *Pacific Reliance*. Captain C. G. Killick. Panama to Los Angeles. Observers, the Master, Mr. M. S. Condon, 4th Officer and Mr. S. R. Humphries, Deck Apprentice.

2nd July 1968. At 0350 GMT, steering 296° at 16.5 kt and 11.5 miles from the Mexican coast, the ship experienced a violent tremor which vibrated the whole ship for 15 to 20 sec. Shortly after the tremor a steep, low E'ly swell was observed which lasted 35 min before levelling out. At the time of the tremor no apparent sea-surface disturbance occurred and the ship's head and engine revs. remained steady. The charted depth was recorded as 1,005 fm. There was no apparent change in barometric pressure. Comments from crew members likened the effect of the tremor to either something large and heavy hitting the ship's propeller or to a vessel running aground. Air temp. 80.7°F, wet bulb 76.8°, sea temp. 84.1°. Wind light and variable. Sea smooth or rippled with no swell waves.

Position of ship: 16° 59'N, 100° 54'W.

Note. Mr. J. Piegza, Seismologist at Kew Observatory comments:

"This tremor was certainly due to an earthquake. At the time of this occurrence no major earthquake was reported from this part of Mexico. Therefore it must have been a shallow, local tremor which would be felt very strongly in the immediate vicinity but would not necessarily be recorded by the distant seismographs.

"The fact that the ship was vibrated only for about 15 to 20 sec indicates that the tremor was a very near one. The low easterly swell which appeared shortly afterwards suggests that the epicentre was situated somewhere between the ship and the coast roughly in an easterly direction.

"The Pacific coast of Mexico is very seismic and the earthquakes of various intensity, both on land and under the sea, are almost a daily occurrence."

Timor Sea

s.s. *Texaco Edinburgh*. Captain H. Bennett. Botany Bay to Singapore. Observers, the Master and Mr. R. S. Jay, 2nd Officer.

27th September 1968. At 0358 GMT the vessel experienced a violent vibration for a period of approx. 30 sec. No shipboard activity could account for this, the engine revs. remained normal and the vessel was in full ballast condition. The echosounder was immediately switched on but no sounding was obtained.

Position of ship: 9° 00'S, 129° 56.5'E.

Note. Mr. J. Piegza comments:

"The violent vibration was due to a large earthquake which occurred at that time under the Banda Sea. The U.S. Coast and Geodetic Survey gives the following preliminary time and the position of its epicentre: 27th September, 03h 58m 55s GMT; 6·8°S, 129·1°E. Magnitude 6."

LUMINESCENCE

Java Sea

m.v. *Sugar Producer*. Captain J. R. L. Atkinson. Panama to Sydney. Observer, Mr. E. McEwen, 2nd Officer.

15th July 1968, between 0900 and 1200 GMT. On seeing small pin-points of light in the sea the Aldis lamp was shone on to the water. Immediately the sea erupted into a fantastic display of red, green and white cat's-eyes. It was noticed that whatever was responsible for the source of light was big enough to cause a disturbance on the surface of the water and it was possible to select individual points of light and chase them away from the ship with the Aldis. Samples of sea-water were taken but nothing could be seen with the naked eye and unfortunately there are no means on board for preserving samples for an indefinite period. Air temp. 73·8°F, wet bulb 69·9°. Wind SE, force 3.

Position of ship at 1200: 04° 18'S, 111° 18'W.

RADAR ECHOES

North Atlantic Ocean

m.v. *Crystal Sapphire*. Captain D. Patrickson. Churchill to London. Observers, the Master and Mr. R. W. Paul, Chief Officer.

13th August 1968. At 1210 GMT a clearly-defined band of radar echoes about 4 miles long by 2 miles wide appeared at a distance of 4-5 miles. This was at first thought to be pack-ice. Visibility was approx. 2,000 yd at the time. Course was altered to pass round the area but, although the vessel came within half a mile of the area, nothing was seen. Attempts to plot an individual echo were unsuccessful and it was realized that the band was sea clutter. Eventually the ship passed through the area but apart from a few small wavelets there was nothing to be seen. On inspecting the echo-sounder trace it was found that the vessel had passed over the edge of a bank, the depth increasing from 240 fm to the extreme range of the machine—630 fm in less than a mile. It was assumed that the clutter was caused by upwelling water. The sea temp. rose from 35·2°F to 37·4° on crossing the area and shortly afterwards the visibility improved. Wind NNE, force 1-2. Rippled sea with moderate to heavy NE'ly swell.

Position of ship: 60° 30'N, 61° 06'W.

STORMBOUND BIRDS

Eastern Pacific Ocean

s.s. *City of Brisbane*. Captain K. B. B. James. Papeete to Balboa. Observers, Mr. W. A. Roberts, 1st Officer, Mr. P. Gill, 2nd Officer and Mr. H. Anthony, Junior 2nd Officer.

25th August 1968. At 0045 GMT the ship passed through a violent storm with extremely heavy rain during which visibility was reduced to about 1 mile. Following the downpour it was found that about a dozen birds had landed on the ship. They were identified from books as Brown Boobies. They appeared to be dazed and exhausted and showed no fear of human beings when approached. Air temp. 78·2°F, wet bulb 76·8°, sea 81·2°.

Position of ship: 5° 08'N, 86° 36'W.

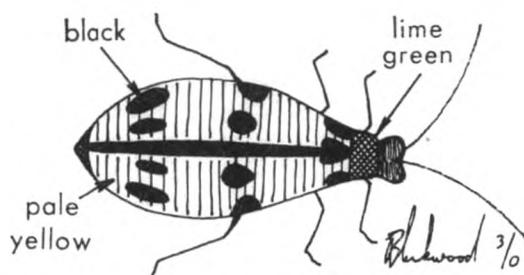
UNUSUAL INSECTS

North Atlantic Ocean

m.v. *Media*. Captain A. Bull. Norfolk, Virginia to Liverpool. Observers, Mr. A. J. Wilson, 2nd Officer and Mr. A. W. Blackwood, 3rd Officer.

12th September 1968. At 1600 GMT several hundred insects resembling lady-birds were seen to land on the starboard bridge wing, mainly on awning spars. They were approx. 1 cm long. A small number were still present 24 hr later. Air temp. 79°F, sea 72°. Wind w'ly, force 5.

Position of ship: 38° 44'N, 71° 16'W.



Note. Mr. R. T. Thompson of the Department of Entomology, Natural History Museum comments:

"I regret that it is not possible to make a precise identification from the description or drawing. It is therefore most unfortunate that no specimen appears to have been retained by the observers who are otherwise to be congratulated on the excellent data provided.

"The drawing does, however, bear some resemblance to certain species of leaf beetle of the genus *Diabrotica*. One of these (*D. duodecimpunctata*(F.)) occurs in North America, including Virginia, and has a pattern of spots similar to those shown in the drawing. This is therefore most likely to be the species concerned but there are others in Mexico, with similar markings, which cannot be ruled out.

"*D. duodecimpunctata* is known in the United States as the spotted cucumber beetle. Evidence has been produced that this species makes seasonal migrations, northwards in spring and early summer and southwards in autumn. It has been estimated that individuals can cover up to 500 miles in 2-4 days at 60-65°F with a favourable wind. It would seem that this swarm was carried out to sea by the westerly wind."

SEA SNAKES

Eastern Pacific Ocean

m.v. *Silverbeach*. Captain M. R. Duke. Cardiff to Los Angeles. Observer, Mr. H. Lawson, 2nd Officer.

19th July 1968. At 1500 GMT numerous snake-like creatures were seen swimming on the sea surface with the same motion as a snake underway on land. They were approx. 2 ft 6 inches in length and 1½ inches in diameter. The greater part of the body was brown with about 6 inches of segmented yellow and brown stripes at the tail end. Air temp. 83°F, sea temp. 80°.

Position of ship: 08° 00'N, 83° 30'W.

Gulf of Siam

m.v. *Glenorchy*. Captain T. W. Willows. Singapore to Bangkok. Observers, Mr. R. M. Walker, 3rd Officer and Mr. P. R. N. Richmond, Officer Cadet.

26th September 1968. At 0240 GMT a sea snake was seen, approx. 8-10 ft long. The body of the snake was white and it was marked throughout its length with dark-brown annular bands.

Position of ship: 05° 46'N, 103° 40'E.

27th September 1968. During the morning an emergency lifeboat drill was held. The ship was stopped and a boat sent away. While the lifeboat was lying stopped a sea snake approached. It was about $4\frac{1}{2}$ ft long with a white body and the dark-brown bars across its back did not encircle the body but were V-shaped, pointing towards its head. The snake attempted to get into the boat and had to be driven off.

Position of ship: $12^{\circ} 19'N$, $100^{\circ} 46'E$.

Note. Miss A. G. C. Grandison, Curator of Herpetology in the Department of Zoology, Natural History Museum comments:

"These reports, unfortunately, do not contain sufficient morphological details to allow for specific identifications. A transverse banded pattern is common to many different groups of sea snake and in numerous species is particularly prominent in juveniles. However, the size of the one observed on 26th September and the colouration suggest that it may well have been *Hydrophis cyanocinctus* which is the commonest and probably the largest species in the area in which the observation was made. An example of this species measuring 8 ft is known and the population occurring in the Gulf of Siam is somewhat unusual in that the banded pattern is retained as age and size advance. The colouration of this species is described as having black annuli on a light-greyish, greenish or yellowish ground, the rings of the annuli often widening dorsally. The smaller individual sighted on 27th September may also have belonged to this species for occasionally the annuli are less distinct on the sides of the body. However, it could also belong to one of the smaller species of *Hydrophis* occurring in the South China Sea. While I would not like to be held responsible for the death of one of the seamen in the lifeboat, I feel it is a pity that the snake was driven off, and not killed and sent here for precise identification which would have made the report so much more interesting and of greater value."

SHARKS

Gulf of Aden

s.s. *City of Manchester*. Captain J. S. Grant. Port Sudan to Dar-es-Salaam. Observers, the Master, Mr. D. C. Walker, 3rd Officer and Mr. J. Clarke, Quartermaster.

18th July 1968. At 0705 GMT an unusually large collection of sharks was sighted off Cape Guardafui. They were seen to be in two distinct packs, one consisting of at least 30 sharks and the other of more than 20. The sharks were 20 to 30 ft in length and appeared to have large squarish heads. They seemed to be swimming in all directions within the pack. The sea was rippled with a slight swell. Air temp. $88^{\circ}F$, sea 87° .

Position of ship at 0600: $12^{\circ} 00'N$, $51^{\circ} 00'E$.

Note. Mr. G. Palmer of the Department of Zoology (Fish Section), Natural History Museum comments:

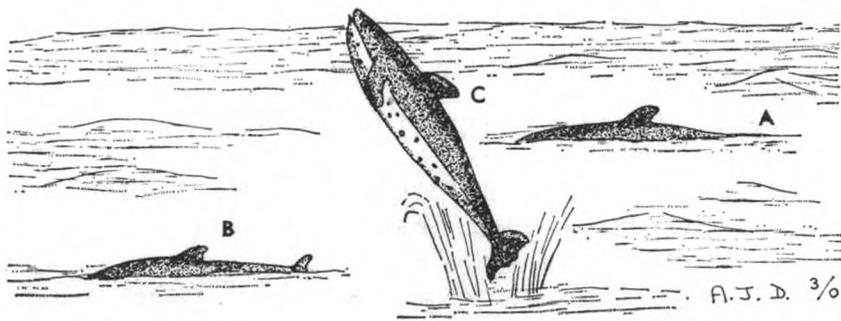
"It is possible that the aggregation of sharks may have been whale sharks, *Rhincodon typus*. The length and the squarish-looking heads would fit this particular species."

WHALES

off Liberia

m.v. *Otaio*. Captain F. S. Angus. Las Palmas to Freemantle. Observer, Mr. A. J. Davies, 3rd Officer.

4th July 1968. At 1445 GMT three large fish or whales of unknown species were observed. They were about 200 yd off abeam to port when one of them jumped almost vertically from the water. The splash it made on falling back into the water was distinctly heard on the ship. The three fish were under observation for 3-4 min during which time four leaps (similar to c in the sketch) were seen. All three fish were moving in a NNW'ly direction. They were about 20 ft long, blue-black in colour, except the underparts which were greyish-white. The belly was speckled with darker spots. When in the air the fish took on a more leathery, brownish appearance.



The tail was believed to be in the horizontal (flipper type) plane rather than a vertical fin (diagrams A and C, rather than B).

Position of ship: $5^{\circ} 48'N$, $13^{\circ} 30'W$.

Note. Dr. F. C. Fraser, formerly of the Department of Zoology, Natural History Museum, comments:

"I am replying not because I can identify the whale but to indicate to you that I have tried. The estimated length of 20 ft rules out all the dolphins except the Killer and the colour does not fit for that species. You will note that the dorsal fin is situated about the end of the fore half of the body; this would rule out the rorquals and the Beaked Whales in which it is situated about the commencement of the posterior third of the body. The mouth and snout do not suggest a beaked whale or a rorqual. I appreciate how difficult it is to get a precise impression of shape and pigmentation from these momentary appearances of cetaceans above the water surface. It may be of interest to Mr. Davies that I myself made an observation of behaviour similar to that he describes and in the same general vicinity. On 9th January 1946, off the coast of Liberia ($5^{\circ} 20'N$, $9^{\circ} 50'W$), a whale was reported blowing quite near the ship and a series of slicks indicated its track. The whale suddenly broke surface and projected the whole of its body almost vertically from the water, turning slightly and falling back into the sea again with a tremendous splash. A second, smaller leap followed with more splashing. The whale was judged to be about 15 m long (49 ft). Its shape and pigmentation corresponded with those of a Sei Whale, *Balaenoptera borealis*. According to accounts, the Sei Whale very rarely behaves in the manner described, so this instance of it doing so may be worth recording."

Ceram Sea

m.v. *Duhallow*. Captain L. Lennox. Fukuyama to Dampier. Observers, the Master, all Deck Officers, and Mr. J. A. Borrett, Junior Radio Officer.

11th July 1968. At 0350 GMT five whales were observed over an area of 5 or 6 square miles. They were on the surface all the time, blowing frequently and occasionally raising their tails and bringing them sharply down on the water. They were large, probably full-grown and were heading out of the bay formed by Sula Mangoli and Sula Sanana islands towards the passage between Sula Mangoli and Obi Major island in a general ENE'ly direction.

At this time a number of echoes in a roughly wedge-shaped formation were seen on the radar at a range of 15 miles. When the range between vessel and echo was reduced, hundreds of fish could be seen jumping and numerous unidentified sea birds were swooping overhead. There were several whales in the vicinity and it was thought that there were whales amongst the fish although none were seen blowing. The formation of fish was 1 to $1\frac{1}{2}$ miles long when first seen but this decreased to about $\frac{3}{4}$ mile on the approach of the vessel. It was travelling in a NNE'ly direction at about 1-2 kt. Air temp. $85.5^{\circ}F$, wet bulb 78.6° , sea 86° . The sea was smooth.

Position of ship: $2^{\circ} 03'S$, $126^{\circ} 30'E$.

ABNORMAL REFRACTION

Indian Ocean

s.s. *City of Birmingham*. Captain J. Sapp. Durban to Dakar. Observer, Mr. C. W. Rapley, 2nd Officer.

10th September 1968. At 1200 GMT haze was present over the horizon to the s, SW, NW and NE and overland to the west. Smoke from the vessel's funnel was hanging astern at mast height and stretching as far as the horizon to the NE. There was apparently no wind at this temperature inversion level. Other vessels coming out of the haze were observed to have a distorted appearance. With most medium-sized vessels this took the form of considerable vertical distortion of the hull but normal appearance of masts and funnels. Our own main mast was 103 ft above sea level. The phenomena persisted until 1300. Air temp. 76.1°F , wet bulb 68.8° , sea 74° . Wind NE, force 1. Cloud 7/8 Ci.

Position of ship: $33^{\circ} 36'\text{s}$, $27^{\circ} 30'\text{E}$.

UNIDENTIFIED PHENOMENON

Mozambique Channel

m.v. *Staffordshire*. Captain N. F. Fitch, M.B.E. Colombo to Cape Town.

12th August 1968. At 1515 GMT, about 10 min after sunset whilst still in good daylight, a brilliant white light appeared in the sky bearing about 300° from the ship. It appeared at an altitude of about 40° to the horizon and increased in brilliance until it burned out at about 25° about 1 sec later. It left a long vapour trail behind, coloured a very bright pale blue which soon twisted in the upper air currents. It remained visible for 10 min.

Position of ship: $15^{\circ} 58'\text{s}$, $42^{\circ} 42'\text{E}$.

Note. Mr. A. J. G. Moorat, Satellite Orbits Group, Radio and Space Research Station, Slough comments:

"From the description we think that the object was a decaying meteor."

COMETS

Indian Ocean

m.v. *Pembrokeshire*. Captain R. B. Tiplady. Hamburg to Singapore. Observers, Mr. A. J. Palmer, 1st Officer and Mr. B. D. Pollock, Extra 3rd Officer.

26th–27th July 1968. At 0030 GMT, when the first light of day was hardly in the sky, two patches of light were seen below the star Achernar. Quickly-moving Cu cloud made observation difficult but during the longer breaks in the cloud they were still there, one about 16° from Achernar and the other about 25° , measured with a sextant. As nautical twilight was just beginning it was at first thought that this was nothing more than the first rays of light on high cloud but a good look using binoculars showed that this was not so; the patches were still there and still unaccountable.

The following night at 0001, with a darker and clearer sky, the two patches of light were still to be seen. They appeared to be the tails of two comets. The lower one, being larger and more distinct, was closer to the rising star Canopus and similar, though not so large, as a comet seen a few years ago. At 0001 on 27th: Air temp. 75.5°F , wet bulb 70.2° , sea 80.6° . Wind SE'E, force 5. Cloud 2/8 C_L. Good visibility.

Position of ship at 0030 on 26th: $14^{\circ} 35'\text{s}$, $66^{\circ} 58'\text{E}$.

Position of ship at 0001 on 27th: $10^{\circ} 27'\text{s}$, $72^{\circ} 58'\text{E}$.

Note. This report was forwarded to Mr. K. B. Hindley, Meteor Section of the British Astronomical Association, who hopes to comment on this and similar reports in a later article.

AURORA

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

Auroral reports for 1968 July–September made by observers in British ships and received at the Balfour Stewart Auroral Laboratory of the University of Edinburgh are summarized below. Some interesting new names appear among the more familiar ones. We appreciated that m.v. *Redcar* should be so happily positioned first on one side of the Atlantic and then on the other for two periods of activity during September. This note is our only means of acknowledging reports from observers in ships and we thank you for taking time and trouble to help us to accumulate data.

Planetary geomagnetic activity never reached a high level during the period; 6– was the highest figure (in a scale of 00–10) and the mean for September was only slightly higher than for the other two months.

In a bulletin about the satellite ESRO I-Aurorae, which has been in orbit since October 1968, there are reports of successful reception of data. The spacecraft was originally intended for a six-months' operational lifetime to cover the 1968/69 winter observing period, but all systems are continuing to function successfully and the craft will probably continue to operate until re-entry into the Earth's atmosphere towards the end of this year. Scientists are thereby being enabled to extend their investigations and to watch aurorae from above. This does not mean, however, that visual observations are no longer necessary. On the contrary, correlation of the satellite data and of the results of rocket-borne experiments with magnetic, ionospheric and auroral ground observations is of great importance.

It is hoped that during the summer there will again be many reports of noctilucent cloud sightings, magnificent displays of which were seen over the British Isles during 1968 June and July. The position of the southern border of the clouds gives an indication of the penetration southwards of low temperatures at the mesopause, i.e. around 80 km, the height of the clouds. As with aurora, information about these clouds is interchanged with centres in North America and U.S.S.R.

DATE (1968)	SHIP	GEOGRAPHIC POSITION	<i>A</i>	ϕ	<i>I</i>	TIME	FORMS
26th July	<i>Cape Franklin</i>	50°25'N 59°10'W	010	62	+72	0300–0500	RB, N
7th Aug.	<i>Weather Surveyor</i>	59°00'N 18°55'W	070	65	+72	0045–0305	HA, RA
15th	<i>Cape Franklin</i>	50°00'N 67°00'W	360	62	+76	0125–0230	HB, RA, RB, RR
17th	<i>Weather Reporter</i>	50°06'N 18°48'W	070	65	+72	0100–0140	RR, P
1st Sept.	<i>Weather Monitor</i>	57°55'N 15°40'W	070	63	+70	0115–0130	RB
	<i>Weather Reporter</i>	58°02'N 15°45'W	070	64	+71	0130–0200	N
6th	<i>Redcar</i>	50°20'N 60°30'W	010	62	+75	0001–0015 0200–0230	RA, RB, R P
	<i>Weather Monitor</i>	52°16'N 54°02'W	020	63	+74	2330–0030	HA, R
	<i>Redcar</i>	59°00'N 19°30'W	070	65	+72	2250–2330	RB
7th	<i>Redcar</i>	52°16'N 54°02'W	020	63	+74	0130	RR
		54°18'N 47°46'W	030	64	+74	2330	R
8th	<i>Redcar</i>	54°30'N 47°30'W	030	65	+74	0030–0130	HB, RB, RR, P, N
	<i>Dunadd</i>	52°42'N 52°36'W	020	63	+76	0055–0230	HA, RA, RB
8th–10th	<i>Illyric</i>	Gulf of St. Lawrence	010	60	+74	0100/8– 0900/10	HA, RA, RB, RR
10th	<i>Weather Monitor</i>	58°55'N 19°05'W	070	65	+72	2150	N
12th	<i>Weather Monitor</i>	59°00'N 18°55'W	070	65	+72	2245	RA
	<i>Fidra</i>	58°30'N 05°00'W	080	62	+71	2300–0030	HA, RA, RR
14th	<i>Weather Monitor</i>	59°00'N 19°10'W	070	65	+72	2335	N
15th	<i>Hemimactra</i>	70°06'N 15°03'E	110	68	+77	1940–2100	HA, RR, P
21st	<i>Redcar</i>	64°06'N 06°44'E	100	64	+75	1925–2000	P, N
22nd	<i>Redcar</i>	60°14'N 15°05'E	110	67	+77	2150–0100	HB, RA, RR, P
23rd	<i>Redcar</i>	60°32'N 16°01'E	110	67	+77	2205–2211	RA, RR, P
28th	<i>Weather Adviser</i>	59°02'N 18°44'W	070	65	+72	2250	N
30th	<i>Weather Adviser</i>	59°01'N 18°40'W	070	65	+72	0150, 0250	N

KEY: *A* = 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.

Historical Notes on the Original Beaufort Scale

BY BLAIR KINSMAN

(Associate Professor of Oceanography, The Johns Hopkins University, Baltimore, Md., U.S.A.)

(This article is part of a hitherto unpublished technical report on the Beaufort Scale.)

Rear-Admiral Sir Francis Beaufort, K.C.B. was born in Ireland—without the titles—in 1774 (see photograph opposite page 120). His father was a protestant clergyman, a topographer and one of the founders of the Royal Irish Academy. Beaufort entered the Royal Navy at the age of 13. He was a midshipman aboard the *Aquilon*, Lord Howe's repeater for the rear squadron at the Glorious First of June when the British thrashed the Brest Fleet under Villaret-Joyeuse. He was made Lieutenant in 1796 and was First Lieutenant of the *Phaeton* in 1800 when she chased His Most Catholic Majesty's polacre *San Josef* in under the 5-gun battery at Fangerola near Málaga, Spain. Two nights later Lt. Beaufort commanded a cutting-out expedition of four of the *Phaeton's* boats. Unfortunately, the launch, which mounted a caronade, was unable to keep up and surprise was lost when the barge and two cutters were detected and fired upon by a French privateer schooner. In spite of this Lt. Beaufort laid his boats alongside the *San Josef* and, after having been thrown back twice, secured the deck and brought her out. During the action Beaufort accumulated three sword cuts and sixteen musket shots in the head, arms and body. As a result of his success Lt. Beaufort made the long step up to Commander and, as a result of his wounds, was given convalescent leave.

Commander Beaufort was on the beach until 1805 but hardly idle. In 1803-4 he helped his brother-in-law, Mr. Edgeworth, father of the novelist Maria Edgeworth, to establish a line of telegraphs (i.e. a chain of semaphore stations) from Dublin to Galway over which messages and replies could be transmitted in 8 minutes.

In the summer of 1805 Beaufort was appointed to the command of the *Woolwich*, armed *en flûte* (i.e. with her guns removed, leaving her gun ports only a row of empty holes). It was at this time that Beaufort devised his wind-force scale. At least that is what Admiral FitzRoy says in *The Weather Book, A Manual of Practical Meteorology* published in 1863.¹ On pages 30 and 31 one finds ". . . the practical, and now common, mode of estimating force of wind by arbitrary scale, ranging from 0 = a calm, to 12 = a hurricane, is found generally sufficient for descriptive purposes; and it is surprising how closely practised observers agree in such estimations. All honour to Beaufort, who used and introduced this succinct method of approximation by scale, expressed in numbers instead of vague words, about the beginning of this century. By the kindness of his family, we have them now before us, in the log of H.M.S. *Woolwich* in his own handwriting dated 1805."* Between 1805 and 1810 when he was promoted to post rank, Beaufort commanded a number of ships and saw service in the East Indies, the Rio de la Plata, the Cape of Good Hope, the Mediterranean, the north coast of Spain, Quebec, and on convoy duty. During this service, when not otherwise occupied, he engaged in hydrographic survey work. For example, he provided the data for new and very accurate charts of the entrances to the Rio de la Plata.

During 1811-12 Captain Beaufort commanded H.M.S. *Frederikssteen* and was employed in the eastern Mediterranean on a hydrographic survey of the coasts of Asia Minor. With his left hand he suppressed the organized system of general and

* The Keeper, Public Record Office, Chancery Lane, London, W.C.2, very kindly tried to find the original entry for me. He has both the captain's log (Adm. 51/1632) and the master's log (Adm. 52/3719) of H.M.S. *Woolwich* for 1805 but in neither is the Beaufort wind force scale recorded. Mr. R. F. Hunnisett of the Public Record Office speculates that the log referred to by Admiral FitzRoy in 1863 may have been Beaufort's private journal and that it may still be in the possession of one of Beaufort's descendants.

absolute piracy then prevalent there and also made astronomical observations. It was this last activity that led to an abrupt end to the survey. In June 1812 Beaufort had an astronomical party ashore when an armed skirmish broke out between the local Pashas who were thoroughly out of any control by the Porte. Captain Beaufort himself went in to take his party off. As they were rowing back out of the harbour a sniper, taking a long shot, put a ball through his groin, breaking his hip. Beaufort was taken safely back to Malta but he was many months in recovering. The survey had been interrupted and the *Frederikssteen* through long service was in almost as bad shape as her captain. Both were ordered back to England at the end of 1812.

For the next several years Beaufort was busy working up the data from his survey and constructing a set of charts for the coast of Asia Minor. Marshall² comments, "From the weighty responsibility attached to such a work, he considered it necessary that the whole should be executed by his own hand; and we have reason to believe . . . that previous to his doing so, no maritime surveyor ever lodged at the Admiralty MSS. so drawn and arranged as to be fit for immediately placing on the copper, without first deriving aid either from the Hydrographer or some of his assistants."

In 1817 Beaufort published a book, *Karamania, or a brief description of the South Coast of Asia Minor, and of the Remains of Antiquity*.³ It was well written and well received. Quite characteristically, Beaufort refused to accept any payment for the book since "the materials . . . were acquired in His Majesty's service in the execution of a public duty".

In 1829 Beaufort was appointed Hydrographer to the Admiralty, a post which he held for the next 26 years. In 1838 the Beaufort wind-force scale was made mandatory for log entries in all ships of the Royal Navy. In 1846 Beaufort was made Rear-Admiral and, in 1848, a K.C.B. in recognition of his civil services as hydrographer. He died in 1858 two years after his retirement.

One cannot read much in the scientific literature of the nineteenth century without gaining the impression that Admiral Beaufort was regarded as a first-rate scientist by scientists of substantial achievement. The *Proceedings of the Royal Society* for 1857-59⁴ gives him a three-page obituary which, however, is vague about the specifics of his work. He is described in a general way as a marine surveyor, a classical scholar and a geologist. He is credited with converting the office of Hydrographer to the Admiralty from an ineffective sinecure to a centre of intense scientific activity in all things connected with the ocean. In particular, his freely-given assistance to scientists, sometimes at the cost of overriding the regulations, is stressed.

I have found it suggested that Beaufort had a hand in the invention and development of the cup anemometer although Robinson⁵ in his paper which described the invention of the cup anemometer does not mention Beaufort.* In addition to his wind-force scale Beaufort devised a system for coding weather observations which was widely used and still is, mainly by land stations. Some idea of the range of Beaufort's scientific interests can be gained from a memorandum he sent to Commander FitzRoy, Captain of H.M.S. *Beagle*, on 11 November 1831. All 18 pages of it are reproduced in Volume II of *Narrative of the Surveying Voyages of His Majesty's Ships 'Adventure' and 'Beagle' between the years 1826 and 1836*.⁶† In addition to outlining the hydrographic survey to be made and calling for a world girdling line of meridian positions—the exact longitude of even such long-frequented ports as Rio de Janeiro was in doubt in 1831—Beaufort lists programmes of observation in:

1. Marine geology: deep sea soundings, sediment distributions and their relation to tidal currents, studies of coral reef formation;

* Robinson does mention Edgeworth, Beaufort's brother-in-law, as active in anemometry and the source of some of his ideas. Possibly that is the connection.

† Volume III is still in print and is better known to you as *The Voyage of the Beagle*. It was written by a bright, but usually seasick, young graduate student whose name appears on the ship's list as supernumerary—Charles Darwin.

2. Physical oceanography: tides in straits, open ocean tides, estuarine tides (set, force, duration, limits of salt intrusion, and variation with wind, current and river flow all required), currents, and sea surface temperatures;
3. Meteorology: monsoon and trade wind limits and periods, barometric pressure, air temperature, winds, and weather;
4. Magnetism: variation, angle, dip, intensity, and diurnal variation;
5. Astronomical observations; and, finally,
6. The Economic and Cultural Geography of each land visited.

Beaufort includes a liberal helping of advice for the 26-year-old FitzRoy, most of which would do no harm if taken seriously by modern oceanographers.*

Beaufort was a Fellow of the Royal Society, London, Vice-President and Fellow of the Royal Astronomical Society, Fellow of the Royal Irish Academy and a corresponding member both of the Institute of France and of the U.S. Naval Lyceum.

As a victim of the modern publish-or-perish syndrome I expected that Beaufort had published extensively. The bibliography lists all I was able to find.^{3, 7, 8} He never appears as an author in the *Philosophical Transactions of the Royal Society*. The *Royal Society Catalogue* attributes to him only two very brief papers, one on an earthquake at sea and the other on longitude determination by means of a partial solar eclipse.

Pleasant as it is to linger with the Admiral, perhaps we should get along to his wind-force scale. Here is the earliest version of it that I have been able to find. It dates from 1831 and is included with Beaufort's memorandum to FitzRoy.

FIGURES TO DENOTE THE FORCE OF THE WIND

o	Calm.	
1	Light Air	Or just sufficient to give steerage way.
2	Light Breeze . . .	Or that in which a man-of-war with all sail set, and clean full, would go in smooth water from
3	Gentle Breeze . .	
4	Moderate Breeze	
5	Fresh Breeze . . .	Or that to which a well-conditioned man-of-war could just carry in chase, full and by
6	Strong Breeze . .	
7	Moderate Gale . .	
8	Fresh Gale	Or that with which she could scarcely bear close-reefed main-topsail and reefed fore-sail.
9	Strong Gale	
10	Whole Gale	Or that which would reduce her to storm staysails.
11	Storm	Or that which no canvas could withstand.
12	Hurricane	

I think we can take this version as a reasonably accurate statement of the original Beaufort scale.

