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The Marine Observer

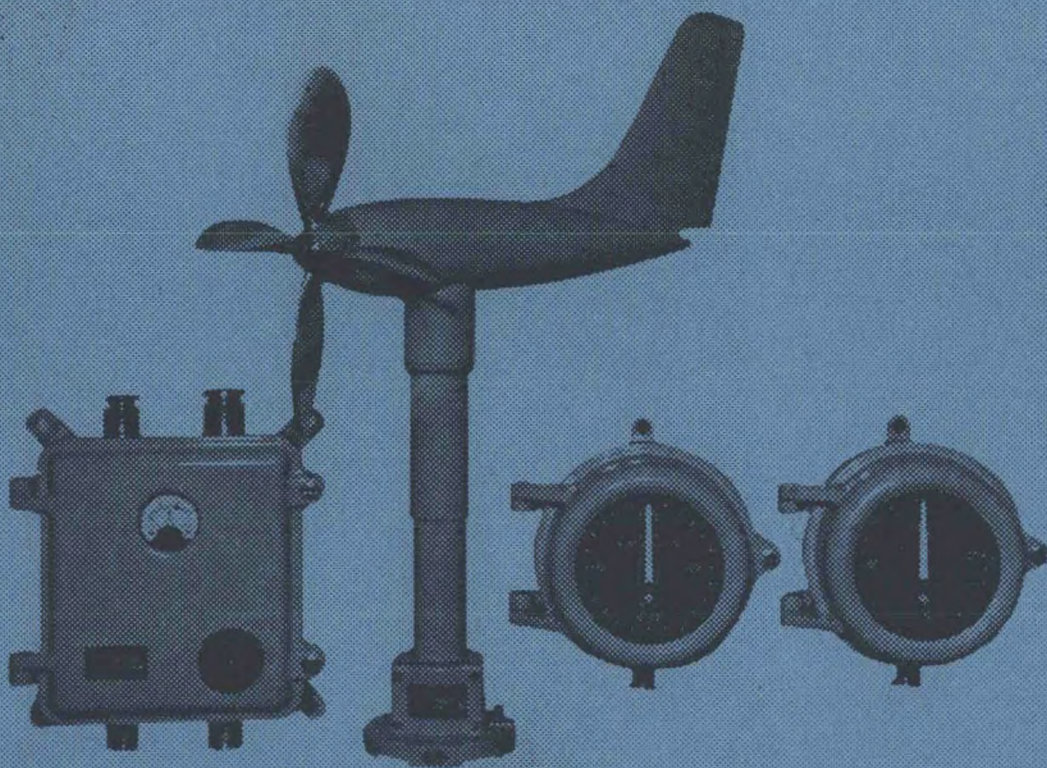
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Meteorology*



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July 1970

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THE MARINE OBSERVER

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

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

Have I not reason to lament
What man has made of man?
William Wordsworth

For 25 years, ever since the end of World War II which, in its latter days, demonstrated the awful power for destruction which could be contained in a single bomb, the question of whether mankind would or even could save his own planet from destruction was interpreted in only one way: would he have the will, the skill and the commonsense to avoid a nuclear holocaust? But in the last year or so it has taken on a new meaning. Quite suddenly, it seems, the nations have become aware of the misuse, the pollution and even the destruction of natural resources going on all around them.

Those mariners who have been home on leave or working coastwise during the first half of this year may have become acquainted with a weekly BBC television programme called 'Doomwatch'. Each episode of this series, though no doubt meant to be regarded as science fiction, gave a salutary lesson as to what might happen should the scientists indulge in too much experimentation with a background of too little knowledge or too little caution. There was, for instance, the story of bacteria which had been developed for the purpose of rotting down plastic waste, the efficient disposal of which is exercising many an urban council today. Unfortunately the bacteria was found to have an appetite also for plastic material still in use, aircraft fuselages, etc. Thus everything with a plastic component—and there are few items nowadays without—was subject to attack at any time. Then again there was an episode wherein the folly of dumping quantities of a nerve gas in a 'safe' depth in the English Channel and in 'safe' containers was illustrated by a ship dropping an anchor on one of these containers and releasing the gas to the ultimate poisoning of the Channel, the beaches and all life therein and thereon.

But one does not have to look very far to find this sort of thing going on in real life; one recalls a drug prescribed a few years ago to a number of pregnant women which, no doubt, fulfilled its original object but also led to alarming physical deformities or deficiencies in their children. More recently there has been a fertility drug which, when given to 'barren' women, has more than once involved them in multiple births, some children being inherently weak, some stillborn. If there can be any comfort to the parents of children such as these, it can only be that it is their tragedies which have been instrumental in stopping the prescribing of these drugs before a whole generation might have been affected.

But there is so much more that one must know before the world can be made safe for further generations. What, for instance, gave rise to the corpses of upwards of 10,000 sea-birds being found in the closing months of last year on both sides of the Irish Sea from Wexford and Merioneth northwards and as far as the Isle of Mull off the west coast of Scotland, more birds even than were involved in the Torrey Canyon disaster of 1967? Observers reported that the plumage of these birds, mainly guillemots, was clean in most cases. One cannot therefore blame the oil companies or their ships for this one; in fact it is only fair to state that the major oil companies have been first and foremost in combating oil pollution even to the extent of introducing, at considerable expense, new methods of loading and tank cleaning and in proposing traffic separation for the avoidance of collisions, proposals which are now being internationally adopted. Most of the corpses examined, however, contained very high levels of Polychlorinated Biphenyls. These chemicals have been found in many birds in the course of routine analyses carried out over the past years in quantities of the order of ten or twenty parts per million but in last year's cases the levels were of the order of hundreds of parts per million. They are widely used in the plastics, lubrication and cosmetics industries. Where did they come from and why were they dumped in such comparatively shallow water?

For hundreds of years the sea, with its tremendous powers of self-purification, has been regarded as an infinitely capacious dumping ground. But now we may be excused for wondering just how much it can take. We are told by the Institute of Oceanography at Kiel that much of the deep water of the Baltic Sea is already dead. Intermittent renewals from the North Sea are keeping the surface waters alive at the moment but, unless indiscriminate dumping ceases or is at least controlled, this vast area of formerly productive, though largely land-locked, water is like to die altogether.

Out in the North Sea things are but little better. Some 12 miles north-west of Heligoland many tons of sulphuric acid are being dumped every day with no corresponding alkaline waste to combat it, whilst about 18,000 tons of formalin go into the sea every year off the coast of Norway from a single canning factory and, currently with the writing of this Editorial, discussions are under way in Germany for the disposal of 3,000,000 tons of iron-oxide waste.

This could become and, indeed, is already becoming an international problem for even with our knowledge of surface currents and tidal streams patiently built up over the years, largely from the observations of voluntary observing ships, we cannot be certain where the waste materials from factories or hopper barges may eventually end up. Already the Portuguese are wondering if the present mortality among their sardines can be traced to the effluents of the Rhine, long known as the biggest sewer in Europe, in which thousands of fish were poisoned last year.

Where is it all going to end? It was with the prime object of finding the answer that representatives of 27 nations met at Strasbourg early in February 1970 to launch European Conservation Year, an effort to get people to care more for their environment and to do something about it while there is yet time. All member countries of the Council of Europe are co-operating in two simple aims: to get agreement on policies and measures to manage and improve its quality and to inform and educate their citizens so as to involve them actively in this great work.

But, though the roots of the problem may lie in Europe, its branches are likely to extend over all the world and already D.D.T., a pesticide which is banned only in private gardens in Britain but banned completely in many other countries, has been found in the livers of penguins in Antarctica. More clearly than all the other evidence put together does this show how Man's interference with Nature has penetrated to the ends of the Earth.

And what can the voluntary marine observer do about all this, it may be asked. Our answer would be that he cannot do better than just go on observing, perhaps a little more conscientiously than before and perhaps with a little more attention now to the 'fringe' subjects of oceanography, entomology, ornithology and botany. For discoloured water and marine bioluminescence, with preserved samples whenever possible, can both help the oceanographer to find out how healthy and fertile or otherwise is the sea and lead him to the areas where sea farming can be made a practical proposition. Then there is the migration of insects and birds, reports of which may give the clue to the spread of toxic chemicals; reports of locusts, either singly or in swarms, preferably in the form asked for in the instructional pages at the front of the meteorological logbook, will now be more than ever a vital part of conservation. Even the drift of a dandelion seed is always worth recording, prosaic as it may seem, for it is only by gathering information of this sort that the botanist can ever hope to know how vegetation, and perhaps disease, is spread from land to land. We feel that it is hardly necessary to remind officers that whatever they record in the Additional Remarks pages of their meteorological logbooks is never just left to moulder on the shelves but every report which is outside the province of the Meteorological Office itself is always sent on to an appropriate authority.

In recent weeks our hearts were warmed by a letter from a young officer asking for copies of the North Atlantic weather maps for seven days at the turn of the year because he was interested in the area between 40°W and the east coast of the United States where he was investigating a series of sightings of oiled gulls in mid ocean.

He was sent his maps, of course, and with them went a piece of unsolicited avuncular advice: that he should not keep his findings to himself but let the Royal Naval Birdwatching Society or someone with like interests know about them. Later we were delighted to hear that this young man was indeed a member of the R.N.B.W.S. and that his letter has been passed on to the Advisory Committee on Oil Pollution of the International Council for Bird Preservation.

It is perhaps not out of place to ask officers not to put themselves to the trouble of trying to analyse a sample, or to cut open a bird to find out what is inside, etc., for these are jobs for the expert and the amateur is largely wasting his time in undertaking them.

Facts, observation and experiment were the cardinal principles of the philosophy of Francis Bacon. Facts and observation can be provided by the common man, the voluntary marine observer, but experiment should be the province of the scientist only. How far nations will implement the views of the scientists or how far the scientists will be able to convince nations of the danger around them remains to be seen. Let us, at any rate, give them the facts and observations on which they may base their researches; let us, in fact, do our part lest Nature herself should die.

L. B. P.

EXCELLENT AWARDS 1969-70

On pages 85 to 87 appears a list of ships, their Masters and Officers who have gained excellent awards in the year which ended on 31st March 1970 and once again we have the pleasure of congratulating the Masters and Officers named in it. Every year many more books have gained the excellent classification than the 100 to which we may give an award. Inevitably therefore, each year must bring a disappointment to many officers; to them we offer our commiserations.

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

1. *Glenfinlas* (Ocean Fleets Ltd.), Captain G. W. Povey
Hurunui (New Zealand Shipping Co. Ltd.), Captain R. B. Hood
Somerset Maugham (Newington Trawlers Ltd.), Skipper R. Taylor
2. *Paparoa* (New Zealand Shipping Co. Ltd.), Captain J. Reid
Glenorchy (Ocean Fleets Ltd.), Captain T. W. Willows
St. Jerome (T. Hamling & Co. Ltd.), Skipper M. F. Hough
Northern Reward (Northern Trawlers Ltd.), Skipper W. Harris
3. *Ross Orion* (Ross Group), Skipper R. Waller

The customary photographs of the three top ships appear opposite page 117 and we would congratulate the *Hurunui* who is thus having hers published for the second successive year. We would also congratulate the *Glenorchy* in her third appearance in an annual short list, her previous ones being in 1969 and 1963.

A feature of this year's list is that no fewer than eight trawlers appear in it, four of them on the short list and one with her photograph published. This is indeed an achievement and well illustrates the fact that these ships, often working in the most arduous circumstances, are well able to hold their own against ships whose work normally lies in kinder waters. Aboard a trawler there are only two people to receive awards, the Skipper and the radio operator, and this enables us to release the third award to a trawler skipper or radio operator on the non-instrumental list. Thus, this year, we are giving many more awards to 'non-instrumental' fishermen than the basic eight. Awards to four of the 'Marid' ships also appear on page 87.

EXCELLENT AWARDS (Year ended 31st March, 1970)

SHIP	CAPTAIN	PRINCIPAL OBSERVING OFFICER	RADIO OFFICER	OWNER/MANAGER
<i>Aranda</i>	B. Hammond	C. A. Jenman	J. Barter	Shaw Savill & Albion Co. Ltd.
<i>Baharistan</i>	J. Brown	J. H. McMurren	T. O'Neill	Frank C. Strick & Co. Ltd.
<i>Benmacdhui</i>	T. Fyfe	A. Lim	G. R. Kerr	Ben Line Steamers Ltd.
<i>Benreoch</i>	J. R. Rodger	A. I. MacFeate	J. Gilhooly	Ben Line Steamers Ltd.
<i>British Bombardier</i>	J. H. Jones	J. A. Wallwork	P. Trant	B.P. Tanker Co. Ltd.
<i>Bristol City</i>	E. Irish	A. D. C. Payne	J. T. W. Moody	Bristol City Line Ltd.
<i>British Freedom</i>	C. Herbert	K. J. Butler	K. Walton	B.P. Tanker Co. Ltd.
<i>British Sailor</i>	J. Wharrie	J. E. Perry	A. Atkinson	B.P. Tanker Co. Ltd.
<i>Calchas</i>	H. K. Timbrell	J. P. Morgan	D. Gunning	Ocean Fleets Ltd.
<i>Camellia</i>	W. R. Hunter	J. C. Gemmeken	E. Conlon	J. Robinson & Sons Ltd.
<i>Cape Howe</i>	J. D. Minards	J. R. C. Peterson	J. Williams	Lyle Shipping Co. Ltd.
<i>Cardiganshire</i>	D. M. Belk	M. J. Harrison	I. H. Pearce	Ocean Fleets Ltd.
<i>Cedric</i>	J. Street	R. J. S. Squirrel	R. Walker	Shaw Savill & Albion Co. Ltd.
<i>City of Eastbourne</i>	K. B. B. James	A. K. Braden	D. Logan	Ellerman Lines Ltd.
<i>Clan Alpine</i>	N. F. Stewart	N. M. Butterfield	D. A. P. Galbraith	Clan Line Steamers Ltd.
<i>Clan Malcolm</i>	R. M. Bessant	R. A. G. Simmons	R. R. Hughes	Clan Line Steamers Ltd.
<i>Corinthic</i>	H. O. V. Andersen	N. J. Hunt	C. R. Butler	Shaw Savill & Albion Co. Ltd.
<i>Cyclops</i>	P. J. Broomfield	G. Peters	P. D. Stapleton	Ocean Fleets Ltd.
<i>Delphic</i>	I. S. McEwan	E. A. L. Glover	P. Wright	Shaw Savill & Albion Co. Ltd.
<i>Devon</i>	W. F. T. Dan	R. A. Carver	L. A. Ryan	Federal S.N. Co. Ltd.
<i>Discovery</i>	R. H. A. Davies	G. L. Howe	A. P. Ross-Murray	Natural Environment Research Council
<i>Dorset</i>	C. A. Miller	R. W. W. Baldwin	S. J. N. Griffith	Federal S.N. Co. Ltd.
<i>Fourah Bay</i>	C. S. Mackinnon	C. M. Canavan	M. R. Palmer	Ocean Fleets Ltd.
<i>Galway</i>	R. J. Ogilvy	M. J. Davies	D. F. Murray	Trinder Anderson & Co. Ltd.
<i>Glenaffric</i>	J. O. Jones	R. J. McCombie	G. Hemming	Ocean Fleets Ltd.
<i>Glenearn</i>	C. H. F. Hill	P. A. Brown	A. Brown	Ocean Fleets Ltd.
<i>Glenfinlas</i>	G. W. Povey	M. J. Boddington	C. W. Knibb	Ocean Fleets Ltd.
<i>Glengarry</i>	R. J. Paterson	R. G. J. Wiltshire	R. Jenkins	Ocean Fleets Ltd.
<i>Glengyle</i>	E. L. Stubbings	J. E. McGregor	D. S. Stoker	Ocean Fleets Ltd.
<i>Glenlyon</i>	J. A. Dougall	I. M. Grant	J. H. Brown	Ocean Fleets Ltd.
<i>Glenogle</i>	R. C. Riseley	C. Dalton Jones	D. Sibley	Ocean Fleets Ltd.
<i>Glunorchy</i>	T. W. Willows	R. M. Walker	R. Buckles	Ocean Fleets Ltd.
<i>Gloucestershire</i>	N. F. Fitch, M.B.E.	R. R. Baker	J. Cottier	Bibby Line Ltd.
<i>Halifax City</i>	N. Childs	P. G. Bowditch	H. Roderick	Bristol City Line Ltd.
<i>Haparangiri</i>	J. M. Burn	P. H. Rainford	C. J. Hughes	New Zealand Shipping Co. Ltd.
<i>Hauraki</i>	J. D. Hellings	C. J. Esdale-Pearson	W. R. Parsons	New Zealand Shipping Co. Ltd.

Excellent Awards (cont.)