Beaufort's specification is essentially an association of lists of three different kinds of things. There is a list of 13 integers from 0 to 12, there is a list of common words for the strength of the wind, and there is a list describing the state and behaviour of a "well-conditioned man-of-war". The choice of the list of numbers is

* As an example, "Trifling as it may appear, the love of giving a multiplicity of new and unmeaning names tends to confuse our geographical knowledge. *The name stamped upon a place by the first discoverer should be held sacred* by the common consent of all nations; and in new discoveries it would be far more beneficial to make the name convey some idea of the nature of the place; or if it be inhabited, to adopt the native appellation, than to exhaust the catalogue of public characters or private friends at home. The officers and crews, indeed, have some claim on such distinction, which, slight as it is, helps to excite an interest in the voyage." (Italics mine. Proponents of the 'Cromwell' current please note.)

quite arbitrary and is no different in principle from the choice of Celsius or Fahrenheit numbers for temperature. How many numbers you use depends on how many distinct levels of the phenomenon you think you can recognize. Beaufort obviously thought that he could recognize 13 levels in the behaviour of a man-of-war. He described them in terms which may seem vague to a modern scientist but would certainly convey the idea with great precision to Nelson's captains. There is no need for fractional values. To say that one had a wind of Beaufort 6.5 would be nonsense. Topsails are either single-reefed or they are double-reefed. There is nothing in between. Further, there is no use for Beaufort numbers higher than 12. When all you can do is drift off to leeward under bare poles it doesn't make much difference whether the wind is 70 or 170 m.p.h.

Beaufort's scale of numbers for the wind was not the only one in use during the nineteenth century. Scott⁹ lists the Continental scale, 0-4, the Land scale, 0-6, and the French scale for telegraphy, 0-9. Curtis,¹⁰ on pages 51-53, tabulates equivalents for 20 scales of wind force other than Beaufort's. The ranges of those using numbers in the manner of Beaufort are, 0-4, 1-6, 0-6, 0-10, 0-9, 0-7, and 0.0-6.0.

The list of common terms will refer to the same situation only if the users of them share a common experience. I have found that what Chesapeake Bay yachtsmen describe as a 'heavy blow' will be called a 'moderate breeze' by visiting yachtsmen from South Africa. The wind régimes in the Chesapeake Bay and in Table Bay and the yacht rigs characteristic of the two places are both so different that there is almost nothing 'common' about the terms the two groups of yachtsmen use. Failure to associate the same common term with the same state of the wind often occurs when Beaufort numbers are used today. The numbers really belong to the seamen. Beaufort had no difficulty with this. He devised his scale for a group of men who had shared the same experience—years of unremitting blockade of Europe in sailing ships which were all quite similar in their characteristics. Their experience had been similar and their common terms *were* common.

The third list, the phenomenon, is the meat of the matter. It describes the different things you may see and you are also told what number and common term to attach to each. And, please note, what you are to look at is a ship—not the wind. It is true that the appearance of the ship depends on the wind but it does so in no simple way. I cannot help but feel that Beaufort was intensely interested in the ship and but little in the wind. Let's look at this third list more closely.

The descriptions for numbers 0 to 4 are couched in terms of the speed of the ship, those for 5 to 9 jointly in terms of her mission and her sail-carrying ability, and those for 10 to 12 in terms of her survival. To recover the meaning of the descriptions we must digress briefly.

No sailing vessel can move directly into the wind but some ships can work up closer to the wind than others, i.e. they are more 'weatherly'. According to Davidson¹¹ a reasonable estimate of the weatherly ability for the ships of Nelson's day is 7 points off the wind (see Fig. 1).

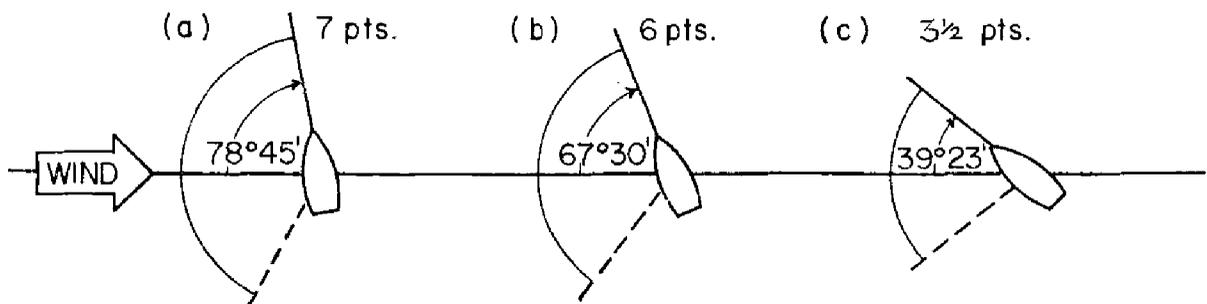


Fig. 1. Weatherly qualities for (a) a ship of Nelson's day, (b) a clipper ship and (c) a modern racing yacht. The heavy arcs show directions relative to the wind in which the ships cannot sail.

For comparison a clipper ship could work up to 6 points off the wind and a good modern racing yacht can work up to $3\frac{1}{2}$ points. For numbers 2-4 and 5-9 'clean full' and 'full and by', respectively, describe the ship's angle to the wind. There is no difficulty with 'full and by'. It still appears in the dictionaries. Webster's gives "full and by: *Naut.* Sailing close-hauled with all sails full, and lying as near the wind as possible" (see Fig. 2 (b)). The meaning of 'clean full' and its relation to 'full and by' is more difficult. Lt. Cdr. A. H. Waite, R.N.V.R. of the National Maritime Museum, Greenwich says, "Referring to your question about the Beaufort scale, the expression 'clean full' is quite correct and was much used in the last century. In Admiral Smyth's *Sailor's Word-Book* of 1865 the entry 'clean full' is described as 'keeping the sail full, bellying off the wind,' and 'full and by' is 'sailing close-hauled on a wind, when a ship is as close as she will be to the wind without suffering the sails to shiver hence "keep her full and by" is the order to the helmsman not to incline too much to windward and thereby shake the sails which would retard the ship's velocity.'" FitzRoy,¹ in presenting a condensed version of the Beaufort scale, says, "from 2 to 10 being supposed as felt in a good ship 'close-hauled.'"

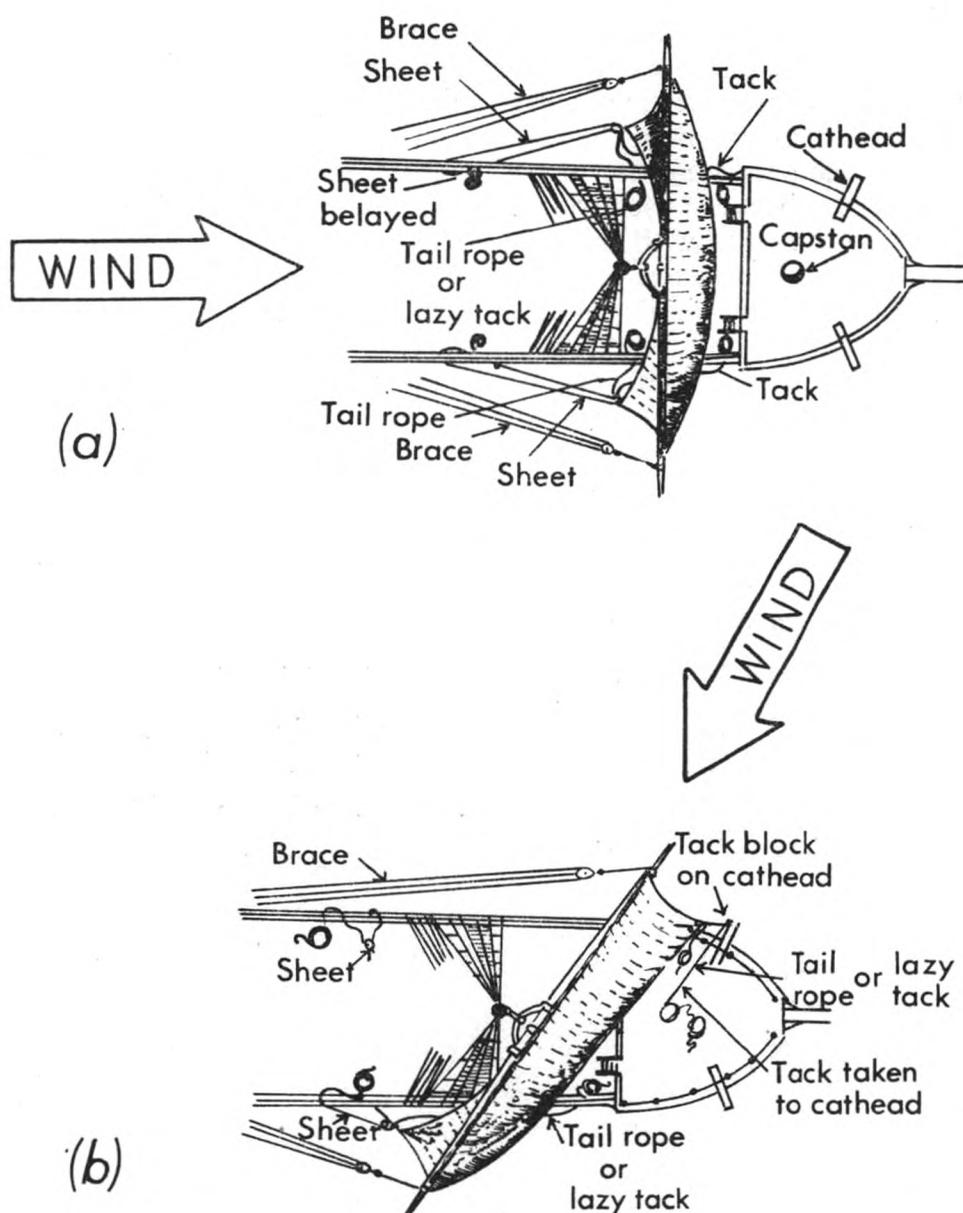
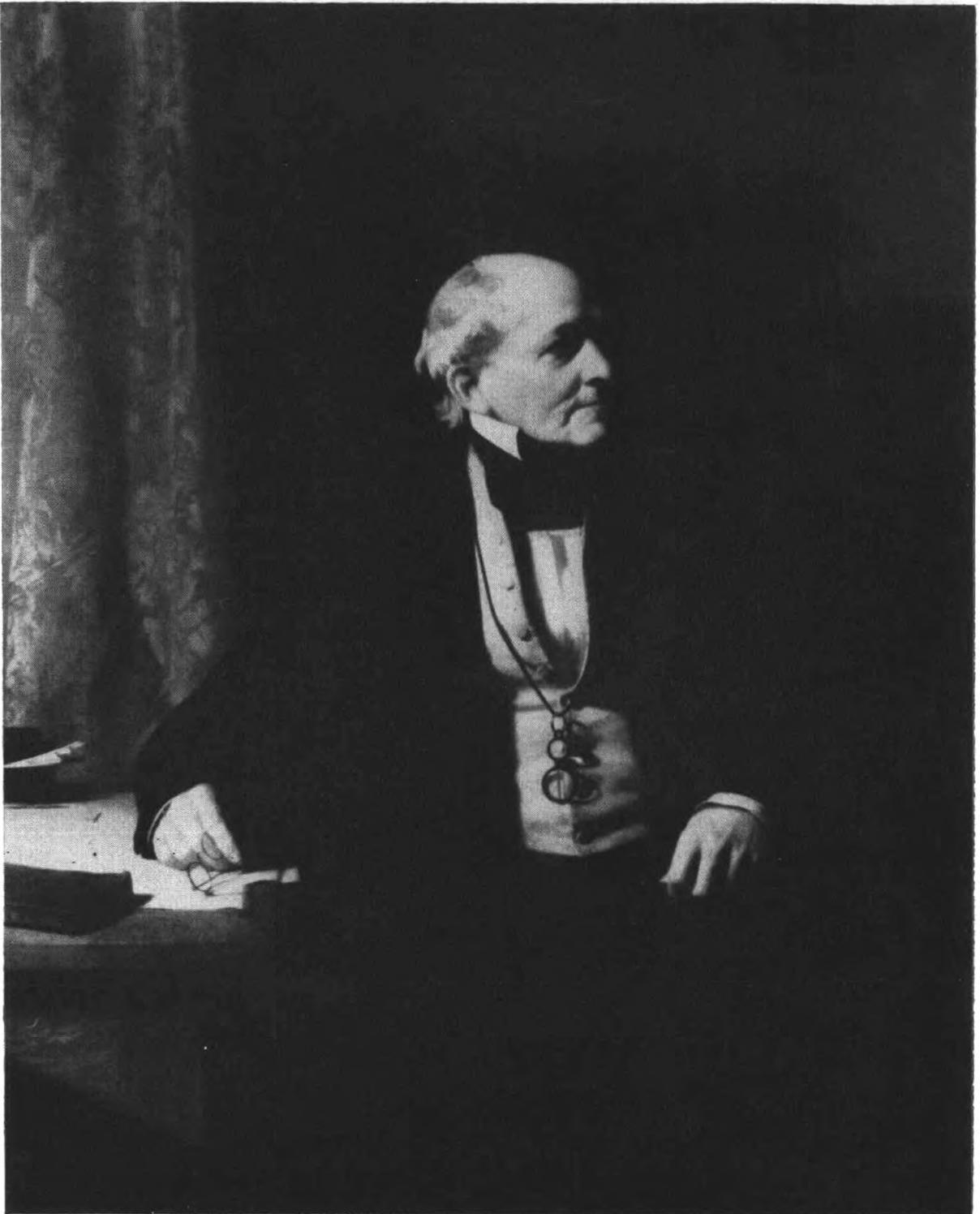


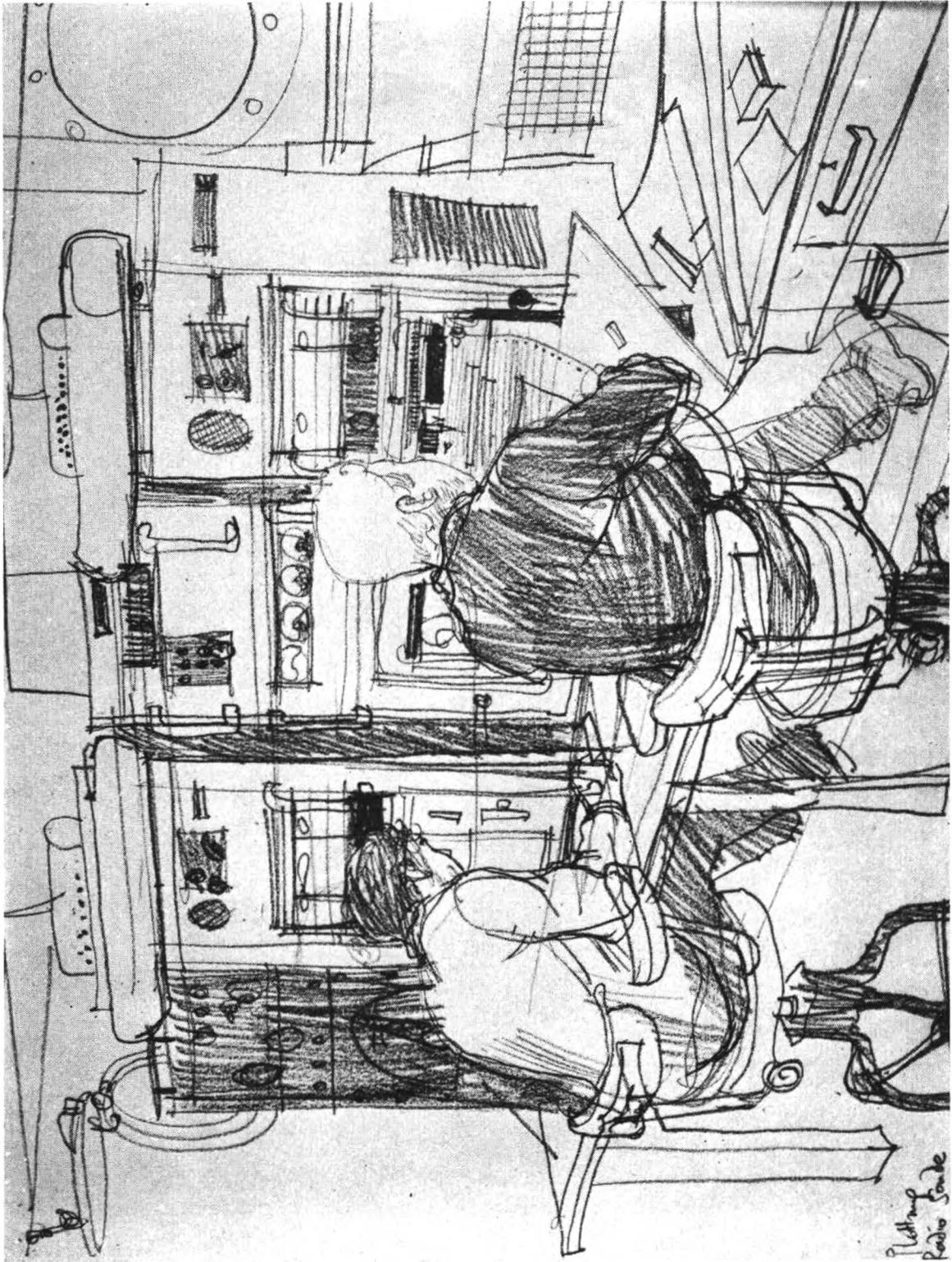
Fig. 2. View from above showing a square sail (a) squared away and (b) close-hauled. (From Underhill.¹²)

(Opposite page 120)



Courtesy of the National Maritime Museum, Greenwich
Admiral Sir Francis Beaufort, K.C.B. (see page 116).

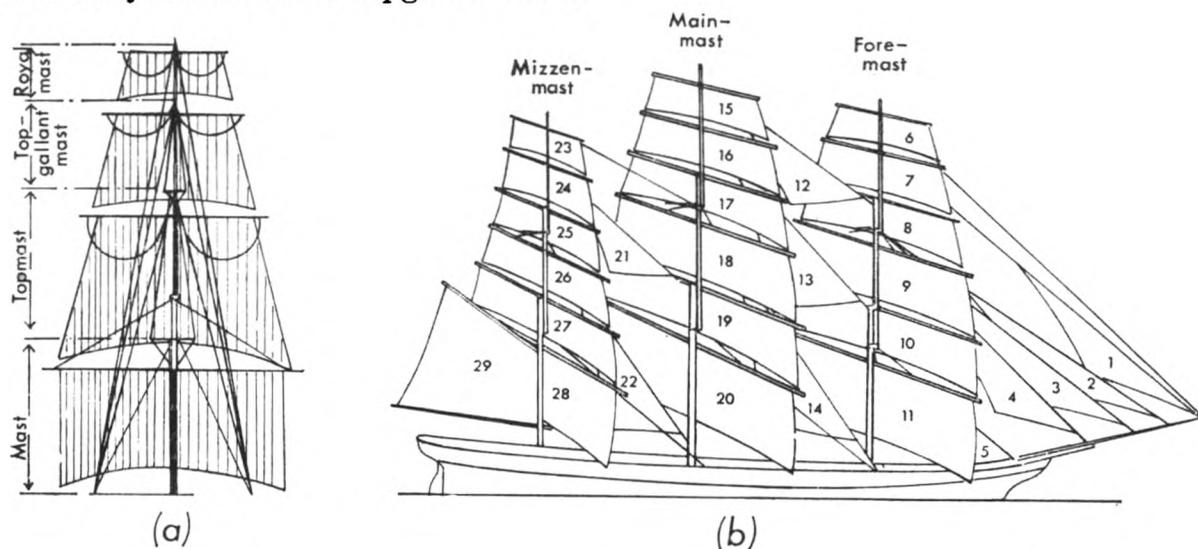
(Opposite page 121)



Plotting radiosonde transmission in the meteorological office aboard O.W.S. *Weather Surveyor*
(drawn by Grenville Cottingham) (see page 125).

Mr. E. D. Stroup of the University of Hawaii comments, "It would seem that it would really *have* to be close-hauled, after all, because if there were *no* restriction on the course with relation to the wind what would the speed ranges mean? 'Sailing off the wind' could be in *any* direction. I begin to get the feeling that 'clean full' corresponds to 'a rap full', that is, close-hauled but holding her off just a shade to avoid any possibility of pinching. (I would guess that pinching would have a rather disastrous effect on speed in something like the *Woolwich*, especially in the lower wind-speed ranges, to which the admonition 'clean full' was applied.)" It seems that for all winds with Beaufort forces from 2 to 9 the ship is to be close-hauled (Figs. 1 and 2 (b)), but that for 2 to 4 the warning "Keep your sails full. Don't pinch." is added.

We have now to understand Beaufort's instructions about the sails. A full-rigged ship has three (or more) masts and carries a complete set of square sails on each of them (see Fig. 3). The mast in the centre, which is usually the tallest, is the main-mast. The mast toward the bow, which is usually the next in height, is the foremast. The mast toward the stern, usually the smallest, is the mizzen-mast. The mast, *per se*, is the unbroken spar which extends to the mast-head, Fig 3 (a). Historically, everything else is an addition to *the* mast. The next section which extends above the mast is the topmast. Later a topgallant-mast was added to the topmast and later still a royal mast to the topgallant-mast.



- | | |
|------------------------------|--------------------------------|
| * 1. Flying jib | **16. Main-upper topgallant |
| 2. Outer jib | **17. Main-lower topgallant |
| 3. Inner jib | **18. Main-upper topsail |
| 4. Fore-topmast staysail | **19. Main-lower topsail |
| * 5. Fore-staysail | 20. Mainsail or main-course |
| 6. Fore-royal | 21. Mizzen-topgallant staysail |
| ** 7. Fore-upper topgallant | 22. Mizzen-topmast staysail |
| ** 8. Fore-lower topgallant | 23. Mizzen-royal |
| ** 9. Fore-upper topsail | **24. Mizzen-upper topgallant |
| **10. Fore-lower topsail | **25. Mizzen-lower topgallant |
| 11. Fore-course | **26. Mizzen-upper topsail |
| 12. Main-royal staysail | **27. Mizzen-lower topsail |
| 13. Main-topgallant staysail | 28. Cro'jack |
| 14. Main-topmast staysail | 29. Spanker |
| *15. Main-royal | |

* It is probable that these sails would not be carried in Beaufort's time.
 ** The division of topsails and topgallants into upper and lower came toward the middle of the nineteenth century in response to the higher wages of seamen. Sails divided into smaller areas can be worked by smaller crews. With the manning rates common to the Royal Navy during the Napoleonic Wars this was not a consideration and the topsails and topgallants were single, large sails as shown at (a).

Fig. 3. Masts and sails of a full-rigged ship.

The name for each square-sail is constructed by specifying, first, to which of the three masts it is attached and, second, to which section of the mast it is attached. For example, in Fig. 3 (b) 6 is the fore-royal while 23 is the mizzen-royal. If more

than one sail is carried on a section of a mast they are distinguished by including the words 'upper' and 'lower' before the mast-section name. For a bit of spice one needs exceptions and sails 11, 20, and 28 while they can properly be called the 'fore', 'main' and 'mizzen' sails, are commonly called the 'fore-course', the 'main-course', and (the exception to the exception) the 'cro'jack', or collectively the 'courses'. The fore and aft sails are carried on the stays that run between masts. They are identified by giving the name of the mast which has the higher point of attachment for the stay followed by the name of the section within the mast to which the stay is attached. To prevent confusion with the square-sail carried on the same mast and section you add 'staysail'. Thus 21 is the 'mizzen-topgallant staysail'.

When the wind breezes up the force it exerts on the sails increases and there always comes a time when you wish you had a little less—either of wind or of sail. Less sail is easier to arrange than less wind. You can always bunch the sail up against the yard and tie it there, i.e., furl it. However, the jump from sail set to sail furled is too big and provision is made for reducing sail in smaller increments. The device is the reef points shown in Fig. 4. Reef points are lengths of light line sewn to the

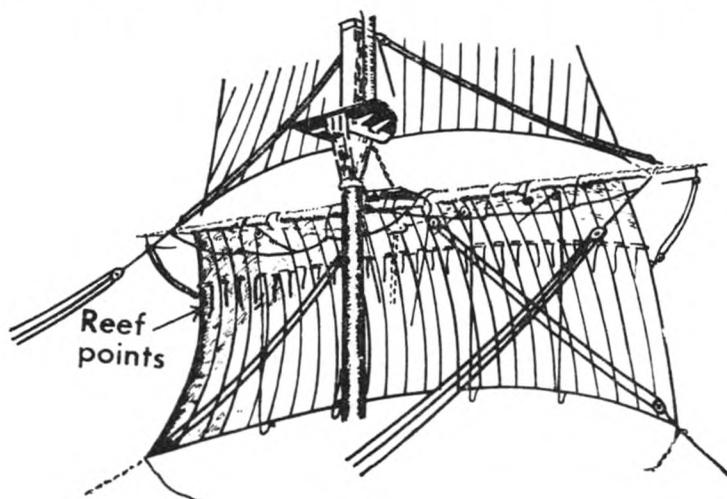


Fig. 4. View from aft a square sail, showing reef points. (From Underhill.¹²)

sail in rows and extending on both sides of it. In Beaufort's time four rows were customary. When it was desired to take a little sail off the ship the first line of reef points was drawn up to the yard, the reef points tied around the yard, and the part of the sail above gathered against it. When that is done, the sail is said to be 'single-reefed'. If you tie in the second row of reef points you are 'double-reefed', and if the third row, 'treble-reefed'. However, if you have a fourth row and you tie them in, you are not 'quadruple-reefed' but 'close-reefed'.

With these terms in hand, consider some examples:

BEAUFORT 3: You are aboard a frigate like H.M.S. *Woolwich*. Spread on the masts and stays are something like 25 great bellying expanses of canvas—all she has ('all sail set'). She is braced up hard on the wind but the helmsman has let her pay off just a little to get the best speed—although not the most distance to windward—('clean full'). The sea is covered with small waves and when the boatswain streams the log it shows that the ship is making 3–4 knots through the water. That's Beaufort 3. There is no doubt about it. All you have to do is look at the state of the ship and how she goes. If you were to ask an old deckhand what the wind was he would most likely tell you that you had a gentle breeze.

BEAUFORT 7: The seas are considerably higher. You have the *Droits d'Homme* in sight to windward and the captain is straining everything to work up and engage her ('in chase').* You are really hard on the wind ('full and by') and the helmsman

* Heretical as it may sound, the French designed and built faster ships than the English during the Napoleonic period and your captain must get every last ounce out of his ship if he is to overcome the handicap.

had better steer small and make every foot to windward that he can even at the cost of some speed—he had better if he doesn't want his back flogged bloody. The captain has judged his sails to a hair's breadth. The courses are on her and so are her fore and aft sails. The topsails are set but they have been reefed down to the second row of reef points. The royals and topgallants are furled. The captain knows that he can't show another square yard of sail without blowing the sticks right out of her. So you thrash along and perhaps you come up with the *Droits d'Homme* and perhaps you don't. Two things are sure. The captain is driving her for all she's worth and you have Beaufort 7. Your old deckhand calls it a moderate gale.

BEAUFORT 11: The *Droits d'Homme* may be in sight but you aren't paying her much attention. She isn't paying you much attention either. The seas are mountainous. The square-sails are all furled. If the job has not been well done the wind may pry into the wadded sail, rip it loose, and shred it to ribbons in seconds. The ordinary staysails have been unbent and you are now carrying a few small staysails of extremely heavy canvas—the storm staysails—in an attempt to give your ship just enough motion through the water to keep her under some sort of control with the rudder. The wind force is Beaufort 11 and your old deckhand, if he has the misfortune to be on watch, will tell you that it's quite a storm.

Two questions must be faced at this point. First, how reproducible is Beaufort's scale? Second, why should one want such a scale? The first question involves a number of subsidiary questions and, in attempting an answer, we will suggest an answer to the second. Perhaps we should begin by taking just a glance at the wind velocity. Wind velocity and force are associated through the ρv^2 terms in the equation of motion. Mean wind velocity varies with height and, for our five-finger exercise, we might as well take the variation as logarithmic. As rough-and-ready values suppose that the roughness length is 1 ft, that the crosstrees are 120 ft above the water while the quarter-deck is 12 ft, and that the wind at anemometer height is 10 kt. Then the speed of the wind for the officer on the quarter-deck is about 7.3 kt while that for the look-out on the crosstrees is about 14.1 kt, almost double. If each were equipped with an anemometer they would get quite different wind speeds and yet they would come up with the same Beaufort number for the wind force. They would get the same Beaufort number because both were looking at the ship which is the same for both and only incidentally at the wind. What matters is the practical problem of how the ship behaves. Men who know a ship seldom disagree about that.

A reasonable description of Beaufort's original scale would be that it is a set of index numbers for the quantized states of one of His Britannic Majesty's frigates of 1805. In some of the later versions of Beaufort's scale the 'well-conditioned man-of-war' literally becomes a 'frigate'. Even if you are willing to concede the uniformity of judgement of men used to frigates you may well wonder if the judgement would remain uniform for a first-rate. Mr. Howard I. Chapelle, Curator, Division of Transportation, Smithsonian Institution says, "The 44-gun frigate would be less able to carry sail in strong winds than a 74 but would be comparable in moderate winds. A matter of hull and rig design in individual ships is involved, but a 44-gun frigate would be 'average' in sail-carrying power." There was really no trouble about applying the Beaufort numbers to ships other than frigates like the *Woolwich*. Almost every officer had served in, and often had commanded, frigates. Even though he might be in a ship-of-the-line, or even in a grog shop ashore, he could still judge accurately what sail he would carry in chase if he were commanding a frigate.

The frigate in modern jargon was a 'probe' for measuring wind force but putting it that way would seem to Beaufort getting the cart before the horse. The measuring system is one that averages over substantial intervals of space and time and which uses undefined and peculiar weighting functions. Wind velocity is a very local concept—ideally, an instantaneous point measure—but for Beaufort's scale the situation was not evaluated in terms of local or temporary gusts of wind. The judgement depends on the appearance of as much of the water surface as can be seen together with what is happening to other ships in sight, the behaviour of birds, the

appearance of clouds and the feel of the ship. All these imply large space scales. Time scales are long too. You don't set or furl sail, or change from starboard tack to port tack in seconds. A French officer captured during the Glorious First of June expressed amazement that the British were able to tack ship in 5 minutes. The French could seldom do it in less than 15.*

The clinching argument for the uniformity of application of the Beaufort scale lies in history and in the phrase 'in chase'. This is the fine adjust on the probe. In 1805 Britain had been at war with France and, indeed, more or less with all Europe for twelve years. She was to be at war with France for another ten with only brief pauses. Her fleet was blockading a continent and was at sea almost continuously. The ships were supplied at sea and it was not unusual for even the great captains like Hood and Nelson to remain afloat without setting foot ashore for two or three years at a stretch. Obviously these were experienced seamen. Further, for every captain who failed there was a qualified officer on the beach at half-pay. The ships were always too few and they had to be fought at full efficiency if the blockade was to be maintained and England supplied. The real kicker in the Beaufort specification is the 'in chase'. I know personally that there is a vast difference between the way I will crack on sail when I race and what I am willing to carry when I cruise. 'In chase' is a racing situation. A captain could fail to bring a chase to action in two ways. He could fail to carry every rag his ship could stand and let the enemy outsail him or he could carry too much and blow away spars and rigging so that the enemy escaped. The 'in chase' really forces a very fine judgement. For encouragement, courts-martial were provided. Blow out your sticks, you lose your command to one of the qualified officers on the beach. Fail to press the chase, you are court-martialled and dismissed the service in disgrace. The log entries of wind force and weather were material evidence for the courts. A uniform scale such as Beaufort's made both log-keeping and courts-martial easier.

REFERENCES

1. FITZROY, R. *The Weather Book, a Manual of Practical Meteorology*. London, Longmans Green, 1863, pp. 464.
2. MARSHALL, J. *Royal Naval Biography*. Vol. IV, Pt. II. London, Longmans Green, 1835, p. 452.
3. BEAUFORT, F. *Karamania, or a brief description of the South Coast of Asia Minor, and of the Remains of Antiquity*. London, R. Hunter, 1817, pp. 299.
4. London, Royal Society. *Beaufort Obituary*. *Proc. R. Soc., London*, 9, 1857-1859, pp. 524-527.
5. ROBINSON, T. R. *Description of an improved anemometer for registering the direction of the wind, and the space which it traverses in given intervals of time*. *Trans. R. Ir. Acad., Dublin*, 22, Pt. 1: Science, 1855, pp. 155-178.
6. FITZROY, R. *Narrative of the Surveying Voyages of His Majesty's Ships Adventure and Beagle*. Vol. II: *Describing their Examination of the Southern Shores of South America, and the Beagle's Circumnavigation of the Globe*. London, Henry Colburn, 1839, pp. 694.
7. BEAUFORT, F. *Account of an earthquake at sea*. *Edin. J. of Sci.*, 5, 1826, pp. 232-234.
8. BEAUFORT, F. *Determination of the longitude of Papeété, from observations of a partial eclipse of the sun*. *Mon. Not. R. astr. Soc., London*, 14, 1853-1854, pp. 48-49.
9. SCOTT, R. H. *An attempt to establish a relation between the velocity of the wind and its force (Beaufort's scale), with some remarks on anemometrical observations in general*. *Q. Jnl. R. met. Soc., London*, new series 2, No. 11, 1874, pp. 109-123.
10. CURTIS, R. H. *An attempt to determine the velocity equivalents of wind forces estimated by Beaufort's scale*. *Q. Jnl. R. met. Soc., London*, 23, No. 101, 1897, pp. 24-61.
11. DAVIDSON, K. S. M. *The mechanics of sailing ships and yachts*. *Surveys in Mechanics*. G. K. Batchelor and R. M. Davis (Ed.). London, Cambridge University Press, 1956, pp. 431-475.
12. UNDERHILL, H. A. *Masting and Rigging the Clipper Ship and Ocean Carrier*. Glasgow, Brown, Son & Ferguson, 1946, pp. 304.

* For comparison, a modern racing dinghy can complete the same evolution in 3 to 5 seconds and if a modern ocean racer takes more than 20 she isn't winning any silver.

The Work of a Meteorologist in a Weather Ship

By H. J. FRECKLETON

(Meteorological Officer-in-charge aboard O.W.S. *Weather Surveyor*)

Meteorologists in the Ocean Weather Service come in all shapes and sizes, with all sorts of opinions; the only things they have in common are that all are volunteers and the conviction that, although one does not have to be mad to do this job, it helps! The meteorologists are volunteers drawn from the shore staff of the Meteorological Office and they sign on originally for a tour of duty of eight voyages which takes just over a year to complete. Most of them do more than one tour and some become addicted to life aboard a weather ship and stay on for many tours of duty.

The normal meteorological complement of a British weather ship is one Experimental Officer, one Assistant Experimental Officer, one Senior Scientific Assistant and four Scientific Assistants. They do not keep normal sea-going watches but split the 24 hours into two periods of 12 hours; although they do not work all the time during that period they cover the entire programme of work and are available for any repeat upper-air ascents or extra surface observations. In addition to his normal duties, the Officer-in-charge is available at all times for stand-in duties and for any queries that may arise.

There are four British weather ships, based at Greenock, which man four ocean weather stations in the eastern North Atlantic (see Fig. 1) in co-operation with



Fig. 1. The Ocean Weather Stations in the North Atlantic which are manned by British weather ships, in co-operation with other countries.

French, Dutch and Norwegian weather ships. As each voyage varies between 28 and 35 days, including 24 days on station, and there are eight voyages in just over a year, it follows that approximately two-thirds of the year are spent at sea; the only difference between the stations is usually the temperature, the weather, and the varying lengths of the days. As sailing schedules are known well in advance, holiday arrangements can be made fairly easily.

Two days before the ship sails the meteorologists report back to Greenock where

they load the meteorological stores, remedy all deficiencies as necessary, check instruments and prepare for the coming voyage. The Officer-in-charge discusses with the meteorologist at the Base any changes and variations in programme and procedure for the forthcoming voyage. Sometimes there will be special requirements for one voyage only or even for one day only during the voyage and all this needs to be merged in with the smooth running of the normal meteorological/oceanographic programme.

Surface observations, similar to those made aboard Selected Ships, are made at hourly intervals, both when on station and on passage. While on station, radar-wind ascents are made daily at 0515 and 1715 GMT and combined radar-wind and radio-sonde ascents, giving pressure, temperature and humidity, at 1115 and 2315 GMT. The same upper-air programme is carried out on passage to and from station when between 10°W and 200 miles from the nearest weather ship. All these observations are broadcast by radio on a strict schedule (a slightly different schedule being used for each station) so that the messages can be readily received direct by the meteorological authorities ashore. If Bracknell does not receive such a message the weather ship is immediately informed and the message is then sent point-to-point. Immediately on receipt the messages are re-transmitted by Bracknell for use by meteorological services throughout the northern hemisphere. Plain-language messages of radar fixes of fronts and precipitation are also transmitted to shore whenever these are obtained.

Bathythermograph soundings to a depth of 450 feet are made on passage by the meteorologist from the 50-fathom line at 6-hourly intervals; when on station these soundings are made twice a day to a depth of 900 feet accompanied by a sea-water sample which is collected for analysis by the oceanographers ashore. Sea-water samples are taken at fixed times on all stations for the International Tritium Survey. Rain-water is also collected at station 'Juliett' for the same authority.

The instruments for the surface observations are in the meteorological office at the after end of the ship, except the air thermometers which are on the wings of the bridge to give maximum exposure. While these are being read the meteorologist has the opportunity of surveying the sea and sky from an excellent vantage point; this is particularly useful at night when the bright deck lights would obscure viewing from the vicinity of the meteorological office situated on the main deck aft.

Two combined wind vanes and anemometers are exposed on arms some 60 feet up the main mast on each side, giving maximum exposure to one or the other depending on wind direction. Two precision aneroid barometers are carried and an oil-damped barograph on anti-vibration mounting. A continuous record of air and sea temperatures and humidity is kept on a Kent Recorder in the meteorological office, using two electrical resistance thermometers exposed alongside the dry- and wet-bulb thermometers in each screen (one either side of the navigating bridge) and a third one in the main condenser intake, at a mean depth of about 12 feet below sea surface, for sea temperatures. Sea-temperature samples for synoptic weather messages are taken with a canvas bucket when the ship is lying stopped on station and by the Meteorological Office rubber bucket, as supplied to Selected Ships, when on passage, in order to be consistent.

Solar radiation measuring equipment is also carried in the weather ships: radiation balance meters on booms just below the bridge wings so as to ensure that the meters are as far away from interference from the ship as possible and a total radiation solarimeter exposed on the top of the balloon shed. Permanent records are made on a Speedomax recorder in the meteorological office. In two of the ships a wave-measuring device, operated on the principle of varying water pressures due to waves of various heights, associated with an accelerometer, is mounted on the ship's side in the engine room, its electrical recorder being in the meteorological office. In the other two ships the wave-measuring equipment is on a buoy which is streamed to windward of the ship once a day and readings are made by tape recorder aboard the ship, connected to the buoy.

The radiosonde and radar-wind equipment, except the radar, are in the meteorological office. The balloon-filling shelter and hydrogen cylinder stowage are on the deck adjoining the office and only a few feet above water level. The radar antenna is mounted on the foremast and the radar office is immediately below the foremast; bearings, ranges and heights of the balloon and target are passed by tannoy to the meteorological office every minute during the ascent. From this information the direction and speed of the wind is worked out for the standard upper-air levels required and also at any levels where appreciable changes in wind occur. The radiosonde signals are received on a frequency of between 27.5 and 27.8 Mc/s and the audio-frequency of about 700 and 1,000 c/s are changed into counts of between 1,000 and 1,400 which are then recorded automatically. This recording is then converted by the radiosonde calibration chart into readings of pressure, temperature and humidity. When these are plotted they give the required information for standard levels in the atmosphere and at positions when significant changes take place.

The meteorological office is rather cramped but, being situated near the stern, suffers from lively movement in rough weather and consequently the less space there is for things to move about the better. The balloon shelter faces aft, is open at its after end and surrounded by about 130 hydrogen cylinders stowed vertically in steel racks disposed in and around the shelter. Ideally the shelter should be on the deck higher up for comfort and safety but this was not found practicable for stability reasons. Inside this shelter the balloons are filled with hydrogen and the necessary equipment attached. They are then launched over the stern while the ship keeps head to wind. Seldom are any flights missed due to weather because the volunteer staff brave all kinds of hazards to get the balloon away but this is not at all an easy job when seas are swilling waist-high round the shelter. Even the older members of the staff become expert at jumping to the top of the hydrogen cylinders to get clear of the water when the necessity arises. Filling a balloon and launching it at station 'Alfa' during the winter four times a day with a temperature of -5°C and a 40-knot northerly wind can be very trying and unprintable words are often heard when things go wrong. Even making a surface observation in these conditions calls for quite an effort on the part of the people concerned.

The meteorologists take part in all the emergency exercises aboard the ship (e.g. fire, air-sea rescue and boat drills, etc.) and often the frogmen in air-sea rescue exercises are volunteers from the meteorological staff. Some of them go in for bird-watching and record details for the Royal Naval Birdwatching Society. During bird migration the enthusiasts are in their element as exhausted birds often land on the ship and during these times the meteorological store-room becomes a makeshift aviary with birds roosting in temporary cages made from cardboard boxes. The birds are photographed and measured and often are ungrateful enough to bite the hand that feeds them.

Another regular activity at some of the ocean stations is the catching of squids and preserving them at the request of the National Institute of Oceanography and also for the Smithsonian Institution of America. The number of volunteers vary according to the weather. Squid fishing is mainly done by harpoons and nets, though on one ship a very lethal cross-bow is used, and the squids show their disapproval by ejecting ink over the unwary.

The meteorological staff indulge in all sorts of games, varying in popularity from ship to ship; some have time-consuming Bridge schools for a time and then turn to Solo and Crib. Aboard the *Weather Surveyor* a vicious game of Monopoly is often played in which all rules are twisted and the biggest cheat wins. But the game that is played by everyone is that of estimating the time of arrival of the relief ship and hoping for a quick passage in and no snags to hold up docking.

A SIGHTING OF SOUTHERN RIGHT WHALE DOLPHINS

We publish below a narrative received from Messrs. Jeffery Boswall and Roderick Dobson, of the Natural History Unit of the British Broadcasting Corporation at Bristol.

On 24th March 1968 one of us, Roderick Dobson, was travelling aboard the *Auckland Star* on a voyage from Melbourne to Hull via the Cape of Good Hope. The position of the ship on that day was logged as 38°S, 82°E. This is about 200 miles east of the French island of St. Paul and is just to the north of the sub-tropical convergence.

On this day a very large school of dolphins was observed. The impression was that there must have been a thousand animals; quite positively there were more than 500. They were filmed in 8 mm cine by the master, Captain M. Bremberg, and in 16 mm black and white by Roderick Dobson (*see* upper photograph opposite this page).

A print of this last film was submitted by Jeffery Boswall to Dr. F. C. Fraser, formerly of the Department of Zoology at the Natural History Museum, who projected it and then wrote on 10th July 1968:

"I don't know if you noticed, but the dolphins . . . have no dorsal fin. This makes their identification quite positively Southern Right Whale Dolphin, *Lissodelphis peroni*. The distinctive black and white patterning of the animals is also consistent with this identification."

Fraser¹ shows that in the 150 years since its first published description in 1804 this species had been identified by less than twenty observers. We have not been able to comb the literature of the last 14 years but it is clear that a sighting of so rarely observed a creature is worth the printed record. Furthermore, the observation may have added significance because Fraser's distribution map gives no record up to 1954 of the creature in the huge segment of water between 30°E and 130°E (i.e. roughly between Southern Africa and Australia).

Selected film shots taken by Roderick Dobson are included in the television film "Look: Naturalist at Sea" held in the library of the BBC Natural History Unit, Whiteladies Road, Bristol.

So far as is known, this species has not previously been photographed at sea though pictures of stranded animals are reproduced in Fraser¹ (*see* lower photograph opposite this page).

REFERENCE

1. FRASER, F. C. The Southern Right Whale Dolphin *Lissodelphis peroni* (Lacépède). *Bull. Brit. Mus. (Nat. Hist.) Zoology*, 2, No. 11, 1954, pp. 341-346.

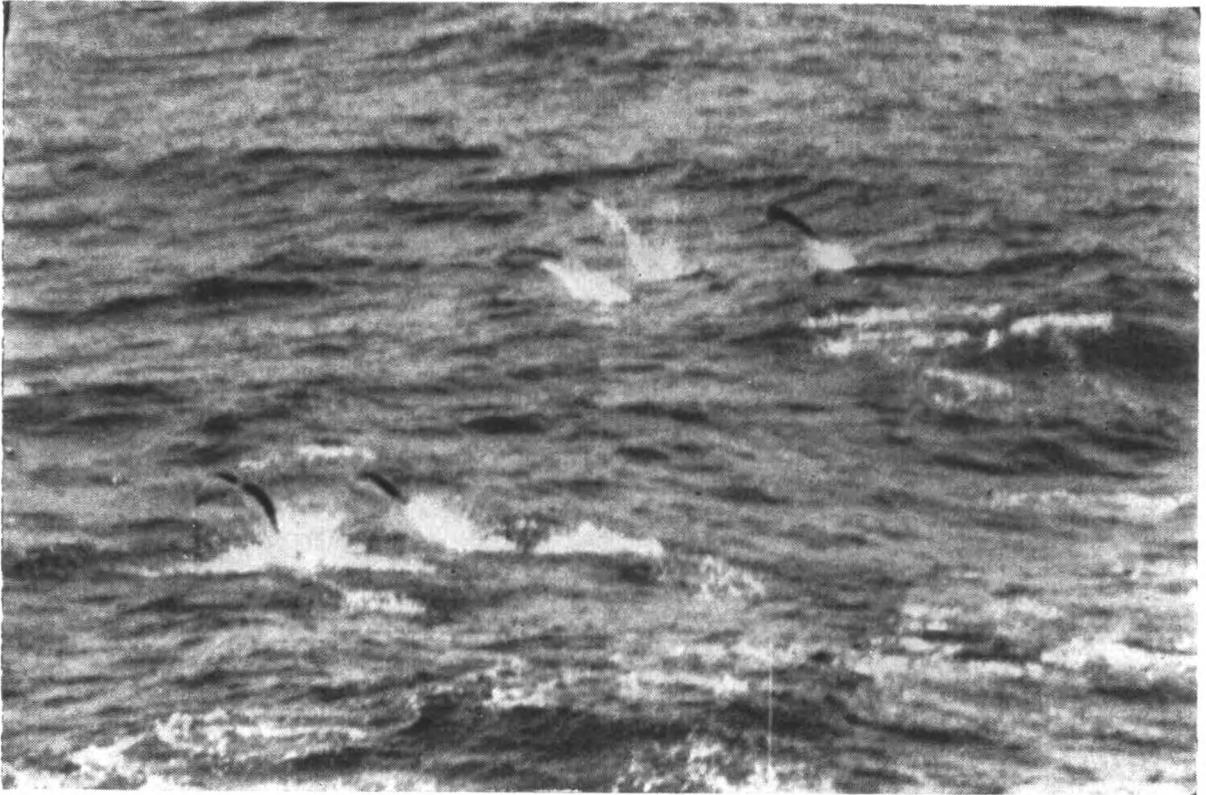
Editor's note. At the time of this observation, the *Auckland Star* was not a voluntary observing ship but she has since joined the fleet.

NOTES ON ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM JANUARY TO MARCH 1969

JANUARY

A large depression in the Norwegian Sea moved slowly south-west and dominated the wind pattern over the eastern half of the area while the north-western half remained under the influence of a large anticyclone. Low pressure affected the south-west at first and was replaced by high pressure towards the end of the month. The winds resulting from this pressure distribution were generally cold over the extreme east of the area, where in places the freezing season was one and a half months ahead, and warm over the south-west where the season was about one month behind the January normal.

(Opposite page 128)



From a 16 mm film by Roderick Dobson
Southern Right Whale Dolphins, as seen from the *Auckland Star* in the Indian Ocean (see page 128).

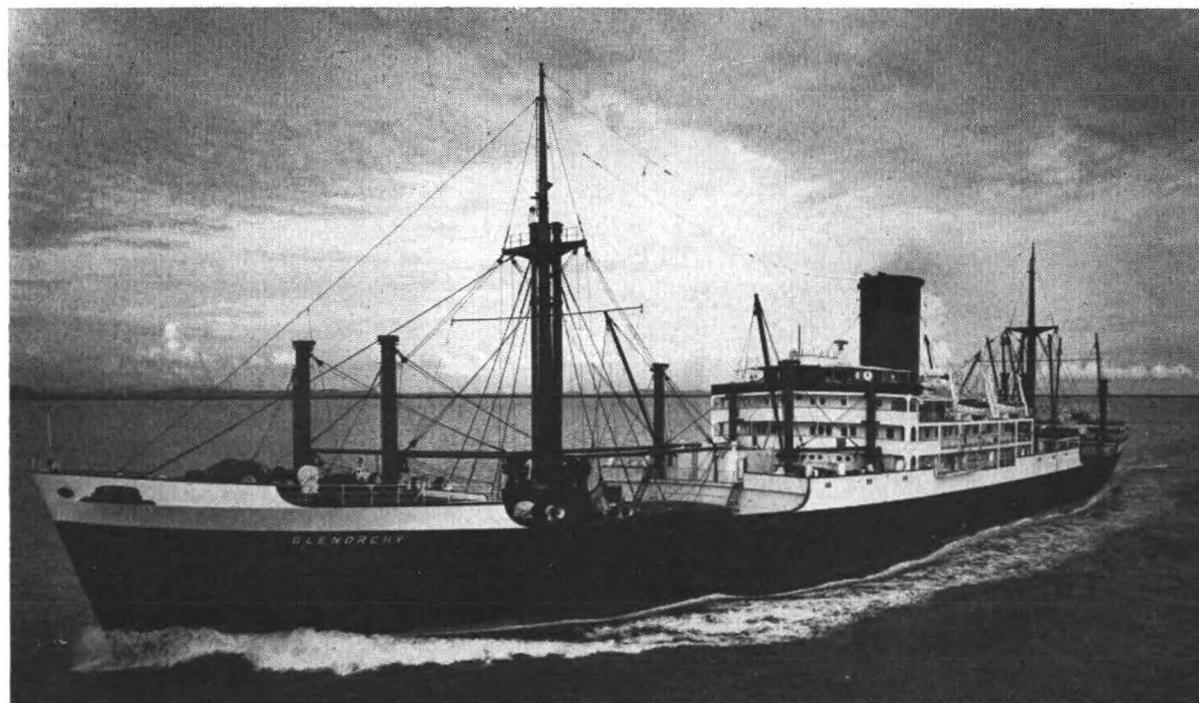


Photo by Mrs. E. M. Goulter
The same species stranded on a beach in New Zealand (from Fraser¹) (see page 128).

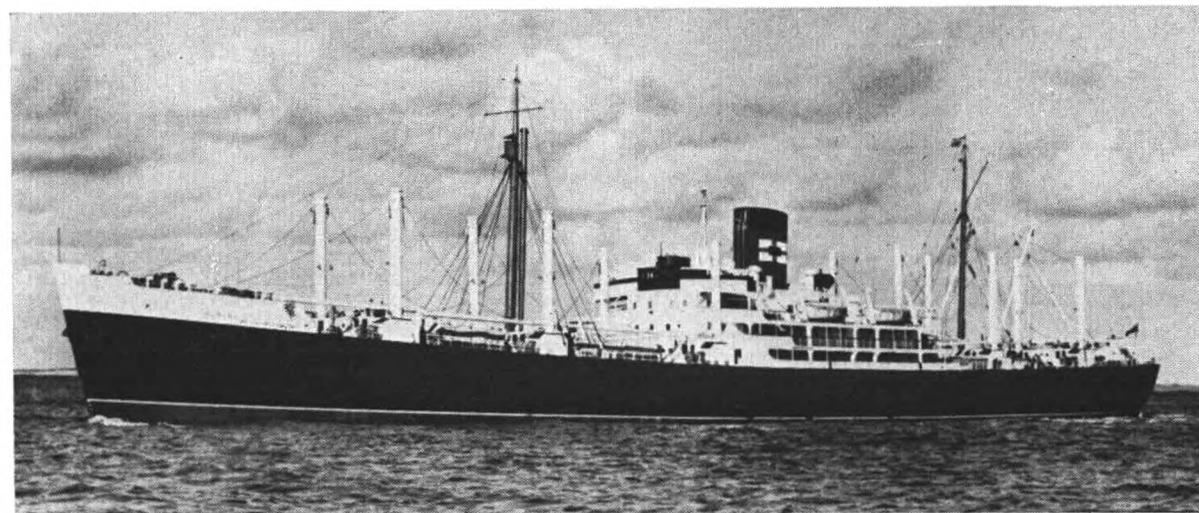
Opposite page 129)



Photo by W. Ralston Ltd., Glasgow
Cape Franklin (Lyle Shipping Co. Ltd.), Captain C. G. Mallet



Glenorchy (Ocean Fleets Ltd.), Captain T. W. Willows



Hurunui (New Zealand Shipping Co. Ltd.), Captain S. G. Robinson, M.B.E.
**THE THREE SHIPS WHICH GAINED THE HIGHEST MARKINGS FOR THEIR
METEOROLOGICAL LOGBOOKS DURING THE YEAR ENDED 31st MARCH 1969**
(see page 100).

Canadian Arctic Archipelago. With temperatures near average the ice situation was normal over the area. There was, of course, a complete cover of ice.

Baffin Bay. Light south-easterly winds were replaced during the latter half of the month by cold north-easterlies. Temperatures, well above average at first, fell to a normal level except in the east. There was a complete cover of ice apart from shore leads on the Greenland coast which opened up under the influence of off-shore winds.

Davis Strait. Moderate to strong south-easterlies gave way to light to moderate north-westerly winds towards the end of the month. As a result air temperatures, about 10 degC above average, fell to near normal. In the north and west pack-ice spread south-eastwards late in the month and shore leads on the Greenland coast closed up due to on-shore winds. In these areas the freezing season was about one month behind normal. In the south-east of the area there was more ice than usual due to pack-ice rounding Cape Farewell and being driven north-westwards, as far as 63°N, by the strong south-easterly winds.

Foxe Basin, Hudson Bay and Strait. Variable winds at first became light north to north-westerly and well above average air temperatures fell to within a few degrees of normal by the end of the month. Close pack-ice covered the whole area.

Labrador Sea. Light south-easterlies were replaced by moderate to strong north-easterly winds later backing to north-west. Despite cooling due to this wind change, air and sea temperatures were still a few degrees above normal at the end of the month. Pack-ice, much more narrow than normal, was confined to the extreme west at first but the ice increased rapidly to become normal towards the end of the month.

Great Bank, South Newfoundland Sea, River and Gulf of St. Lawrence. A light southerly wind early in the month gave way to a light northerly. Air and sea temperatures remained a few degrees above normal. The freezing season over the Great Bank was about one month behind average and over the whole area there was less ice than normal. The Great Bank and South Newfoundland Sea were ice-free except for the formation of new ice across the Belle Isle Strait towards the end of January. In the St. Lawrence there was a slow increase in ice cover mainly near coasts.

Greenland Sea. Moderate to strong north-easterly winds affected the whole area except the extreme south where light east to south-east winds prevailed. As a result, over most of the area, air temperatures were below normal, though there was some warming during the month near north Iceland. Sea temperatures remained near normal. In the extreme south this warming was sufficient to raise the air temperatures just above average. In general there was more ice than usual and off north Iceland the ice edge was 50 to 100 miles south-east of the normal January position, i.e. the edge of the open pack was about 30 miles north of the Icelandic coast.

Spitsbergen. Moderate to strong north-easterly winds persisted over the area but near Bear Island winds veered to south-easterly towards the end of the month. Air temperature, at first well below, rose to just above normal. Sea temperatures remained a few degrees above average. Though there was generally more ice than normal, the ice edge being 50 miles further west than usual, a bight of open water existed west of Spitsbergen. The southern limit of the pack-ice was located 20 miles north of Bear Island.

Barents Sea. Moderate to strong south-easterly winds veered in the south to south-westerly late in the month. Over the greater part of the area air temperatures, already well below average, fell to 10–14 degC below normal except near Spitsbergen where air temperatures recovered to near average. The edge of the polar pack-ice, some 100 miles south of normal, retreated slowly northwards throughout the month under the influence of the moderate to strong south-easterly winds. In the south-east there was a rapid increase in ice cover from mid-month onwards and in this area the freezing season was one and a half months ahead of average. Over the whole area there was more ice than normal.

White Sea. Strong south-westerly winds persisted throughout January. Temperatures were a little above average early but fell to 10–14 degC below average by the end of the month. There was a complete cover of ice.

Baltic. Moderate to strong south-easterly to south-westerly winds prevailed over the area. In the Gulf of Bothnia air temperatures remained about normal though sea temperatures fell to just below normal. By mid-month close pack formed in the north and by the end of the month there was a complete cover of ice over the head of the Gulf of Bothnia. In the Gulf of Finland air and sea temperatures remained well below normal. Close pack, more than usual, covered the area by the end of the month. In the south, the Baltic Sea, air and sea temperatures recovered to just above normal. A little ice near south coasts early in the month soon melted and the Baltic Sea was almost ice-free at the end of the month.

Table 1. Icebergs sighted by aircraft and merchant ships within latitudes 40°N-65°N and longitude 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 limit	JAN.	222	222	77	32	12	4	2	2	1	0	0	0	0
	FEB.	94	94	94	62	20	3	0	0	0	0	0	0	0
	MAR.	> 348	> 344	> 337	> 293	> 214	> 88	19	0	0	0	0	0	0
	Total	> 664	> 660	> 508	> 387	> 246	> 95	21	2	1	0	0	0	0
Number of bergs reported east of limit	JAN.	222	179	64	6	3	3	3	3	3	2	2	1	0
	FEB.	94	86	28	8	1	0	0	0	0	0	0	0	0
	MAR.	> 348	> 347	> 267	> 153	> 76	> 41	> 27	> 22	> 2	> 1	> 1	> 1	0
	Total	> 664	> 612	> 359	> 167	> 80	> 44	> 30	> 25	> 5	> 3	> 3	> 2	0
Extreme southern limit	JAN.	48° 09'N, 40° 56'W on 4.1.69												
	FEB.	55° 30'N, 57° 30'W on 19.2.69 and 55° 30'N, 59° 30'W on 19.2.69												
	MAR.	52° 28'N, 55° 36'W on 18.3.69												
Extreme eastern limit	JAN.	48° 09'N, 40° 56'W on 4.1.69												
	FEB.	55° 30'N, 57° 30'W on 19.2.69												
	MAR.	59° 42'N, 43° 42'W on 12.3.69												

> ('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.

North Sea. With winds between south and south-west throughout the month air and sea temperatures were a little above normal. There was a little ice along the north-west coast of Germany at first but the area was ice-free by the end of January.

FEBRUARY

Areas east of Greenland remained under the influence of depressions but high pressure persisted over north Greenland. Low pressure over eastern Canada moved south to be replaced by high pressure towards the end of the month. At this time low pressure developed off south-east Greenland. Once again, over the eastern half of the area the month was generally colder than average and there was more ice than normal. In the west the month was relatively warm and there was less ice than usual.

Canadian Arctic Archipelago and Baffin Bay. Winds were light and variable over the whole area. Temperatures, a little above average at first, rose to as much as 17 degC above normal in the middle of the month. Shore leads closed up off the east Greenland coast as off-shore winds decreased. Otherwise the area was completely covered by ice.

Foxe Basin, Hudson Bay and Strait. Moderate to strong east to north-east winds early in the month soon became light and variable. Temperatures rose to well above average by mid-month. Nevertheless, close pack-ice covered the area.

Davis Strait. Strong south-easterly winds veered to light southerly and became moderate to strong north-westerly by the end of the month. Air temperatures rose to more than 10 degC above normal by mid-month and later fell to a few degrees above average with the change to cold north-westerly winds. Sea temperatures remained a few degrees above normal. The ice edge off Baffin Island retreated north-westwards at first and then advanced south-eastwards with the reversed wind. In the north-east of the Davis Strait the ice edge was further north than usual and a lead opened up to Disko. Pack-ice rounding Cape Farewell was driven further north than usual but by mid-month this pack-ice was confined to its normal limit of 61°N. With the change to north-westerly winds the Cape Farewell pack-ice was driven south-eastwards and its southern edge was located at 58½°N, 45°W at the end of the month, further south than usual. Over the whole area there was less ice than usual.

Labrador Sea, Great Bank, South Newfoundland Sea, River and Gulf of St. Lawrence. Once more air and sea temperatures were above average. In the Gulf of St. Lawrence sea temperatures were as much as 5 degC above normal and over the whole area air temperatures rose to more than 6 degC above normal as relatively warm south-easterly winds became established over the area. There was some cooling towards the end of the month as cool north-west to north-east winds replaced the south-easterlies, though temperatures were still a few degrees above normal. In the Labrador Sea pack-ice spread eastwards to 52°W at 55°N. New ice formed along the east coast of the Nord Peninsula, Newfoundland, north of 51°N. Later close pack-ice

Table 2. Baltic Ice Summary: January to March 1969
 No ice was reported at the following stations during the period: Flensburg, Oslo, Kristiansundfjord.