SHIP	CAPTAIN	PRINCIPAL OBSERVING OFFICER	RADIO OFFICER	OWNER/MANAGER
<i>Helenus</i> ..	N. D. Martin ..	M. Mason ..	A. G. Thomson ..	Ocean Fleets Ltd.
<i>Hero</i> ..	W. R. Kays ..	R. B. Shimell ..	T. J. Noble* ..	Bristol S.N. Co. Ltd.
<i>Hertford</i> ..	A. B. Stalker ..	R. K. Blake ..	A. Rose ..	Federal S.N. Co. Ltd.
<i>Hinakura</i> ..	N. L. Warren ..	A. J. T. Gray ..	W. F. Law ..	New Zealand Shipping Co. Ltd.
<i>Hurunui</i> ..	S. W. Lambrick ..	H. M. Close ..	C. J. Elliott ..	New Zealand Shipping Co. Ltd.
<i>Illyric</i> ..	W. A. Murison ..	D. J. Hewitt ..	H. A. Sirett ..	Shaw Savill & Albion Co. Ltd.
<i>Jason</i> ..	J. Petticrew ..	S. P. C. Saverimutto ..	J. P. R. Binding ..	Ocean Fleets Ltd.
<i>John Biscoe</i> ..	T. Woodfield ..	M. Bentley ..	H. M. S. O'Gorman ..	British Antarctic Survey
<i>John Murray</i> ..	M. J. Perry ..	G. M. Brown ..	P. H. Maw* ..	Natural Environment Research Council
<i>Joseph Conrad</i> ..	B. Taylor ..	— ..	J. S. Hallam ..	Newington Trawlers Ltd.
<i>Kirkella</i> ..	L. Fewster ..	— ..	W. M. Davies ..	J. Marr & Sons Ltd.
<i>Mabel Warwick</i> ..	C. J. Welch ..	M. J. Crocker ..	M. J. Moorcroft ..	Houlder Bros. Co. Ltd.
<i>Manapouri</i> ..	J. D. Guyler ..	T. W. Carnduff ..	M. Moore ..	New Zealand Shipping Co. Ltd.
<i>Manchester Faith</i> ..	J. Illingworth ..	L. G. Ridyard ..	P. M. Byrne ..	Manchester Liners Ltd.
<i>Manchester Trader</i> ..	J. R. Stephens ..	D. J. Burton ..	J. McCarthy ..	Manchester Liners Ltd.
<i>Marbella</i> ..	R. Boughen ..	— ..	G. R. Smith ..	J. Marr & Sons Ltd.
<i>Masketiya</i> ..	W. H. C. Hicks ..	I. A. Reeves ..	F. A. White ..	Cunard-Brocklebank Ltd.
<i>Mataura</i> ..	E. F. H. Allen ..	R. A. Newnham ..	D. L. Byrne ..	New Zealand Shipping Co. Ltd.
<i>Menestheus</i> ..	J. W. Hutchinson ..	J. R. K. Corrin ..	J. B. Carr ..	Ocean Fleets Ltd.
<i>Nevasa</i> ..	F. A. J. Downer, D.S.C. ..	M. L. Bechley ..	W. C. G. Sturgess ..	British India S.N. Co. Ltd.
<i>Northella</i> ..	J. A. Ness ..	— ..	R. Baillie ..	J. Marr & Sons Ltd.
<i>Northern Reward</i> ..	W. Harris ..	— ..	S. B. Barr ..	Northern Trawlers Ltd.
<i>Northumberland</i> ..	R. G. Hollingdale ..	C. J. Armstrong ..	D. J. Lendrum ..	Federal S.N. Co. Ltd.
<i>Nottingham</i> ..	G. W. McCathie, R.D. ..	J. P. Paling ..	J. E. Hocking ..	Shaw Savill & Albion Co. Ltd.
<i>Otaio</i> ..	F. S. Angus, R.D. ..	A. J. Davies ..	R. G. Heath ..	New Zealand Shipping Co. Ltd.
<i>Otaki</i> ..	J. H. B. Weston ..	W. B. Anderson ..	M. J. Morrall ..	New Zealand Shipping Co. Ltd.
<i>Pacific Reliance</i> ..	H. W. Gates ..	R. E. Burdett ..	A. Read ..	Furness Withy & Co. Ltd.
<i>Paparoa</i> ..	J. Reid ..	D. R. Embury ..	P. Lockitt ..	New Zealand Shipping Co. Ltd.
<i>Pembrokehire</i> ..	R. B. Tiplady ..	S. Brown ..	H. N. Kinley ..	Glen Line Ltd.
<i>Pendenmis Castle</i> ..	R. A. D. Cambridge, D.S.C., R.D. ..	A. R. Binder ..	D. G. Bristow ..	Union-Castle Mail S.S. Co. Ltd.
<i>Perseus</i> ..	D. D. McIntosh, R.D. ..	J. Hanney ..	J. W. Smallthwaite ..	Ocean Fleets Ltd.
<i>Persic</i> ..	M. J. A. Clark ..	D. G. Olley ..	J. S. Matthews ..	Shaw Savill & Albion Co. Ltd.
<i>Photenia</i> ..	R. J. Freeman ..	M. Kennedy ..	E. Evans ..	Stag Line Ltd.
<i>Port Adelaide</i> ..	D. Hart ..	J. A. Hawkins ..	R. A. Jones ..	Blue Star Port Lines Ltd.
<i>Port Auckland</i> ..	F. M. Barton ..	F. P. L. Onslow-Free ..	A. E. Leeder ..	Blue Star Port Lines Ltd.
<i>Port Caroline</i> ..	R. A. Holmes ..	G. Lascelles ..	H. B. Hughes ..	Blue Star Port Lines Ltd.

<i>Port Chalmers</i> ..	R. A. Wight ..	P. H. D. Coombs ..	S. A. White ..	Blue Star Port Lines Ltd.
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<i>Port Wellington</i> ..	A. J. Starkey ..	J. H. Bowering ..	J. E. Appleton ..	Blue Star Port Lines Ltd.
<i>Potosi</i> ..	R. T. Riley ..	C. G. G. Hawken ..	F. J. Curran ..	Pacific S.N. Co. Ltd.
<i>Prometheus</i> ..	R. G. Boyd ..	G. J. J. Mansfield ..	E. O. Roberts ..	Ocean Fleets Ltd.
<i>Rakaia</i> ..	D. E. Moran ..	M. L. Martin ..	R. I. Parkinson ..	New Zealand Shipping Co. Ltd.
<i>Rievaulx</i> ..	G. W. Brown ..	J. T. Brown ..	D. Warth ..	Bolton Steam Shipping Co. Ltd.
<i>Rosemary Everard</i> ..	W. G. Hunt ..	J. P. Skinner ..	G. J. Broome* ..	F. T. Everard & Son Ltd.
<i>Ross Implacable</i> ..	G. Whur ..	— ..	A. Ramsay ..	Ross Trawlers Ltd.
<i>Ross Orion</i> ..	R. Waller ..	— ..	R. R. N. Laing ..	Ross Trawlers Ltd.
<i>St. Jerome</i> ..	M. F. Hough ..	— ..	K. C. Stone ..	T. Hamling & Co. Ltd.
<i>Sarpedon</i> ..	A. S. Thompson ..	J. P. Duncan ..	W. C. A. Phillips ..	Ocean Fleets Ltd.
<i>Somerset Maugham</i> ..	R. Taylor ..	— ..	B. E. K. Robinson ..	Newington Trawlers Ltd.
<i>Strathconon</i> ..	G. McGowan, R.D. ..	M. R. Clowes ..	J. D. Watson ..	P. & O. Lines Management Ltd.
<i>Sugar Exporter</i> ..	D. Patrickson ..	G. P. Colebrook ..	W. Ferguson ..	Sugar Line Ltd.
<i>Surrey</i> ..	P. Lay ..	P. J. Donaldson ..	W. F. Shepherd ..	New Zealand Shipping Co. Ltd.
<i>Sussex</i> ..	J. S. Laidlaw ..	I. MacK. Murray ..	B. T. Davis ..	Federal S.N. Co. Ltd.
<i>Taupo</i> ..	F. C. Taylor ..	B. O'Dea ..	J. Diggie ..	New Zealand Shipping Co. Ltd.
<i>Theseus</i> ..	I. Webster ..	W. E. L. Godsell ..	R. Gibson ..	Ocean Fleets Ltd.
<i>Tremeadow</i> ..	J. J. Watson ..	H. O'Mullan ..	M. Hurley ..	Hain-Nourse Ltd.
<i>Turakina</i> ..	R. B. Hood ..	M. Austin ..	G. D. Lawrance ..	New Zealand Shipping Co. Ltd.
<i>Venassa</i> ..	J. Y. Cox ..	B. W. Bailey ..	D. Smith ..	Shell Tankers (U.K.) Ltd.
'MARID' SHIPS†				
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<i>St. George</i> ..	F. Patterson ..	P. Backhouse ..	M. C. Powell ..	British Railways Board
<i>Ulster Queen</i> ..	W. W. P. Lucas ..	R. E. Wildgoose ..	N. Braddon ..	Belfast S.S. Co. Ltd.
<i>W. J. H. Wood</i> ..	D. Battle ..	L. Ferguson ..	G. Prow ..	Stephenson Clarke Shipping 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
H. Bowman ..	—				R. Irvin & Sons Ltd.
J. W. E. Boyle ..	—				Boyd Line Ltd.
T. Doyle ..	—				T. Hamling & Co. Ltd.
J. N. Kerr ..	—				Ross Trawlers Ltd.
B. McCall ..	—				Ross Trawlers Ltd.
E. March ..	—				Hellyer Bros. Ltd.
F. Myers ..	—				Ross Trawlers Ltd.
A. Osler ..	—				Hellyer Bros. Ltd.
F. Penistone ..	—				Northern Trawlers Ltd.
—	C. Bird ..	..	..	..	Boyd Line Ltd.
—	F. R. Hailstones ..	..	..	..	R. Irvin & Sons Ltd.
—	P. R. Hickson ..	..	..	..	Northern Trawlers Ltd.
—	A. J. Nettleship ..	..	..	..	Hellyer Bros. Ltd.
—	G. A. Osborne ..	..	..	..	T. Hamling & Co. Ltd.
—	H. Scott ..	..	..	..	Ross Trawlers Ltd.
—	J. L. Thorpe ..	..	..	..	Ross Trawlers Ltd.
—	K. Ward ..	..	..	..	T. Hamling & Co. Ltd.
—	A. S. Wittlin ..	..	..	..	Northern Trawlers Ltd.

The recipients of the awards will, as in past years, be notified individually by letter and asked for an address to which they would like their awards sent. A number of shipping companies, in their house journals, are now giving publicity to the Excellent Awards list as it affects their ships and if any master or officer sees his name in such a list or, indeed, in the list in this issue of *The Marine Observer*, before he receives the official letter, it would save a lot of time if he would please write to us, claiming the award and giving us the address to which he would like it sent.

A world atlas still seems to be the most popular award with a dictionary a close runner-up and the first and second awards to an officer are usually these volumes respectively. When an officer comes up for the third time he receives the book of the year which is chosen annually on the recommendation of Dr. Hope of the Seafarers Education Service. If, however, any first or second-time officer does not want either an atlas or a dictionary, we would be glad if he would let us know; we would normally be able to meet his request and send him the book as an alternative.

L. B. P.



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.

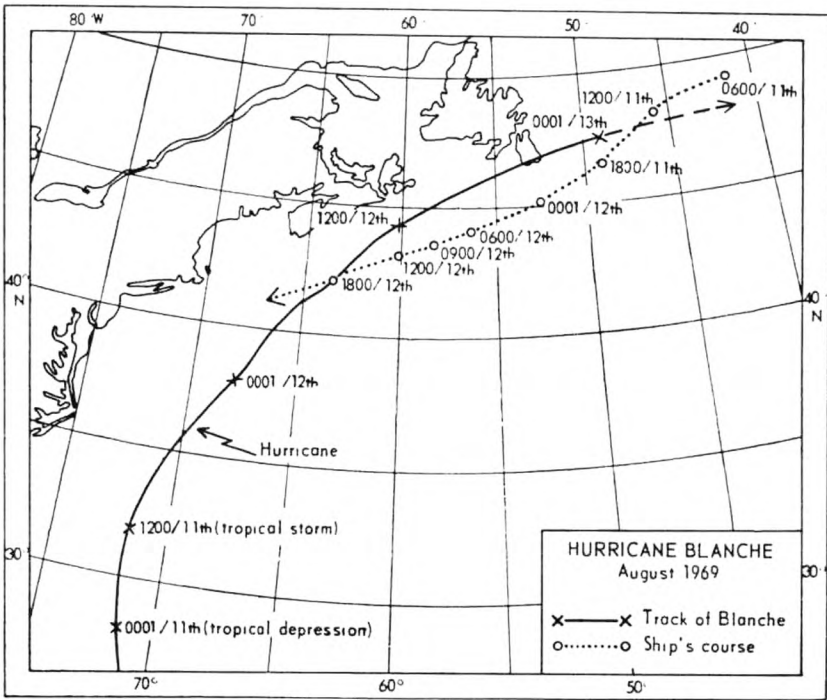
HURRICANE ‘BLANCHE’

North Atlantic Ocean

s.s. *Queen Elizabeth 2*. Captain W. E. Warwick, R.D. R.N.R. Le Havre to New York. Observer, Mr. J. R. D. Hall, 3rd Officer.

12th August 1969. At 0610 GMT hurricane warnings were received from Washington, after which regular reports of the passage of the hurricane were plotted. It was estimated that the ship would pass to the south of the centre at 1600 on the 12th. The normal 6-hourly weather reports were made but at 0900 the barometer started falling rapidly and a special observation was transmitted. At 0930 a plain language report was sent to Miami and others were despatched at 1100, 1200 and 1300. By 1000 the wind speed had increased to 75 kt and it was estimated that the centre was passed at 1030 in position 43° 26' N, 60° 36' W. By 1400 conditions were normal again apart from a heavy confused swell. At 1200: Air temp. 68°F, wet bulb 65·3°, sea 61°. Wind wsw, force 9.

Position of ship at 1200: 43° 07' N, 60° 08' W.



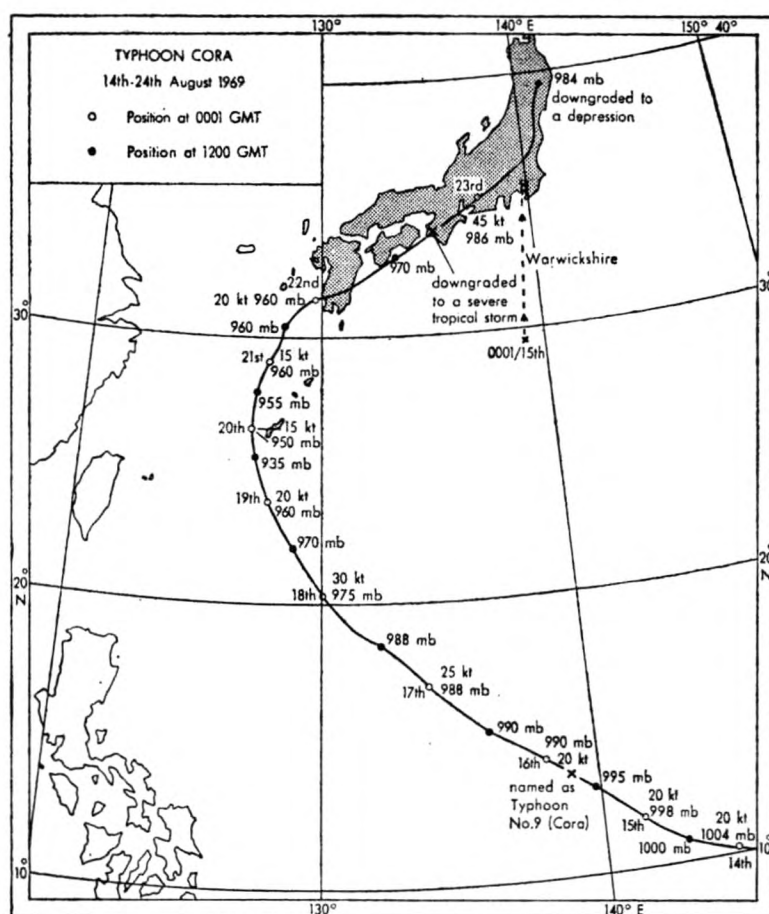
Note. The diagram shows the tracks of *Queen Elizabeth 2* and Hurricane Blanche.

TYPHOON ‘CORA’

Western Pacific Ocean

m.v. *Warwickshire*. Captain A. R. Moore. Brisbane to Tokyo. Observers, the Master and all officers.