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	623	1	28	28	28	0	0	28	0	931	1	31	31	31	0	0	31	0	1167
Riga ..	3	31	25	16	3	22	1	0	386	2	28	27	19	5	6	18	0	581	1	31	31	31	0	0	31	0	755
Pyarnu ..	1	31	31	31	0	24	7	0	374	1	28	28	28	0	0	28	0	588	1	31	31	31	0	0	29	2	819
Viborg ..	1	31	31	31	0	0	17	14	—	1	28	28	28	0	0	28	0	—	1	31	31	31	0	0	31	—	—
Klaipeda ..	2	28	22	2	2	19	0	0	313	7	28	22	2	12	22	0	486	1	31	28	0	11	20	1	0	594	
Ventspils ..	2	29	24	3	0	11	0	0	—	1	28	23	5	3	19	0	—	1	31	29	1	12	21	0	0	—	
Tallin ..	7	31	24	0	20	8	13	0	—	1	28	28	3	25	2	26	0	704	1	31	31	10	21	0	31	0	910
Helsinki ..	2	31	7	0	0	7	0	0	101	12	28	17	15	0	17	0	362	1	31	31	31	0	0	5	26	0	581
Mariehamn ..	25	31	15	0	6	4	6	0	—	1	28	26	0	22	1	13	12	—	1	31	31	0	31	0	0	0	—
W. Norrskar ..	10	31	30	24	0	18	7	0	356	1	28	28	28	0	0	10	0	609	1	31	31	31	0	0	31	0	823
Turku ..	2	31	23	7	0	18	0	0	—	1	28	26	20	0	24	2	—	1	31	31	31	0	0	31	0	—	
Manlyuoto ..	2	31	31	31	0	0	0	0	468	1	28	28	28	0	0	16	12	806	1	31	31	31	0	0	0	0	1058
Vaasa ..	1	31	31	31	0	0	0	31	702	1	28	28	28	0	0	28	0	1135	1	31	31	31	0	0	0	0	1450
Oulo ..	1	31	31	31	0	0	0	0	—	1	28	28	28	1	27	0	—	1	31	31	31	0	31	0	0	—	1545
Roytaa ..	1	31	31	31	0	0	14	7	824	1	28	28	28	0	0	14	4	1292	1	31	31	31	0	0	0	0	—
Lulea ..	1	31	31	31	0	0	0	0	—	1	28	28	28	0	10	14	0	—	1	31	31	31	0	0	31	0	—
Bredskar ..	2	31	30	25	0	30	0	0	371	1	28	28	28	0	28	0	644	1	31	31	31	0	31	0	0	816	
Alnosund ..	4	31	28	0	0	28	0	0	141	1	28	28	18	0	28	0	300	1	31	31	31	0	31	0	0	438	
Stockholm ..	3	31	27	1	0	8	2	0	104	3	28	23	3	0	11	1	204	1	27	27	4	0	27	0	0	272	
Kalmar ..	1	31	31	28	0	11	18	0	—	1	28	28	28	0	0	3	25	—	1	31	31	31	0	0	0	0	—
Skellefteå ..	0	0	0	0	0	0	0	0	65	3	26	7	1	0	0	0	191	1	3	3	0	0	0	0	0	242	
Göteborg ..	0	0	0	0	0	0	0	0	77	0	0	0	0	0	0	0	200	12	12	1	0	0	0	0	0	—	
Visby ..	6	20	15	0	10	15	0	0	—	11	28	18	0	8	16	1	—	1	25	15	0	0	11	0	0	—	
Tönning ..	6	14	9	0	1	7	0	0	—	13	24	12	6	0	9	0	—	5	7	3	0	0	0	0	0	—	
Husum ..	0	0	0	0	0	0	0	0	—	14	24	11	0	0	8	0	—	0	0	0	0	0	0	0	0	—	
Emden ..	8	10	3	0	0	0	0	0	—	18	23	6	0	0	0	0	—	4	6	3	0	0	0	0	0	—	
Lilbeck ..	0	17	12	0	0	11	0	0	—	12	28	17	0	1	11	0	—	3	17	7	0	0	1	4	0	—	
Gluckstadt ..	0	0	0	0	0	0	0	0	—	20	23	4	0	1	0	0	—	0	0	0	0	0	0	0	0	—	
Bremerhaven ..	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	—	5	5	1	0	0	0	0	0	—	
Kiel ..	0	0	0	0	0	0	0	0	—	5	28	23	3	0	19	0	275	5	5	1	0	0	0	0	0	—	
Stettin ..	2	27	26	7	0	24	0	0	187	7	28	28	0	0	0	0	—	1	27	27	0	1	24	0	0	201	
Gdansk ..	7	21	6	0	0	0	0	0	217	3	18	3	0	0	1	0	330	3	18	3	0	0	0	0	0	364	
Aarhus ..	0	0	0	0	0	0	0	0	—	17	10	3	0	0	0	0	—	0	0	0	0	0	0	0	0	—	
Copenhagen ..	0	0	0	0	0	0	0	0	18	17	28	12	0	1	12	0	75	1	5	5	0	0	5	0	0	85	

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.

spread south-eastwards to 51°N , 50°W , a position further east than normal. The Belle Isle Strait, covered by close pack-ice early and late in the month, opened up from the Newfoundland side in the middle of the month. The South Newfoundland Sea was ice-free; by this time there is usually a large area of ice near the Cabot Strait. On the western side of the Gulf of St. Lawrence there was a rapid increase in ice cover early in the month. The eastern half remained ice-free. The Gulf of St. Lawrence is normally completely covered by ice at this time. Over the whole area there was less ice than usual.

Greenland Sea and Spitsbergen. In the north, strong north to north-east winds gradually decreased in strength during the month. Air temperatures were well below normal, in some places, especially early in the month, by as much as 12 degc. In the south, winds were variable though a strong north-westerly prevailed to the north of Iceland early in the month. Here air temperatures recovered to near normal. Sea temperatures in the Spitsbergen area and near south-east Greenland were a little above average, otherwise sea temperatures were below normal, especially to the north of Iceland where the sea was 5 degc colder than usual. Except in the extreme south-west there was much more ice than normal. Satellite pictures showed the ice edge along 5°E at 74°N , some 200 miles east of the normal position. There was more ice than usual along the west Spitsbergen coast. The edge of close pack-ice moved quickly south-east in the Iceland area and remained 20 to 40 miles north of Iceland throughout the month, some 100 to 150 miles further south-east than normal. At times open pack-ice extended south to the coast of north Iceland. Off south-east Greenland, despite some increase during the month, there was less ice than normal.

Barents Sea and White Sea. Air temperatures, well below average over most of the area, recovered (except in the extreme north) to a few degrees above normal as very strong southerly winds veered to moderate south-westerly during the month. Sea temperatures in the south Barents Sea were a few degrees above normal. The ice edge in the Barents Sea moved north during the month to 75°N , the normal position at this time of year. Close pack covered the White Sea and south-eastern sector of the Barents Sea. In these areas short-lived shore and flaw leads opened up from time to time.

Baltic. South-westerly winds gave way to strong south-easterlies and as a result air and sea temperatures, near normal at first, fell to several degrees below normal. By the end of the month the whole of the Gulf of Bothnia was ice covered. This complete cover occurred a little earlier than normal. The Gulf of Finland and Riga remained ice covered. In the south there was a small increase in ice cover especially along the Russian coast where there was more ice than usual. Small amounts of ice formed in places in the Kattegat, the usual picture at this time of year.

North Sea. Light north-westerly winds veered to east and later became moderate south-easterly. Near-normal air and sea temperatures fell to a few degrees below average by the end of the month. By mid-month a little ice had formed along the north-west German coast and later there were a few reports of ice along the south coast of Norway.

MARCH

The Siberian anticyclone moved westwards during the month to affect the whole of north-west Europe. As a result, depressions leaving North America were steered north-east from the North Atlantic into the Barents Sea. High pressure persisted over the North Greenland and Canadian Arctic area. As in earlier months the resulting winds were relatively cool over areas east of Greenland and relatively warm over sea areas off western Canada. In these latter areas there was much less ice than normal.

Canadian Arctic Archipelago, Baffin Bay, Foxe Basin, Hudson Bay and Strait. These areas remained completely ice-covered though short-lived windward shore leads occurred in most areas.

Davis Strait. In the west, under the influence of moderate north-easterly winds early in the month, the ice edge retreated to $61\frac{1}{2}^{\circ}\text{W}$ at 57°N , about 30 miles westwards of normal. Cold northerly winds occurred in the middle of the month causing above-average temperatures to drop temporarily to around 5 degc below normal and the ice edge returned to its normal position for the latter half of the month. In the east, due to northerly winds, the main west Greenland pack-ice moved south and the lead to Disko Bay closed up, leaving a narrow shore lead in the south of this ice area. The ice edge, at $63\frac{1}{2}^{\circ}\text{N}$, was a little further south than normal. The Cape Farewell pack-ice advanced to 63°N early in the month, retreated south-eastwards mid-month and once again advanced to $62\frac{1}{2}^{\circ}\text{N}$ by the end of the month as south-easterly winds became northerly and later returned to the south-east. On the whole there was more ice than normal in this area.

Labrador Sea, Great Bank, South Newfoundland Sea, River and Gulf of St. Lawrence. Over all these areas there was less ice than normal. Moderate to strong north-easterly winds became established over these areas by mid-month and temperatures dropped to around 2 degC below average. Temperatures recovered to around 3 degC above average late in the month as winds became south-westerly. Sea temperatures remained up to 4 degC above average. Ice over the Labrador Sea retreated to $53\frac{1}{2}^{\circ}\text{W}$ at 55°N due to strong east to north-east winds. Apart from a little ice near Belle Isle, the Great Bank was almost ice-free early in the month. However, by mid-month a 50-mile-wide belt extended southwards along $55\frac{1}{2}^{\circ}\text{W}$ to 50°N . This belt retreated to $51\frac{1}{2}^{\circ}\text{N}$ at the end of the month. At this time there was open water around Belle Isle. Over the Great Bank the ice edge was some 200 to 300 miles west of the normal position. The normal area of ice near the Cabot Strait was once more absent and the South Newfoundland Sea was ice-free. There was some ice near coasts in the south of the Gulf of St. Lawrence throughout the month but more than two-thirds of the Gulf was ice-free (normally there is at least half cover of ice at this time). The Belle Isle Strait was ice-covered only in the middle of the month.

Greenland Sea and Spitsbergen. In the north temperatures were as low as 15 degC below average early in the month due to strong north to north-east winds. By the end of the month winds became light east to north-east and temperatures recovered to around 2 degC below normal. The Greenland Sea ice spread eastwards to 8°E at 74°N by mid-month, some 180 miles east of normal before retreating to 5°E at the end of the month. Near Spitsbergen, due to strong north-east winds, the ice spread south-westwards to 13°E at $75\frac{1}{2}^{\circ}\text{N}$, 50 miles beyond normal. Strong north-west winds off north Iceland, with air temperatures 13 degC below normal, drove the ice south-east along the coast to $65\frac{1}{2}^{\circ}\text{N}$, about 180 miles beyond normal. By mid-month winds here had become south-easterly and the ice retreated about 100 miles. Air temperatures recovered to near normal but sea temperatures remained 4 degC below normal throughout the month. Off the coast of south-east Greenland there was less ice than normal due to the ice edge moving westwards under the influence of strong east to north-east winds.

Barents Sea. The wind flow was strong cyclonic till mid-month when light to moderate northerly winds became established over the area. Temperatures generally remained well below normal though there was a recovery to near normal in the middle of the month. Sea temperatures in the south remained near normal. At 40°E the ice edge advanced steadily southwards as far as $71\frac{1}{2}^{\circ}\text{N}$. However, at 30°E the ice edge retreated to 76°N by mid-month and later advanced to $75\frac{1}{2}^{\circ}\text{N}$. In the extreme east there was a complete cover of ice apart from a shore lead on the west side of Novaya Zemlya. At 30°E there was less ice than normal but over the whole area there was more ice than average.

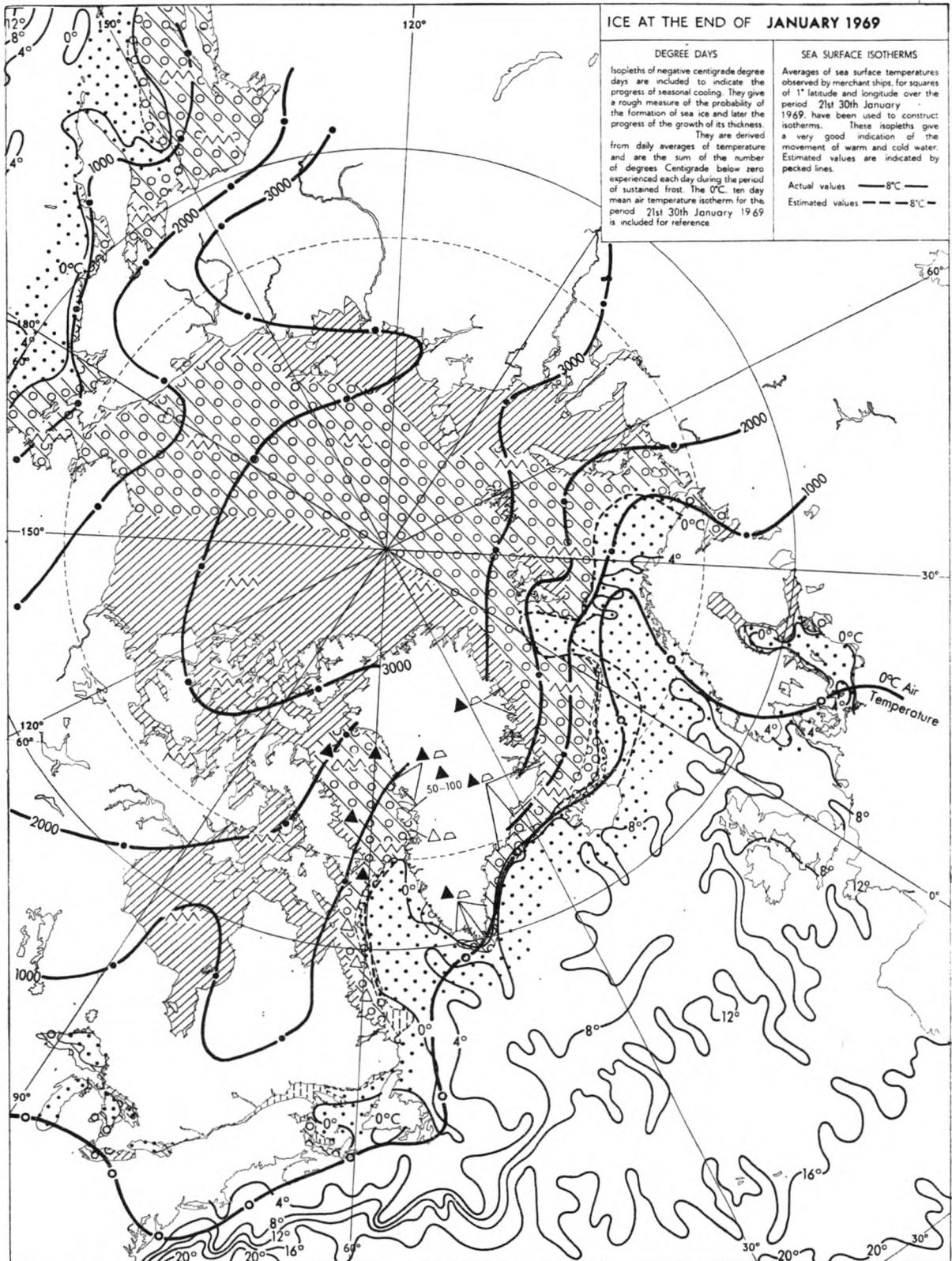
White Sea. Apart from the occurrence of short-lived flaw leads the area was completely covered by ice.

Baltic. In the Gulf of Bothnia there was a complete cover of ice. The Gulf is normally partly open at this time. Air temperatures remained at least 2 degC below average. In the south, the Baltic Sea, the ice spread steadily south-westwards to north Gotland, under the influence of east-south-easterly winds. This limit is 150 miles south of normal. Air and sea temperatures were 2-3 degC below normal. The Gulfs of Finland and Riga remained covered by close pack-ice throughout the month, the normal situation for these areas at this time. There were a few isolated pieces of ice as normal in the Kattegat.

North Sea. At the beginning of the month there were a few reports of ice along the south coast of Norway, otherwise the area was completely ice-free.

R. M. S.

Note. The notes in this article are based on information plotted on ice charts similar to the map shown overleaf but on a much larger scale (39 in \times 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.



ICE AT THE END OF JANUARY 1969

DEGREE DAYS

Isoleths of negative centigrade degree days are included to indicate the progress of seasonal cooling. They give a rough measure of the probability of the formation of sea ice and later the progress of the growth of its thickness. They are derived from daily averages of temperature and are the sum of the number of degrees Centigrade below zero experienced each day during the period of sustained frost. The 0°C ten day mean air temperature isotherm for this period 21st 30th January 1969 is included for reference.

SEA SURFACE ISOTHERMS

Averages of sea surface temperatures observed by merchant ships, for squares of 1' latitude and longitude over the period 21st 30th January 1969, have been used to construct isotherms. These isotherms give a very good indication of the movement of warm and cold water. Estimated values are indicated by pecked lines.

Actual values ——— 8°C ———
 Estimated values - - - - - 8°C - - - - -

<ul style="list-style-type: none"> 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) 	<ul style="list-style-type: none"> Ridged ice Rafted ice Puddled ice Hummocked ice <p>(The symbols for hummocked and ridged ice etc. are superimposed on those giving concentration)</p> <p>* Extreme southern or eastern iceberg sighting</p> <p> Ice depths in centimetres</p> <p> Snow depths in centimetres</p>	<ul style="list-style-type: none"> N New ice or Nilas P Pancake Y Young ice F First-year ice S Second-year ice M Multi-year ice — Known boundary 	<ul style="list-style-type: none"> Few bergs (< 20) Many bergs (> 20) Few growlers (< 100) Many growlers (> 100) Radar target (probable ice) <p>The 'number observed' may be put below the iceberg, growler, or radar target symbol</p> <ul style="list-style-type: none"> Radar boundary Assumed boundary Cracks 	<ul style="list-style-type: none"> Isoleths of degree days 0°C air temperature isotherm Estimated general iceberg track. Very approximate rate of drift may be entered Observed track of individual iceberg. Approximate daily drift is entered in nautical miles beside arrow shaft <p>Note:- The plotted symbols indicate predominating conditions within the given boundary. Data represented by shading with no boundary are estimated</p>
---	---	---	---	---

Book Reviews

Windjammers of the Horn, by Captain A. G. Course. $8\frac{1}{2} \times 6\frac{3}{4}$ in, pp. 176, *illus.* Adlard Coles Ltd., 3 Upper James Street, Golden Square, London, W.1, 1969. Price: 50s.

This latest book by Captain Course, which he has dedicated to "the scattered remnant of a vanished age", follows the fortunes (and a good many misfortunes) of the ten deep-water sailing ships owned by Sir William Garthwaite during the period 1915–1929. These vessels were, in fact, the last square-rigged ships to trade under the Red Ensign. They were all bought from other owners and were fairly old; none of them built later than 1895. Captain Course knows his subject well, as he spent his early years afloat in similar vessels. A previous book of his, *The Wheel's Kick and the Wind's Song*, was an account of his experiences as an apprentice in barques owned by John Stewart and Company of London. In those days apprentices got no pay; in fact premiums had to be paid to the owners for the doubtful pleasure of four years in the half deck.

The author must have done a great deal of research into the voyages of the Garthwaite ships and the men in them. He tells of the length of ocean passages, the cargoes, the accidents, the names of the Masters and Mates, and the dates of their joining and leaving; information that is not easily dug out nowadays.

Although the term 'windjammer' seems to have become customary, the reviewer still rather dislikes it. The first three of Garthwaite's ships were lost by enemy action during World War I. The author gives a chapter or two on the history of each of the ships. Extracts from logbooks are often quoted; the short laconic wording telling the story of some unusual event in simple language and with no frills. There is a good account of how the full-rigged ship *Garthforce* collided with a huge iceberg in the Southern Ocean in 1922. Although partially dismasted and barely under control, the ship was saved by the great exertions of her crew. In the ship *Wray Castle*, renamed *Garthwray*, an apprentice broke both legs in a fall. The Mate and 2nd Mate successfully set the fractures and fitted splints. The patient made a good recovery, but there was a rather quaint sequel to the affair.

Handling a big vessel under sail is well described and so is the work of discharging and loading cargo by the ship's crew at ports on the west coast of South America. The four-master *Garthpool* made a long passage of 128 days from Australia to the U.K. by way of the Cape of Good Hope (instead of the usual passage via Cape Horn) without once sighting land until entering the English Channel. In writing of sailing-ship voyages it is natural that the more dramatic incidents of damage and danger should be stressed. Although the life was what, nowadays, might be called hard (few comforts, poor food, and plenty of work on long ocean passages on 'watch and watch') it was not altogether unpleasant. A good deal of most voyages would be spent in fine warm trade wind areas: splendid sailing weather. Accounts such as this by Captain Course, written with first-hand knowledge of the subject, will certainly be of service to future nautical historians, marking the end of a kind of seafaring that had lasted for many hundreds of years. As well as 30 photographs, there are two maps, three diagrams of sail plans, and an index. The dust cover carries an excellent picture of the *Garthpool*, the last big sailing ship under the British flag.

C. H. W.

Sea Navigation. A manual for students and yachtsmen, by Ernest S. Gates. $10 \text{ in} \times 7\frac{1}{2} \text{ in}$, pp. 132, *illus.* George G. Harrap & Co. Ltd., 182 High Holborn, London, W.C.1, 1968. Price: 30s.

The preface tells us that the aim of this book is "to satisfy the demands of the amateur yachtsman who is determined to acquire sufficient of the basic navigational skills to enable him to take his little ship into unknown waters with complete confidence, and to return safely, satisfied, with an aim fulfilled".

The first thing that strikes one about this book is the clarity of the print and the excellence of the many diagrams and maps from the viewpoint of the student. Both these are very great assets in a book designed for use aboard a yacht.

Having said this, one is tempted to ask if the book really serves its purpose and whether the average yachtsman will not get a bit frightened by the author's attempt to cram rather a lot of plane and spherical trigonometry into two relatively short chapters. Even if we accept the assumption in the Introduction that the student "is already capable of applying the elementary rules of arithmetic, algebra, geometry and logarithms" it seems that he would find these two chapters very heavy going.

Position and direction of the earth's surface is explained very clearly and simply in this book with good explanatory drawings but does the amateur navigator need to be bothered about the complication of kilometres at present? The author cleverly deals with deviation and variation in four pages but one wonders why he needs to drag in a definition of isogonals. There is a clear and simple description of the principles of the Mercator's and gnomonic chart; the latter might well be useful aboard a yacht on (say) a North Atlantic crossing.

Coastal navigational techniques are dealt with very clearly and include advice about making allowances for tidal streams and leeway; the schematic diagrams are exceptionally good. Plane, Mercatorial and Great Circle sailings are discussed surprisingly adequately in 4 pages but the author introduces a complication with the terms *chlat* and *chlong* instead of the familiar *d. Lat.* and *d. Long.* This will surely be rather confusing when using conventional tables. The principles of astronomical navigation are described in a very interesting and clear manner and here again the diagrams are exceptionally good; on the other hand this whole subject, including the Marcq (mis-spelt Marc) St. Hilaire position line technique, Meridian Altitude and Pole Star latitude is dealt with in 20 pages, including the numerous drawings, and one wonders how many yachtsmen could find their position at sea after studying it. The practical side of taking a sight, for example, although mentioned in an Appendix, is dealt with very inadequately; no warnings are given about such details as refraction or 'woolly' horizon. The chapter on radio navigational aids, including *D/F*, Loran, Decca and Consol seems only of academic interest to the yachtsman, except, perhaps, *D/F* bearings from the shore. As for radar, the author infers that it merely gives "an electronic representation of the Earth's surface within range of the equipment" and he does not mention its use by merchant ships as an anti-collision aid. It might have been useful if he had made some reference to the value of a radar reflector aboard a yacht. He does, however, advise readers to refer to the *Admiralty Radar Manual*.

There is a brief chapter about tides and tidal streams; the illustrations of the uniform buoyage system are incomplete but the author does state that a complete list is given in *Admiralty Sailing Directions*. There is a final chapter giving a mixture of hints on navigation in rivers, anchoring, and incomplete extracts from the Regulations for Preventing Collisions at Sea. These incomplete extracts from these important rules seem rather dangerous and it would be wise, in a future edition, if the author drew attention to the fact that these are incomplete. The Appendices include information about instruments—including the bubble sextant and station pointer, both of which seem unlikely to be used aboard many yachts, and a few representative navigational tables which are inadequate for navigational purposes.

C. E. N. F.

Ocean Currents, by G. Neumann. 8½ in × 5½ in, pp. 352, *illus.*, Elsevier Publishing Company Ltd., 22 Rippleside Commercial Estates, Ripple Road, Barking, Essex, 1968. Price: 150s.

This is a textbook which fills a need that has existed for a long time, i.e. an account of instruments theory and methods of mapping with regard to ocean currents. It

provides a necessary preparation from which a student may proceed to study modern and advanced work.

It will not serve any useful purpose to go closely into the contents of the book which are available in many places elsewhere and familiar to oceanographers, but it provides all the basic concepts than one encounters in advanced papers and discusses them mathematically and physically without using difficult mathematical symbols or functions.

Early in the book fundamental difficulties with regard to reference points in the measuring of currents is discussed fully, including the use of buoys. Methods of mapping and representing currents are fully described.

Basic hydrodynamic equations are described. It is pointed out, for example, that the equation of continuity can be usefully applied to the salt content of the oceans.

The forces and physical causes of currents and the effects of friction and diffusion are described with an interesting section on inertia currents. The theoretical work of Ekman and his relationships between wind and current are given in detail with later work based on these.

The final chapter covers the general oceanic circulation including work of Stommel and others on the special characteristics of the Gulf Stream.

The book is clearly written, with good diagrams, a full list of references and a thorough index. This textbook should be on the bookshelf of all scientists associated with the sea.

G. A. T.

Personalities

RETIREMENT.—CAPTAIN R. A. D. CAMBRIDGE, D.S.C., R.D. recently retired after spending 46 years at sea with the Union-Castle Line, except for the war years 1939 to 1946 spent on active service in the Royal Navy.

Robert Arthur Dillon Cambridge was trained for the sea aboard the T.S. *Mercury* and at the Nautical College, Pangbourne. He joined his first ship, *Bampton Castle*, as a cadet in 1923.

In 1927 he passed for 2nd Mate and for Master in 1935. In 1931 he joined the Royal Naval Reserve as a Sub-Lieutenant and served seven months of his long training in the battleship *Warspite*, specializing later in anti-submarine warfare. He was promoted Commander R.N.R. in 1948.

When hostilities were declared in 1939 he was serving as 2nd Officer of the *Cape-town Castle* and, on arrival of the ship in the U.K., he was immediately called up for service in the Royal Navy and appointed in command of the anti-submarine trawler *Kingston Agate*. He served throughout the war in command of anti-submarine vessels. For his part in the sinking of a U-boat in the North Atlantic he was awarded the D.S.C., and for towing a burning ship away from a quay he was mentioned in despatches.

On the cessation of hostilities he was released from Naval service and returned to the Union-Castle Line; in the same year he was appointed in command of their cargo ships. In 1950 he was given his first command in a passenger ship and in 1960 was promoted to the Cape Mail Service and, finally, in 1967 was promoted Commodore Master of the British and Commonwealth Shipping Company of which the Union-Castle Line is a subsidiary.

Captain Cambridge's association with the Meteorological Office commenced in 1928 when he was serving as a junior officer in the *Banbury Castle*. Since then 39 meteorological logbooks bearing his name have been received, covering a period of 25 years of observing. Seven of these logbooks have been assessed as Excellent.

We wish him a long and happy retirement.

A. D. W.

RETIREMENT.—CAPTAIN J. G. A. DUNN has retired from the sea after 43 years with the Port Line.

James Godfrey Archibald Dunn was born at East Mersea in Essex, where his father was Rector, and signed indentures with the Commonwealth & Dominion Line (later to be called the Port Line) in 1925, being appointed to their *Port Hobart* for her maiden voyage.

He passed for 2nd Mate in 1929 and went to the *Port Adelaide* as 4th Officer. In 1931 the full force of the economic blizzard which had been building up for some time hit the Australian trade, and the Port Line, together with many other established shipping companies, were obliged to lay up several of their ships. To keep the minds and hands of young officers active during this distressing period they decided that one ship still in operation should be manned on deck entirely by certificated officers; the ship chosen was the *Port Gisborne* and Dunn went to her as Lamptrimmer and A.B. for the first voyage of the new régime. She made several voyages like this and most young Port Line officers of the period did at least one aboard her, coming back to their rightful position as soon as a job could be found for them. All too often this could only be in a laid-up ship and Dunn subsequently spent almost a year as an officer in various Port Line ships laid up in the River Blackwater, hard by his birthplace.

He passed for Master in 1936.

During World War II Captain Dunn had three major brushes with the enemy, all occurring when he was 2nd Officer. He was in the *Port Denison* when she was bombed and sunk off Kinnaird Head in September 1940; she was the Port Line's first war loss. In March 1943 when he was in the *Port Auckland* she was torpedoed and sunk in mid-Atlantic and in July 1943 his next ship, the *Port Fairy*, was attacked by Focke Wulf high-level bombers near the Josephine Bank, west of Portugal, her stern being set on fire and her steering gear burnt out. She was navigated on her twin screws into Casablanca for repairs and Dunn received a Commendation for Good Services.

Captain Dunn was appointed to his first command, the *Port Halifax*, in 1954 and subsequently commanded nine Port Line ships. His last command was the *Port Chalmers* which he brought out from the builder's yard early in 1968. She was the largest refrigerated ship in the world and fully automated—he tells us that full control of the helm and main engines was attended to, from berth to berth, through canals and entering and leaving port, solely by the officer of the watch.

Apart from the personal fact that the writer made one voyage with him in the half deck of the *Port Adelaide* in 1926, our association with Captain Dunn goes back to 1930 when he sent us his first meteorological logbook from the *Port Adelaide*, as 4th Officer. There is a 26-year gap in his personal record card from 1931 until 1957 because, though always at sea during those years, he was never in a voluntary observing ship. But, in all, he observed for us in 8 separate years and sent us 12 meteorological logbooks. He received Excellent awards in 1965 and 1968.

We wish him health and happiness in his retirement.

L. B. P.

Notice to Mariners

CHANGES IN FACSIMILE MAPS BROADCAST FROM BRACKNELL

The following changes in the detail shown on the analysis and forecast maps broadcast by facsimile from the Meteorological Office, Bracknell will be introduced on or about 1st August 1969, in order to conform with recommended practices of the World Meteorological Organization.

1. Facsimile analyses—surface.

(a) Fronts will be shown by the usual symbols but the five-figure indicator group will be dropped. A distinguishing letter will be given to each front as at present, but the letters C, W and O for cold, warm and occlusion will be dropped as these are self-evident from the symbols.

(b) Pressure centres will be located by an X and by a capital letter, L or H. The identifying letter will be written as a suffix and the central pressure will be given in whole millibars immediately below the X, the letters and numbers being parallel to the adjacent line of latitude. The remaining numbers which used to appear in the pressure centres (taken from the analysis code) will be dropped. (These will continue to be reported in the coded analysis of the Atlantic Bulletin.)

(c) Tropical cyclones will be indicated as hitherto but their tracks will be shown—see (d) below.

(d) Tracks of pressure centres will be shown as arrows for periods up to the previous 24 hours. The dotted part of the arrow will indicate previous history of the system and the solid part will show the position and estimated pressure at a stated future time, which is usually 24 hours from the analysis time.

(e) The direction of circulation of the system will be shown by an arrow head on the innermost isobar.

2. Facsimile prognoses—surface.

(a) Fronts will bear an identifying letter.

(b) Pressure centres for the 'valid time' will be labelled as indicated in para. 1 (b). (The term 'valid time' means the time for which the forecast is valid.)

(c) Forecast tracks of pressure centres will be shown by a solid arrow which joins the positions of the centre at the base time and valid time of the prognostic chart.

(The term 'base time' means the time of the observations on which the chart is based.) When considered desirable by the forecaster, the subsequent movement will be shown by means of a continuation of the arrow in the expected direction of the movement, the expected speed of movement being entered at the arrow head in knots. A similar arrow may be used at times to indicate the expected speed of movement of a front.

Note. The period between valid time and base time will be stated, e.g. "24 hours", in the 'box' at the bottom of the chart.

Further details about these changes are given in an Admiralty Notice to Mariners.

Fleet Lists

GREAT BRITAIN (Information dated 31.3.69)

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 Officers 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
<i>Achilles</i>	24.3.69	R. G. Edwards	P. J. Thorne, D. P. Worsnop, J. H. Hart...	R. D. Cause	Ocean Fleets Ltd.
<i>Adelante Star</i>	28.3.69	A. Chivers	M. A. James, R. Guy, P. Caur, J. A. H. Gray, M. D. Edmunds	F. Hugget	Blue Star Line Ltd.
<i>Adventurer</i>	4.10.68	R. H. K. Ledger	F. Martin, J. Maddison, T. M. Fitzpatrick	M. Donaldson	T. & J. Harrison Ltd.
<i>Afghanistan</i>	27.3.69	H. O. Webb	I. W. Davidson	R. J. Shepherd	Common Bros. Ltd.
<i>Ajax</i>	*	D. L. Emery	G. Hathaway, J. A. Hampton, M. S. Unni Nayar	T. McMahon	Ocean Fleets Ltd.
<i>Alaric</i>	*	R. I. Bland	N. C. Sudd, T. O. Griffiths, M. Powell	R. Petch	Shaw Savill & Albion Co. Ltd.
<i>Akaroa</i>	1.2.68	M. Larrive	M. Edbroome, R. Baddley, P. Ginzier, M. Hancock	A. J. Selman	Shaw Savill & Albion Co. Ltd.
<i>Alauria</i>	26.2.69	A. M. Thomson	C. Allport, B. C. Gouldthorpe, A. J. Wilson, J. G. Parry	N. Holloway	Cunard S.S. Co. Ltd.
<i>Albany</i>	2.12.68	G. Chatterley	J. R. B. Harding, J. L. Frain, A. C. Herdan	J. D. Rush	Royal Mail Lines Ltd.
<i>Albistan</i>	3.2.69	M. Robinson	A. P. Sweeney, C. A. Baker, A. A. Abdulla	J. J. McCallif	Silver Line Ltd.
<i>Alertgate</i>	31.1.68	J. B. Wyness	D. Vipond, V. Isidro, J. B. Simmons	R. M. D. MacDonald	H.M. Postmaster General
<i>Alice Bowater</i>	*	J. P. Ruddock, O.B.E.	R. G. Dawson, A. Fulton, K. J. Mair, R. A. Neill	R. Davies	Cayzer Irvine & Co. Ltd.
<i>Alinda</i>	1.2.68	I. W. Bennett	C. D. Hindley, J. Buttress, N. Coombs	A. Bevan	Shell Tankers (U.K.) Ltd.
<i>Alva Bay</i>	1.2.66	W. B. Cairns	D. F. Camruth, G. O. Okaroh, J. McCormick	— Jones	Alva S.S. Co. Ltd.
<i>Amalric</i>	8.7.68	L. L. Wellings	W. Kraemer	B. A. Montrose	Shaw Savill & Albion Co. Ltd.
<i>Amara</i>	31.3.69	P. K. Murchison	A. Ross, S. Barber, R. E. Baylis, J. D. Howie	P. J. Montaghan	Shell Tankers (U.K.) Ltd.
<i>Amorita</i>	20.1.69	C. J. Whitton	H. M. Clifford, P. M. Malling, W. G. Stephen	R. F. Davies	Shell Tankers (U.K.) Ltd.
<i>Anadara</i>	6.11.68	J. Morrison	M. C. Batrick, Y. Nimeh, C. R. George	R. Passmore	Shell Tankers (U.K.) Ltd.
<i>Anadania</i>	5.12.68	C. Anderson	C. G. Beath, P. D. Keyte	W. J. Anderson	Shell Tankers (U.K.) Ltd.
<i>Andes</i>	12.6.68	J. R. Lidgley, D.S.C.	J. H. Osmond, M. R. Gadd, S. Dobell, P. Seymour		Cunard S.S. Co. Ltd.
<i>Aracluen</i>	27.5.68	J. Fox	D. W. Milnes, N. J. Collingwood, P. Hart		Royal Mail Lines Ltd.
<i>Aranada</i>	*	T. Hastings	H. Goulden, W. D. Wright, A. Melnes		Trinder Anderson & Co. Ltd.
<i>Aravaa</i>	*				Shaw Savill & Albion Co. Ltd.

<i>Argentina Star</i>	13.3.69	J. S. Crowe	N. A. Ianson, P. Hutchings, N. Martin, R. Tilley	W. Long	Blue Star Line Ltd.
<i>Argyllshire</i>	12.3.69	A. S. Palethorpe-May	E. D. Hugo, A. R. MacIntyre	A. W. J. MacLeod	Clan Line Steamers Ltd.
<i>Armanistan</i>	31.10.68	L. Seddon	C. J. Sabine, I. Stroud, J. J. Woodmass	F. G. Huggett	Frank C. Strick & Co. Ltd.
<i>Asprella</i>	27.2.69	J. G. Wilson	B. I. Dawson, C. S. Perkins, J. E. Purvis, B. Glass	M. P. Carter	Shell Tankers (U.K.) Ltd.
<i>Asyvanax</i>	20.1.69	J. A. Rundie	J. E. Tumilty, P. C. Hewitt	P. J. Robertson	Ocean Fleets Ltd.
<i>Athelcrest</i>	9.12.68	R. G. Gray	I. G. D. Verran	I. Adamson	Athel Line Ltd.
<i>Athletic</i>	5.3.69	G. H. Heywood	D. G. Olley, J. S. Merrells, C. D. Marshall, J. B. Fowler	M. A. Murphy	Shaw Savill & Albion Co. Ltd.
<i>Auckland Star</i>	10.10.68	M. A. Brenberg	J. D. McGill, A. Goodman, J. Leask, P. Gates	W. Wade	Blue Star Line Ltd.
<i>Aureol</i>	21.3.68	C. S. H. O'Sullivan	G. Peters, A. Frost, P. Willerton	I. Noonan	Ocean Fleets Ltd.
<i>Australia Star</i>	13.11.68	P. W. W. Hunt	R. C. P. Lloyd, H. K. Dyer, R. P. Row	E. J. D. Banner	Blue Star Line Ltd.
<i>Australind</i>	27.5.68	L. J. Blake	R. B. Hurst, A. Greig, P. Thackstone	I. Farrer	Trinder Anderson & Co. Ltd.
<i>Author</i>	28.2.68	J. D. Sharman	R. Herbert	P. Brennan	T. & J. Harrison Ltd.
<i>Baharistan</i>	9.10.68	S. A. Booker	J. H. McMurren, I. Skinner, T. Mathews, H. McBay	E. Marks	Frank C. Strick & Co. Ltd.
<i>Baltistan</i>	4.7.68	J. R. Taylor	W. Sloan, J. Bruce, F. N. Toney	P. Marks	Frank C. Strick & Co. Ltd.
<i>Bamburgh Castle</i>	16.1.69	J. MacVean	R. D. Mountray, D. A. B. Walker, R. Andrews, R. I. Crawford	D. English	W. A. Souter & Co. Ltd.
<i>Bankura</i>	3.10.68	D. A. C. Windle	R. A. Graham, R. M. Speller, A. D. Horscroft	J. P. D. Mosley	British India S.N. Co. Ltd.
<i>Barrister</i>	2.1.69	J. W. Cubbin	R. A. Francis, J. M. Newby, C. H. Roberts	I. C. Smith	T. & J. Harrison Ltd.
<i>Beaverash</i>	10.3.60	I. W. Hooley	P. M. Bell, E. Potts	R. A. Cockett	Canadian Pacific Steamships Ltd.
<i>Beaverbank</i>	4.3.68	D. J. R. Davies	P. I. Harris, R. D. Turner	J. B. Keenan	Bank Line Ltd.
<i>Beaverdam</i>	26.9.67	C. Beck	R. W. Grice, D. Slater, J. Findlay	I. Martin	Canadian Pacific Steamships Ltd.
<i>Beaveroak</i>	3.2.60	C. Beck	P. C. M. Adair, G. A. Jenkins	R. J. Dixie	Canadian Pacific Steamships Ltd.
<i>Beaverpine</i>	9.1.69	P. J. Roberts	G. Cotton, T. Fisher, W. D. Clark	M. J. Corry	Canadian Pacific Steamships Ltd.
<i>Benalbanach</i>	11.2.69	S. Murray	J. H. Martin, P. I. Ewart, S. Townsend	P. Ryan	Ben Line Steamers Ltd.
<i>Benalligin</i>	28.11.68	K. C. Powell	A. L. Knowles, D. Durbini, A. Alexander	B. M. Roberts	Ben Line Steamers Ltd.
<i>Benarain</i>	7.1.69	J. C. Harvey	C. S. Green, D. Nesbit, I. F. Macrae	M. C. Murphy	Ben Line Steamers Ltd.
<i>Benarlay</i>	25.3.69	A. Sinclair	P. C. Thompson, P. G. Edgar, W. E. Van Geyzel, D. D. Brown	P. Mannion	Ben Line Steamers Ltd.
<i>Benattow</i>	28.2.69	A. S. Hamilton	M. A. G. Rayson, R. Arkless, A. K. Dewar	D. J. O'Brian	Ben Line Steamers Ltd.
<i>Benavon</i>	22.11.68	D. Wright	A. G. Thomas, W. Alexander, A. C. Hitcham	G. Morrison	Ben Line Steamers Ltd.
<i>Benclench</i>	3.7.68	J. Ritchie	I. Phillips, R. Shaw, L. Morrison	R. G. Hollet	Ben Line Steamers Ltd.
<i>Bencluchan</i>	30.10.68	K. Hardie	Yip Nai Kong, G. Line, J. N. Ramsay	T. W. Reid	Ben Line Steamers Ltd.
<i>Benhope</i>	11.3.69	G. Reid	D. M. Wohlgenuth, A. C. Hitcham, R. S. Moore, J. W. Mainwaring	W. Parkinson, M.B.E.	Ben Line Steamers Ltd.
<i>Benlillan</i>	22.11.68	R. C. Thomas	J. Robertson, A. Milligan	G. Kirby	Ocean Fleets Ltd.
<i>Benlornmond</i>	8.1.69	A. McKenzie	E. L. Davison, M. P. Wingfield	K. Mutimear	Silver Line Ltd.
<i>Benrinnies</i>	10.12.68	J. R. Muir	H. D. M. Glennie, P. Miller, T. Kirkpatrick	S. R. Potter	Prince Line Ltd.
<i>Bhama</i>	23.12.68	S. B. Hamilton	N. W. C. Cooper, A. Collop, G. Mathias	E. Rogers	British India S.N. Co. Ltd.
<i>Bishopgate</i>	23.7.68	J. Bowen	A. D. Horscroft, G. R. Davidson, J. P. Butler	A. P. Moss	Booker Line Ltd.
<i>Black Prince</i>	5.5.67	A. Gordon	J. Cullen, D. R. Ellis, N. Hough-Smith	D. Caws	Booker Line Ltd.
<i>Bombada</i>	10.5.68	R. G. Williams	G. H. Cross, R. McKechnie, D. R. Ellis, W. Hill	T. Murphy	Warwick Tankers Ltd.
<i>Booker Vanguard</i>	17.3.69	E. J. Jones	D. Allan, D. Chaplin, J. Q. Lees	O. O'Shaughnessy	Blue Star Line Ltd.
<i>Booker Venture</i>	19.11.68	P. Hector	N. A. Ianson, M. Thompson, J. Abbell, T. Jones	I. T. W. Moody	Blue Star Line Ltd.
<i>Brandon Priory</i>	8.8.68	H. W. McNeil	J. K. Cheesman, J. S. Brown, — Patrick	R. C. Williamson	Hall Bros. S.S. Co. Ltd.
<i>Brazil Star</i>	25.4.68	I. W. Jackson	W. A. Hurey, M. J. Winter, D. Flower	M. J. Walsh	Chapman & Willan Ltd.
<i>Bretwalda</i>	29.11.68	J. MacLean	C. Brandon, J. Proctor, N. D. Brookes	P. E. Davies	Bristol City Line Ltd.
<i>Brighton</i>	4.10.68	A. F. Ashton	E. I. Musson, P. Burleigh, W. Hopkins	I. Pitkin	B.P. Tanker Co. Ltd.
<i>Bristol City</i>	5.12.68	W. N. Young	T. J. W. Hunter, M. R. Duignan, J. D. McLeod	H. C. Craig	B.P. Tanker Co. Ltd.
<i>British Ambassador</i>	25.3.69	A. Derrick	C. R. Smith, T. R. Hughes, T. Tyheridge	J. L. Pearson	B.P. Tanker Co. Ltd.
<i>British Bombardier</i>	11.12.68	J. F. Surman	N. J. Greig, R. J. Higgins, J. A. Buchanan, P. W. Wilson	B. Fraser	B.P. Tanker Co. Ltd.
<i>British Freedom</i>	25.2.69	E. K. Williams	N. J. Groves, D. Campbell, C. Schiller	D. Macpherson	B.P. Tanker Co. Ltd.
<i>British Oak</i>	23.5.68	A. MacMillan	G. K. Waite, P. Brownlee, J. Bowser		B.P. Tanker Co. Ltd.
<i>British Resource</i>	29.8.68	B. Sexton	D. Harris, J. D. Nash		B.P. Tanker Co. Ltd.
<i>British Sailor</i>	26.8.68	F. C. B. Terry, M.B.E.			B.P. Tanker Co. Ltd.
<i>British Splendour</i>		S. J. Robinson			
<i>British Trust</i>					

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Buccleuch</i> ..	15.3.68	J. Downard	K. N. Metcalfe, C. B. Thorpe, R. Donaldson, M. J. Ingamells	D. Drummond	Hain-Nourse Ltd.
<i>Bulimba</i> ..	13.2.67	D. P. Barry	T. R. Young, E. K. Bushnell	C. J. A. Voutt	British India S.N. Co. Ltd.
<i>Cairngowan</i> ..	28.2.68	J. Lobban	J. Stanford, J. Craigan, I. McRae, I. White	R. Marshall	Cairns Noble & Co.
<i>Calchas</i> ..	13.2.69	H. K. Timbrell	J. P. Morgan, R. N. Moon, P. S. Carr, W. K. Vick	J. D. Willford	Ocean Fleets Ltd.
<i>Caledonia Star</i> ..	23.1.60	P. Davies	C. Naismith, A. Beale, K. Kilmartin, D. Bedford	J. Lee	Blue Star Line Ltd.
<i>Camito</i> ..	4.11.68	A. Thomson	S. W. Jones, P. G. Pinkerton, W. N. Williamson	R. Leatham	Elders & Fyffes Ltd.
<i>Canadian Star</i> ..	13.12.68	C. McGowan	I. E. Bell, M. Jarvis, C. Jackson	S. Taylor	Blue Star Line Ltd.
<i>Cannanore</i> ..	14.2.60	C. A. S. Borthwick	R. G. J. Poyntz, P. C. Cawthorn, C. H. C. Knight	M. Taylor	P. & O. Lines Management Ltd.
<i>Canopic</i> ..	21.10.68	C. A. S. Borthwick	P. O. Sully, T. M. E. Bond, J. Grant	C. D. McNeilly	Shaw Savill & Albion Co. Ltd.
<i>Canterbury Star</i> ..	23.12.68	W. Warden	G. Johnson, H. Cook, A. Walker	D. Smith	Blue Star Line Ltd.
<i>Cape Clear</i> ..	20.1.69	T. P. Edge	T. Hamilton, G. Towers, F. Moran	B. G. Breslin	Lyle Shipping Co. Ltd.
<i>Cape Franklin</i> ..	30.12.68	A. MacKinlay	W. A. Andersen, D. Coe, J. A. Roberts	W. MacLeod	Lyle Shipping Co. Ltd.
<i>Cape Howe</i> ..	30.10.68	J. Hetherington	R. Crawford, J. A. Roberts, D. Coe		Lyle Shipping Co. Ltd.
<i>Cape Nelson</i> ..	20.3.69	D. B. Jack	R. C. Howard, P. G. Radford, J. R. Curry	I. H. Pearce	Sir Wm. Reardon Smith & Sons Ltd.
<i>Cardiff City</i> ..	24.1.69	C. R. B. Goodman	P. J. Barratt, C. Winstett, C. A. M. Thatham, P. F. Robinson		Ocean Fleets Ltd.
<i>Cardiganshire</i> ..					
<i>Carmania</i> ..	22.5.68	J. E. Woolfenden, D.S.C.	K. H. Stanley, E. H. Bocking, A. T. Willy, R. Green	T. McConnell	Cunard S.S. Co. Ltd.
<i>Carrigan Head</i> ..	28.11.68	J. T. Sellers	P. C. Dobbs, J. McD. Knox, H. Stewart	J. Carwardine	G. Heyn & Sons Ltd.
<i>Cedric</i> ..		I. G. Street	A. Ross, G. Mathews, R. Squirrel	R. Walker	Shaw Savill & Albion Co. Ltd.
<i>Ceric</i> ..	23.1.69	N. S. Milne, O.B.E.	T. J. C. Holmes, J. S. Brooke	F. E. Page, M.B.E.	Shaw Savill & Albion Co. Ltd.
<i>Chakla</i> ..	23.12.68	H. N. Severs	J. A. Carlidge, N. Crump, R. H. Small	C. Sadler	British India S.N. Co. Ltd.
<i>Chantala</i> ..	11.3.69	F. Bell	J. Craig, G. B. Wright, J. Dyson	R. J. A. Jones	British India S.N. Co. Ltd.
<i>Cheviot</i> ..	27.3.69	R. Gatiss	J. Gray, J. E. Davies, R. Cordon	J. Gargan	Bamburgh Shipping Co. Ltd.
<i>Chicanao</i> ..		P. A. Chubb	K. W. Gordon, C. J. Gilbert, J. C. Twite	J. N. MacDonald	Elders & Fyffes Ltd.
<i>Chindawara</i> ..	23.9.68	J. A. McCowan	A. R. Lucas, D. H. Brown, A. R. Jones	A. L. Dobson	British India S.N. Co. Ltd.
<i>City of Bedford</i> ..	3.2.69	A. G. Hine	W. D. Dick, B. K. Keith, R. M. Ashworth	S. G. Matthews	Ellerman Lines Ltd.
<i>City of Birmingham</i> ..	2.10.68	J. Sapp	M. J. Hewitt, J. I. Owen, C. W. Rapley	D. G. Riordan	Ellerman Lines Ltd.
<i>City of Brisbane</i> ..	12.11.68	K. B. B. James	H. Anthony, W. A. Roberts, F. P. Gill	B. J. Brown	Ellerman Lines Ltd.
<i>City of Canberra</i> ..	19.12.68	T. H. Morgan	N. C. Hall, M. J. P. Fagan, J. M. Waller	M. R. W. Sheehy	Ellerman Lines Ltd.
<i>City of Capetown</i> ..	30.4.68	R. Frame	J. Pearsall, J. H. Naves, P. E. Rowlands, P. D. Kimber	P. J. Ryan	Ellerman Lines Ltd.
<i>City of Chester</i> ..	6.12.68	I. B. Hutcheon	J. G. Dunford, J. Welsh, E. S. Fowler, C. Hainsworth	R. J. Maule	Ellerman Lines Ltd.
<i>City of Eastbourne</i> ..	26.2.69	R. H. Broadbent	P. G. Dickinson, V. I. Baseley	J. Kelly	Ellerman Lines Ltd.
<i>City of Glasgow</i> ..	11.11.68	P. Redhead	R. G. Mugsford, C. Pilkington, A. Forrest	S. A. Cooper	Ellerman Lines Ltd.
<i>City of Guiltford</i> ..	12.12.68	R. Clark	D. M. Sisson, E. Russell, C. J. Griffith	P. G. Roscoe	Ellerman Lines Ltd.
<i>City of Yohannesburg</i> ..	15.11.68	F. C. O'Neill, R.D.	R. J. Mugsford, M. G. Robertson, C. D. Royle	D. T. Tremayne	Ellerman Lines Ltd.
<i>City of Manchester</i> ..	20.3.69	L. W. Roberts	D. G. Hall, J. G. Hill, J. McV. Turner	J. F. M. Walsh	Ellerman Lines Ltd.
<i>City of Ottawa</i> ..	14.3.69	J. S. Grant	I. C. Carmichael, J. A. MacLeod	P. J. McGill	Ellerman Lines Ltd.
<i>City of Oxford</i> ..	24.3.69	M. W. Hartley	D. E. Watson, R. Meikle, T. R. Page	J. Brierley	Ellerman Lines Ltd.
<i>City of Wellington</i> ..	26.4.67	A. A. Ramsden	B. C. Spaven, M. P. Lambie, P. A. Marcon	M. Ley	Ellerman Lines Ltd.
<i>City of Winchester</i> ..	27.2.69	H. Lewis	N. D. Leslie, D. C. Butcher, M. Taylor, J. Pearsall	D. Herdman	Ellerman Lines Ltd.
<i>Clan Alpine</i> ..	25.9.68	T. Rigg	S. H. Butterfield, N. F. Combes, T. Young	D. A. P. Galbraith	Clan Line Steamers Ltd.
<i>Clan Macdonald</i> ..	3.2.69	N. F. Stewart	S. H. Gledhill, I. F. B. Currie, D. M. Pope	J. L. Spanner	Clan Line Steamers Ltd.
<i>Clan Macdougall</i> ..	3.2.69	D. H. MacMillan	A. C. Thomson, P. J. Ward, J. Pitman	J. H. Williams	Clan Line Steamers Ltd.
<i>Clan Macgillivray</i> ..	24.3.69	A. Crawford	A. Fakira, A. Melia, E. Martin	J. Wright	Clan Line Steamers Ltd.

Clan Macgovan	19.2.69	W. H. Bosanquet	W. A. Asi, D. Innes, G. B. Charleson	W. Latus	Clan Line Steamers Ltd.
Clan Macgregor	24.2.69	C. A. Russ	R. A. Robertson, S. Stokes	J. K. Paterson	Clan Line Steamers Ltd.
Clan MacIntyre	10.10.68	P. N. V. Rewell			Clan Line Steamers Ltd.
Clan Macindoe	10.10.68	H. M. Walden			Clan Line Steamers Ltd.
Clan MacLaren	11.12.68	S. Hagan	R. A. Slack, G. D. Bowie, S. M. Kanjilal	M. G. Snell	Clan Line Steamers Ltd.
Clan MacLay	4.3.68	R. Harber			Clan Line Steamers Ltd.
Clan Maclean	4.2.69	P. J. Rose			Clan Line Steamers Ltd.
Clan Macleod	31.1.69	G. B. Craig	E. N. Perera, R. G. Smith, J. S. P. Santamaria	M. G. Eskins	Clan Line Steamers Ltd.
Clan Macnab	10.12.68	T. R. Kendra	M. G. Ward, R. R. Cawdery, I. Ferguson	D. McNeil	Clan Line Steamers Ltd.
Clan Macnair	15.1.69	C. C. Atkinson	A. S. Hill, R. B. Reid, A. J. MacDonald	M. MacDonald	Clan Line Steamers Ltd.
Clan MacLennish	15.8.68	N. Wallace		K. Watkins	Clan Line Steamers Ltd.
Clan MacLennan	11.12.68	R. M. Bessant	D. A. Reid, O. T. Ross, M. Slayman	N. C. Ellis	Clan Line Steamers Ltd.
Clan Matheson	2.12.68	J. G. Smith	M. R. G. Simmons, M. C. Barrett, P. D. Eilbeck	P. McGarrigle	Clan Line Steamers Ltd.
Clan Ramsay	11.11.68	D. L'Estrange	M. R. Garton, J. Simpson, R. Silverwood	P. G. Heald	Clan Line Steamers Ltd.
Clan Sutherland	27.3.68	F. J. Pye, M.B.E.			Ministry of Agriculture & Fisheries
Clone	*	H. Munro	T. Everett, A. Button, A. Lerner	S. Walker	J. & J. Denholm Ltd.
Canon Forest	*	M. R. Sutcliffe	D. McDonald, G. Marsland, F. Millar		Ministry of Agriculture & Fisheries
Corella	27.9.68	W. Craig	C. Snowling	N. W. Boyd	Shaw Savill & Albion Co. Ltd.
Corinthic	3.1.69	H. O. V. Andersen	P. Simmonds, D. Pearce, C. V. Farrant	G. F. Mulvin	Pacific S.N. Co. Ltd.
Cotopaxi	22.11.68	L. W. Cooper, O.B.E.	R. D. Lothian, J. Flood, W. Jenkins, P. R. Brown		Hain-Nourse Ltd.
Costruold	14.1.69	M. R. Ryan	R. M. Bell, P. Bytheway, M. M. Reeves	C. Connison	Bibby Line Ltd.
Coventry City	12.12.68	R. A. McLeod	F. Revill, J. Seidler, R. Eastwood	R. Liston	Shaw Savill & Albion Co. Ltd.
Cretic	11.12.68	W. Blackie	A. Quirey	J. Minay	J. & J. Denholm Ltd.
Crinan	7.3.69	A. T. Creer	T. E. Hughes, C. D. Riley, D. T. Watkins	J. F. A. Sharples	T. & J. Harrison Ltd.
Crofter	21.1.69	B. E. Evans	B. J. Ditcher, J. E. Sherwood, R. White	— McFarland	Sugar Line Ltd.
Crystal Crown	22.5.68	R. M. Pirns	M. J. Murphy, J. King, G. P. Colebrook, J. Small	D. Fitzgibbon	Sugar Line Ltd.
Crystal Diamond	28.10.68	W. M. Shirreff	I. D. Spence, B. F. Rogers, I. C. Rollo	J. Cullen	Sugar Line Ltd.
Crystal Gem	25.2.69	J. S. Wisden	A. N. Smith, R. Thompson, M. H. Case	D. Gunn	Sugar Line Ltd.
Crystal Jewel	12.3.69	D. Patricson	O. T. Stephenson, G. H. Griffiths, J. Bailey, R. W. Paul	P. Gardner	Sugar Line Ltd.
Crystal Sapphire	17.1.69	C. P. Robinson	R. C. Sclater, W. Land, J. Jackson	J. Diggle	Federal S.N. Co. Ltd.
Cumberland	*	P. J. Broomfield	R. M. Swabey, E. Owen, — Mazri	— Staplefield	Ocean Fleets Ltd.
Cyclops	23.12.68	C. R. Downes	D. Marr, R. Wooding, G. Coleridge, M. Murray	J. R. Cameron	Shaw Savill & Albion Co. Ltd.
Cymric	12.3.69	D. Martucci	J. Parmley, R. Phillips, K. R. Hicks	I. R. Stewart	Common Bros. Ltd.
Daghestan	4.12.68	A. Sutherland	M. G. Bolland, J. A. Billington, J. Blakeley	D. Murphy	T. & J. Harrison Ltd.
Dalesman	13.2.69	J. Potter	W. F. R. Whiting, K. Corcoran, J. Ardzieg, M. Hore	P. M. S. Lebbon	Wm. France Fenwick & Co. Ltd.
Dartwood	21.3.69	I. S. McEwan	A. T. Turner, E. A. L. Glover, C. J. Bland, G. Trounson	P. Wright	Overseas Containers Ltd.
Delphic	23.10.68	W. J. S. Eynon	G. J. J. Mansfield, H. S. M. Roodenburg, J. G. Stewart	R. A. Browne	Ocean Fleets Ltd.
Demodocus	17.1.69	J. L. Jones, D.S.O., D.S.C.	D. Ganderton, R. V. Jones, G. Lathan	R. C. Brissler	Lampport & Holt Line Ltd.
Devia	21.1.69	J. D. Hellings	C. J. Francis, R. G. J. Davis, T. W. Carnduff, K. Bellfield	C. E. Hughes	Federal S.N. Co. Ltd.
Devon					
Devon City	13.3.69	G. Harvey	K. Jones, J. C. Lee, P. J. Warren	J. W. Cuthbert	Sir Wm. Reardon Smith & Sons Ltd.
Discovery	7.11.68	R. H. A. Davies	G. L. Howe, H. M. Day, S. G. Pearce	A. P. Ross-Murray	National Institute of Oceanography
Donegal	5.3.69	E. J. Ridout	G. C. Dovey, J. F. Holder, G. Mortimer	J. L. Okey	Trinder Anderson & Co. Ltd.
Dorset	16.12.68	C. A. Miller	T. E. McLaren, M. Henson, M. Doyland, E. Bishop	J. S. I. N. Griffith	Federal S.N. Co. Ltd.
Dukallow	13.2.69	A. V. Rowles	F. J. Downan, I. L. Roberts, A. Bettles	A. R. Watt	Hain-Nourse Ltd.
Dukesgarth	11.2.69	N. Richardson	H. O. L. Phillips, R. Finlayson, R. B. Milson	D. Edmondson	Cory Maritime Ltd.
Dunadd	15.1.69	E. MacGregor	R. N. Morgan, C. Black, B. W. Jordan	P. Jones	J. & J. Denholm Ltd.
Duncraig	*	I. C. Graham	K. Davis, G. Marshall, L. Buchanan	F. Chadwick	J. & J. Denholm Ltd.
Eden	30.12.68	C. D. Ratcliff	M. D. Edwards, G. A. Hope, P. L. Morley	S. Owen	Royal Mail Lines Ltd.
Edenmore	13.3.69	B. Estill	D. Bowman, J. S. Rutherford, B. H. Mitchell	R. J. Lawrence	Furness Withy & Co. Ltd.
Edinburgh Castle	6.12.68	D. W. Sowden, R.D.	T. E. Dubicki, D. W. Fellowes, R. K. Kirkpatrick	H. Liggins	Union-Castle Mail S.S. Co. Ltd.
Edward Wilshaw	11.6.68	W. Watson	R. M. Keyzor, K. Brammer, A. F. Wilson	J. Otley	Cable & Wireless Ltd.
Egton	9.12.68	W. Watson	M. T. Phillips, C. Robertson, R. Jackson	K. Kirtley	Roland & Marwood S.S. Co. Ltd.
Elmbank	10.10.68	D. J. Rees	M. G. Greenen		Bank Line Ltd.
Empire Star	27.2.69	T. D. Brewster	D. M. Shepherd, G. R. Henderson	T. J. O'Donnell	Lampport & Holt Line Ltd.