15th–23rd August 1969. The first warning of a possible typhoon came at 0001 GMT on the 15th in a weather synopsis from Tokyo. This gave the position of a tropical



depression at $11^{\circ} 36'N$, $141^{\circ} 30'E$, south-west of Guam Island, moving NW at 9 kt. In further reports the depression was seen to move NW and then N when far off the east coast of Taiwan. At this point it curved in a direction towards Japan, passing to the west of Okinawa. It finally reached the island of Kyushu, Japan on the 22nd at 0001, the central pressure then reading 960 mb (the lowest reached was 935 mb on the 19th). The forecast gave its future movements as between NE and ENE with pressure rising and the depression accelerating from 12 kt to a possible 20 kt.

At 0300 on the 22nd the vessel moved from an alongside berth in Yokohama port to the typhoon anchorage in Tokyo Bay, position $35^{\circ} 31'N$, $139^{\circ} 53'E$. At 1800 the centre of the depression was reported to be at $34^{\circ} 06'N$, $135^{\circ} 24'E$, 35 miles south of Osaka city. The pressure at the centre was 980 mb and the depression was moving in a direction between NE and ENE at 20 kt. It was at this time that the typhoon was downgraded to a severe tropical storm.

Weather observations at each half-hour showed a steady decline in pressure, an increase in wind velocity and a fall in temperature. At 0001 on the 23rd the storm was positioned at $35^{\circ} 24'N$, $137^{\circ} 36'E$, central pressure 985 mb, moving NE-ENE at 22 kt. Before this report was received we noticed that the wind was tending to veer, giving the impression that the storm would continue on a NE'ly track, passing to the north of Tokyo.

The wind continued to veer steadily and by 0230 had increased to force 9. The sky became overcast and the rain intensified but at 0300 clear sky was observed NW'W of the ship, obviously the eye of the storm, as forecast, at a distance of 60 miles. At 0400 the wind had increased to force 10 and the depression was then in its closest forecast position to the ship, bearing NW'N at a distance of 40 miles. Barometric pressure was 989.1 mb, the wind ssw'ly and the air temperature $80.2^{\circ}F$, still falling.

At 0515 the barometric pressure reached its lowest point, 987.4 mb, which was 1.4 mb higher than the centre of the depression. This indicated that the storm passed closer than the forecast position and that it was at its nearest point at 0515 on the 23rd and not at 0400 as we originally thought. The clear patch in the sky became

greater as the storm drew nearer and the air temperature began to rise again shortly before 0515.

At about 0600 the wind began to drop and the barometer continued to rise steadily. The final observation was at 0730 when the storm was in a forecast position 115 miles NE'E of the vessel. The wind at this time was SSW, force 6 with a pressure of 991.2 mb and the weather was fine with 3/8 cloud.

Position of ship at 0001 on 15th: 29° 54'N, 138° 30'E.

Note. Typhoon Cora first formed as a weak tropical cyclone of 1009 mb at 2100 GMT on 12th August at 9.6°N, 150.5°E. The diagram showing the positions, central pressures and mean speeds of the storm was based on a chart kindly supplied by the Japanese Meteorological Agency.

FOG

Atlantic Ocean

m.v. *Crystal Sapphire*. Captain J. R. L. Atkinson. Las Palmas to Japan. Observers, the Master, Mr. E. McEwan, 2nd Officer and Mr. J. Bailey, 3rd Officer.

16th July 1969. At 1231 GMT the vessel ran into thick fog. At times, in relatively clear patches, it was possible to see banks of fog arranged in almost parallel bands across the surface of the sea. Marked current disturbance of the sea surface was also noticed. By 1650 all traces of fog had disappeared. At 1230: Air temp. 72.1°F, wet bulb 70.5°, sea 71.5°. At 1700: Air temp. 71.7°, wet bulb 71.4°, sea 71.4°. Wind SSE, force 2 throughout.

Position of ship at 1230: 0° 00', 10° 00'W.

Note. At the time of this report the vessel was close to the probably disturbed boundary between the South Equatorial and the Guinea Currents. Upwelling of cool, sub-surface water (the reported sea temperatures are below average) may have occurred in bands along this boundary, leading to cooling of overlying moist air, resulting in turn in the formation of banks of sea fog.

Peruvian waters

s.s. *Potosi*. Captain R. T. Riley. Guayaquil to Callao.

11th-14th September 1969. A very large amount of fog was encountered north of Callao (but by October little or no fog was seen). Between Guayaquil and Pimentel a very marked and sudden drop in sea temperature was observed and thick fog was first encountered off Paita, unusual so far north. The following readings were taken between Guayaquil and Callao.

	TIME (GMT)	DRY (°F)	WET (°F)	SEA (°F)	
11th	2000	70.5	69.7	72.0	
12th	0001	66.2	65.3	70.0	
	0600	61.0	61.0	58.5	fog
	1200	61.3	61.3	61.0	fog
13th	0001	61.0	60.8	60.0	mist
	0600	59.7	59.7	59.0	fog
14th	0001	61.5	61.3	59.0	fog
	0600	61.0	60.8	60.0	fog
	1200	60.8	60.3	58.0	
	1800	62.9	61.7	61.0	fog in past hour

Position of ship at 0001 on 13th: 7° 24'S, 79° 42'W.

Note. According to the *South America Pilot*, Vol. III (5th Edition, 1970) fog has been reported along this coast as far north as the equator; the frequency is highest in April and lowest in October. The sea temperatures reported by the *Potosi* were below average (by 4 or 5 degF). This is the probable reason for occurrences of fog at that time of the year.

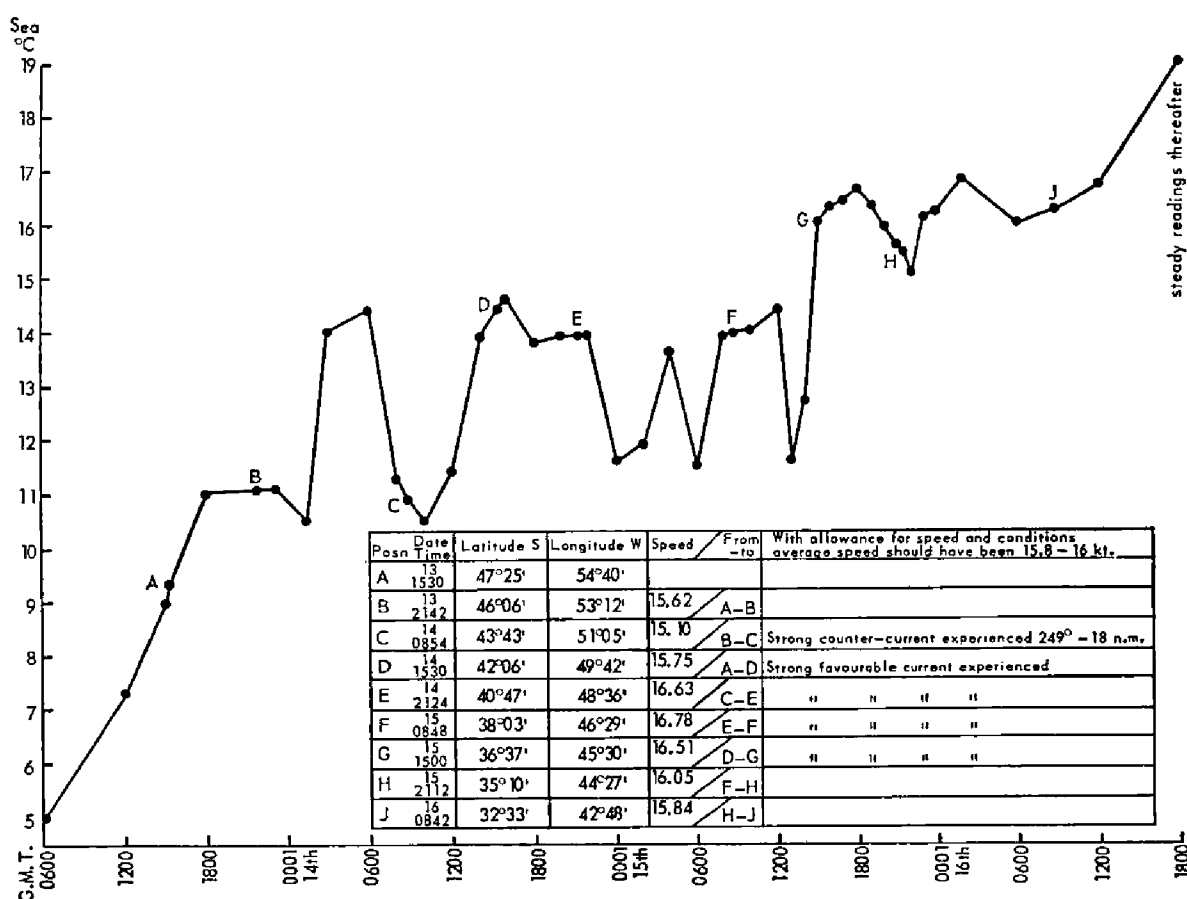
STRONG CURRENTS

Western South Atlantic

s.s. *Dorset*. Captain C. A. Miller. Bluff Harbour, N.Z. to Las Palmas via Cape Horn. Observers, Mr. R. W. W. Baldwin, 3rd Officer and all other deck officers during watch-keeping hours.

13th–16th September 1969. Between 1530 GMT on the 13th and 0842 on the 16th the vessel was subjected to strong counter and favourable currents. During this period the sea temperature fluctuated at irregular intervals and a graph was drawn to show the extent of the fluctuations. Reliable fixes and speeds experienced are included on the graph.

Position of ship at 0001 on 15th: 40° 12'S, 48° 12'W.



Note. The *Dorset's* track lay along the boundary between the cool, north-easterly setting Falkland Current (which continues northward of the Río de la Plata as the Brazil Inshore Counter-Current) and the further off-shore Brazil Current. Eddies along this boundary would mean that the vessel would alternately come under the influence of both currents until the effect of the cool Inshore Counter-current died out—at about 30°S.

CURRENT RIP

Arabian Sea

s.s. *British Bombardier*. Captain J. H. Jones. Kharg Island to Cape Town.

6th September 1969. There was a sudden drop in wind speed from force 6 to 4. This lasted a few minutes before increasing again to its original speed. There was a confused sea and swell from a s-se'y direction. The ship was thrown 15–20° off course and the automatic helm had the rudder hard over for a considerable time

before the ship returned to her course. During this time barometric pressure remained constant. At 0001 GMT: Air temp. 76.3°F , sea 73.3° . Wind ssw, force 5.

Position of ship at 0001: $11^{\circ} 28' \text{N}$, $55^{\circ} 05' \text{E}$.

Note. The Somali Current is strongest in the region southward of Socotra where, in September, easterly sets of 6–7 kt have been reported. A plot of the *British Bombardier*'s positions (taken from 6-hourly weather observations) reveals that the ship's speed, meaned over 24-hour periods, dropped from 15.5 kt to 14 kt on passing southward of the latitude of Socotra. The current and wind effects and the disturbed sea indicate that the ship crossed the northern boundary (on this occasion well marked) of the Somali Current. (The foregoing explanation assumes that the ship's head was thrown to port and that full starboard helm was applied.)

GULF STREAM

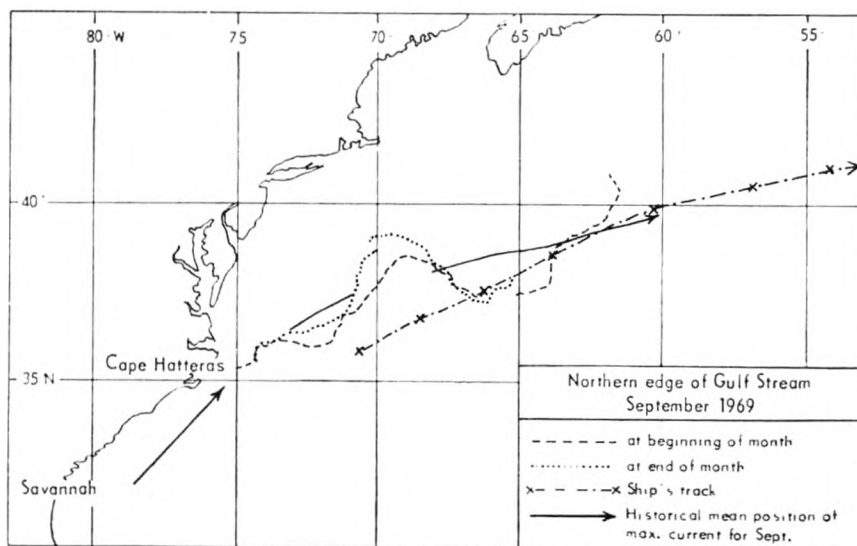
North Atlantic Ocean

m.v. *Silverbeach*. Captain F. Moorcraft. Savannah to Bremen, Observer, Mr. L. M. Skelhorn, 3rd Officer.

20th–24th September 1969. Over these past few days sharp increases and decreases in sea temperature, together with tide rips and loss of speed, seem to lead to the possibility of the axis of the Gulf Stream leading a very devious course in these latitudes with possible counter-currents at the edge of the main stream. An abundance of floating weed was seen in the vicinity of the main stream. At 0001 GMT on 20th: Air temp. 74.5°F , sea 79.6° . At 0001 GMT on 24th: Air temp. 61.0° , sea 70.6° . Wind N'w, force 2.

Position of ship at 0001 on 20th: $35^{\circ} 54' \text{N}$, $70^{\circ} 42' \text{W}$.

Position of ship at 0001 on 24th: $42^{\circ} 24' \text{N}$, $47^{\circ} 12' \text{W}$.



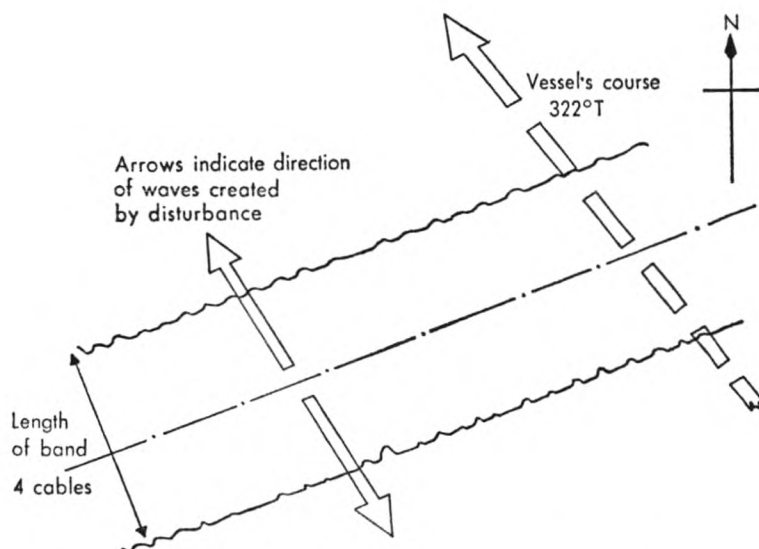
Note. The position of the 'north wall' (the sharp boundary between the Gulf Stream and the Labrador Current) varies considerably as the former current meanders between Cape Hatteras and the Great Bank. The diagram shows the positions of the north wall at the beginning and end of September 1969, the long-term mean position, and the track of the *Silverbeach* which appears to have crossed the north wall at least twice.

DISTURBED WATER

Southern North Atlantic

s.s. *City of Winchester*. Captain T. Rigg. Cape Town to Brixham. Observer, Mr. P. G. Dunford, 3rd Officer.

16th September 1969. At 0830 GMT, whilst maintaining a course of 322° in 250 fm,



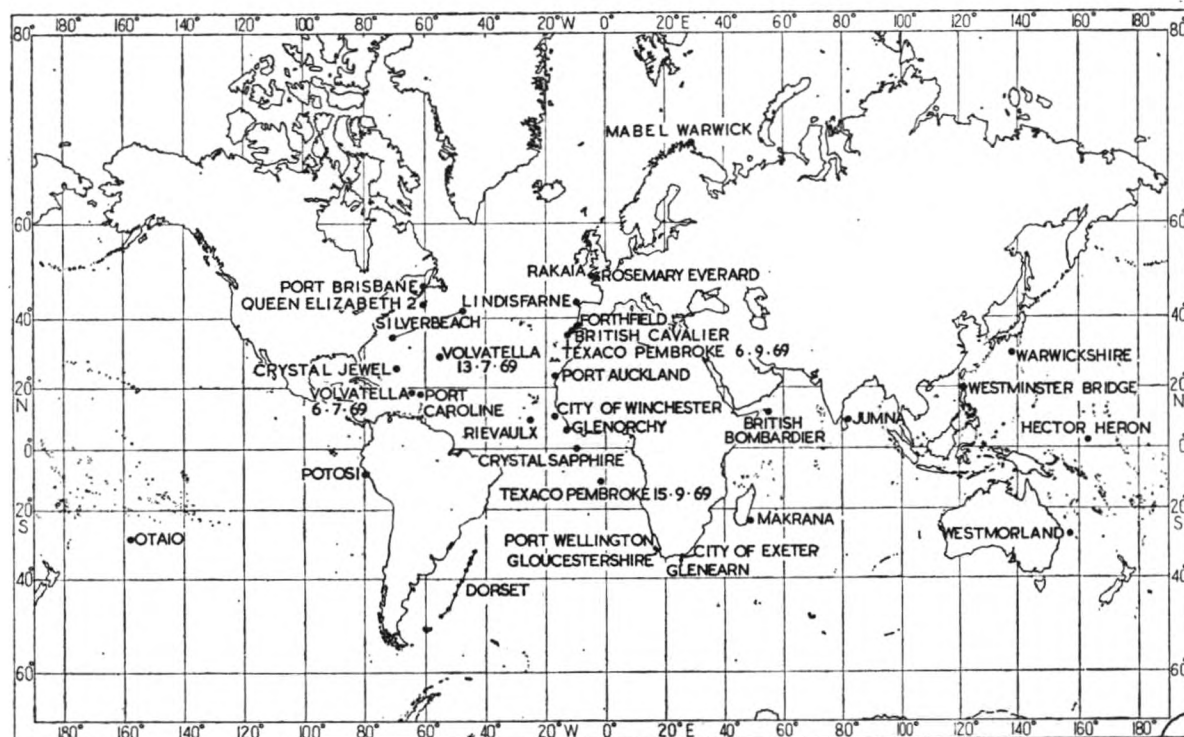
the vessel encountered a band of disturbed water. Although only 4 cables in width (800 yd), the disturbance stretched as far as the eye could see in an $070^{\circ}/250^{\circ}$ direction. On passing through the area it was noticed that the wave heights had increased to approx. 7 ft with very little distance between successive crests. It was observed that the waves spread from the centre of the disturbance in both NNW'ly and SSE'ly directions to the northern and southern limits of the band respectively.