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Empress of Canada</i> ..	16.12.68	R. Walgate	P. C. H. Adair, G. B. Drewery, A. Baker, M. J. Howden	W. Fryer	Canadian Pacific Steamships Ltd.
<i>Empress of England</i> ..	10.3.69	I. D. Jeavons	R. Horth	J. A. Barry	Canadian Pacific Steamships Ltd.
<i>English Star</i> ..	18.6.68	G. J. A. Seaye	D. S. Fford, C. Mundy, H. N. Owen, A. W. Kinghorn	R. Birkinshaw	Blue Star Line Ltd.
<i>Ernest Holt</i> ..	31.3.69	E. A. Binnington	A. D. Evans, M. J. Charlesworth, G. C. Stalker,		Ministry of Agriculture & Fisheries
<i>Essex</i> ..	31.3.69	H. C. R. Dell	A. P. Jagers		Federal S.N. Co. Ltd.
<i>Esso Hampshire</i> ..	10.3.69	R. Hyam	P. A. Kearney, R. H. A. Hart, P. E. Russell,	A. C. L. Coates	Esso Petroleum Co. Ltd.
			J. R. Donovan		
<i>Esso Pembrokehire</i> ..	23.12.68	R. E. Smith	P. K. Tyrer, G. F. Thomas, D. G. A. Flynn	J. Ritchie	Esso Petroleum Co. Ltd.
<i>Esso Warwickshire</i> ..	21.8.68	T. R. C. Rutherford,	R. J. Risi, C. F. Wass	P. M. Hodgson	Esso Petroleum Co. Ltd.
		C.B.E.			
<i>Esso York</i> ..	8.1.68	J. Humble	P. E. Russell	R. S. Kimberley	Esso Petroleum Co. Ltd.
<i>Eucadia</i> ..	*	A. J. F. Colquhoun,	J. Priest, I. Swan, J. Swan	R. E. Hartland	Walter Runciman & Co. Ltd.
		M.B.E.			
<i>Explorer (m.v.)</i> ..	7.1.69	R. Sutcliffe	J. B. Williams, M. Williamson, K. Long	K. Roberts	T. & J. Harrison Ltd.
<i>Explorer (F.R.S.)</i> ..	12.2.69	A. A. Baxter	J. McBride, B.E.M.	J. Steven	Dept. of Agriculture & Fisheries for Scotland
<i>Farsistan</i> ..	27.3.69	D. Calvert	A. A. Noor, D. Golightly, Z. Greber	W. Williams	Frank C. Strick & Co. Ltd.
<i>Finnamore Meadow</i> ..	17.3.69	I. A. McCulloch	R. B. R. Vart, P. Yare, G. Knight, B. Rogers	I. Wylie	Mayroleon Bros. Ltd.
<i>Firbank</i> ..	23.6.66	W. Watson	R. A. Bazaire, A. K. Gillespie, E. Irvine	D. Wilson	Bank Line Ltd.
<i>Flintshire</i> ..	2.12.68	R. G. Rippon	J. Walker, A. E. J. Coates, R. A. Jones	A. Wayne-Jones	Ocean Fleets Ltd.
<i>Floristan</i> ..	4.11.68	D. R. Carden	J. W. Wightman, D. W. Parke, C. M. Gibbs,	W. F. Stirling	Frank C. Strick & Co. Ltd.
			M. H. Wilson		
<i>Forthfield</i> ..	7.3.69	J. F. Blakie	J. W. Elcoate	M. R. Palmer	Hunting & Son Ltd.
<i>Fourah Bay</i> ..	13.11.68	R. G. Williams	G. F. Foster, A. G. Maxwell, J. M. Mackenzie	A. N. Henderson	Ocean Fleets Ltd.
<i>Franconia</i> ..	16.12.68	H. L. de Legh, R.D.	P. Ferguson, R. Sturge, R. A. Woodall	L. K. Lavie	Cunard S.S. Co. Ltd.
<i>Frenantite Star</i> ..	12.11.68	G. Figott	J. Lock, R. Chadwick, C. Poulter	D. F. Murray	Blue Star Line Ltd.
<i>Gateway</i> ..	14.2.69	R. J. Ogilvy	M. J. Davies, B. G. Cox, F. E. Spicer	R. B. Geale	Trinder Anderson & Co. Ltd.
<i>Geestbay</i> ..	18.11.68	D. G. Powell	N. Cooper, K. Waters, R. A. Cole	G. M. Parsons	Geest Industries Ltd.
<i>Geestcape</i> ..	11.12.68	A. Macneil	R. E. Baker, M. MacLeod, E. J. Waipole	D. H. Letcher	Geest Industries Ltd.
<i>Geesthaven</i> ..	23.1.69	O. Springett	C. R. Thomas, B. Lee, A. W. Breach	C. Hutchinson	Geest Industries Ltd.
<i>Geestport</i> ..	17.1.69	P. W. Groves	B. Jones	J. P. Duckworth	F. T. Everard & Sons Ltd.
<i>Georgina V. Everard</i> ..	17.3.69	L. Andersen	H. Faw	N. C. Ellis	Cayzer Irvine & Co. Ltd.
<i>Glady's Bowater</i> ..	*	R. D. Lofts	R. B. Howatson, D. S. Williams, L. W. Roberts	P. W. Adams	W. J. Tatem Ltd.
<i>Glanely</i> ..	27.9.68	A. Laythorpe	D. A. Cross, R. W. Chisholm, R. G. Laurensen	D. R. Gibson	Ocean Fleets Ltd.
<i>Glenaffric</i> ..		I. O. Jones	S. P. Khong, H. A. C. Ross, S. P. C. Saverimutto	A. Moloney	Ocean Fleets Ltd.
<i>Glenaimond</i> ..	6.12.68	N. Willis	J. F. Dunn, D. M. Gow	C. E. Gullely	Ocean Fleets Ltd.
<i>Glenearn</i> ..	3.3.69	G. I. Wright	W. B. Thomas, G. K. Thomson, E. C. Metham,		
			R. B. Stephens		
<i>Glenfalloch</i> ..	1.1.69	P. H. Edwards	C. O. Clowes, G. C. McCullagh, P. D. Clarke,	W. W. Beebee	Ocean Fleets Ltd.
			N. G. Simpson		
<i>Glenfinlas</i> ..	8.1.69	G. W. Povey	D. Laing, R. M. Simpson, P. Lloyd-Jones	J. P. R. Binding	Ocean Fleets Ltd.
<i>Glen Garray</i> ..	22.11.68	R. J. Paterson	J. J. Macaulay, J. Bathgate, J. G. Melia	S. G. Brannan	Ocean Fleets Ltd.
<i>Glen gyle</i> ..	31.3.69	D. H. Stewart, R.D.	J. E. McGregor, J. A. Nightingale, B. D. Pollock,	D. P. Stoker	Ocean Fleets Ltd.
			E. J. Turner		
<i>Glenlyon</i> ..	26.2.69	J. A. Dougall	A. S. Jackson, J. E. Tunmore, B. N. Jones	R. Daniels	Ocean Fleets Ltd.
<i>Glenmoor</i> ..	23.1.69	R. W. L. Crawford	J. H. Burn, A. Macvicar, M. J. Martin, J. Swan	H. Foster	Walter Runciman & Co. Ltd.

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Yumna</i>	22.3.68	M. Ryan	B. V. Purvis, —, Bettles, S. R. Milburn	A. L. Dobson	Hain-Nourse Ltd.
<i>Karakistan</i>	18.6.68	N. Wray	P. Quayle, G. H. Gordon, S. E. Chapman, S. J. McCollin	H. G. Burton	Frank C. Strick & Co. Ltd.
<i>Kenuta</i>	7.2.69	A. MacLean	G. F. Lack, R. A. Childs, P. G. Carr	H. O'Donnell	Pacific S.N. Co. Ltd.
<i>Kenya</i>	19.3.69	I. K. Bowerman	A. Greenhaugh, A. J. Burke, R. V. Hanks	C. J. Davidson	British India S.N. Co. Ltd.
<i>King Arthur</i>	20.9.68	I. M. Shearer	G. M. Nduato, J. A. Wignall	S. V. Heron	Cayzer Irvine & Co. Ltd.
<i>King George</i>	24.3.69	A. A. Graham	R. D. Shand, B. Preece, —, Slater	—, Popple	Cayzer Irvine & Co. Ltd.
<i>King Malcolm</i>	*	N. F. Wray-Cook	P. A. Pears, O. T. Ross, J. Howell	C. E. G. Pratt	Union-Castle Mail S.S. Co. Ltd.
<i>Kingnaid Castle</i>	16.4.68	M. N. Ure	C. J. Bush, B. J. Bartlett	J. Duignan	Frank C. Strick & Co. Ltd.
<i>Kohistan</i>	27.9.68	W. H. D. Marker	E. R. Bruce, B. J. Masey, D. Baker	N. Marwood	Bank Line Ltd.
<i>Laganbank</i>	10.2.69	I. Campbell			Chr. Salvesen & Co. Ltd.
<i>Laksa</i>	20.11.67	W. G. Ross			Buries Markes Ltd.
<i>La Loma</i>	*	M. J. Brennan	J. Lynch, D. J. Hunkin, P. B. Webb	E. Coogan	Bibby Line Ltd.
<i>Lancashire</i>	2.5.68	K. G. P. Swift	R. K. Cameron, M. Kingsmill, C. Marton, M. J. M. Tyrell	C. R. Bolton	Trinder Anderson & Co. Ltd.
<i>Limerick</i>	15.10.68	P. D. Guerrier	J. S. Northcott, N. Luck, D. Maer	R. J. Nolan	W. A. Souther & Co. Ltd.
<i>Lindisfarne</i>	27.3.69	R. Wilson	I. Beetham, W. C. Johnston, T. E. Wilson	J. A. Cartwright	Royal Mail Lines Ltd.
<i>Loch Gowan</i>	12.12.68	J. T. Jones	M. G. McDonald, A. E. Mawer, P. Griffin	W. C. Doyle	Royal Mail Lines Ltd.
<i>Loch Loyal</i>	18.11.68	G. C. W. Meldrum, M.B.E.	G. A. Bateman, D. K. Allin, R. C. Phillips	J. McMillan	Furness Withy & Co. Ltd.
<i>Loch Ryan</i>	3.3.69	H. I. Pirie	B. F. Hoare, A. Hardy, B. Lewarn, B. M. Bowden	J. Ferguson	Chr. Salvesen & Co. Ltd.
<i>Logna</i>	30.12.68	W. P. Watt	A. B. Gibson, D. MacLean	T. Kucharshi	W. A. Souther & Co. Ltd.
<i>Longstone</i>	15.1.69	T. Goldie	P. Hardy, I. Crawford, J. Wallace	M. Ennis	Canadian Pacific (Bermuda) Ltd.
<i>Lord Strathcona</i>	23.12.68	P. Denham	P. Woods, N. Johnson	M. Moorcroft	Houlder Bros. Co. Ltd.
<i>Mabel Warwick</i>	17.1.69	T. Dean	I. J. D. Scott, I. M. Wright, J. Macadam		Cunard-Brocklebank Ltd.
<i>Magadapur</i>	21.8.68	D. A. M. O'Byrne			Cunard-Brocklebank Ltd.
<i>Mahout</i>	19.3.68	S. Baxter			Cunard-Brocklebank Ltd.
<i>Mahseer</i>	31.10.68	A. P. Briggs	A. A. Smith, C. P. Margeson, C. S. Kingston	J. Fuller	Cunard-Brocklebank Ltd.
<i>Makrana</i>	14.8.67	I. E. Askew	M. Cadman, M. A. Agnew, D. Evans	J. K. Singleton	Cunard-Brocklebank Ltd.
<i>Manchester City</i>	27.2.69	A. Starmer	D. B. Cox	J. M. Scarratt	Cunard-Brocklebank Ltd.
<i>Manchester Commerce</i>	15.1.69	I. E. Askew	W. H. Jackson, J. A. McKay, F. N. Briggs	P. A. Byrne	Manchester Liners Ltd.
<i>Manchester Courage</i>	*	D. Thomas	R. Harper, A. Scotland, J. Baker, F. Shepherd	I. McDonald	Manchester Liners Ltd.
<i>Manchester Exporter</i>	27.3.69	J. Watson	K. Graham, J. Williamson, N. McLean	K. Smith	Manchester Liners Ltd.
<i>Manchester Faith</i>	4.3.68	F. Illingworth	R. Street, D. Smith, G. Hughes-Jones	G. C. Tyrrell	Manchester Liners Ltd.
<i>Manchester Fame</i>	16.1.69	J. Lewis	R. Young, B. Nelson, A. Bashford, T. Mitchell	J. Patterson	Manchester Liners Ltd.
<i>Manchester Freighter</i>	3.9.68	J. Hogg	G. A. Mackay, R. Bain, L. C. Rowse	R. Stewart	Manchester Liners Ltd.
<i>Manchester Miller</i>	28.3.66	E. W. Espley	F. Shepherd, D. W. Whitworth, R. Woods, J. Chapman	R. Heywood	Manchester Liners Ltd.
<i>Manchester Port</i>	26.7.67	P. N. Fielding	C. J. Hunt, P. Humphreys, D. Deer	W. String	Manchester Liners Ltd.
<i>Manchester Progress</i>	*	A. Cookson	R. Galloway, K. W. Rourke, D. Perry	—, Berry	Manchester Liners Ltd.
<i>Manchester Renewal</i>	30.6.66	T. E. G. Oliver	I. H. Cryer, C. N. McLean, L. Clark, J. Williamson	V. Dalton	Manchester Liners Ltd.
<i>Manchester Shipper</i>	27.2.69	W. B. Hancock	A. E. F. Taylor, E. Docherty, I. C. Murray		Bank Line Ltd.
<i>Marabank</i>	18.11.68	J. B. Mitchell	R. M. Garrett, N. T. Alford, E. Lauritsen	J. Kwiatkowski	Ocean Fleets Ltd.
<i>Maron</i>	27.9.68	R. M. McWilliam	C. Dalton Jones, D. P. Worsnop, D. J. P. Leonard	R. J. L. Leppard	T. & J. Brocklebank Ltd.
<i>Maskelyta</i>	10.9.68	W. H. C. Hicks	J. K. Wilkinson, C. A. Hare, P. R. Skelton	Beilfield	Elders & Fyffes Ltd.
<i>Matina</i>	16.8.68	W. A. Thompson	W. G. Harris, N. James, R. G. Burnett, R. E. Roberts	F. Williams	Cunard-Brocklebank Ltd.
<i>Marwana</i>	17.1.69	G. B. Thomas	D. Stillwell, J. C. Roberts, A. M. Watt	P. Marriott	Cunard S.S. Co. Ltd.
<i>Medea</i>	31.12.68	A. Bull	D. M. Pyett, P. F. W. Tozer	F. A. Dunn	Shaw Savill & Albion Co. Ltd.
<i>Megantic</i>	19.3.69	W. J. Stanger	P. Dawson, P. J. Hamilton, D. J. Metcalf, D. J. Tatham	R. L. Baker	Ocean Fleets Ltd.
<i>Melampus</i>	6.2.67	H. K. Martin	J. S. Gee, N. McDonnell, J. Mockett	E. O. Barnfather	Ocean Fleets Ltd.
<i>Melbourne Star</i>	7.3.69	J. S. Hunter		J. Heartshorn	Blue Star Line Ltd.

<i>Mercury</i>	17.1.68	P. B. Henderson	C. O. Thomas, K. D. Miller, I. Brinsmead-Williams	T. M. Jenkins, M.B.E.	Cable & Wireless Ltd.
<i>Monarch</i>	8.1.69	O. R. Bates, O.B.E.	M. Lodge	J. W. Fields	H.M. Postmaster General
<i>Montreal City</i>	21.10.68	N. Childs	M. B. Harvey, R. G. Dance, R. O'Callaghan	A. W. Hay	Bristol City Line Ltd.
<i>Mystic</i>	*	G. Roberts	E. J. Atkinson, G. A. Davies, D. S. Walker	W. C. G. Sturgess	Furness Withy & Co. Ltd.
<i>Nardana</i>	4.11.68	J. D. Stephenson	C. E. Banks	J. Riley	British India S.N. Co. Ltd.
<i>Nelus</i>	13.3.69	F. A. J. Downer, D.S.C.	R. Thorpe, J. Hebdon	F. Murrant	Ocean Fleets Ltd.
<i>Nevasa</i>	17.2.69	J. G. King	R. J. Holt, R. C. Allen, B. G. Witton, E. W. Foxworthy	W. J. Redfern	British India S.N. Co. Ltd.
<i>Newcasile Star</i>	17.1.69	J. T. Sheffield, M.B.E.	W. P. J. Horgan, H. M. Owen	V. Bracegirdle	Blue Star Line Ltd.
<i>Newfoundland</i>	*	I. G. Reeve	C. P. Stockings, T. B. Miller, P. Draisey	P. O'Carroll	Furness Withy & Co. Ltd.
<i>New Zealand Star</i>	5.12.68	R. D. Lofis	M. R. Godfrey		Cayzer Irvine & Co. Ltd.
<i>Nina Bowater</i>	23.10.68	D. T. Mouldley	D. G. Beckett, A. J. Ward, J. W. Spence, J. Morrison		Shaw Savill & Albion Co. Ltd.
<i>Northern Star</i>	28.3.69	R. G. Hollingdale	D. W. Viner, J. Rutherford, R. I. Duce, A. R. Penney	D. J. Lendrum	Federal S.N. Co. Ltd.
<i>Northumberland</i>	13.12.68	J. A. North	M. I. Cullerne, R. M. Exelby, D. Pascoe	J. E. Hocking	Shaw Savill & Albion Co. Ltd.
<i>Nottingham</i>	13.2.69	R. I. Heys	M. I. S. Thompson, G. H. M. Grant, P. A. Golding	D. L. L. Evans	Furness Withy & Co. Ltd.
<i>Nova Scotia</i>	27.3.69	W. J. Perkins	A. C. True, M. J. Gold, N. Martin	P. Croll	Hain-Nourse Ltd.
<i>Nurmatid</i>	23.1.69	D. Howe	A. M. S. Baker, T. I. D. Erskine, G. L. Roe	G. Evans	P. & O. Lines Management Ltd.
<i>Obuari</i>	7.2.69	S. Avles	T. H. Lawrence, P. H. Chadwick, N. W. Lester,	J. R. V. Winchester	Furness Ship Management Ltd.
<i>Orcades</i>	25.9.68	A. A. Lang	A. C. Downing	C. Gamwell	Pacific S.N. Co. Ltd.
<i>Orcania</i>	10.3.69	T. F. J. Leddra	A. W. Hepburn, N. Land, C. Downing		Furness Ship Management Ltd.
<i>Ortita</i>	*	W. A. E. Johnston	R. L. Kinnier, P. W. Howes, P. Barry	W. S. Milne	Furness Ship Management Ltd.
<i>Oropesa</i>	*	P. D. O'Driscoll	D. P. Smith, A. Smith, C. Patrick, W. Stockton	J. Blue	Furness Ship Management Ltd.
<i>Oroya</i>	6.2.69	L. Oliver	A. H. Falke, D. Willis, P. A. Messenger, R. S. Hall	H. K. Butler	Hellyer Bros. Ltd.
<i>Orsino</i>	30.10.68	I. D. O. Green	C. Curran, P. Turner, C. Chadwick, M. Fathen	R. C. Berry	P. & O. Lines Management Ltd.
<i>Orsova</i>	5.9.68	R. J. H. Cutler	S. A. Davies, D. A. Foster, W. Marshall, C. M. Turner	J. B. French	P. & O. Lines Management Ltd.
<i>Oronsay</i>	2.12.68	F. S. Angus	S. A. Mieszkowski, W. B. Anderson, D. Debar	A. C. McInnes	New Zealand Shipping Co. Ltd.
<i>Otahi</i>	17.12.68	I. H. B. Weston	I. P. Dalgarno, R. Good, R. Brinkworth, E. H. Gregson	L. C. Whittington	New Zealand Shipping Co. Ltd.
<i>Otati</i>	7.11.68	M. Musson	R. E. Burdett, P. F. Jowers, B. Norton, M. S. Condon	V. Dalton	New Zealand Shipping Co. Ltd.
<i>Pacific Northwest</i>	7.10.68	C. G. Killick	M. J. Rasor, J. Hope-Smith, P. H. Warn,	S. Walsh	Furness Withy & Co. Ltd.
<i>Pacific Reliance</i>	29.10.68	H. J. Pirie	G. W. Anderson	D. Briggs	Furness Withy & Co. Ltd.
<i>Pacific Stronghold</i>	*	E. A. W. Mortleman-Lewis, R.D.	C. J. Stoddart, D. G. Andrews, T. Wainman	H. V. Hall	P. & O. Lines Management Ltd.
<i>Pando Cape</i>	23.12.68	K. E. Howard	D. J. Tomkiss, C. T. Godderidge, M. R. Sullivan	D. E. Hicks	P. & O. Lines Management Ltd.
<i>Pando Head</i>	7.1.69	B. S. C. Mordaunt	- Foorman-Williams, W. J. C. Clarke, A. H. Read	R. W. Bewley	P. & O. Lines Management Ltd.
<i>Pando Point</i>	*	A. I. Field	D. A. Pocket, D. P. Montgomery, M. J. F. Moulin	H. K. Smith	P. & O. Lines Management Ltd.
<i>Pando Sound</i>	6.2.69	R. Bullock-Webster	D. R. Embery, P. Grimes, J. G. R. Griffith, R. A. Nixon	T. I. Turpie	P. & O. Lines Management Ltd.
<i>Pando Strait</i>	15.1.69	J. Reid	J. H. Osmond, H. V. Anguish, J. K. Cooper	L. A. Ryan	New Zealand Shipping Co. Ltd.
<i>Paparoa</i>	4.12.68	B. L. O'Brien	R. Coldham, G. Caughy, G. T. Dickens	N. O. S. McLaren	New Zealand Shipping Co. Ltd.
<i>Paritua</i>	31.12.68	M. H. Haggas	S. Thompson, A. Warren, I. I. Kazi	M. Ridley	Cunard S.S. Co. Ltd.
<i>Patonga</i>	*	W. R. Willis	D. M. Lucey, M. S. Brown, I. Bower	R. Browne	P. & O. Lines Management Ltd.
<i>Patroctus</i>	20.8.68	I. C. Morris	W. R. C. Butler, A. C. Jenkins, J. C. R. Jones, A. Railton	D. Mackay	Ocean Fleets Ltd.
<i>Pegai</i>	14.3.69	H. Owen	B. J. Waters, J. C. Goble, J. N. Montgomery	A. White	Ocean Fleets Ltd.
<i>Peisander</i>	15.1.69	R. N. Curphey	M. S. Unni Nayar, H. G. S. Davies, A. J. Palmer,	W. S. Young	Ocean Fleets Ltd.
<i>Petelus</i>	6.2.69	R. B. Tiplady	D. M. Maclean	H. N. Kinley	Glen Line Ltd.
<i>Pembrokeshire</i>	28.10.68	R. A. D. Cambridge,	A. Hodges, J. P. Madge, R. Tallack	D. G. Bristow	Union-Castle Mail S.S. Co. Ltd.
<i>Pendennis Castle</i>	12.8.68	D.S.C., R.D.	G. C. Winter, J. F. Flowerdew, J. Sloan	J. Hamilton	R. S. Dalglish Ltd.
<i>Pennyworth</i>	13.2.69	A. Mathison	D. G. Marsh, E. Anderson, W. G. MacDonald,	C. W. Hughes	Ocean Fleets Ltd.
<i>Perseus</i>	7.2.69	D. D. McIntosh	D. L. Smith	J. Mathers	Shaw Savill & Albion Co. Ltd.
<i>Persic</i>	17.3.67	M. J. Clarke	W. J. Donnan, C. T. Dampier, G. V. F. Baker,		Stag Line Ltd.
<i>Photinia</i>		R. J. Freeman	G. T. Batchelor		

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Picko</i>	13.12.68	H. J. D. Sladen	D. E. Spencer, R. K. Young, C. J. Armstrong	S. J. Braithwaite	New Zealand Shipping Co. Ltd.
<i>Picardy</i>	1.10.68	J. G. Street	M. C. Neal, A. Millward, P. Savage	M. Davies	Furness Ship Management Ltd.
<i>Pipiriki</i>	13.3.69	R. M. Michael	J. Harrigan, G. Hawkes, A. W. Noble	W. R. Parsons	New Zealand Shipping Co. Ltd.
<i>Pizarro</i>	13.11.68	D. L. Whitaker	R. G. Pym, T. J. Sax, A. M. Shaw	K. Rutter	Pacific S.N. Co. Ltd.
<i>Platania</i>	*	D. G. T. Daniel	C. L. Chipchase, G. MacConville, C. J. Windsor	N. Fenton	Shell Tankers (U.K.) Ltd.
<i>Port Adelaide</i>	4.2.69	B. Collier	F. E. Beer, R. G. Howell	R. A. Jones	Blue Star Port Lines Ltd.
<i>Port Auckland</i>	20.11.68	F. M. Barton	J. Lewis, D. Parsons, J. A. Coffin	E. G. Hutchinson	Blue Star Port Lines Ltd.
<i>Port Brisbane</i>	13.12.68	A. J. Hawkins	R. W. S. Barnes, R. S. Bolton, R. B. Smith	T. J. C. Kirkpatrick	Blue Star Port Lines Ltd.
<i>Port Burnie</i>	31.3.69	I. R. dit-Leschery	R. B. Lloyd, B. R. Link, P. A. Carter	W. Cumming	Blue Star Port Lines Ltd.
<i>Port Caroline</i>	*	R. A. Holmes	G. Lascelles, O. G. Parry, W. J. Corbett	H. B. Hughes	Blue Star Port Lines Ltd.
<i>Port Chalmers</i>	30.12.68	J. G. A. Dunn	J. Hinchliffe, J. D. Farrar, P. Coombs	S. A. White	Blue Star Port Lines Ltd.
<i>Port Hobart</i>	15.1.69	M. L. Coombs	D. W. Ross, R. O. Roberts, B. E. Langman	R. T. Greer	Blue Star Port Lines Ltd.
<i>Port Invercargill</i>	28.8.67	H. B. Conby	R. G. Howell, O. G. Barry, E. R. Bacon	M. M. Garrett	Blue Star Port Lines Ltd.
<i>Port Launceston</i>	28.3.69	E. E. Chapman	D. J. Fisher, R. Mitchell, R. Soanes	P. Henderson	Blue Star Port Lines Ltd.
<i>Port Lincoln</i>	12.12.68	M. H. C. Twomey	R. Lavers, G. G. Blackler, H. Money	I. S. MacPherson	Blue Star Port Lines Ltd.
<i>Port Lyttelton</i>	17.1.69	D. Hart	J. E. B. Simpson, D. N. Ford	D. R. Uglow	Blue Star Port Lines Ltd.
<i>Port Napier</i>	5.8.68	F. M. Barton	R. N. Wheelhouse, R. N. Barnes		Blue Star Port Lines Ltd.
<i>Port Nelson</i>	21.10.68	V. A. Hunt	K. P. G. Bowers, R. H. Givan, J. A. Oscrift	J. M. Lyons	Blue Star Port Lines Ltd.
<i>Port Nicholson</i>	12.3.69	L. W. Cady	A. D. Pique, G. Hay, D. Roberts	H. Grey	Blue Star Port Lines Ltd.
<i>Port Phillip</i>	21.2.69	W. J. Williams	P. Holmes, B. C. Grant, D. C. Ray	N. McDuffie	Blue Star Port Lines Ltd.
<i>Port Pirie</i>	28.10.68	R. H. Finch	D. I. Plume, J. W. White, P. J. Dewar, G. H. Sutherland	A. M. Worthington	Blue Star Port Lines Ltd.
<i>Port Stanley</i>	22.8.68	E. H. Jenkins	A. D. Mackenzie-Letry, G. E. Oliver, N. C. Bates	L. V. O'Sullivan	Blue Star Port Lines Ltd.
<i>Port Townsville</i>	10.2.69	R. E. Jenkins	D. E. Beresford, J. Burtt, J. Williams	J. Dunham	Blue Star Port Lines Ltd.
<i>Port Victor</i>	23.9.68	G. Carling	P. V. Holmes, D. I. Rowland, W. R. Owen	J. A. D. Connor	Blue Star Port Lines Ltd.
<i>Port Vindex</i>	6.11.68	A. Lawson-Smith	A. M. Tweedie, L. J. Carman, P. W. T. Carter	J. A. Foreman	Blue Star Port Lines Ltd.
<i>Port Wellington</i>	23.1.69	A. M. Downes	A. Craigie-Lucas, M. F. Bennett, J. Bowering	J. E. Appleton	Blue Star Port Lines Ltd.
<i>Potosi</i>	2.12.68	R. T. Riley	C. G. G. Hawken, D. E. C. Tripp, F. N. D. Parker	F. J. Curran	Blue Star Port Lines Ltd.
<i>Priam</i>	10.3.69	I. R. Atkinson	R. W. Bristow, M. P. Stone, G. J. Sives, J. A. W. Whitaker	A. G. Thomson	Pacific S.N. Co. Ltd.
<i>Prometheus</i>	2.10.68	R. G. Boyd	A. R. Wilkinson, D. J. Hill, G. Livingstone	E. O. Roberts	Ocean Fleets Ltd.
<i>Queen Elizabeth 2</i>	*	W. E. Warwick, R.D.	R. Arnot, T. D. Ridley, R. Wandsworth	D. H. Butterworth	Cunard S.S. Co. Ltd.
<i>Queensgarth</i>	12.3.69	J. P. Waldock	L. C. Rowse, J. Leatherbarrow, W. Wilson	M. A. Crockford	Cory Maritime Ltd.
<i>Queensland Star</i>	10.9.68	R. S. Hopper, D.S.C.	J. T. Mackereth, G. W. Evans, I. S. Bunney	W. R. C. Powell	Blue Star Line Ltd.
<i>Rakana</i>	11.2.69	I. Cosker	M. L. Martin, E. Daubeny, A. R. Taylor, G. F. Everitt	T. H. Webb	New Zealand Shipping Co. Ltd.
<i>Ramon de Larrinaga</i>	27.12.67	M. J. Ross	J. R. W. Hutchinson, G. Chatfield, D. A. Wyatt, D. B. Truscott	C. L. Lambe	Larrinaga S.S. Co. Ltd.
<i>Rangitoto</i>	13.3.69	K. Barnett, R.D.			New Zealand Shipping Co. Ltd.
<i>Rapallo</i>	14.10.68	F. Metham	P. J. Blud, D. Stevenson, L. Gibson, T. Fugill	R. P. Limbert	Ellerman's Wilson Line Ltd.
<i>Raphael</i>	25.9.68	S. M. Williams	C. Bufton, M. J. Cawood, C. B. Middleton	D. J. Buchan	Lampoport & Holt Line Ltd.
<i>Rathlin Head</i>	31.1.69	J. Greene	J. McParland, A. G. Soppitt, P. J. Sherriff	J. Dunn	G. Heyn & Sons Ltd.
<i>Redcar</i>	14.10.68	J. J. Grugan	K. W. Fulker, M. A. Gater, P. Tilbury	P. Sheerin	Bolton Steam Shipping Co. Ltd.
<i>Regent Eagle</i>	30.7.68	B. S. Goodland			Regent Petroleum Tankship Co. Ltd.
<i>Regent Falcon</i>	P. Howells				Regent Petroleum Tankship Co. Ltd.
<i>Regent Pembroke</i>	3.1.68	R. Armstrong	A. J. Cavey	B. Benyon	Regent Petroleum Tankship Co. Ltd.
<i>Registan</i>	23.1.69	R. L. Cain	P. J. L. Taylor, R. Warren, J. Wright	C. B. Blane	Regent Petroleum Tankship Co. Ltd.
<i>Renoir</i>	26.11.68	H. Smith	G. S. Oakley, J. Frost, J. Scallan		Frank C. Strick & Co. Ltd.
<i>Rialto</i>	5.7.68	A. S. Jackson	T. Fugill, C. Neadley, J. M. Jarratt, R. Parcell	G. Clarkson	Ellerman's Wilson Line Ltd.
	11.2.69				

<i>Ribblehead</i>	17.1.69	I. Parsloe	C. R. H. Ingham, J. W. Lovell, W. Barnes	F. G. Treanor	Bolton Steam Shipping Co. Ltd.
<i>Richard de Larrinaga</i>	14.12.67	W. McKechnie	G. T. S. Mahon, P. M. C. Morris	M. J. Foran	Larrinaga S.S. Co. Ltd.
<i>Richmond Castle</i>	26.8.68	R. A. Escolme	S. H. Duckworth, J. W. Wilcock, V. Cook	L. R. Bell	Union-Castle Mail S.S. Co. Ltd.
<i>Ricvaux</i>	23.1.69	G. W. Brown	G. M. Long, N. Holman, W. G. Ogle	R. Wilton	Bolton Steam Shipping Co. Ltd.
<i>Ripon</i>	14.10.68	J. E. Riektins	J. R. Webber, C. Watterson, W. G. Wood	P. J. Hall	Bolton Steam Shipping Co. Ltd.
<i>Roland</i>	27.3.69	W. A. Sparks	J. Hart, G. Bowman, M. A. Chaplin	C. Hawkridge	Lampport & Holt Line Ltd.
<i>Romanby</i>	15.3.68	E. A. Snaith	D. A. Raynor, D. A. Ganderton, J. M. Macleod	J. McC. Slaven	Sir R. Koppner & Co. Ltd.
<i>Rossetti</i>	26.8.68	E. D. Spooner	W. McR. Morrison, J. Bryan, D. Parks, J. Henderson	R. Kenyon	Lampport & Holt Line Ltd.
<i>Rosemary Head</i>	24.2.69	F. R. N. Best	J. H. Keyte	C. Hawkridge	G. Heyn & Sons Ltd.
<i>Rosvellan Castle</i>	3.2.69	E. Everitt	M. Waite, C. Thomson, I. Irving	R. Kenyon	F. T. Everard & Sons Ltd.
<i>Rovanmore</i>	18.2.69	A. M. Cameron	M. Brown, R. J. Blackburn, D. Milburn	N. S. Reeve	Union-Castle Mail S.S. Co. Ltd.
<i>Runswick</i>	13.2.69	S. Jackson	J. W. Thomson, W. A. Davies, E. C. Glass	E. N. Nutton	Furness Ship Management Ltd.
<i>Rushpool</i>	10.1.69	E. Dunn	R. D. Collings, B. Chapman, A. Hall	T. Peake	Headlam & Son Ltd.
<i>S. A. Oranje</i>	1.8.68	V. J. Owen	W. G. Head, I. A. Carruthers, J. R. Clegg	J. F. Linehan	Sir R. Koppner & Co. Ltd.
<i>St. Margaret</i>	13.2.69	C. G. Wells	E. Evans, D. Chamberlain, D. Chadburn	M. A. Crockford	Union-Castle Mail S.S. Co. Ltd.
<i>St. Merriel</i>	10.10.68	R. J. Coyle	D. C. Lewis	G. Smethurst	Houlder Bros. & Co. Ltd.
<i>Sagamore</i>	23.12.68	D. S. Archibald	M. J. Kenyon, D. C. Aichison, A. B. Woodley	P. Madagan	Houlder Bros. & Co. Ltd.
<i>Salmela</i>	6.2.68	D. E. James	R. Mullen	M. A. Crockford	Furness Withy & Co. Ltd.
<i>Samarina</i>	24.7.68	E. L. Seaton	J. C. Roberts, J. T. West, M. W. Wadsworth	G. Smethurst	Chr. Salvesen & Co. Ltd.
<i>Santona</i>	27.9.68	A. S. Thompson	W. T. Stainer, J. H. Jenkinson, F. Shepherd,	P. Madagan	Cunard S.S. Co. Ltd.
			R. M. Swanston		G. Heyn & Sons Ltd.
<i>Sarpedon</i>	7.10.68	G. D. Williams	I. P. Duncan, H. F. Bos	W. C. Phillips	Ocean Fleets Ltd.
<i>Saxonia</i>	13.11.68	R. O. Venn	C. Axford, B. Clemenson, H. Anguish, S. Gilchrist	K. Fawcett	Cunard S.S. Co. Ltd.
<i>Scotia</i>	9.9.68	M. R. Bremberg	G. M. Grainger, A. M. Watt, B. C. Gouldthorpe	J. J. Neary	Cunard S.S. Co. Ltd.
<i>Scottish Star</i>	16.2.67	D. H. Shimmis	A. L. MacLeman, E. G. Bee, J. McNeill	J. Hunter	Blue Star Line Ltd.
<i>Scythia</i>	15.1.69	R. Connacher	C. Rankin, P. Kendall, T. H. Owen, J. M. Bubb	W. J. Mullarkey	Cunard S.S. Co. Ltd.
<i>Serbistan</i>	18.6.68	G. Lomax	J. C. Jones, G. Andrews, A. Gunner	T. D. Ogbourne	Frank C. Strick & Co. Ltd.
<i>Serentia</i>	24.3.69	J. Walker	M. R. Lowie, R. S. Savage, J. P. Cleveland,	R. S. Marks	Shell Tankers (U.K.) Ltd.
			P. C. Davidson		
<i>Sheaf Crest</i>	9.5.68	D. H. Turnbull	J. W. Smith, K. G. Geest, D. Sandercock	P. J. Tomlinson	W. A. Souter & Co. Ltd.
<i>Shackleton</i>	24.3.69	J. Walker	P. J. Bromby, E. Genochio, M. J. Cole	C. J. Irving	British Antarctic Survey
<i>Shahristan</i>	10.1.69	E. H. Jones	B. Edgecombe, L. Lumley, R. Fletcher	G. Gray	Frank C. Strick & Co. Ltd.
<i>Sheaf Tyne</i>	11.12.68	K. B. Jewell	B. MacLean, I. D. Pattison, R. Wilson	R. A. Waller	W. A. Souter & Co. Ltd.
<i>Silksworth</i>	2.12.68	M. R. Duke	D. H. Thomas, D. I. Jones, R. Birkett	R. Rigg	Bibby Line Ltd.
<i>Silverbeach</i>	15.8.68	F. Morecraft	T. Hall, J. Phillips, K. Duggan, F. Mordey	N. G. Calder	R. S. Dalgliesh Ltd.
<i>Sitersand</i>	21.2.69	J. Tew	B. R. Stevens, R. Sidney, H. N. Lawson	R. W. Spence	Silver Line Ltd.
<i>Situersea</i>	13.2.69	D. A. Reynolds	P. Lewis, J. H. Cloke, R. T. Harrison	P. Scott	Silver Line Ltd.
<i>Sir Galahad</i>	3.1.67	A. J. Walker	H. P. Prior	D. F. Drage	Silver Line Ltd.
<i>Sir Lancelot</i>	6.2.68	A. A. Dorkins	P. R. Thake, T. J. Bearder	R. Cooper	British India S.N. Co. Ltd.
<i>Somersel</i>	7.1.69	W. W. Newport	W. I. C. McKillop, M. Carrell, G. F. Everitt, T. E. Hartnell	A. Stephen	British India S.N. Co. Ltd.
<i>Southern Cross</i>	12.3.69	A. E. Young	R. Griffin, M. Wilkie, A. Hooper, J. Penson, J. Griffith,	R. D. Duggan	Minister of Technology
	27.8.68	W. N. H. Jarvis	G. Ede		Federal S.N. Co. Ltd.
<i>Staffordshire</i>	17.3.60	J. W. Terry	R. F. A. Kendrick, D. A. Griffiths, L. P. Weinman		Shaw Savill & Albion Co. Ltd.
<i>Strathardle</i>	15.11.68	E. Snowden	T. S. Morrow, R. W. Burr, M. I. G. Staub	C. Beyer	Bibby Line Ltd.
<i>Strathbrora</i>	17.3.69	J. F. Mason	N. A. F. Roe, S. Jamieson, I. C. Sturt	J. J. Mahony	Bowring S.S. Co. Ltd.
<i>Suevic</i>	18.2.69	S. Gorrell, D.S.C.	C. I. C. Johnston, D. A. Rodger, M. Hall-Thompson	T. R. Clark	P. & O. Lines Management Ltd.
<i>Sugar Crystal</i>	15.11.68	P. Sutcliffe	D. H. Willis, G. A. Stoker, I. C. Stanway	J. Rice	P. & O. Lines Management Ltd.
<i>Sugar Exporter</i>	3.3.69	N. S. Lancaster	A. Moore, A. Shaw, D. J. Stansbury, G. Cairns	A. C. Ruscoe	Shaw Savill & Albion Co. Ltd.
<i>Sugar Importer</i>	14.2.69	A. F. Lunn	J. McNeill, J. Whyte, P. Wilmot	D. Panton	Sugar Line Ltd.
<i>Sugar Producer</i>	11.2.69	H. Syversen	E. G. Winsor, A. R. J. Leigh, F. Brown, C. Corrigan	R. Walker	Sugar Line Ltd.
<i>Sunek</i>	19.3.69		J. C. Gemmetken, O. T. Stephenson, M. R. White	H. Morgan	Sugar Line Ltd.
			E. A. Duffield, J. Allen, K. Morris, D. N. L. Thomson	W. Ferguson	Sugar Line Ltd.
			R. F. Galea, R. Knight, G. K. Graham	R. J. Morrow	Sugar Line Ltd.
				C. English	John Kilgour & Co. Ltd.

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
Surrey	27.2.69	P. Lay	P. J. Donaldson, D. S. MacDonald, J. B. Hill, P. G. Cotton	W. F. Shepherd	Federal S.N. Co. Ltd.
Sussex	29.8.68	S. W. Lambrick	A. Bignall, K. M. Lingard, D. Strange	R. B. Redhead	Federal S.N. Co. Ltd.
Sylvan Arrow	4.10.68	I. Pawlowicz	T. H. Purvis, I. Down, R. H. J. Shilling	G. Jones	Mobil Shipping Co. Ltd.
Sylvania	10.5.68	H. L. de Legh, R.D.	J. R. D. Hall, J. Fisher, C. G. Briggs, E. H. Bocking	A. C. MacPherson	Cunard S.S. Co. Ltd.
Tactician	21.8.68	H. G. Skelly	A. N. Willis, D. R. Sowden, A. R. Hudson	F. P. Lawton	T. & J. Harrison Ltd.
Tamworth	24.2.69	A. Hurst	D. M. Burr, G. Bowman	R. G. Cruise	R. S. Dalgliesh Ltd.
Tantallon Castle	2.12.68	A. T. Underdown	J. H. Edmond, G. Brice, A. Rapkin	A. E. Fell	Union-Castle Mail S.S. Co. Ltd.
Tasmania Star	8.10.68	W. A. Davidson	M. James, P. O'Hare, O. H. Cook	A. Colquhoun	Blue Star Line Ltd.
Taupo	27.1.69	D. C. Blackman	A. C. Patterson, P. R. Simpson, D. I. Walker	A. Titley	New Zealand Shipping Co. Ltd.
Tehoa	28.10.68	F. C. Taylor	M. B. Turner, M. J. Rowland-Hill, J. A. Henderson	R. G. Heath	New Zealand Shipping Co. Ltd.
Teviotbank	*	H. Barber	J. Singleton, R. Harris		Bank Line Ltd.
Texaco Camberra	9.12.68	T. Kennington	A. G. Shaw, F. S. Ritchie, D. MacAskill, G. M. Read	I. Conn	Texaco Overseas Tankship Ltd.
Texaco Edinburgh	7.1.69	H. Bennett	R. F. Brass, S. J. Wozniak, J. Campbell	J. F. Carty	Texaco Overseas Tankship Ltd.
Texaco Saigon	9.7.68	R. G. A. Barnes	R. A. Russell, J. Campbell, R. R. Brooks	G. Cockburn	Texaco Overseas Tankship Ltd.
Theseus	2.12.68	I. Webster	W. E. L. Godsell, M. J. Knight, J. P. H. Fisher	H. F. Murray	Ocean Fleets Ltd.
Tongariro	27.2.69	J. D. Bennett	R. H. Wightman, B. G. Richardson, J. D. Hook	L. H. Sutton	New Zealand Shipping Co. Ltd.
Toronto City	30.8.68	J. W. Waldie	C. W. Fyans, I. H. Williams, P. H. S. Coventry	W. J. Ferry	Bibby Line Ltd.
Torr Head	20.1.69	T. McI. Hamill	J. McAllister, J. Ronald, N. C. Kerr	C. E. Jones	G. Heyn & Sons Ltd.
Tower Bridge	22.10.68	J. W. H. Whitelaw	J. A. Guy, I. F. Harrison, I. Matheson		Silver Line Ltd.
Trebartha	3.2.69	F. L. Newell, M.B.E.	J. Davies, R. G. Whisker, C. J. Flanagan	W. J. Anderson	Hain-Nourse Ltd.
Treclare	19.3.69	E. Stewart	J. N. Cracknell, F. Brady, W. Pwelly, G. A. Alexander	G. Singleton	Hain-Nourse Ltd.
Trecarrell	23.1.69	J. Reilly	P. May, I. G. Wingate, J. Bache	R. L. MacKay	Hain-Nourse Ltd.
Trefjus	10.3.69	I. J. Watson	S. R. E. Pardon, S. Halseam, J. Wallace, W. V. Veruning	R. F. Horsley	Hain-Nourse Ltd.
Tremeadow	29.1.69	J. O. Spence	I. A. Smeeton, D. Lyon, F. J. Lovegrove, D. Pratt	M. Hurley	Hain-Nourse Ltd.
Trevalgan	7.11.68	J. R. Darby	R. J. Smith, M. Robinson, A. N. Tannock	D. Nicklas	Hain-Nourse Ltd.
Trevaylor	27.3.69	F. M. Marchant	R. H. Donaldson, M. Robinson, T. J. Sears	H. A. Hambling	Hain-Nourse Ltd.
Trevadden	4.3.69	R. C. Lister	C. V. Umrigar, A. M. Ellington, K. P. Pickering	I. P. Doherty	Hain-Nourse Ltd.
Trincula	5.3.69	K. Lyall	N. Muhsin, J. R. D. Peterkin, B. Newlove	P. W. Adams	Hain-Nourse Ltd.
Turakina	17.12.68	R. B. Hood	L. Davies, J. Hughes, R. Cannon	— Hamilton	Bowring S.S. Co. Ltd.
Turkistan	4.10.68	I. F. Ockleford	M. Austin, A. D. G. Bell, C. C. Wood, R. K. Young	J. P. Whiteley	New Zealand Shipping Co. Ltd.
Uganda	14.2.69	E. C. Plowman	P. J. Strachan, J. Ridout, B. G. Peck	A. P. H. Stevenson	Frank C. Strick & Co. Ltd.
Venassa	11.2.69	J. Y. Cox	N. J. S. Edwards, N. E. Edwards, T. J. Ridge, M. S. Wheeler	J. F. Mennell	British India S.N. Co. Ltd.
Victore	27.2.69	P. B. Hall	B. W. Bailey, M. Barks, R. G. Stollery, W. Rogerson	D. Smith	Shell Tankers (U.K.) Ltd.
Volatella	27.5.68	M. A. Yarrow	B. Whitney-Smith, P. Langley, R. Jeans, R. Mills	R. Plenderleith	Mavrolean Bros. Ltd.
Wanliu	12.1.67	I. W. G. Wilby	D. Carrick, J. C. Dunlop, P. G. M. Allen	A. D. Perrot	Shell Tankers (U.K.) Ltd.
Warkworth	30.10.68	I. B. Gault	I. N. Bolton, J. Mulward, D. R. Parkinson	T. Tang Yuen	China Navigation Co. Ltd.
Warwickshire	16.8.68	M. C. Mills	W. F. Caldwell, T. R. Fulthorpe, P. F. Curry	S. J. Polden	R. S. Dalgliesh Ltd.
Welsh City	*	I. Thornhill	S. N. Morris, H. A. Scott, B. P. Phillip	F. R. Fallon	Bibby Line Ltd.
Welsh Herald	14.1.69	W. Knight	M. O. Wilson, R. McLeod, M. Lester	J. Mathews	Sir Wm. Readon Smith & Sons Ltd.
Western Prince	11.12.68	E. A. A. Peirce	P. Gillard, P. J. Goodwin, D. Garside	C. Murray	Welsh Ore Carriers Ltd.
Westminster Bridge	20.1.69	D. E. Moran	M. D. Green, J. D. Routledge, H. E. Carlisle	R. D. Bateman	Furness Ship Management Ltd.
Westmorland	24.6.68	A. J. Hort	A. Leachman, R. Longworth, G. D. Younger, R. W. W. Baldwin	W. J. R. Davenport	Britain S.S. Co. Ltd.
Windsor Castle	6.3.69	I. R. Kidd	J. A. Wignall	B. Twiddy	Union-Castle Mail S.S. Co. Ltd.
Woozing	24.3.69	F. G. Gurney	T. P. Cox, C. S. Wood, I. D. Fletcher	Ching Leung	China Navigation Co. Ltd.
Yorkshire	3.3.69	C. Skelton	G. Rae, A. G. Preshaw, K. R. Kumarsinghe	D. Alcock	Bibby Line Ltd.
Zaphon			A. R. Watson, P. Redfern, R. Dobinson	J. Slowey	Shell Tankers (U.K.) Ltd.

Supplementary Ships

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Aaro</i>	14.2.69	N. Cook	F. A. Pearson, P. J. Blut, K. B. Glayson, R. Ward	F. H. Nicoll	Ellerman's Wilson Line Ltd.
<i>Angelo</i>	17.2.69	E. Barnes	P. L. Willingham		Ellerman's Wilson Line Ltd.
<i>Apollio</i>	14.10.68	R. V. Barnes	A. S. Phillips, L. J. Pippett	J. Brickwood	Bristol S.N. Co. Ltd.
<i>Arctic Freebooter</i>	30.1.69	G. S. Bryant			Boyd Line Ltd.
<i>Aristo</i>	6.3.69	A. Gillis			Ellerman's Wilson Line Ltd.
<i>Baltic Sun</i>	10.3.69	C. E. Thomson	B. T. Wood, D. Martin, J. E. Scholey, G. Pittock	R. G. Woolf	United Baltic Co. Ltd.
<i>Bendoran</i>	30.12.68	R. Griffiths	G. Poppie, W. Chippendale, A. Hood	D. Taylor	Ben Line Steamers Ltd.
<i>Benmacduh</i>	10.10.68	T. Eyfe	N. M. Wight, J. M. Anggang, J. Fleming	G. R. Kerr	Ben Line Steamers Ltd.
<i>Benvoortich</i>	11.6.68	J. Main	A. Lim, B. Lee, D. A. Graham	M. O. Bunce	Ben Line Steamers Ltd.
<i>Border Shepherd</i>	30.5.68	H. Smallwood	M. Suhaumi, H. H. Scally, R. Jardine		Common Bros. Ltd.
<i>Boston Viscount</i>	6.3.68	W. A. Deacon			Boston Deep Sea Fisheries Ltd.
<i>British Widgeman</i>	27.3.69	A. G. M. Ferguson	P. Cullin	R. J. Spence	B.P. Tanker Co. Ltd.
<i>British Destiny</i>	25.10.67	J. Picken	J. Taylor, R. L. Walker, P. Brownlee	P. J. Abbey	B.P. Tanker Co. Ltd.
<i>British Energy</i>	3.9.68	J. Hunter	D. Harris, D. A. Weeks, D. Harrison	J. Barlow	B.P. Tanker Co. Ltd.
<i>British Reliance</i>	4.3.69	S. A. N. Le Fevre	D. W. Powell, J. L. Gillan, B. S. Hope	W. G. A. Cowe	B.P. Tanker Co. Ltd.
<i>British Robin</i>	3.7.68	W. P. Budge	C. J. Watson, I. Anderson	P. Davies	B.P. Tanker Co. Ltd.
<i>Camellia</i>	10.1.69	W. O. M. Burns	R. Dukes, R. B. Eckersley, P. J. Matten	R. Hanlon	J. Robinson & Sons Ltd.
<i>Cicero</i>	9.12.68	W. R. Hunter	E. Ritchie, G. B. H. Breese, J. R. Bruce		Ellerman's Wilson Line Ltd.
<i>Echo</i>	3.2.69	C. Everingham	T. B. A. Wyness, I. Flower, W. A. Sutherland		Bristol S.N. Co. Ltd.
<i>Esso Lancashire</i>	30.12.68	W. Briens	A. M. Cowie, L. R. Cooper, M. S. Bean, D. W. Matingly	R. Smith	Esso Petroleum Co. Ltd.
<i>Esso Westminster</i>	1.10.68	K. Mackenzie	R. Gunns, D. Fish, R. Craythorne	C. W. Lomax	Esso Petroleum Co. Ltd.
<i>Ethel Everard</i>	14.10.68	H. Roberts	R. Stead, J. Beam, C. A. Clague		F. T. Everard & Sons Ltd.
<i>Glitra</i>	11.11.68	J. Duncan	D. G. Green, J. Emanuel		Chr. Salvesen & Co. Ltd.
<i>Hero</i>	4.3.69	G. V. Barnes	J. W. T. Low, T. Adamson		Bristol S.N. Co. Ltd.
<i>Hudson Deep</i>	27.2.69	D. Willey	R. B. Shimell, L. J. Pippett	R. Walsh	Hudson S.S. Co. Ltd.
<i>Ian Fleming</i>	15.1.69	D. G. Cawood	G. T. Bell, A. Gordon, A. Magrath	E. D'Constantine	Newington Trawlers Ltd.
<i>Joseph Conrad</i>	20.12.68	A. Scrivens		B. E. K. Robinson	Newington Trawlers Ltd.
<i>Kirkella</i>	2.12.68	L. Fewster		W. M. Davies	East Coast Fish Sales Ltd.
<i>Lady Parkes</i>	3.3.69	P. E. Cravan		C. Sheen	J. Marr & Sons Ltd.
<i>Lord Nelson</i>	13.3.69	N. E. Longthorp		G. W. Taylor	T. & J. Brocklebank Ltd.
<i>Mangla</i>	15.11.68	S. Baxter		H. J. Doherty	St. Andrew's Steam Fishing Co. Ltd.
<i>Marbella</i>	12.11.68	A. Eagle		T. Maddell	Hellyer Bros. Ltd.
<i>Maretta</i>	17.1.69	R. S. Murchie		J. Hind	J. Marr & Sons Ltd.
<i>Methane Princess</i>	8.3.68	B. L. Oliver		R. M. Elliott	Shell Tankers (U.K.) Ltd.
<i>Methane Progress</i>	1.2.68	E. H. Jones			Shell Tankers (U.K.) Ltd.
<i>Milo</i>	19.2.69	J. Millar		B. Sagers	Bristol S.N. Co. Ltd.
<i>Mobil Arnie</i>	10.1.69	O. Breeze		M. A. Place	Mobil Shipping Co. Ltd.
<i>Mobil Apex</i>	27.2.69	J. George		D. I. Griffiths	Mobil Shipping Co. Ltd.
<i>Mobil Enterprise</i>	28.2.69	J. A. Miller		R. Baillie	J. Marr & Sons Ltd.
<i>Northella</i>	12.3.69	A. C. Ness			Talisman Trawlers Ltd.
<i>Outon Queen</i>		R. C. Newrick			Ross Trawlers Ltd.
<i>Ross Intrepid</i>		L. Wileman			Ross Trawlers Ltd.
<i>Ross Orion</i>		R. Waller			Ross Trawlers Ltd.

Supplementary Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Royal Arrow</i>	6.9.68	A. M. Marsden	D. J. Read, J. H. Frew, K. J. Beverley, T. J. Garrett	K. E. Pritchard	Mobil Shipping Co. Ltd.
<i>St. Geronius</i>	3.3.69	P. Skipworth	H. G. Pask	H. G. Pask	T. Hamling & Co. Ltd.
<i>St. Jason</i>	*	T. Sawyers	R. Murphy	R. Murphy	T. Hamling & Co. Ltd.
<i>St. Jerome</i>	*	M. F. Hough	K. C. Stone	K. C. Stone	T. Hamling & Co. Ltd.
<i>Sea Captain</i>	25.4.67	R. E. Huggins	A. A. Makhija, W. I. Morrison, B. P. Kelly	P. J. Skelton	Vergocean S.S. Co. Ltd.
<i>Soutra</i>	11.3.69	W. H. Spence	J. P. Sutherland		Chr. Salvesen & Co. Ltd.
<i>Streambank</i>	29.12.65	P. Smith			Bark Line Ltd.
<i>Swanella</i>	7.6.68	L. Fewster	J. Liddle	W. M. Davies	J. Marr & Sons Ltd.
<i>Tolsta</i>	8.10.68	G. Barrie	P. Howe, K. V. Lewis, G. F. S. Swaine		Chr. Salvesen & Co. Ltd.
<i>Tudor Prince</i>	19.8.68	A. H. Kent		B. J. Welch	Prince Line 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	A. Wilkinson	Hellyer Bros. Ltd.
G. Atherton	H. Scott	Hudson Bros. Trawlers Ltd.
W. R. Beamish	J. Wells	Hudson Bros. Trawlers Ltd.
A. T. Blenkin	H. G. Pask	T. Hamling & Co. Ltd.
H. Bowman	F. R. Hailstones	R. Irvin & Sons Ltd.
W. Brettell	J. S. Hallam	Newington Trawlers Ltd.
H. Daniels	E. W. Christy	J. Marr & Sons Ltd.
T. Doyle	K. Ward	T. Hamling & Co. Ltd.
F. Drewery	J. Cockburn	Hellyer Bros. Ltd.
J. Gilby	A. S. Wittlin	Northern Trawlers Ltd.
C. Hamling	G. Duffield	Boyd Line Ltd.
W. Harris	S. B. Barr	Northern Trawlers Ltd.
R. S. Hinchliffe	A. Wilkinson	Hellyer Bros. Ltd.
R. Hutcheon	R. Green	Hewitt Steam Trawling Co. Ltd.
E. J. Johnson	K. Ward	T. Hamling & Co. Ltd.
E. March	A. J. Nettleship	Hellyer Bros. Ltd.
C. Newton	G. Swallow	Boston Deep Sea Fisheries Ltd.
J. A. Osborne	J. Wells	Hudson Bros. Trawlers Ltd.
A. Osler	K. Harrison	Hellyer Bros. Ltd.
F. Penistone	P. R. Hickson	Northern Trawlers Ltd.
D. Platten	P. M. Denehy	T. Hamling & Co. Ltd.
J. W. Russell	T. A. Cowlwell	Hellyer Bros. Ltd.
B. Stipetic	J. E. Billany	Hellyer Bros. Ltd.
G. Strachan	R. Green	Hewitt Steam Trawling Co. Ltd.
P. A. Thundercliffe	H. G. Pask	T. Hamling & Co. Ltd.
E. M. Ward	S. Fulton	Hellyer Bros. 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
<i>Adriatic Coast</i>	O. Evans	Coast Lines Ltd.
* <i>Ashington</i>	G. Robson	Stephenson Clarke Ltd.
<i>Avalon</i>	W. Bramhill	British Railways Board
<i>Bardic Ferry</i>	D. Morgan	Atlantic S.N. Co. Ltd.
* <i>Brenda</i>	J. Henderson	Dept. of Agriculture & Fisheries for Scotland
* <i>Caesarea</i>	B. A. Cause	British Railways Board
<i>Cambria</i>	W. J. Roberts	British Railways Board
* <i>Cardiffbrook</i>	R. O’Keefe	Comben Longstaff & Co. Ltd.
* <i>Cerdic Ferry</i>	C. Tanner	Atlantic S.N. Co. Ltd.
<i>Claymore</i>	D. Gunn	David MacBrayne Ltd.
<i>Clupea</i>	J. Jappy	Dept. of Agriculture & Fisheries for Scotland
<i>Corbank</i>	N. Bennett	Wm. Cory & Sons Ltd.
<i>Corbrae</i>	— Chatley	Wm. Cory & Sons Ltd.
* <i>Corkbrook</i>	C. Taylor	Comben Longstaff & Co. Ltd.
<i>Darlington</i>	G. Shipley	Associated Humber Lines Ltd.
<i>Dido</i>	N. J. Llewellyn	Bristol S.N. Co. Ltd.
<i>Doric Ferry</i>	R. Hocking	Atlantic S.N. Co. Ltd.
<i>Dorset Coast</i>	P. Graham	Coast Lines Ltd.
<i>Duke of Argyll</i>	L. C. Mills	British Railways Board
<i>Duke of Lancaster</i>	D. A. Ponting	British Railways Board
<i>Elk</i>	C. F. Crede	British Railways Board
<i>Elwick Bay</i>	W. G. Dennison	Elwick Shipping Co.
<i>Etrick</i>	G. Patience	G. Gibson & Co. Ltd.
<i>Fallowfield</i>	R. Saunders	Coast Lines Ltd.
* <i>Fernhurst</i>	J. Marshall	Stephenson Clarke Ltd.
<i>Ferryhill</i>	J. Innes	Aberdeen Coal & Shipping Co. Ltd.
<i>Fingal</i>	R. McEachern	Northern Lighthouse Board
* <i>Fulham X</i>	J. Young	Stephenson Clarke Ltd.
<i>Hamble</i>	H. Jack	Shell-Mex & B.P. Ltd.
<i>Harrogate</i>	J. R. Rowlands	British Railways Board
* <i>Hebrides</i>	J. Hodgson	Northern Lighthouse Board
* <i>Helmsdale</i>	A. F. Ross	Northern Trading Co. Ltd.
* <i>Heron</i>	A. E. Guest	General S.N. Co. Ltd.
* <i>Hesperus</i>	D. McCorquodale	Northern Lighthouse Board
<i>Hibernia</i>	R. Roberts	British Railways Board
<i>Ionic Ferry</i>	W. Close	Atlantic S.N. Co. Ltd.
<i>Killingholme</i>	G. Lawrie	Shell-Mex & B.P. Ltd.
* <i>Kinnaird Head</i>	A. E. Alvis	Henry & MacGregor Ltd.
<i>Lairdsglen</i>	G. Bain	Burns & Laird Lines Ltd.
* <i>Lairds Loch</i>	F. Flint	Burns & Laird Lines Ltd.
<i>Loch Ard</i>	D. McKinnon	David MacBrayne Ltd.
<i>Loch Carron</i>	R. Johnson	David MacBrayne Ltd.
* <i>Loch Seaforth</i>	J. Smith	David MacBrayne Ltd.
<i>Mytongate</i>	F. Williams	Hull Gates Shipping Co.
* <i>Oliver Bury</i>	J. Purvis	Stephenson Clarke Ltd.
* <i>Oredian</i>	K. Walker	Ore Carriers Ltd.
* <i>Oreosa</i>	J. Jacques	Houlder Bros. Ltd.
<i>Orselina</i>	T. M. Jarvis	Continental Cargoes Ltd.
* <i>Pharos</i>	C. Campbell	Northern Lighthouse Board
* <i>Plover</i>	L. A. Buntyn	General S.N. Co. Ltd.
<i>Pointer</i>	R. Bruce	Burns & Laird Lines Ltd.
* <i>Pole Star</i>	A. Walker	Northern Lighthouse Board
<i>St. Andrew</i>	H. H. Coney	British Railways Board
* <i>St. Clair</i>	J. Johnson	North of Scotland Shipping Co.
<i>St. George</i>	S. E. Dale	British Railways Board
* <i>St. Patrick</i>	N. Deadman	British Railways Board
* <i>Sarnia</i>	H. Walker	British Railways Board
* <i>Scotia</i>	A. M. Finlayson	Dept. of Agriculture & Fisheries for Scotland
* <i>Scottish Coast</i>	A. S. Nicholson	Coast Lines Ltd.
* <i>Selby</i>	G. H. Hughes	British Railways Board
<i>Slieve Bawn</i>	J. R. Rowlands	British Railways Board
<i>Slieve Bearnagh</i>	J. D. Nash	British Railways Board
<i>Slieve Donard</i>	K. Sharpless	British Railways Board
<i>Spartan Prince</i>	P. A. Johnson	Coast Lines Ltd.
* <i>Spray</i>	J. Andrews	Ellis & McHardy Ltd.
<i>Stormont</i>	P. A. Johnson	Belfast S.S. Co. Ltd.
* <i>Superiority</i>	R. V. Everett	F. T. Everard & Sons Ltd.
* <i>Sydenham</i>	H. G. N. D’Evelin	South Eastern Gas Board
<i>Torquay</i>	G. Proctor	J. D. Davidson Ltd.
<i>Treviscoe</i>	H. S. Shugar	Channel Shipping Co. Ltd.
<i>Trojan Prince</i>	A. Cochrane	Coast Lines Ltd.
<i>Ulster Queen</i>	W. Lucas	Belfast S.S. Co. Ltd.
<i>W. J. H. Wood</i>	D. Battle	Stephenson Clarke Ltd.
* <i>Warwickbrook</i>	D. Simpson	Comben Longstaff & Co. Ltd.
<i>Westminsterbrook</i>	J. Shaw	Comben Longstaff & Co. Ltd.
* <i>Winchester</i>	W. P. Laity	British Railways Board
<i>Yarvic</i>	F. Williams	Zodiac Shipping Ltd.