The vessel passed through four of these bands and each lay in the same direction and possessed the same wave characteristics as the first. The bands were estimated to be about 1 mile apart.

Whilst navigating the disturbed areas it was found that the automatic pilot required more helm to maintain its course. The vessel pitched gently and it was noted that the engine revs. fluctuated slightly. Air temp. 79.1°F . Wind ENE, force 1-2.

Position of ship: $10^{\circ} 12' \text{N}$, $17^{\circ} 14' \text{W}$.

Note. The disturbance was probably due to the convergence between the Equatorial Counter-current and the Canary Current.



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

DISCOLOURED WATER

off Spanish West Africa

m.v. *Port Auckland*. Captain G. Carling. Tenerife to Cape Town. Observers, Mr. P. V. P. Holmes, 3rd Officer and Mr. A. J. R. May, Jnr. 3rd Officer.

21st July 1969. At 1400 GMT the vessel passed through large patches of dense plankton. The colour was a very dark red or reddish-brown. Course 189° at 17 kt.

Position of ship: 22° 58'N, 17° 14'W.

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

"This was very probably a dense swarm of the ciliate protozoan *Mesodinium rubrum* Lohm (syn. *Cyclotrichium meunieri* Powers) which contains symbiotic flagellates. We had one exceptionally good sample to the south of this region recently from the *City of Ottawa* which showed this species strongly dominant, but without a sample one must also state that a dinoflagellate swarm is also a distinct possibility thereabouts and would give a very similar appearance to the unaided eye."

SUBMARINE EARTHQUAKE

Eastern North Atlantic

s.s. *British Cavalier*. Captain F. W. Cuffley. Göteborg to Table Bay, Cape Town. Observer, the Master.

6th September 1969. At 1430 GMT we experienced a very heavy shaking throughout, the result of some kind of underwater eruption. This lasted for a period of about 30 sec and was naturally most disturbing to all on board. Once I had established that nothing was wrong on the ship, either below or on deck, I recalled a similar experience on *British Vigour* in early 1954, more or less equivalent to depth-charges being used in close vicinity in war-time. As soon as possible I got into contact with the Italian vessel *Carlo Carmeli* who was 3½ miles sw and who felt the same effects and who, like ourselves, found no damage. I would be obliged if this be brought to the notice of the department interested in seismic disturbances.

Position of ship: 37° 05'N, 12° 30'W.

s.s. *Texaco Pembroke*. Captain R. S. Hawkins. Europoort to Ra's Tannūrah. Observers, the Master and Mr. P. J. Langdon, 2nd Officer.

6th September 1969. At 1432 GMT the vessel shuddered violently throughout her length for about 2 sec and a loud thump was heard. No large waves or any obstruction were observed before and after a search. The echo-sounder was switched on without any trace at all. Course 199° at 17.41 kt.

Position of ship: 34° 36'N, 13° 22'W.

Note 1. Mr. G. Neilson of the Institute of Geological Sciences, Edinburgh comments:

"The shock felt on 6th September was a medium-sized earthquake: origin time 14h 30m 39.5s; position 36.9°N, 11.9°W; magnitude (Richter scale) = 5.7, the total seismic energy released being equivalent to approximately 100,000 tons of TNT.

"The Richter scale is, broadly speaking, a method of determining the energy released in an earthquake by means of signals recorded at seismological stations. Gutenberg and Richter drew up the first local instrumental magnitude scale for California. The structure of this is as follows. When an event of a given size occurs the record at a station near the shock will be larger than the record at a more distant station, assuming the same instruments are used. If the common logarithm of the amplitude of the signal, divided by period, is taken and plotted against distance for several stations then a series of parallel curves emerge, representing different sizes of events. If one of these curves is given a value (say 1) then it is possible to draw in the curve of an earthquake of 0 magnitude. It is therefore possible to add this factor of an 0 earthquake (termed log A) to the log of the measured trace amplitude over period to find how many times greater it is than a shock of magnitude 0. This can be extended to distant earthquakes and both the waves that travel through the earth and those that travel round the crust can be used for this purpose."

Note 2. In the January 1970 edition of *The Marine Observer* we published details of a submarine earthquake (magnitude 8 to 8½) on 28th February 1969 in an area not far from the position given for 6th September.

RADAR ECHO FROM BIRDS

Barents Sea

m.v. *Mabel Warwick*. Captain C. J. Welch. Murmansk to Glasgow. Observer, Mr. J. C. Yeo, Chief Officer.

27th July 1969. At 0440 GMT, when the vessel was off the entrance to Tana Fjord on the NE coast of Norway, a small echo was seen on the radar at a distance of 2 miles. The echo had the appearance of that from a small craft, probably a fishing boat. On examining the sea in the direction of the echo with binoculars no trace of any boat could be seen. However, some 3 min later, the echo was identified as coming from a large group of several hundred herring gulls. Most of them were sitting on the water but some were milling around in the air. At the same time a large steam trawler was observed some 3 miles to the NW. It was thought that a probable explanation of the presence of the gulls was that they were feeding on the guttings of the trawler catch. Course 309° at 11.5 kt.

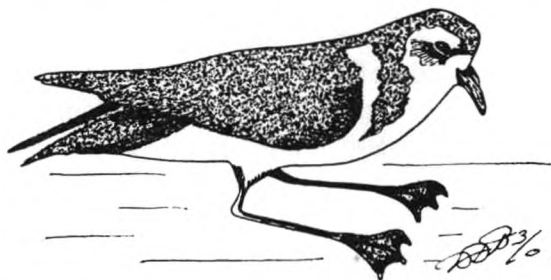
Position of ship: 70° 56'N, 29° 12'E.

BIRDS

Coral Sea

m.v. *Westmorland*. Captain J. A. North. Panama to Brisbane. Observers, Mr. W. Battson, Chief Steward and Mr. D. De Barr, 3rd Officer.

10th July 1969. At 110 SMT a white-faced storm petrel was found in the storeroom, below the main decks, attempting to find a dark corner to rest in. The bird did not appear to be frightened when picked up although it seemed to have difficulty in walking, apparently due to its long legs. Although repeated attempts were made by day and night to get the bird to take off it seemed to prefer the comfort of burrowing,



head first, down the side of the Chief Steward's bunk until our arrival at Brisbane a day later. It then descended to the water and skimmed along the surface towards the river bank. Attempts had been made to get the petrel to eat fish and crumbs but to no avail.

Position of ship at 1100 on 10th: 25° 52'S, 157° 20'E.

North Atlantic Ocean

s.s. *Volvatella*. Captain C. H. Baker. Puerto Miranda to Rotterdam. Observers, Mr. D. H. Rayfield, Chief Officer and Mr. P. B. Kirsopp, 2nd Officer.

13th-17th July 1969. On the 13th, when the vessel was about 480 miles ESE of Bermuda, a wading bird was found on deck. The bird was slim, long-necked with

long bluish legs and long stout bill. It stood about 12 inches high. The upper parts were closely marbled with dark-brown or black markings on a white ground with a warm buff tinge on wings and mantle; under parts were white with the marbled markings more widely spaced, nearly absent on belly and throat. In flight, the wings showed a bright, flashing white stripe not visible when closed, the rump was white and tail pale buff. Primaries were dark brown and a patch about the elbow was also dark. The bird was identified from Peterson's *Field Guide to the Birds (U.S.A., Eastern States)* as a willet [a shore-bird of the snipe family]. Weather was good when the bird came aboard and had been for several days. The bird did not seem distressed. It disappeared on the 17th; as the prevailing wind was sw'ly it may have reached the western U.K.

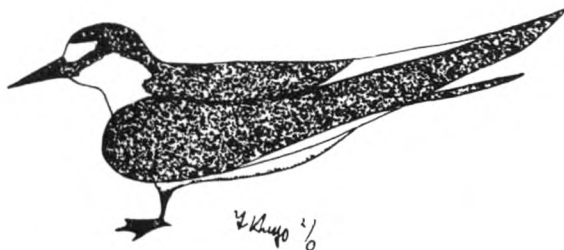
Position of ship on 13th: 29°N, 56°W.

Position of ship on 17th: 41°N, 37°W.

Southern North Pacific

m.v. *Hector Heron*. Captain A. G. Allson. Suva to Japan. Observer, Mr. F. D. Hugo, 2nd Officer.

21st July 1969. At 1515 GMT a bird flew from low on the starboard bow, over the bridge and, with a squawk, collided with the radar mast. It was found with wings outstretched on the monkey island and taken into the chart room. No injuries could be found; the bird was silent, passive and unstable on its feet though able to stand and submitted to being sketched, measured and photographed. In the hope that it was only dazed and would recover the bird was returned to the monkey island.



At 1640 the bird was still on the monkey island but tried to fly when the torch was shone on it. The length of its wings and shortness of legs made take-off impossible so it was brought and launched from the bridge wing from whence it flew upwind over the ship and disappeared eastwards.

The bird was approximately swallow-shaped with a long, thin, black beak, a small round head, black upper half, white lower half with a white forehead. Rounded body, black above, white below. Long, narrow, black wings, the wrist of which protruded in front of the body when folded. Long forked tail, black. Short legs and small webbed feet also black. Head 9 cm long. Over-all length, beak to wing tips (standing), 45 cm. Height (standing) 11 cm. Wing-span approx. 70 cm.

Position of ship (approx.): 2°N, 163°E.

Note. From the sketch and the excellent description this bird is easily identified as a Sooty Tern, a species widespread in tropical and sub-tropical seas.

INSECTS

Caribbean Sea

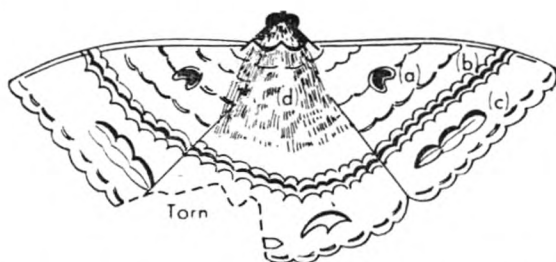
s.s. *Volvatella*. Captain C. H. Baker. Rotterdam to Puerto Miranda. Observers, Mr. M. B. Blair, 3rd Officer, Mr. P. A. James and Mr. R. G. Feacham, Supernumeraries.

6th July 1969. At about 2200 GMT, 43 miles sw of Sombrero Island, a large moth

flew on to the foredeck and settled on the underside of an open tank lid. It measured 5 inches between wing tips and $2\frac{1}{2}$ inches from head to tail. Part of a wing was torn away. The general colour of its upper side was dull olive-brown; on the outer parts of the wings there were patches and spots of gold, crimson and silvery-blue. The colours of its markings are noted in the sketch; those not described are black.

On the same afternoon a smaller white butterfly was seen on deck.

Position of ship (approx.): $18^{\circ} 05'N$, $64^{\circ} 00'W$.



- (a) Gold rim around black with turquoise speckles. (b) Black centre line on white background. (c) Upper half brown, edged with black; lower half silvery-blue. (d) 'Furry', olive-brown.

Note. Mr. A. H. Hayes of the Department of Entomology, Natural History Museum comments:

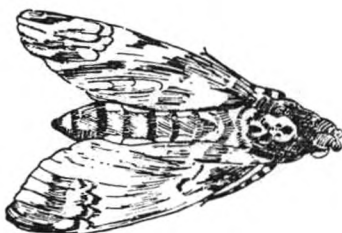
"This is *Otosema odorata* Linn., a large, common South American moth of the family Noctuidae."

South Atlantic Ocean

s.s. *Texaco Pembroke*. Captain R. S. Hawkins. Europoort to Ra's Tannūrah. Observers, the Master, Mr. P. J. Langdon, 2nd Officer and Mr. M. Gray, 3rd Officer.

15th September 1969. The enclosed moth [as drawn below, half life-size] was discovered on board at 0930 GMT. The first attempt to catch it was unsuccessful but it was caught later the same day at 1800. Acetone fumes were used to kill it. Air temp. $67.6^{\circ}F$. Wind SSE, force 3. Course 143° at 16 kt.

Position of ship: $10^{\circ} 52'S$, $00^{\circ} 14'W$.



Note. Mr. A. Watson of the Department of Entomology, Natural History Museum, comments:

"The specimen you enclosed is a Death's-head Hawk-moth (*Acherontia atropos* Linn.). The name of this moth undoubtedly stems from the existence of the skull and cross-bones pattern on the upper surface of the thorax. This species is a rare migrant to Britain but is widely distributed throughout the world where it is known to be migratory. We are most grateful to you for sending in this specimen and for the accurate data you gave us."

River Fal

m.v. *Rakaia*. Captain J. Cosker. Laid up. Observer, Mr. M. L. Martin, 3rd Officer.

9th September 1969. At 1715 GMT, while the vessel was laid up at King Harry Ferry, River Fal, Cornwall, this insect [as drawn to scale] was found in the 3rd Officer's cabin. Although having wings, it did not seem particularly inclined to fly at all.

Position of ship: $50^{\circ} 13'N$, $5^{\circ} 01'W$.



Note. Mrs. G. M. Black of the Department of Entomology, Natural History Museum comments:

"The insect sent for identification is a shield-bug, *Pentatoma rufipes* (Linnaeus). It belongs to the insect order Hemiptera, sub-order Heteroptera, family Pentatomidae. This is a common British species usually associated with oak trees, but it may be found on most of our common trees. It is said to feed by sucking the sap of the young shoots, but it probably feeds also on caterpillars, which would explain the wide variety of trees on which it is found. It lays its eggs in clusters on the leaves in August and these hatch out in September. The winter is passed in the larval stage and the bugs then mature in the following summer. *Pentatoma rufipes* is a strong flier and often flies through the open windows of houses. It is quite harmless but, like all bugs, gives off an unpleasant odour. It is widely distributed in the British Isles, though commoner in the south, and extends across Europe and Siberia to Japan.

MARINE LIFE

Southern North Atlantic

m.v. *Rievaulx*. Captain G. Murray. Vitória to Immingham. Observers, Mr. M. A. Gater, Chief Officer and Mr. J. J. Miller, 3rd Officer.

9th July 1969. The vessel was stopped between 0900 and 1800 GMT. During the morning large amounts of refuse were thrown overboard in the hope that this would attract sharks. Meat hooks were sharpened and lashed on to a 3-ft length of strong seizing wire; these in turn were made fast to a heaving line. A sharp look-out was kept by off-duty personnel and at 1500 a small Mayo shark appeared. It measured between 5 and 6 ft long with a greyish body and white-tipped fins and tail. Lumps of meat were used to bait the hooks, trailing them first below the surface. The shark was eager for the bait and, once it got hold of the meat, was very loath to part with it, being lifted clear of the water several times. Unfortunately the hook design must have been at fault as not once did it appear to worry the shark who was being well fed on prime beef!

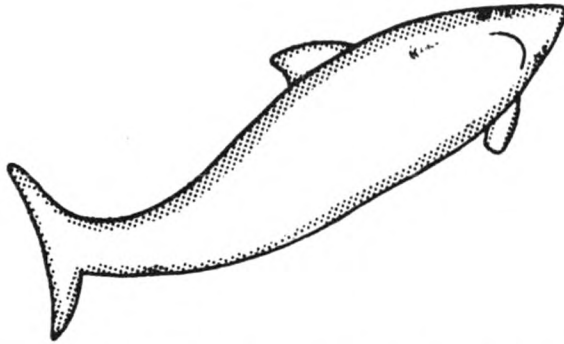
At 1800 a larger shark appeared, 8 to 10 feet long. Both sharks commenced alternate attacks at the bait. Eventually one of the sharks was hooked but the line parted and the shark swam free, though he still continued to attack the fresh bait, surprisingly oblivious of the fact that he had a large meat hook embedded in his mouth. Frantic efforts were being made meanwhile to produce a suitably-barbed hook but unfortunately, as all good things must come to an end, the engine repairs were completed and we proceeded on our way. With a supply of suitable equipment it would have been relatively easy to capture these monsters but we are, as usual, always wise after the event.

Position of ship: 9° 02'N, 25° 24'W.

North Atlantic Ocean

m.v. *Lindisfarne*. Captain H. Dishman. Immingham to Vitória, Brazil. Observers, the Master and Mr. G. D. Sandercock, Chief Officer.

20th July 1969. At 1710 GMT, in the northern approaches to Finisterre, a large fish was seen to clear the water about 40 ft from our starboard quarter. It was a good 15 ft in length, pale grey in colour with cream-coloured spots or freckles covering the upper part of its body. The tail was vertical, the nose quite pointed with a mouth



the same shape but much smaller than that of a shark. In the area near the tail its body was much thicker than that of a porpoise or shark. The general appearance of its skin was like wet rubber. Generally it fitted the description of a whale shark.

Position of ship: $43^{\circ} 42'N$, $9^{\circ} 30'W$.

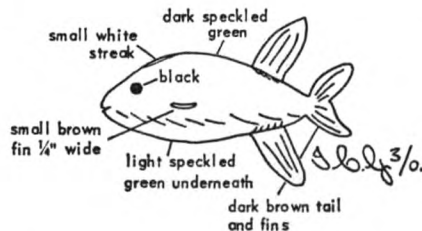
Note. Mr. G. Palmer of the Fish Section, Natural History Museum, regrets that neither the description nor the sketch gives a clear enough indication to enable him to suggest what species of shark or cetacean this may have been.

Western North Atlantic

m.v. *Crystal Jewel*. Captain F. Bawden. Salt River, Jamaica to London. Observer, Mr. I. C. Gravatt, 3rd Officer.

8th September 1969. While the vessel was stopped this small fish, approx. 5–6 inches long, was observed alongside. It remained there for well over an hour until the ship started again and it seemed quite unafraid even though several attempts were made to catch it for closer inspection. The fins on the upper and lower parts of the body were used like wings to propel the fish through the water.

Position of ship: $24^{\circ} 55'N$, $70^{\circ} 00'W$.



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

"This is probably a species of trigger fish (? *Canthidermis*) but it is not possible to be more precise."

Indian Ocean

s.s. *Makrana*. Captain J. J. Redden. Colombo to Cape Town. Observers, Mr. R. P. R. Sibley, Radio Officer, Mr. J. G. Brook, 4th Engineer, Mr. E. C. Henry, Carpenter and Mr. R. Ball, Q.M.

27th September 1969. A few minutes after noon the vessel was 130 miles from the east coast of southern Madagascar. A large shark, estimated to be 12 to 15 ft long, was observed to leap out of the water, exposing three-quarters of its length above the surface. On first sighting, a large dark back with a triangular fin, centrally placed, was seen breaking the surface about 40 yd from the starboard beam. The shark then submerged and suddenly re-appeared, shooting sideways from the water, twisting in the air as most of its body came clear until it was upside-down, back

arching so that its head was curving down towards the surface of the sea as it re-entered the water. Repeating this display several times, it was thought on one occasion to have started its leap already upside-down as it came out of the water. During each leap the bright white under-belly was exposed and the large curved mouth could be clearly seen. The head, as seen from the white underside, was squarish and 2 to 3 ft wide. The back was very dark, possibly black or dark grey, but bright sunlight was behind the shark and therefore it may have appeared darker than it actually was. The average distance from the starboard quarter of the ship during the leaps was 75 yd.

Choosing from photographs of the main shark species, all four observers gave the 'tiger shark' as a possible identification with second choice divided between the 'great white' and 'bull' sharks.

Position of ship: $24^{\circ} 18'S$, $48^{\circ} 48'E$.

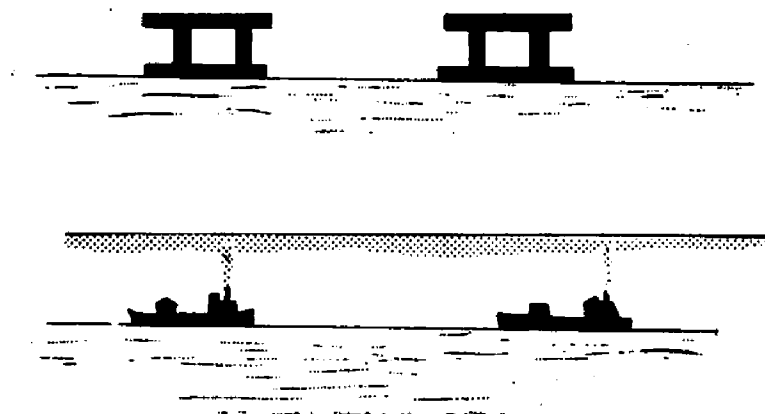
Note. Mr. G. Palmer of the Department of Zoology, Natural History Museum thinks that possibly the shark was attempting to rid itself of unwelcome parasites.

ABNORMAL REFRACTION

Cabot Strait

m.v. *Port Brisbane*. Captain A. J. Hawkins. Observer, Mr. R. W. S. Barnes, 3rd Officer.

11th July 1969. At 1230 GMT two coasters which were 9 miles away (radar range)



underwent the changes in appearance shown in the sketches, due to the effects of abnormal refraction. Air temp. $56.7^{\circ}F$, wet bulb 53.7° , sea 56.2° . Wind SE, force 2. Cloudless and clear.

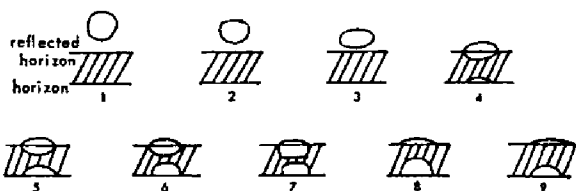
Position of ship: $47^{\circ} 24'N$, $60^{\circ} 35'W$.

Portuguese waters

s.s. *Forthfield*. Captain H. L. Park. Lisbon to Naples.

10th July 1969. While steering a course of 173° after leaving Lisbon at 1818 GMT, 4 miles off shore and approaching Cape Espichel, refraction was observed. The area stretched from the south side of the cape to some 50° on the starboard quarter and was dark in colour, having the appearance of cliffs seen through haze. The masts of two yachts in the region of the Cape were distorted to about three times their normal size and two coasters seen at the same time had erect images above them.

At 2056, with the sun approaching the reflected horizon, its shape was seen to alter as in sketches 2, 3 and 4. A second sun was seen as in sketch 5 and, as the two



approached the point of merging, they took on a rectangular appearance. The observations ended at 2106 with the sun resuming its normal shape.

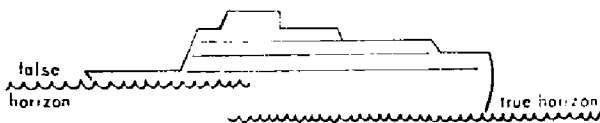
At 2130 the engine room began blowing boiler tubes and the resultant dark smoke was seen to move away from the vessel in the direction of the prevailing NNW'ly wind and at right angles to the wind over a horizontal angle of 70° . The surface wind was estimated at force 2 and the ship's speed 15 kt. At a height of no more than 140 ft the smoke rapidly moved ahead of the vessel and appeared to remain at a constant height. Smoke from other vessels was seen to have similar characteristics. Air temp. 67.5°F , wet bulb 64.1° , sea 64.1°

Position of ship at 2130: $38^\circ 08'\text{N}$, $9^\circ 20'\text{W}$.

South African waters

m.v. *City of Exeter*. Captain R. S. Steel. Port Elizabeth to East London. Observers, the Master, Mr. T. D. Parkhouse, 1st Officer and Mr. R. A. Shopland, 2nd Officer.

26th July 1969. At about 1400 GMT, while the vessel was still in Port Elizabeth, smoke from the funnel of a ship outside the port was seen to be 'layering' at about masthead height. We left port at 1418 and set course (087°) towards Bird Island. A large passenger ship was seen on the horizon, steering approx. 050° and hence crossing our bow from starboard to port. As we cleared the port a very clear false horizon could be seen ahead and this increased to cover the whole of the seaward horizon by about 1430 and, shortly after, included most of the adjacent land. This false horizon appeared to 'envelop' the passenger ship, as shown in the sketch, a condition lasting for several minutes. At the time the air temperature was 62°F and the sea 58° (from E.R. intake).



From 1430 to 1500 the shape of the passenger vessel was constantly changing in height, width and general appearance. At 1500 an inverted image of the ship appeared above the actual ship and approx. twice its size. This image lasted until the vessel was lost in darkness at a radar range of 22 miles at about 1600. The image was at all times very clear and, with binoculars, structural details were easily identified. A sextant angle between the top of the image and the true horizon was $17'$ at range 14.4 miles.

At 1515 the radar showed a circle of 'sea-clutter-like' echoes, radius $4-5\frac{1}{2}$ miles, although the sea at this time was almost flat calm. This lasted for about 45 min.

Throughout this period (1430-1600) Cape Recife Light and the surrounding sand dunes were seen to be standing high and were in sight for much longer than is normal, i.e. max. range today 26 miles approx. Bird Island lighthouse was also standing high and, for a time, had an inverted image of the island and lighthouse on top of it. When this light came on after sunset a double flash of the light, one above the other, could be seen and was visible for 10-15 min.

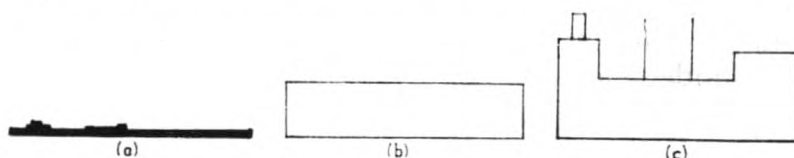
Sunset was at 1530, bearing 240° . As far as we could tell the horizon and land returned to normal as darkness fell, after 1600.

Note. The *City of Exeter* is a South African Observing Ship.

off Cape Recife, South Africa

m.v. *Glenearn*. Captain C. H. F. Hill. Colombo to Cape Town. Observers, the Master and all officers.

29th July 1969. At 0930 GMT it was seen that a ship passing 8 miles to the north



changed its shape when viewed from different decks: (a) at a height of 50 ft; (b) 40 ft; (c) 30 ft. Shortly afterwards, a vessel belonging to the same company almost passed unnoticed because its distinctive 14,000-ton shape was so altered at 6 miles to make it look like a Clyde Puffer. She, too, was to the north (i.e. landwards). By telephone it was confirmed that our shape was unchanged from her viewpoint. Air temp. 67·9°F, wet bulb 61·4°, sea 69·2°. Wind ENE, force 1.

Position of ship at 1200: 34° 06'S, 26° 18'E.

Eastern South Atlantic

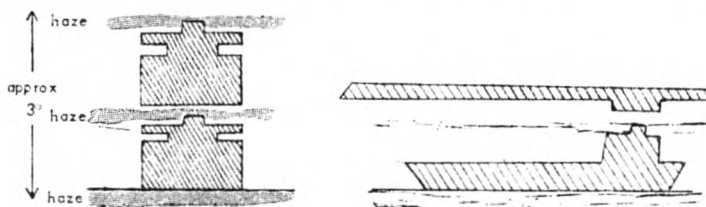
m.v. *Port Wellington*. Captain E. Arnold. Genoa to Cape Town. Observer, Mr. L. J. Dove, Jnr. 3rd Officer.

11th August 1969. At 1900 GMT the loom of Cape Columbine Light (height 264 ft, range 32 miles) was observed to rise at 87 miles' range, bearing about 120°. At that range it was possible to distinguish the characteristics of the light but not its position, due to heavy scattering of the rays in the low-level Cu. At 75 miles' range the position of the light became clear but started to appear very infrequently until, at 65 miles, the light was visible at every characteristic. During this period there was abnormal refraction present, causing ships to be visible at up to 20 miles' range with their steaming lights inverted at times, causing one light to be reflected three or four times. The lights of these vessels only became clear at 6–8 miles' range. Air temp. 63°F, wet bulb 58°, sea 59°. Cloud 2/8 Cu and 1/8 Ns. Wind E'ly, force 2. Course 144° at 15 kt.

Position of ship at 1900: 31° 42'S, 16° 25'E.

m.v. *Gloucestershire*. Captain N. F. Fitch, M.B.E. Las Palmas to Cape Town. Observers, Mr. R. R. Baker, 3rd Officer and Mr. Mohandass, Cadet.

25th August 1969. At 2040 GMT Cape Columbine Light (32° 50'S, 17° 51'E) was seen at a distance of 50 miles. The normal distance at which it is visible for a height of eye of 52 ft is 26½ miles. Ten minutes later a vessel with accommodation aft



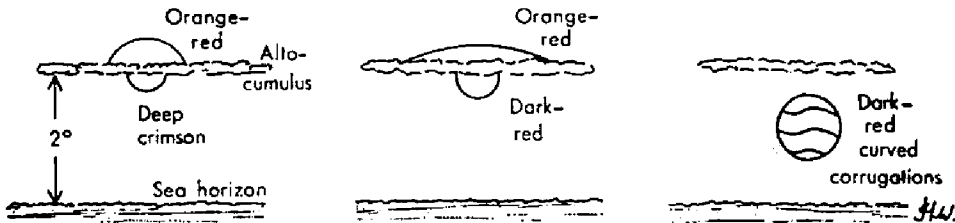
was observed 3 points on the port bow at a distance of 16·7 miles. When first observed it seemed to be some way above the horizon, hull down, with an image above it (approx. altitude of image 3°). Later the vessel appeared to have an inverted, elongated image above it. At a range of 7 miles the inverted image was no longer visible. Air temp. 60·8°F, wet bulb 58·3°, sea 53·6°. Cloud 3/8 Cb and 1/8 Ac. Course 142° at 14·2 kt.

Position of ship: 32° 01'S, 16° 31'E.

Southern North Atlantic

m.v. *Glenorchy*. Captain T. W. Willows. Las Palmas to Penang. Observer, Mr. I. T. Whale, 2nd Officer.

20th September 1969. From 1848 till 1852 GMT, shortly before sunset, the sun's disc was seen to be distorted as it passed behind a narrow band of Ac cloud which was at an altitude of about 2° above the horizon. The lower part of the disc, as it emerged from the underside of the band of cloud, appeared to have shrunk to about

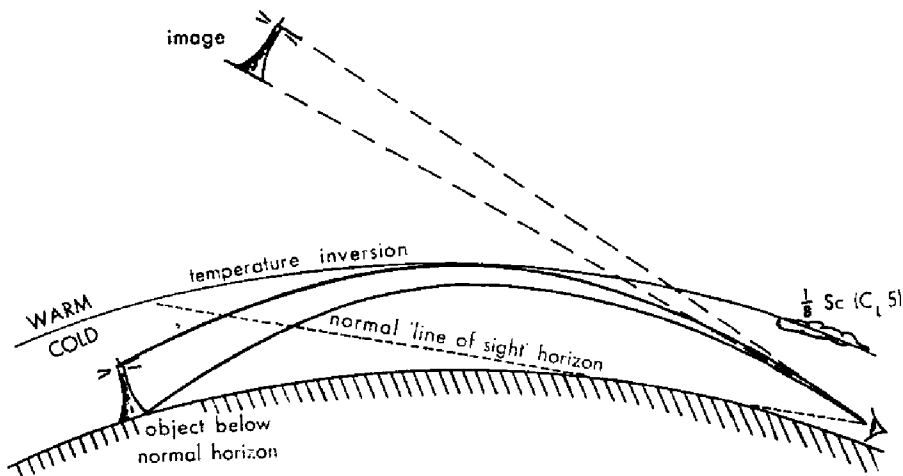


half the size of the part visible above the cloud. The colour of the lower part of the disc was deep crimson while the upper part was orange-red. As the sun continued to set the part still visible above the cloud continued to flatten and increase in diameter, while the lower part remained in the 'shrunk' state. As the sun neared the horizon it had broad wavy bands horizontally across it. Air temp. 76.0°F , wet bulb 69.8° . Wind ssw, force 3.