*These ships report wind and weather.

Light-vessels

NAME OF VESSEL	MASTERS
<i>Bar</i>	N. S. Burns, A. Woodhall
<i>Dowsing</i>	R. Halfnight, A. S. Richards
<i>East Goodwin</i>	G. F. Bailey, J. H. Wilson
<i>Galloper</i>	E. L. Jaeger, E. Marsden
<i>Humber</i>	S. F. Goose, F. W. Grice
<i>Longstone (Lt. Ho.)</i>	D. G. Sythes, M. Macpherson
<i>Newarp</i>	G. A. Harris, L. R. Long
<i>North Carr</i>	G. Rosie, J. Leask
<i>Royal Sovereign</i>	B. R. Woolnough, G. Davies
<i>St. Gowan</i>	S. Dagnall, A. M. Robinson
<i>Seven Stones</i>	T. W. Dodd
<i>Shambles</i>	H. Price
<i>Shipwash</i>	J. Goldsmith, W. G. Burrough
<i>South Rock</i>	D. Hawkins, J. McCleane
<i>Smith's Knoll</i>	F. Harrison, F. George
<i>Varne</i>	

Training Establishments

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

ESTABLISHMENT	CAPTAIN/SUPERINTENDENT
<i>Conway, H.M.S.</i>	E. Hewitt, R.D. Capt. R.N.R.
<i>Pangbourne Nautical College</i>	A. F. P. Lewis, C.B.E. Capt. R.N. (Retd.)
<i>Reardon Smith Nautical College</i>	J. N. Rose, R.D., Lt. Cdr. R.N.R. (Retd.)
<i>Warsash School of Navigation</i>	G. W. Wakeford, M.B.E.
<i>Worcester, H.M.S.</i>	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 1.3.69)

NAME OF VESSEL	OWNER/MANAGER
Selected Ships:	
<i>Andamans</i>	Shipping Corporation of India Ltd.
<i>Bahadur</i>	Asiatic S.N. Co. Ltd.
<i>Bharatmitra</i>	Bharat Line Ltd.
<i>Dumra</i>	British India S.N. Co. Ltd.
<i>Dwarka</i>	British India S.N. Co. Ltd.
<i>Indian Exporter</i>	India S.S. Co. Ltd.
<i>Indian Merchant</i>	India S.S. Co. Ltd.
<i>Indian Pioneer</i>	India S.S. Co. Ltd.
<i>Indian Reliance</i>	India S.S. Co. Ltd.
<i>Indian Renown</i>	India S.S. Co. Ltd.
<i>Indian Security</i>	India S.S. Co. Ltd.
<i>Indian Shipper</i>	India S.S. Co. Ltd.
<i>Indian Success</i>	India S.S. Co. Ltd.
<i>Indian Trader</i>	India S.S. Co. Ltd.
<i>Jaladhan</i>	Scindia S.N. Co. Ltd.
<i>Jaladhanya</i>	Scindia S.N. Co. Ltd.
<i>Jaladharna</i>	Scindia S.N. Co. Ltd.
<i>Jaladhruv</i>	Scindia S.N. Co. Ltd.
<i>Jaladuhita</i>	Scindia S.N. Co. Ltd.
<i>Jalaganga</i>	Scindia S.N. Co. Ltd.
<i>Jalakrishna</i>	Scindia S.N. Co. Ltd.
<i>Jalamanjari</i>	Scindia S.N. Co. Ltd.
<i>Jalaputra</i>	Scindia S.N. Co. Ltd.
<i>Jalavihar</i>	Scindia S.N. Co. Ltd.
<i>Jalawahar</i>	Scindia S.N. Co. Ltd.
<i>Jalazad</i>	Scindia S.N. Co. Ltd.
<i>Kampala</i>	British India S.N. Co. Ltd.
<i>Karanja</i>	British India S.N. Co. Ltd.
<i>Mohammedi</i>	Mogul Line Ltd.
<i>Mozaffari</i>	Mogul Line Ltd.
<i>Nicobar</i>	Shipping Corporation of India Ltd.
<i>Rajula</i>	British India S.N. Co. Ltd.
<i>Saudi</i>	Mogul Line Ltd.
<i>Sirdhana</i>	British India S.N. Co. Ltd.
<i>State of Assam</i>	Shipping Corporation of India Ltd.
<i>State of Bihar</i>	Shipping Corporation of India Ltd.
<i>State of Bombay</i>	Shipping Corporation of India Ltd.
<i>State of Gujarat</i>	Shipping Corporation of India Ltd.
<i>State of Haryana</i>	Shipping Corporation of India Ltd.
<i>State of Kutch</i>	Shipping Corporation of India Ltd.
<i>State of Madras</i>	Shipping Corporation of India Ltd.
<i>State of Maharashtra</i>	Shipping Corporation of India Ltd.
<i>State of Orissa</i>	Shipping Corporation of India Ltd.
<i>State of Travancore-Cochin</i>	Shipping Corporation of India Ltd.
<i>State of Uttar Pradesh</i>	Shipping Corporation of India Ltd.
<i>Vishva Prabha</i>	Shipping Corporation of India Ltd.
<i>Vishva Sudha</i>	Shipping Corporation of India Ltd.
Supplementary Ships:	
<i>APJ Akash</i>	Surrendra Overseas Ltd.
<i>APJ Sushma</i>	Surrendra Overseas Ltd.
<i>Ashok Jayanti</i>	Jayanti Shipping Co. Ltd.
<i>Bande Nawaz</i>	Bharat Line Ltd.
<i>Chanakya Jayanti</i>	Jayanti Shipping Co. Ltd.
<i>Damodar Mondovi</i>	Damodar Bulk Carriers Ltd.
<i>Desh Banhu</i>	Shipping Corporation of India Ltd.
<i>Gandhi Jayanti</i>	Jayanti Shipping Co. Ltd.
<i>Indian Industry</i>	India S.S. Co. Ltd.
<i>Indian Resolve</i>	India S.S. Co. Ltd.
<i>Indian Resource</i>	India S.S. Co. Ltd.
<i>Indian Splendour</i>	India S.S. Co. Ltd.
<i>Indian Strength</i>	India S.S. Co. Ltd.
<i>Indian Tradition</i>	India S.S. Co. Ltd.
<i>Indian Triumph</i>	India S.S. Co. Ltd.
<i>Indian Trust</i>	India S.S. Co. Ltd.
<i>Jag Jiwan</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Kisan</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Laxmi</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Manek</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Rahat</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Ratna</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Shanti</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Vijay</i>	Great Eastern Shipping Co. Ltd.
<i>Jagat Neta</i>	Dempo S.S. Co.
<i>Jaladharati</i>	Scindia S.N. Co. Ltd.

INDIA (contd.)

NAME OF VESSEL	OWNER/MANAGER
<i>Jaladhir</i>	Scindia S.N. Co. Ltd.
<i>Jaladurga</i>	Scindia S.N. Co. Ltd.
<i>Jaladuta</i>	Scindia S.N. Co. Ltd.
<i>Jalagomati</i>	Scindia S.N. Co. Ltd.
<i>Jalagopal</i>	Scindia S.N. Co. Ltd.
<i>Jalagouri</i>	Scindia S.N. Co. Ltd.
<i>Jalagovind</i>	Scindia S.N. Co. Ltd.
<i>Jalajyoti</i>	Scindia S.N. Co. Ltd.
<i>Jalakala</i>	Scindia S.N. Co. Ltd.
<i>Jalakanta</i>	Scindia S.N. Co. Ltd.
<i>Jalakendra</i>	Scindia S.N. Co. Ltd.
<i>Jalakirti</i>	Scindia S.N. Co. Ltd.
<i>Jalamaya</i>	Scindia S.N. Co. Ltd.
<i>Jalapalak</i>	Scindia S.N. Co. Ltd.
<i>Jalapankhi</i>	Scindia S.N. Co. Ltd.
<i>Jalarajan</i>	Scindia S.N. Co. Ltd.
<i>Jalarashmi</i>	Scindia S.N. Co. Ltd.
<i>Jalavijay</i>	Scindia S.N. Co. Ltd.
<i>Jalavikram</i>	Scindia S.N. Co. Ltd.
<i>Jalavishnu</i>	Scindia S.N. Co. Ltd.
<i>Jalaveera</i>	Scindia S.N. Co. Ltd.
<i>Krishna Jayanti</i>	Jayanti Shipping Co. Ltd.
<i>Laxmi Jayanti</i>	Jayanti Shipping Co. Ltd.
<i>Maha Vikram</i>	South East Asia Shipping Co. Ltd.
<i>Maha Raja</i>	South East Asia Shipping Co. Ltd.
<i>Rajah</i>	Asiatic S.N. Co. Ltd.
<i>Rama Jayanti</i>	Jayanti Shipping Co. Ltd.
<i>Ranee</i>	Asiatic S.N. Co. Ltd.
<i>Ratna Manjushree</i>	Ratnakar Shipping Co. Ltd.
<i>Ratna Usha</i>	Ratnakar Shipping Co. Ltd.
<i>Shompen</i>	Shipping Corporation of India Ltd.
<i>State of Andhra</i>	Shipping Corporation of India Ltd.
<i>State of Kerala</i>	Shipping Corporation of India Ltd.
<i>State of Madhya Pradesh</i>	Shipping Corporation of India Ltd.
<i>State of Mysore</i>	Shipping Corporation of India Ltd.
<i>State of Punjab</i>	Shipping Corporation of India Ltd.
<i>State of Rajasthan</i>	Shipping Corporation of India Ltd.
<i>State of West Bengal</i>	Shipping Corporation of India Ltd.
<i>Vishva Jyoti</i>	Shipping Corporation of India Ltd.
<i>Vishva Kalyan</i>	Shipping Corporation of India Ltd.
<i>Vishva Kanti</i>	Shipping Corporation of India Ltd.
<i>Vishva Kaushal</i>	Shipping Corporation of India Ltd.
<i>Vishva Kirti</i>	Shipping Corporation of India Ltd.
<i>Vishva Mahima</i>	Shipping Corporation of India Ltd.
<i>Vishva Mangal</i>	Shipping Corporation of India Ltd.
<i>Vishva Maya</i>	Shipping Corporation of India Ltd.
<i>Vishva Nidhi</i>	Shipping Corporation of India Ltd.
<i>Vishva Pratap</i>	Shipping Corporation of India Ltd.
<i>Vishva Prem</i>	Shipping Corporation of India Ltd.
<i>Vishva Tilak</i>	Shipping Corporation of India Ltd.
<i>Vishva Usha</i>	Shipping Corporation of India Ltd.
<i>Vishva Vibhuti</i>	Shipping Corporation of India Ltd.
<i>Vishva Vijay</i>	Shipping Corporation of India Ltd.
<i>Vishva Vir</i>	Shipping Corporation of India Ltd.

Auxiliary Ships:
India has 3 Auxiliary Ships.

NEW ZEALAND (Information dated 28.3.69)

NAME OF VESSEL	OWNER/MANAGER
Selected Ships:	
<i>Auckland Exporter</i>	New Zealand Maritime Services Ltd.
<i>City of Auckland</i>	Ellerman & Bucknall S.S. Co. Ltd.
<i>Holmborn</i>	Holm Shipping Co. Ltd.
<i>Kaimiro</i>	Union S.S. Co. of New Zealand Ltd.
<i>Kaitoa</i>	Union S.S. Co. of New Zealand Ltd.
<i>Kaitoke</i>	Union S.S. Co. of New Zealand Ltd.
<i>Kaituna</i>	Union S.S. Co. of New Zealand Ltd.
<i>Karamu</i>	Union S.S. Co. of New Zealand Ltd.
<i>Karepo</i>	Union S.S. Co. of New Zealand Ltd.
<i>Karetu</i>	Union S.S. Co. of New Zealand Ltd.
<i>Katea</i>	Union S.S. Co. of New Zealand Ltd.
<i>Kawaroa</i>	Union S.S. Co. of New Zealand Ltd.
<i>Kawatiri</i>	Union S.S. Co. of New Zealand Ltd.
<i>Kawerau</i>	Union S.S. Co. of New Zealand Ltd.
<i>Konui</i>	Union S.S. Co. of New Zealand Ltd.
<i>Koraki</i>	Union S.S. Co. of New Zealand Ltd.
<i>Koranui</i>	Union S.S. Co. of New Zealand Ltd.
<i>Kowhai</i>	Union S.S. Co. of New Zealand Ltd.
<i>Kurutai</i>	Union S.S. Co. of New Zealand Ltd.
<i>Maurea</i>	Shell Oil New Zealand Ltd.
<i>Moana Roa</i>	New Zealand Government
<i>Navua</i>	Union S.S. Co. of New Zealand Ltd.
<i>Ngahere</i>	Union S.S. Co. of New Zealand Ltd.
<i>Ngakuta</i>	Union S.S. Co. of New Zealand Ltd.
<i>Ngapara</i>	Union S.S. Co. of New Zealand Ltd.
<i>Ngatoro</i>	Union S.S. Co. of New Zealand Ltd.
<i>Saracen</i>	Crusader Shipping Co. Ltd.
<i>Taranui</i>	South Seas Shipping Co. (Suva) Ltd.
<i>Tarawera</i>	Union S.S. Co. of New Zealand Ltd.
<i>Taveuna</i>	Union S.S. Co. of New Zealand Ltd.
<i>Tofua</i>	Union S.S. Co. of New Zealand Ltd.
<i>Valetia</i>	British Phosphate Commissioners
<i>Waikare</i>	Union S.S. Co. of New Zealand Ltd.
<i>Waimea</i>	Union S.S. Co. of New Zealand Ltd.
<i>Wainui</i>	Union S.S. Co. of New Zealand Ltd.
<i>Waitaki</i>	Union S.S. Co. of New Zealand Ltd.
<i>Wellington Exporter</i>	New Zealand Maritime Services Ltd.
<i>Wharamui</i>	Crusader Shipping Co. Ltd.
Supplementary Ships:	
<i>Aramoana</i>	New Zealand Government Railways Department
<i>Aranui</i>	New Zealand Government Railways Department
<i>Carnatic</i>	Crusader Shipping Co. Ltd.
<i>Haweia</i>	Union S.S. Co. of New Zealand Ltd.
<i>Maori</i>	Union S.S. Co. of New Zealand Ltd.

Auxiliary Ships:

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

HONG KONG (Information dated 12.3.69)

NAME OF VESSEL	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
Anking ..	M. T. Anderson	M. Williams, R. M. Mitchell, C. R. Finney	S. M. Tsui ..	China Navigation Co. Ltd.
Anshun ..	B. A. Owen	A. J. Gregg, J. G. Baker, J. S. Lambourn, A. L. Cathro	Y. S. Ma ..	China Navigation Co. Ltd.
Cape St. Mary	Fu Chiu-wan ..	Chan Hok-min, Kwok Yung-sing	Wong Kam-tim ..	Agriculture & Fisheries Dept., H.K. Govt.
Cardross ..	G. G. Sager	J. D. Shearman, Cheung Hi Loi, Chan Kwong Yu	Chan Kun ..	Kiu Lee Shipping Co. Ltd.
Carl Offersen	A. J. Andresen	M. P. Alimund, A. P. Schmidt, H. Lindegaard-Petersen	K. Sornasundram	Jebsen & Co.
Changsha ..	J. F. O'Connor	T. W. Allsop, D. G. Falkner, M. J. Hudson-Ansell, R. R. Freeman	C. S. Yeung	China Navigation Co. Ltd.
Chefoo ..	W. B. Jones	J. A. Derrick, H. J. Conybeare, A. D. Hotchkiss	M. H. Leung	China Navigation Co. Ltd.
Cheungtu	R. F. D. Pook	D. M. Simpson, R. B. Cornell, A. W. Curtis	K. Y. Lau ..	China Navigation Co. Ltd.
Eastern Argosy	J. M. Marshall	P. L. Ballantyne, J. W. Burton, G. Bell, K. R. Atkinson	P. Bailey ..	Indo-China S.N. Co. Ltd.
Eastern Cape	K. Millar	D. C. Burcher, A. MacGilchrist, H. N. P. Aplin	M. R. Weaver	Indo-China S.N. Co. Ltd.
Eastern Cliff	G. C. Taylor	P. W. Campbell, N. C. E. Cook, M. A. Smith, Wan Hah Chung	J. B. Hands	Indo-China S.N. Co. Ltd.
Eastern Maid	R. G. MacDonald	D. P. Gibbons, J. Elliott, W. R. Fitzgerald	A. Cardona ..	Indo-China S.N. Co. Ltd.
Eastern Moon	P. J. Sullivan	A. H. Dalton, M. J. Kearney, I. J. H. Alexander	W. B. Campbell	Indo-China S.N. Co. Ltd.
Eastern Muse	D. N. Greenhalgh	D. J. Rayner, T. R. Falk, R. W. Tipper	E. A. Dunford	Indo-China S.N. Co. Ltd.
Eastern Queen	M. J. K. Crichton	G. G. Taylor, J. W. Dale, J. M. Stanaway, P. R. Turner	H. D. Bray ..	Indo-China S.N. Co. Ltd.
Eastern Ranger	D. Smith	J. H. Pring, B. Trevorrow, J. P. H. Dunn	M. M. B. Philippot	Indo-China S.N. Co. Ltd.
Eastern Rover	I. B. Skerritt	P. Hold, W. M. J. Lee-Emery, M. A. Horridge	H. W. Fingerhut-Holland	Indo-China S.N. Co. Ltd.
Eastern Tyader	W. G. White	M. G. Bishop, J. M. Joyce, R. H. James	N. Whitehead	Indo-China S.N. Co. Ltd.
Foh Kim ..	P. A. Zimmer	A. L. P. Rodrigues, S. K. Sud, Lam Lung-ki	Sun Yun Wing	Lai Fook Kim Shipping Co. Ltd.
Francis Drake	H. Bailey	H. Sparou-Cran, D. Read, K. Cosack	F. Isaac ..	Indo-China S.N. Co. Ltd.
George Anson	A. Dyason	P. Fox, T. Pinder, R. Grant, C. Hills	D. Murphy ..	Indo-China S.N. Co. Ltd.
Hai Hing ..	A. Grønvik	E. Knutsen, J. Stiles, B. Egeland	Leung Man Sing	Thoresen & Co. Ltd.
Hai Meng ..	Arne Johnsen	S. Olsen, T. Kull, Normann Johnsen	Chan Siu Ming	Thoresen & Co. Ltd.
Hailborg	A. Sjøberg	J. Riverud, A. Horsdal, K. Johansen	Yung Wing Ching	Thoresen & Co. Ltd.
Haildids	J. Eide	K. Olsen, A. Bakke, A. Alvestad	Lau Kam Pui	Thoresen & Co. Ltd.
Haildor	N. O. Wilhelmsen	O. Lauvli, R. Rasmussen, S. Nielsen	Lai Kwong Yin	Thoresen & Co. Ltd.
Hailvard	E. Nordendal	E. F. Andreassen, M. Rossehaug, J. Fosen	Ip Yuk Fai ..	Thoresen & Co. Ltd.
Helios	O. Andreassen	T. Egeland, H. Buarø, Storm Lausen	Poon Chee Pool	Thoresen & Co. Ltd.
Hermud	K. Digernes	L. Røsvik, F. Schulze, K. Øi	Woo Pak Keung	Thoresen & Co. Ltd.
Hero	A. Solbak	B. Vold, J. Johnsen, K. Vike	P. W. J. Joubert	Thoresen & Co. Ltd.
Hoi Kung ..	O. Oftedal	L. Moen, A. O. Langeland, A. Hestness	S. E. Ryen ..	Thoresen & Co. Ltd.
Hoi Wong ..	J. Bierkenes	E. de Bustos, F. P. Galves, J. A. Vargas	Estindo Dulos	Thoresen & Co. Ltd.
Hughaverett	L. P. Valencia	R. J. Smith, R. F. D. Davies, C. I. Hanwell, H. Iele, T. Tapungao	G. W. McLaren	Karsten Larssen & Co. (H.K.) Ltd.
Hupei ..	M. D. Burbidge	H. Sallaba, T. K. Madsen	Z. Marr ..	Karsten Larssen & Co. (H.K.) Ltd.
Jacob Jebsen	R. Feldtmann	D. H. Norcott, Y. Y. Chan, D. I. C. McNeil	K. Tsang ..	China Navigation Co. Ltd.
Kuala Lumpur	R. C. W. Gorman	K. R. Emmerson	W. Chau ..	China Navigation Co. Ltd.
Kwangsí ..	C. D. Nisbet	I. D. Goddard, S. Jones, P. F. Buffett, P. L. Yeung, C. M. Ho	I. Omar ..	China Navigation Co. Ltd.
Kwangsung	J. H. Gomersall	N. J. Alexander, A. C. Davidson, R. P. Dodkin	H. W. Ma ..	China Navigation Co. Ltd.
Kweichow ..	C. J. N. Darch	D. A. Daisi, G. E. Garrett, R. M. Post	Thomas Bullicer	China Navigation Co. Ltd.
Kweilin ..	M. R. M. Seale	T. S. Payne, D. R. Ewings, R. C. Dundas	P. C. Choi ..	China Navigation Co. Ltd.
Manoloeverett	V. P. Rondain, Jr.	C. G. Villanueva, O. L. Gutierrez, Sotero Flores	Y. Tang	China Navigation Co. Ltd.
Ninghat ..	K. H. Nettleship	M. R. Coyne, N. T. Turner, T. L. Jeffery, H. M. Tam, Y. K. Ng		China Navigation Co. Ltd.
Ningpo ..	R. Kennett	B. Keeble, P. Barton, P. Appleyard		China Navigation Co. Ltd.

HONG KONG (contd.)

NAME OF VESSEL	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Red Dragon</i>	A. W. McLauchlan	Wong Tung Hoi, Mok Ka Ho, Mok Che Ho	Lau Hon Lim	Ankan Shipping Co. Ltd.
<i>Star Alcyone</i>	O. B. Falk	K. B. V. Magnusson, S. V. S. Petterson, S. G. Adler	A. G. W. Paulsson	Everett S.S. Corporation S/A
<i>Star Antares</i>	R. Frederiksson	J. Paulsson, T. Lumsden, Lars-Axel Wahren	Ragnar Reslow	Everett S.S. Corporation S/A
<i>Star Betelgeuse</i>	P. G. J. Osterling	L. B. Hovenas, J. A. Stroberg, S. F. Lagerlof	E. G. Ederstedt	Everett S.S. Corporation S/A
<i>Tai Lung Shan</i>	J. Coull	C. Y. Lau, M. P. Lau, T. C. Yeung	C. L. Cheung	Shun Cheong S.N. Co. Ltd.
<i>Tai Poo Sek</i>	D. W. R. Gash	R. H. Ross, W. K. Wong, W. M. Tsui	K. C. Chan	Shun Cheong S.N. Co. Ltd.
<i>Tai Poo Shan</i>	W. M. Pearson	S. M. Cheng, C. Y. Man, T. C. Wong	J. C. Appleby	Shun Cheong S.N. Co. Ltd.
<i>Tai Wah Shan</i>	H. E. Hamlett	C. T. Yu, W. C. Lau, H. Chan	C. S. Choi	Shun Cheong S.N. Co. Ltd.
<i>Taiyuan</i>	J. R. Kidd	J. Milward, D. R. Walker, C. J. Langford, L. D. Lawrie	C. K. Chung	China Navigation Co. Ltd.
<i>Thomaseverett</i>	A. O. Asinas	S. P. Atienzar, A. Q. Lirio, Tito G. Lido	L. R. Vicente	Everett-Orient Line Inc.
<i>Tong Yit</i>	K. Barlow	K. G. James, Abu Bakar Bin Awang, Khoo Gark	Mui Siew Loon	Kie Hock Shipping (H.K.) Co. Ltd.
<i>Wenchow</i>	D. T. Hollands	S. K. Ioon, J. Vaughan, A. M. Pritchard	T. Y. Chiu	China Navigation Co. Ltd.
<i>Yachow</i>	C. J. H. Ennon	K. I. Barnett, R. L. Staker, C. L. Pickles	S. H. Kwong	China Navigation Co. Ltd.
<i>Yunnan</i>	R. E. Brooks	K. G. C. Troughton, R. B. Hodges, C. K. Lai	S. K. Tsui	China Navigation Co. Ltd.

SINGAPORE (Information dated 17.3.69)

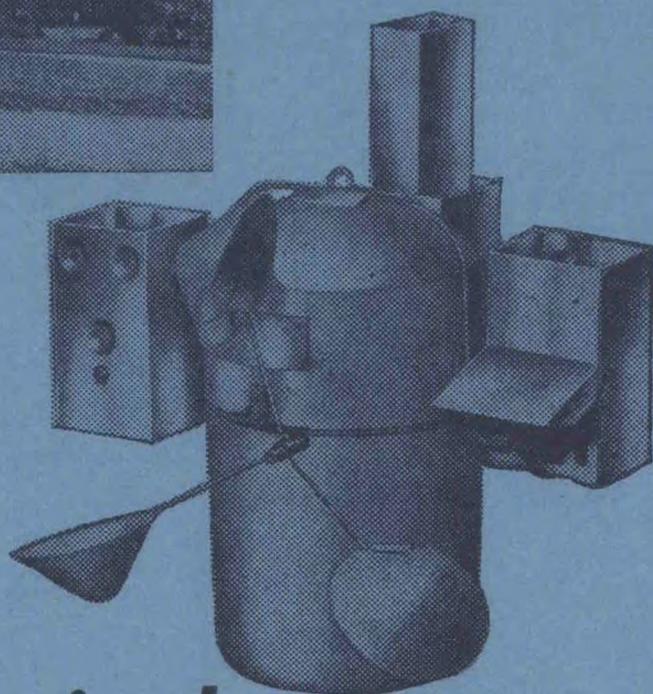
NAME OF VESSEL	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Bidor</i>	W. Chua Ngiap Fatt	Raymond Lim, Akop Salim	Mohd. bin Shariff	Sharikat Perkapalan Kris Tanah Melayu Ltd.
<i>Cable Enterprise</i>	G. H. C. Reynolds, O.B.E.	W. T. Godale, T. S. Gwyer, K. Murtiti, N. L. Jackson	A. Dalton	Cable and Wireless Ltd.
<i>Golden Spring</i>	R. E. Morley	J. A. Kenny, Tan Choir Wee	Fong Pai Kiat	Guan Guan Shipping Ltd.
<i>Golden Wonder</i>	T. A. Sheppard	Craig, Lim Ong Tong, Chia Tien Hoe	Edwin Tan	Guan Guan Shipping Ltd.
<i>Katong</i>	G. C. Carter	Mohd. Hashim bin Mohd.	Tan Choon Huan	Straits S.S. Co. Ltd.
<i>Kemingau</i>	R. C. Barker	M. F. James	P. V. Abraham, Low Lock Kwan	Straits S.S. Co. Ltd.
<i>Kimanis</i>	R. E. Davies	C. R. Rankine	Tan Yee Seng, Ng Twan Hock	Straits S.S. Co. Ltd.
<i>Kim Hock</i>	Andreas Andresen	L. Johanness, Wee Ah Sai	M. Hussain Shah	Guan Guan Shipping Ltd.
<i>King Bay</i>	J. L. Wyles	B. J. Alexander, Ghulam Yusoff, T. S. Theodomis	Wong Lang Kuan	Hong Kong South Sea Shipping Co. Ltd.
<i>Kota Naga</i>	Abdul Latiff bin Omar	Said Mohammed	Hew Yoong Sang	Pacific International Lines Ltd.
<i>Kunak</i>	H. W. Wilkinson	A. Chan Eng Lock, Azin bin Madon	I. De Souza, Bobby Pang	Straits S.S. Co. Ltd.
<i>Perak</i>	A. Lockwood	Sahak bin Yasin	A. L. Hewage	Sharikat Perkapalan Kris Tanah Melayu Ltd.
<i>Perlis</i>	Liew Kon Kiew	Hanzah bin Abu, Ali bin Mohd. Noor	Mohd. Salleh bin Ariffin	Sharikat Perkapalan Kris Tanah Melayu Ltd.

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

*precisely the same -
but different*

that's the

Mk. II

PRECISION ANEROID BAROMETER

Unchanged from Mk. I:

Performance - Quality

Operating Principle - Digital Display

NEW with Mk. II



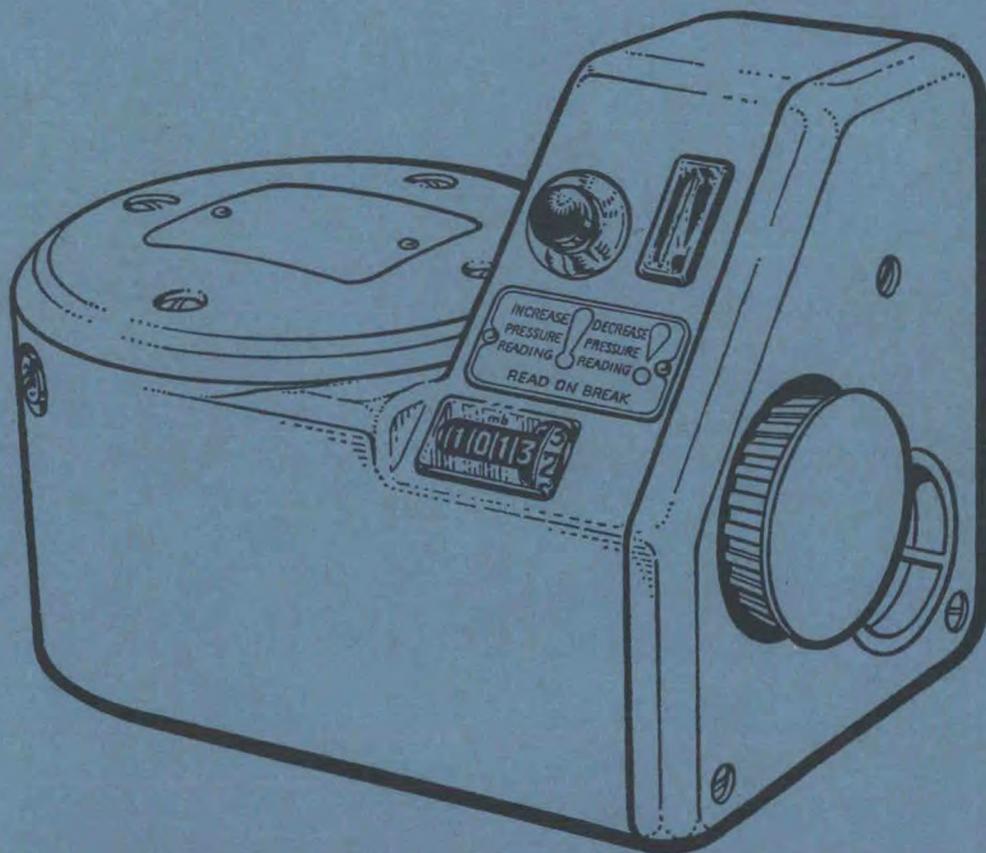
Controls and displays re-grouped ergonomically on a sloping fascia to simplify operation and allowing a wider choice of fixing levels



Table-top or wall mounting facility



Accessible battery compartment with a solid state H.T. Battery eliminator.



MECHANISM LIMITED

CROYDON · CR9 2HP · SURREY · ENGLAND

Telephone: 01-688-3426/9 · Cables: GYROME Croydon