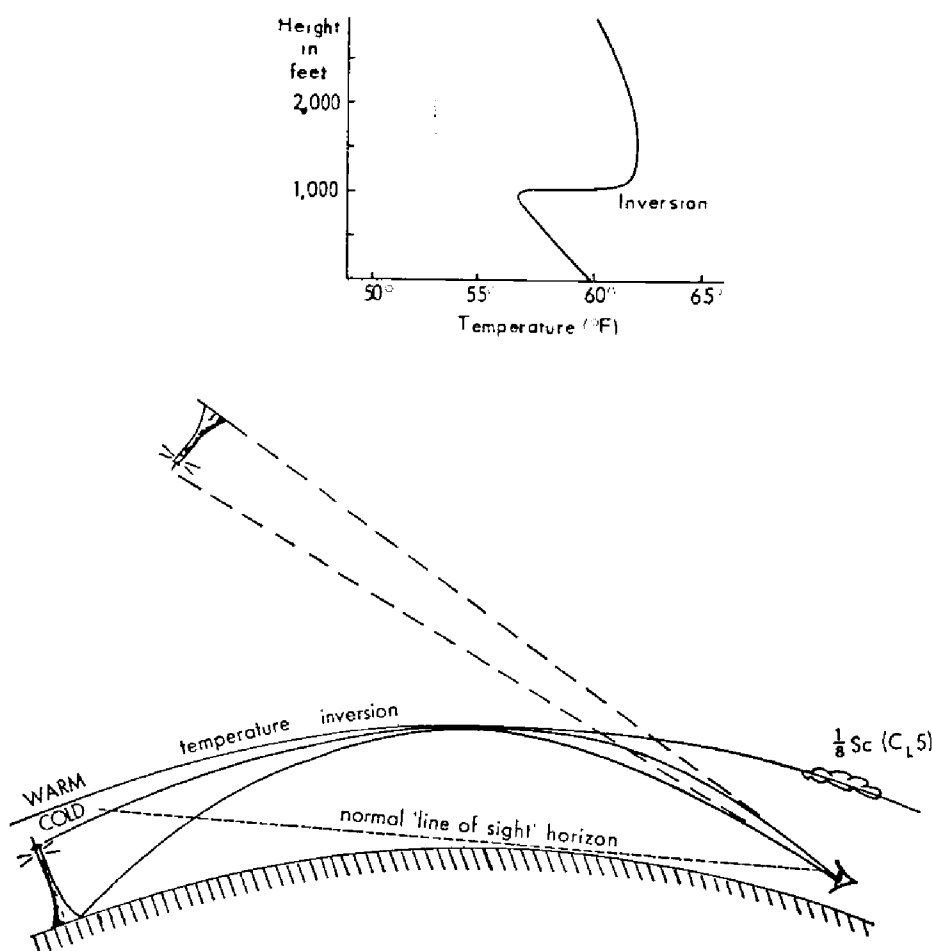
Position of ship: $6^\circ 31'\text{N}$, $13^\circ 43'\text{W}$.

Note. The various effects of abnormal refraction reported above (exceptional visibility, inverted and distorted images and even anomalous propagation of radar waves) are due to the bending of light (or radar) waves at a temperature inversion at low levels just above the earth's surface (say below 2,000 ft). These inversions are most commonly found within anticyclones where the air is slowly subsiding and, as it does so, is being warmed by compression. Thus the subsiding air, on reaching a level near the surface, is warmer than the air below this level and an inversion is formed. They are also a feature of fronts between cold and warm air masses. However, when inversions of this type occur at low level, the front is very close and the weather and visibility are usually bad so that abnormal refraction is not observed. A third type of inversion is that which forms when hot air from a heated land surface moves out over a cool sea. The hot air is cooled from below, resulting in an inversion. The report from the *Gloucestershire* is such a case. The ship lay within the influence of a non-frontal inversion, conditions which would not normally lead to abnormal refraction. However, the airstream just above the surface was moving from Cape Province, with a temperature in excess of 70°F , over a cool sea (around 54°F was reported), resulting in a well-marked inversion. A typical temperature inversion on a simple temperature/height graph is shown opposite.

Two of the most common effects of abnormal refraction are exceptional visibility, which in this context means the viewing of objects which are geometrically below the horizon, and inverted images. The following diagrams show how these effects occur.



The first illustrates exceptional visibility. The rays of light leaving the object are bent downwards at the inversion and appear to the eye to come from the position of the image.



The second shows an inverted image (object out of sight). Rays of light from the top and base of the object cross and are bent downwards at the inversion. They thus project an inverted image to the eye in the position shown. When the inversion is at a very low level, changes in the height of the observer's eye can produce remarkable effects, as in the report from the *Glenearn*. Distortion and inversion of images do occur at close range. It would seem, when viewed from bridge height, that the object should be more than 5 miles away for abnormal refraction to be observed. The two effects shown above may occur simultaneously. At times the inversion will be of a complex, laminated and slightly undulating nature, refraction occurring at each discontinuity. The pairing of images, inverted following upright, possibly repeated several times, is due to the laminated structure. The undulating nature may give rise to refraction in the horizontal as well as the vertical plane, the former resulting in elongation of the image. On most occasions the inversion will be marked by small amounts of C_{L6} or C_{L5} , by haze or by the levelling-out of funnel smoke.

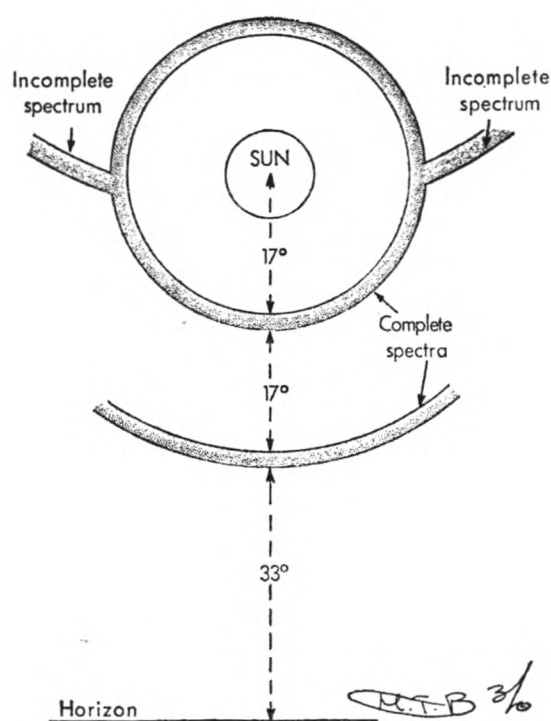
SOLAR HALO COMPLEX

Bay of Bengal

m.v. *Jumna*. Captain J. F. Ashbridge. Aden to Vishākhapatnam. Observer, Mr. M. T. Barwell, 3rd Officer.

22nd July 1969. At 0450 GMT (0950 SMT), when the sky was completely covered by a veil of C_s cloud, the halo complex shown in the accompanying sketch was observed. A strong and complete halo of 17° radius encircled the sun which was at an elevation of 67° .

All the colours of the spectrum were visible. Another partial halo was seen, which had a radius of 34° . The lowest part of this arc was at an elevation of 33° above the horizon and again all the colours of the spectrum were present.



By 0505 two arcs had formed, each extending outwards and slightly upwards from the primary halo, on opposite sides of it. The only colours seen were red, yellow and green. These gradually faded to a dim yellow at the end remote from the halo. By 0530 the complex had entirely disappeared.

Position of ship: $9^{\circ} 00'N$, $82^{\circ} 31'E$.

Note. The arcs which branch out on each side of the inner halo are part of the parhelic circle, a ring parallel to the horizon and passing through the sun. It is unusual for coloration of the parhelic circle to be reported.

GREEN FLASH

English Channel

m.v. *Rosemary Everard*. Captain W. G. Hunt. Rotterdam to Belfast. Observers, the Master and Mr. J. W. R. Daniels, 2nd Officer.

27th September 1969. At 1800 GMT the atmospheric conditions prevailing seemed to indicate that a green flash could be expected at sunset and the setting sun was duly observed through binoculars with striking results.

Visibility was exceptional with a very clear horizon and no distortion of the sun's upper limb. The green flash commenced on either side of the upper limb at the point where the sun's circumference intersected the horizon and spread rapidly inward until the two green segments met in the centre. Momentarily the upper limb itself was completely bright-green before it disappeared below the horizon.

Viewed through binoculars one did not get the impression of a green flash but rather of a rapid change of colour of the upper limb from red to brilliant green. Air temp. $59.5^{\circ}F$, wet bulb 52.6° , sea 61.6° . Wind NW, force 4.

Position of ship: $50^{\circ} 18'N$, $2^{\circ} 54'W$.

Note. The conditions favourable for observation of the green flash are that the horizon should be clear of dust and haze as well as cloud and that there should be abnormal refraction, the latter normally occurring within an anticyclone. These conditions prevailed at the time of the *Rosemary Everard*'s report. This account indicates that the phenomenon lasted appreciably longer than normal. An explanation of the green flash appears in the *Marine Observer's Handbook*.

LUNAR GREEN FLASH

South Pacific Ocean

m.v. *Otaio*. Captain F. S. Angus. Balboa to Auckland. Observers, Mr. A. J. Davies, 2nd Officer and Mr. S. Barton, Cadet.

17th July 1969. At 2020 SMT the moon was observed to pass behind a bank of cloud one or two diameters above the horizon. As it did so it became a bright orange-red in colour. At the moment of apparent moonset the centre segment faded into a faint greenish colour for a second before disappearing and the two remaining segments became elongated vertically. At this stage the diameter of the moon was about six times greater than its true size. The dark part of the moon remained clearly visible until it disappeared below the horizon at 2025.

Position of ship: $28^{\circ} 50'S$, $158^{\circ} 53'W$.

Note. Reports of the lunar green flash are rare, occurring less frequently than those of Venus and Jupiter. The effects described here indicate abnormal refraction, the bank of cloud probably occurring at the temperature inversion which had produced these effects.

ERUPTION OF DIDIKAS VOLCANO

Luzon Strait

m.v. *Westminster Bridge*. Captain E. A. A. Peirce. Muroran to Mossamedes, Angola. Observers, Mr. M. M. Reeves, 2nd Officer and Mr. J. McMullan, 3rd Officer.

23rd August 1969. At 0300 GMT the vessel passed Didikas Rock, Babuyan Islands, at a distance of 8 miles. The volcano was still active. Close to, the island appeared to be whitish-grey with smoke issuing from the summit.

Position of ship: $19^{\circ} 05'N$, $122^{\circ} 19'E$.

Note. The Didikas volcano appeared suddenly in 1856 and there had been no eruption since that date until 1952 when a fresh eruption was reported in March. Formerly there were three rocks 200 to 270 ft high but on 25th June 1952 the new volcano formed a cone 750 ft high, completely covering the three original rocks. On 12th July it was reported that the volcano was no longer erupting violently. In August 1952 the *Cameronia* and the *Tectus* reported renewed activity and on 8th November 1953 observers on the *Cingalese Prince* saw a plume of steam or white smoke rising from the centre of the island which is now estimated to be about 800 ft high.

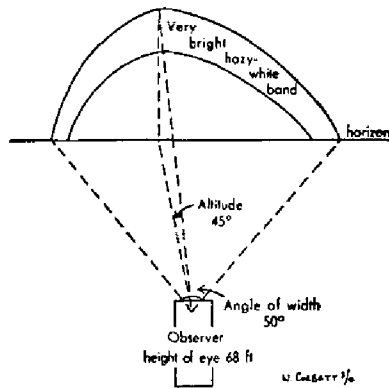
UNIDENTIFIED PHENOMENON

off Barbuda, West Indies

m.v. *Port Caroline*. Captain R. A. Holmes. Balboa to London. Observers, Mr. D. W. Lax, 3rd Officer, Mr. I. M. Graham, Jnr. 3rd Officer and Mr. H. B. Hughes, Radio Officer.

22nd August 1969. At 0030 GMT a large, luminous area, the centre bearing of which was 310° , was seen to be rising above the horizon (as in sketch). It increased in size and altitude and started to assume a well-defined crescent shape. Although the night was bright with moonlight there was marked difference in the degree of darkness along the horizon in the vicinity of the luminous crescent, the sky being noticeably less bright. At 0037 the glow seemed to decrease in intensity although the crescent was increasing in size and in altitude. When an altitude of about 80° was attained the crescent could no longer be seen. The moon bore 210° and had an altitude of $44^{\circ} 43'$ at 0035. Course 043° at 22 kt. Cloud, 2/8 Cb in patches.

Position of ship: $17^{\circ} 36'N$, $61^{\circ} 00'W$.



Note. This report from the *Port Caroline* is similar to those from the *Otaio* and the *Port Victor* appearing in the January 1970 edition, though at a different time of year. Bearings plotted from the three reports result in a small 'cocked-hat' well to the northward of Puerto Rico and well to the eastward of Cape Kennedy rocket-firing ranges. High atmosphere or space-rocket experiments would appear to be the most likely explanation of these reports.

AURORA

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

"The accompanying list summarizes briefly the auroral reports from observers in British ships which have been received at the Balfour Stewart Auroral Laboratory of the University of Edinburgh for the period July–September 1969.

"Activity during the three months worked up to a climax at the end of September. Only one sudden outburst on 26th/27th July broke the calm of that month and rays were seen at similar geomagnetic latitudes in the Western Atlantic and U.K. The mean activity for August was the same as for July but longer hours of darkness and/or less cloudy conditions allowed for rather more observations.

"September lived up to its reputation for an equinoctial increase and alternating periods of low and medium geomagnetic activity culminated in three days of sustained activity from 28th to 30th. The number of reports for the month bears witness to the fact that aurora was very active in the auroral belt but visible at U.K. stations on disappointingly few occasions. We received many truly excellent reports and sketches—that for 29th/30th from Officers of O.W.S. *Weather Surveyor* being particularly worthy of mention. All the sketches sent with the reports are very valuable to us.

"Analysis of satellite observations is, so far, providing a good check on the general theories of auroral displays, built up after years of widespread ground observations. The great advantage of not having to contend with adverse weather conditions is probably somewhat offset by the frustratingly brief view of only one section of the auroral oval at a time. But these are yet early days.

"We thank you all again for your help."



Captain R. Maybourn, the author of the article on page 110, standing on typical old ice in the McClure Strait. The Canadian ice-breaker *John A. Macdonald* is seen in the background.



Photos by courtesy of the British Petroleum Co. Ltd

The *Manhattan* temporarily stuck in McClure Strait. The ice at the bow, over 14 feet thick, was eventually penetrated by repeated ramming manoeuvres (see page 110).

(Opposite page 109)

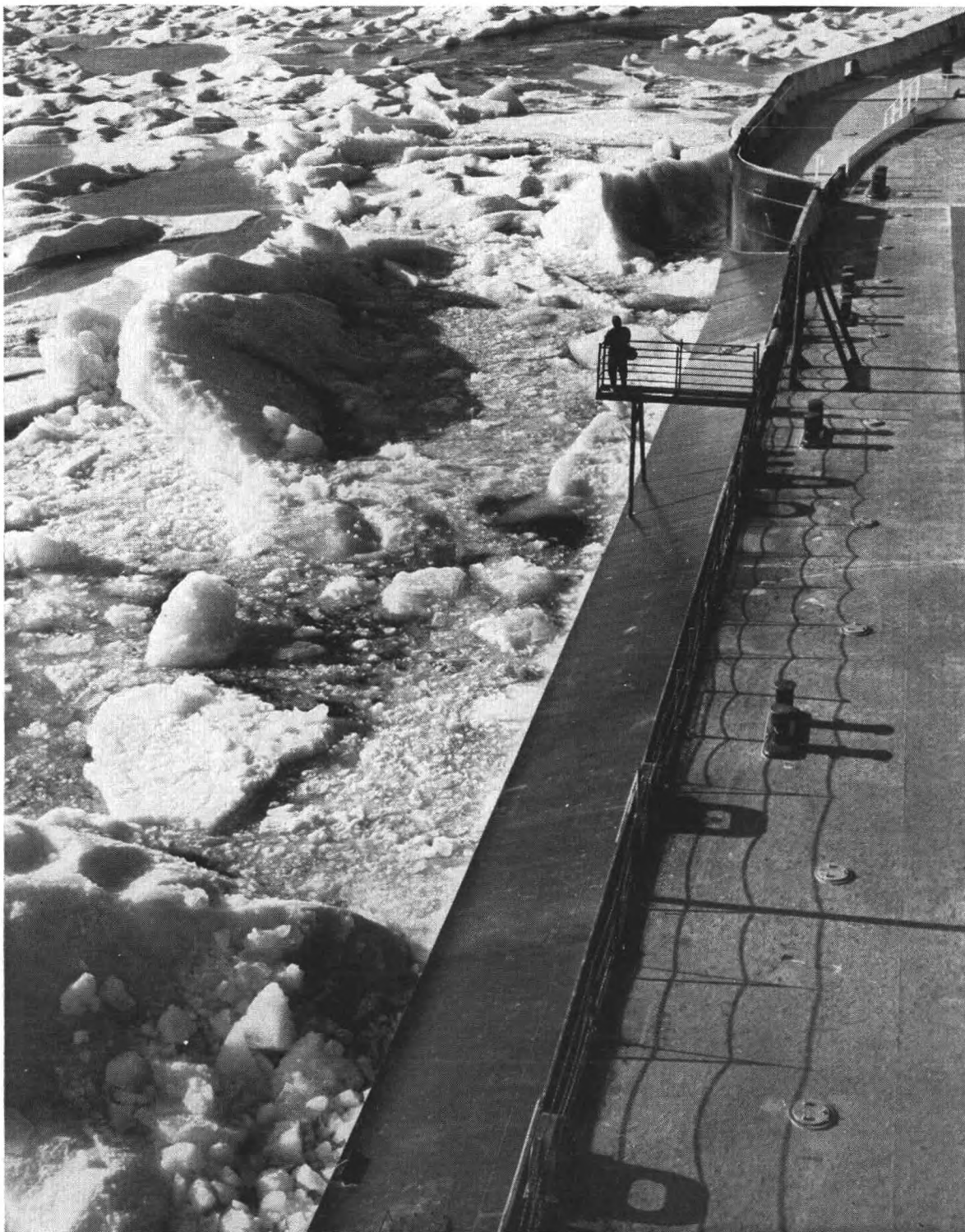


Photo by courtesy of the British Petroleum Co. Ltd.

Part of the *Manhattan's* specially-designed bow. The 9-foot wide ice belt protecting the hull is seen outside the rails lining the original ship's side (*see* page 110).

DATE (1969)	SHIP	GEOGRAPHIC POSITION		Λ	Φ	I	TIME (GMT)	FORMS
24th Mar.	<i>Alaunia</i>	40°50'N	64°20'W	010	52	+71	0200-0230	N
27th July	<i>Weather Reporter</i>	57°22'N	13°50'W	070	62	+71	0100, 0140	HB, RB
	<i>Scythia</i>	48°22'N	46°22'W	030	59	+71	0455-0525	RR, N
19th Aug.	<i>Ribblehead</i>	63°38'N	03°42'E	100	65	+74	2210-2305	HB, RA, SB, RR, V, P, N
21st	<i>Weather Surveyor</i>	59°07'N	18°28'W	070	65	+72	2307-2400	P, N
24th	<i>Weather Adviser</i>	61°12'N	29°25'W	060	70	+76	0050-0500	HA, N
25th	<i>Weather Adviser</i>	61°43'N	32°00'W	060	70	+76	0330-0420	RB
26th	<i>Weather Adviser</i>	61°54'N	32°30'W	060	70	+76	0345-0500	N
		62°00'N	32°06'W	060	70	+76	2350	RB
2nd Sept.	<i>Weather Adviser</i>	61°54'N	33°12'W	060	70	+76	0550	N
5th	<i>Cape Franklin</i>	57°30'N	28°25'W	060	65	+73	0300-0400	HA
	<i>Weather Adviser</i>	62°04'N	32°47'W	060	70	+76	2240-2400	HB, RB
	<i>Weather Reporter</i>	59°01'N	19°15'W	070	65	+72	2245-0130	HB, RB, R, P
6th	<i>Gothland</i>	51°00'N	58°00'W	020	62	+76	0001-0600	HA, RA
7th	<i>Gothland</i>	53°00'N	52°00'W	020	64	+75	0015-0650	HA, HB, RA, RB, N
	<i>Weather Adviser</i>	62°07'N	33°08'W	060	70	+76	0200-0500	HB, RB, N
8th	<i>Gothland</i>	55°00'N	46°00'W	030	65	+74	0001-0600	N
	<i>Weather Reporter</i>	59°09'N	19°22'W	070	65	+72	0001,	HB, P
	<i>Dukesgarth</i>	50°24'N	59°00'W	010	62	+75	0300, 0400	N
	<i>Weather Adviser</i>	62°03'N	32°56'W	060	70	+76	0145-0730	HA, RA, RB, RR, P
	<i>Manchester Courage</i>	54°18'N	50°03'W	030	65	+75	0300-0530	RB, RR, N
9th	<i>Gothland</i>	56°30'N	40°00'W	040	66	+74	0500-0600	RB, RR
	<i>Weather Adviser</i>	62°56'N	32°48'W	060	70	+76	0001-0500	N
		62°03'N	33°16'W	060	70	+76	0100	RB
	<i>Weather Reporter</i>	59°13'N	18°43'W	070	65	+72	2240-0500	HB, RA, RB, RR, N
10th	<i>Weather Reporter</i>	59°01'N	19°09'W	070	65	+72	2330-0030	P
11th	<i>Weather Adviser</i>	61°50'N	33°14'W	060	70	+76	0350	HB
	<i>Northern Reward</i>	66°54'N	24°16'W	070	73	+77	0100-0600	RB, RR, V, P, N
12th	<i>Weather Reporter</i>	59°02'N	18°55'W	070	65	+72	2335-0027	HB, RR
	<i>Cape Franklin</i>	54°48'N	45°30'W	030	65	+74	0130-0330	P
13th	<i>Weather Adviser</i>	61°50'N	33°09'W	060	70	+76	0300-0615	HA, RB, RR, P
14th	<i>Weather Adviser</i>	61°40'N	32°23'W	060	70	+76	0600	SB
	<i>Manchester Courage</i>	54°23'N	44°28'W	030	64	+73	0445	N
15th	<i>Nova Scotia</i>	51°08'N	41°05'W	040	61	+71	2345-0139	HA, RA, RR, P, N
	<i>Weather Reporter</i>	58°51'N	18°59'W	070	65	+72	0130-0305	HA, RA, RB, P, N
	<i>Northern Reward</i>	70°22'N	17°13'E	120	68	+78	0200-0430	HA, HB, RA, RR, P
	<i>Weather Monitor</i>	60°22'N	25°15'W	060	67	+74	1700-0010	HB, RB
16th	<i>Weather Adviser</i>	61°51'N	32°50'W	060	70	+76	2325-0155	All forms
17th	<i>Weather Reporter</i>	58°59'N	18°42'W	070	65	+72	0001-0500	HB, RR
	<i>Weather Adviser</i>	59°30'N	21°06'W	070	66	+74	0001-0500	RB
	<i>Weather Monitor</i>	62°00'N	33°00'W	060	70	+76	2300	HB
18th	<i>Cape Franklin</i>	53°40'N	50°00'W	030	64	+74	2320	RB, RR
	<i>Weather Monitor</i>	62°01'N	33°08'W	060	70	+76	0200-0500	RB, P
	<i>Ross Orion</i>	72°10'N	28°00'E	130	68	+79	0218-0250	HB, N
	<i>Weather Monitor</i>	62°00'N	33°33'W	060	70	+76	2100-2130	HB, RB, RR, P
20th	<i>Weather Reporter</i>	58°59'N	18°42'W	070	65	+72	2245-0500	All forms
	<i>Weather Monitor</i>	61°54'N	33°35'W	060	70	+76	0030-0400	HB
21st	<i>Weather Monitor</i>	61°38'N	33°20'W	060	70	+76	0050-0450	N
23rd	<i>Weather Monitor</i>	61°45'N	33°29'W	060	70	+76	2150-0300	HA, HB, RA, RB, RR
25th	<i>Ribblehead</i>	70°45'N	21°00'E	120	68	+78	2150	RB
27th	<i>Kingston Pearl</i>	73°50'N	20°00'E	120	70	+79	0125	HB
	<i>Weather Monitor</i>	61°57'N	32°52'W	060	70	+76	2000	HB
28th	<i>Weather Monitor</i>	61°55'N	32°26'W	060	70	+76	2140-0100	RB, RR, P, N
29th	<i>Kingston Pearl</i>	70°30'N	33°00'E	130	65	+78	2145-0030	HB, RA, RB, RR
	<i>Weather Surveyor</i>	59°02'N	18°35'W	070	65	+72	1800	A
	<i>Weather Monitor</i>	62°12'N	32°40'W	060	70	+76	2210-0330	HA, HB, RA, RR, P, N
							2230-2245	HA, RB

KEY: Λ = geomagnetic longitude; Φ = geomagnetic latitude; I = inclination; HA = homogeneous arc; HB = homogeneous band; RA = rayed arc; RB = rayed band; R(R) = ray(s); P = Patch; V = Veil; S = striated; N = unidentified auroral form.

The *Manhattan* and the North-west Passage

BY CAPTAIN R. MAYBOURN
(Chief Marine Superintendent, B.P. Tanker Co. Ltd.)

The voyage of the *Manhattan* through the North-west Passage in September and October last year opened up for the first time the possibility that commercial shipping routes could be developed in the Arctic on a year-round basis. Hitherto, even in the North-east Passage across the top of Russia, only limited operations have been sustained and these have been in the summer and, generally, with substantial ice-breaker support. It seems very likely that the mineral resources of Alaska, northern Canada, the Canadian Arctic islands and, possibly, Greenland will prove to be so immense that there will be ample incentive in the next decade to design tankers and large bulk carriers with an ice-breaking capability so that these resources may be exploited. The Arctic environment is, however, forbidding to say the least and these ships are unlikely to resemble any ships currently in service so far as their strength and power are concerned.

What is the Arctic really like? There is probably no simple answer as one's view of it is coloured by one's reasons for being there. The seaman, however, is likely to think of it in terms of icebergs, pack-ice, total darkness in winter and bitter cold. It is certainly like this for much of the time but there are periods in the summer when the climate is almost temperate and mosquitoes can make life unbearable.

The route from the Atlantic to the Pacific, from southern Greenland to the Bering Strait, is about 3,000 miles long and has three quite distinct sections which set the Arctic navigator rather different problems to solve (see Fig. 1). In winter the whole of this route is heavily encumbered with ice but in summer severe ice conditions may exist over as little as 1,000 miles. Coming from the Atlantic the first area is Baffin Bay extending up to latitude 74°N where the entrance to Lancaster Sound marks the passage through the islands. The climate here seems to have been less severe at one time as there is evidence that the Vikings penetrated even further north than this in the eleventh century. Today, however, there are few inhabitants and these are mostly connected with the early-warning radar stations. Even in summer there is sometimes a lot of pack-ice in Baffin Bay but it tends generally to lie on the western side near the coast of Baffin Island. The Greenland side is the breeding ground of the icebergs which later find their way to the Great Bank, the North Atlantic shipping routes. They form mainly in two areas, Disko Bay at 70°N and Melville Bay at 76°N , where there are many massive glaciers. How many are formed is a matter for conjecture but a count from aerial photographs in 1949 suggested the number could be as high as 40,000 in one season. They travel firstly north, the seasonal maximum for Melville Bay is late summer, and the southward migration in the grip of the cold Labrador Current is at its peak in late autumn. At this period, also, ice forms in substantial quantities on the sea, rapidly at first but at a decreasing rate through the winter since the ice itself forms an insulating barrier between the freezing air above and the warmer water below. Growth is, perhaps, 24 inches by the end of November, 40 inches by the end of January, 50 inches by the end of March and at a maximum of around 60 inches in May. The area of ice-cover varies little despite year-to-year variations in the weather but its thickness does vary between severe and mild winters. This difference is less than might be imagined, however, and would not affect the problems of ice navigation significantly. For example, an area having an annual growth of about 80 inches would still acquire about 72 inches of ice even though daily temperatures averaged 15°deg F above normal over a period of three months. All things considered, icebergs are likely to be the main problem in Baffin Bay as they will be difficult to detect in the total darkness of winter when the sea is completely covered with pack-ice.

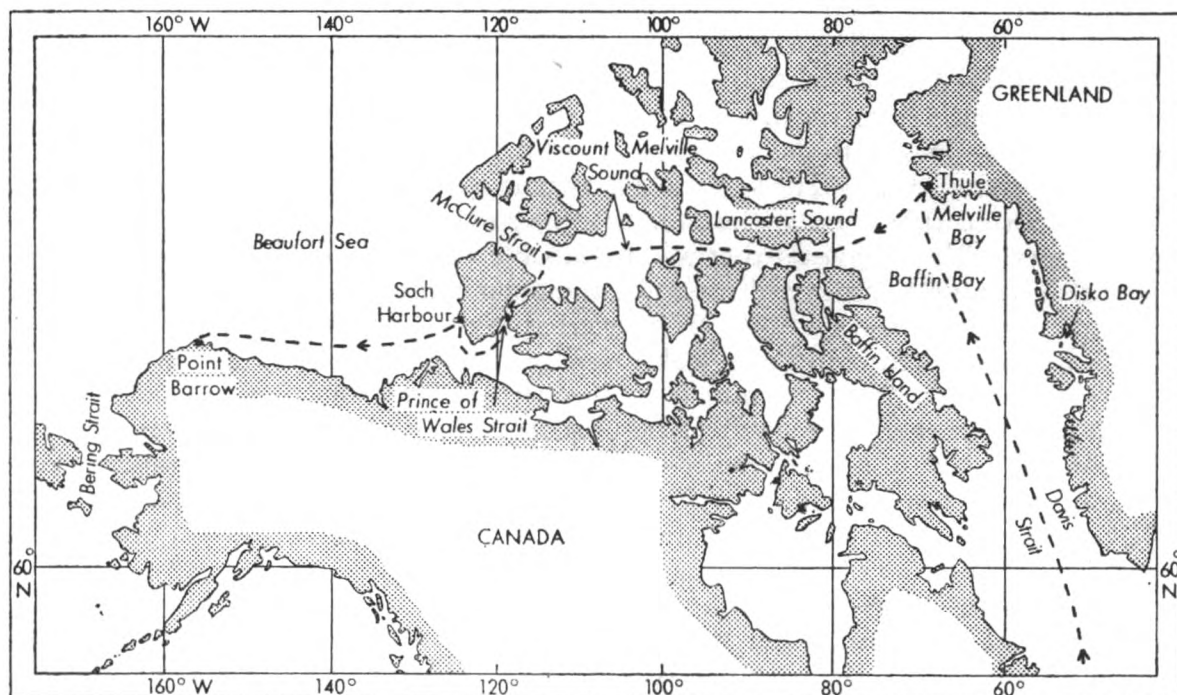


Fig. 1. The route taken by the *Manhattan*.

The second area comprises the channels through the Arctic islands to the Beaufort Sea. They are many and the early explorers favoured those to the south which follow the north coast of the Canadian continent. The first transit by a single vessel—Amundsen's voyage in the 47-ton *Gjoa* in 1903-6—was by this route. This was because the narrower channels tend to melt earlier due to the warmth of the adjacent land masses in summer but they are also rather tortuous with shallow water in parts. The route followed by the *Manhattan* was due west through Lancaster Sound, Viscount Melville Sound and the Prince of Wales Strait. The McClure Strait leading direct to the Arctic Ocean was attempted but could not be forced. In the narrower channels much of the ice in winter is 'land-fast', that is to say it is attached to the sides of the channels and, therefore, fixed. In Lancaster Sound and Viscount Melville Sound it is subject to wind and current action and always on the move.

With winter temperatures falling as low as -60°F ice forming on open water can grow to about 84 inches in a single season. Where it is affected by wind action, pressure ridges may form as one ice mass presses against another and the masses of broken ice so formed can be as much as 100 feet from top to bottom, perhaps 20 feet above sea level and about 80 feet below. Ice formed in winter contains appreciable quantities of brine but as it grows older this brine leaches out and the ice becomes very much stronger. What is known as multi-year ice (more than two years old) is virtually salt-free, very hard and a most magnificent blue in colour when broken. It is this older ice which is found in large floes often several miles in diameter which are the main problem to shipping. They take typically 4 to 7 years to grow after which they maintain their form unless driven into warmer waters where they may melt. Ice having grown to about 7 feet in the first winter will diminish to perhaps 4 feet the following summer after which it will increase in thickness again. The growth will be less the following winter and after a small number of years it will reach a maximum thickness where the loss in summer is matched by the growth in winter. The ice is not permanent, however, as the upper 2 feet or so are lost each summer so that no part of the ice is likely to exceed about 7 years in age. Due to ridging and hummocking, however, these old floes are very irregular in thickness and can be as little as 2 or 3 feet thick in places with ridges 20 feet or more thick only a short distance away.

After leaving the channels through the islands, one enters the Beaufort Sea. This is part of the Arctic Ocean which is covered by a roughly circular mass of pack about 2,000 miles in diameter. From Alaska to north-west Europe via the Arctic Ocean is only about 3,500 miles. This vast area of ice is always on the move in a clockwise rotation about the Pole and, due to this movement, has approximately 10% open water. Wally Herbert, in his recent journey on foot across the Arctic Ocean, reported that even at the Pole the average ice thickness measured was only about 8 feet which suggests that a ship capable of using the North-west Passage might also be able to cross to Europe by the polar route. There are problems, however, due to the pressure which can be exerted at the lines of convergence between two ice masses which could grip a ship and prevent it moving. These are transient conditions which might last only a day or two but which, although accepted as normal by icebreakers, are likely to be unacceptable to a merchant vessel trying to maintain some sort of a schedule. It seems likely, also, that ridging and hummocking in the Beaufort Sea will be more frequent and more severe than in Viscount Melville Sound so that the final leg of the route along the Alaskan coast will prove to be the most difficult.

It became very apparent during *Manhattan's* voyage that ice conditions are far from uniform and that when the wind is driving the ice before it and making conditions difficult there may be areas up wind when conditions are, temporarily at least, much easier. Much information is currently gathered on the ice situation from satellites in the same way that weather information is obtained. The *Manhattan* Project took advantage also of local reconnaissance provided by aircraft of the U.S. Navy and the Canadian Department of Transport. The techniques employed were novel and of great interest. The primary tool was side-looking radar which scanned the ice for about 10 miles either side of the aircraft and, by using electronic focusing techniques, a detailed picture of the topography of the ice surface was obtained. Infra-red photography and a laser were also employed and the results obtained from each flight were parachuted on to the ice for recovery by *Manhattan's* helicopter and analysis on board. These techniques will undoubtedly be improved to the extent that navigators of the future will be able to assess for themselves which are the most suitable tracks to follow to avoid the more difficult ice conditions.

To take advantage of high-quality reconnaissance, whether in winter with its total darkness or summer with its frequent fog and overcast skies, a very high standard of navigation will be necessary both by the ship and by the aircraft collecting the data. The *Manhattan* relied on the recently declassified Navy Navigation Satellite System which enables positions to be obtained from any of four satellites revolving round the earth in polar orbits. Each satellite transmits about every 108 minutes and fixes in high latitudes can be obtained at intervals of an hour or less. This very sophisticated system was backed up by a doppler sonar system so that the associated computer was able to provide a position every five minutes with an accuracy of the order of a few hundred yards. It is unlikely, however, that a system of this refinement would be required by vessels trading in Arctic waters if a medium-range radio-system such as Decca or Loran were to be provided covering the navigable routes. Experience with unmanned stations in northern Norway suggests that the Arctic winter need be no impediment to such a development but problems could possibly arise in the vicinity of the North Magnetic Pole where radio interference is common.

Radar is also an extremely valuable tool for the Arctic navigator even though there is evidence that ice does not always show up on the PPI. Our problem on the *Manhattan* was rather the reverse in that it was difficult to interpret what sort of ice was being shown but even here, with experience, we were often able to identify old polar floes in an area of broken pack-ice. The greatest hazard would probably arise in areas where large bergs are to be found in 10/10 ice cover, as even a well-designed ice-breaking tanker could not afford to run into an iceberg of any size. One possible development which would assist in this situation is a horizontally-beamed

sonar which might be able to detect the large underwater mass of a berg at a considerable distance.

The *Manhattan* was extensively modified for her assault on the North-west Passage at a cost in the region of \$40 million but, even so, she fell far short of having the capability to navigate in Arctic waters on a year-round basis. She was intended as a research vehicle to obtain the necessary data to enable a realistic design study to be made and bulk carriers for Arctic service are likely to have twice her displacement and three times her power. The major modifications were to her hull. A specially-designed bow with a stem raked to only 18 degrees above the horizontal and massively built replaced the original bow and ice belts were added to her sides (see photographs opposite pages 108 and 109). These ice belts which were 9 feet in width and about 25 feet in vertical extent were attached outside the hull with their upper edges 10 feet above the water line so that adequate protection was provided for the areas in contact with the ice. To resist ice pressure the internal structure of the ice belts was carried through the cargo tanks and secured near the keel. Additionally, special propellers were made to replace the originals and protection was provided for the rudders. Extensive instrumentation was fitted so that measurements from strain gauges in the hull, thrust, horsepower and so on could be recorded on magnetic tape whenever required.

There seems little doubt that as a result of the information gained from the voyage commercial operations in the Arctic are now much nearer reality than seemed possible a year ago. The problems having been better identified, a solution can be found and, without in any way minimising the problems of Arctic navigation, it seems that properly-trained personnel using well-designed ships should be able to navigate Arctic waters in safety and with acceptable regularity so as to make commercial exploitation possible in the not-too-distant future.

The Anatomy of a Casualty—the loss of the *Wahine*

By A. N. COCKCROFT
(Extra Master Mariner)

(This article is reproduced from *Safety at Sea International*, No. 17, 1970 by kind permission of the Editor-in-Chief.)

The passenger ship *Wahine* was built by Fairfields of Glasgow for the Union Steam Ship Company of New Zealand. She was delivered to her owners in June 1966. Her length was 440 feet and her gross tonnage 8,948. Turbo-electric machinery and twin screws gave her a cruising speed of 17 knots with a maximum of 22 knots. Accommodation was provided for 924 berthed passengers.

The *Wahine* arrived at Wellington, New Zealand in August 1966 to begin service as a ferry between the ports of Wellington and Lyttleton. In that service she usually made six overnight trips per week, three in each direction, sailing at approximately 2000 and arriving at 0700 the following morning.

On 9th April 1968, the *Wahine* left Lyttleton on what was to be her last voyage. She carried 123 crew, 610 passengers and a stowaway. In addition there were 74 motor cars and a number of other vehicles aboard.

On 5th April a tropical cyclone had developed near the Solomon Islands. Storm warnings were issued to shipping on the 6th as the disturbance moved southwards with its centre passing to the west of the New Hebrides. By 1800 on the 9th the centre was about 30 miles to the east of Cape Reinga—the northern tip of North Island—apparently moving south-east at about 20 knots.

Gale warning

Messages broadcast by radio-telegraph during the night and early morning gave warning of southerly gales in the area of Cook Strait but the centre was forecast to pass well to the east of Hawke Bay. However, the depression accelerated and intensified during the night and its centre passed the eastern entrance to Cook Strait at 1000 on 10th April. Between 0900 and 1200 on the 10th the mean wind speed at Wellington Airport exceeded 70 knots, gusting to more than 100 knots, giving the most severe weather conditions that have ever been instrumentally recorded in New Zealand.

The voyage of the *Wahine* was uneventful until she reached Cook Strait. At 0400, when the vessel was about four miles south of Cape Campbell, the weather was recorded in the log as "overcast with continuous heavy rain, rough sea, moderate to heavy swell, moderate visibility". The wind was south-south-west, Force 8.

At about 0500 Beacon Hill Signal Station was called on VHF. The *Wahine* was informed that the wind was southerly, Force 10, and that a tug would be standing by at 0630. The Master came to the bridge at 0545. He was not worried about the weather as he thought the centre was well to the east and that there would be no further increase in wind speed.

Baring Head was abeam at approximately 0600. Engines were reduced to half speed just before passing Pencarrow Head (see Fig. 1) at about 0610. As the vessel approached the narrow waters between Barrett Reef and the mainland the wind speed was between 60 and 75 knots (Force 11–12). Visibility was very poor due to heavy rain. At this point the radar broke down.

Shortly after passing Pencarrow the ship sheered about 20–30° to port. The Master ordered the helm to be put hard to starboard but this had no effect. Full Ahead was rung for both engines at 0613. Despite the extra power the vessel continued to swing to port so the Master decided to put the starboard engine full astern. At this moment the *Wahine* rolled heavily to starboard, flinging the Master

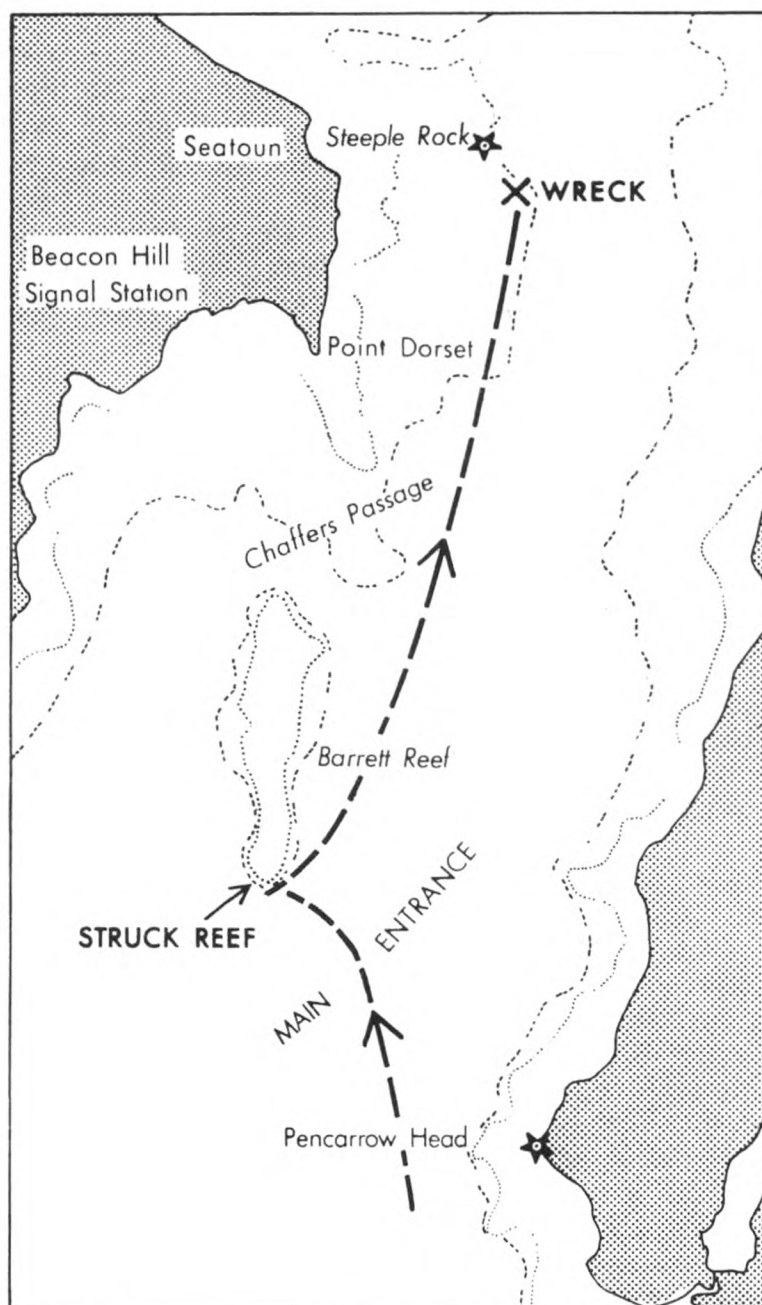


Fig. 1. Chart showing where the disaster occurred in the approaches to Wellington Harbour.

across the bridge to the starboard wing, a distance of 74 feet. He recovered and decided to continue the turn to port to get the vessel heading out to sea.

For the next half-hour, in winds of hurricane force and in zero visibility, the Master continued his attempts to get the *Wahine* round, head to sea, so as to get more sea room but he was not successful. At 0641 the starboard quarter of the vessel struck the south-west extremity of Barrett Reef.

The Master closed the watertight doors and ordered both anchors to be let go. The starboard propeller was lost and within a few minutes the port engine failed. Because of the exceptional weather conditions it took approximately 20 minutes for the Chief Officer and Boatswain to make their way forward, take off the compressors and devil's claws and let the anchors go. It was intended to pay out six shackles on each cable but the brakes would not hold and the cables ran to their full extent.

After the anchors had been let go the *Wahine* came clear of the reef into the eastern entrance to Chaffers Passage. The wind was now south-south-west, Force 12, and the vessel lay head up to it, gradually dragging her anchors.

Immediately after the vessel struck a VHF message was sent to Beacon Hill reporting that the vessel was ashore on Barrett Reef. The harbour-master, at his home in a Wellington suburb, was informed by telephone at 0643. He directed the deputy harbour-master, and the second and third pilots, to go to Queen's Wharf to prepare pilot launches. The signalmen had already directed the tug *Tapuhi* to proceed to the *Wahine*.

On the Master's orders the Purser informed the passengers that the vessel had struck the reef but there was no cause for alarm. They were told to go to their cabins, don their life-jackets, then go to B deck. Within about an hour all passengers had mustered as instructed and there was no sign of panic.

Flooding

When the Chief Officer returned to the bridge after letting go the anchors he was ordered by the Master to take charge of preparing life-saving equipment. Life-rafts were cleared away and placed along the ship's side with painters made fast to the rail. Lifeboats were also prepared.

About 0730, when the life-saving appliances had been attended to, the Chief Officer began to check the damage. It was found that there was flooding in four compartments including the machinery space and the steering flat. Meanwhile the Master had been trying to estimate the increase of draught. The mean draught for entering Wellington would have been just over 17 feet. After striking the reef it was found to be about 22 feet, but it stayed at this figure for several hours.

As the *Wahine* continued to drift to the north, dragging her anchors, the Master became concerned at the risk of the vessel grounding on the rocks off Point Dorset. She was swinging through about 100° at the end of her cables. At 0830 the engine-room staff were called up on deck as it seemed as if the vessel might be wrecked at the next swing. Fortunately the danger receded, and at about 1000 the engineers were able to return to the engine room to raise steam for the auxiliaries.

The pilot launch, with the deputy harbour-master on board, had put out to sea and got to a position just south of Steeple Rock by 0830. High seas and nil visibility caused her to retreat to Seatoun. The wind reached its maximum strength of 80 knots gusting to 100 knots, at about 0900. Meanwhile the tug *Tapuhi* had come up from the Point Halswell area and at approximately 1100 the tug and launch put out from Seatoun. By this time the *Wahine* had reached a position just south of Steeple Beacon and was only dragging her anchors very slowly.

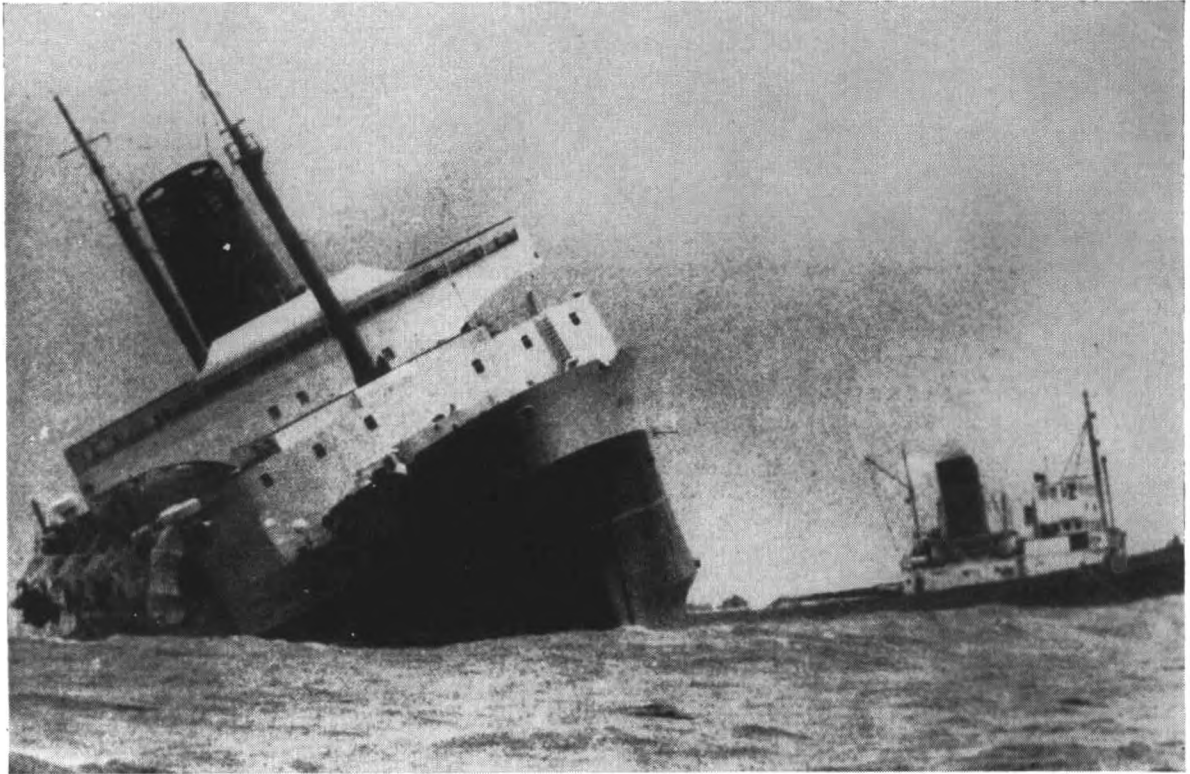
The *Tapuhi* approached the *Wahine* in the very heavy seas and by excellent seamanship managed to get a rocket line across. A 4-inch towing wire was hauled over to the ferry by hand as there was no power on the windlass. It was made fast at about 1150. The Master proposed to shorten his starboard cable, and possibly the port one, so that the tug could tow the *Wahine* into harbour, assisted by wind, sea and tide. Unfortunately, as the slack was being taken up, a heavy sea caused the tug to lurch away from the ferry and the wire parted.

Damage check

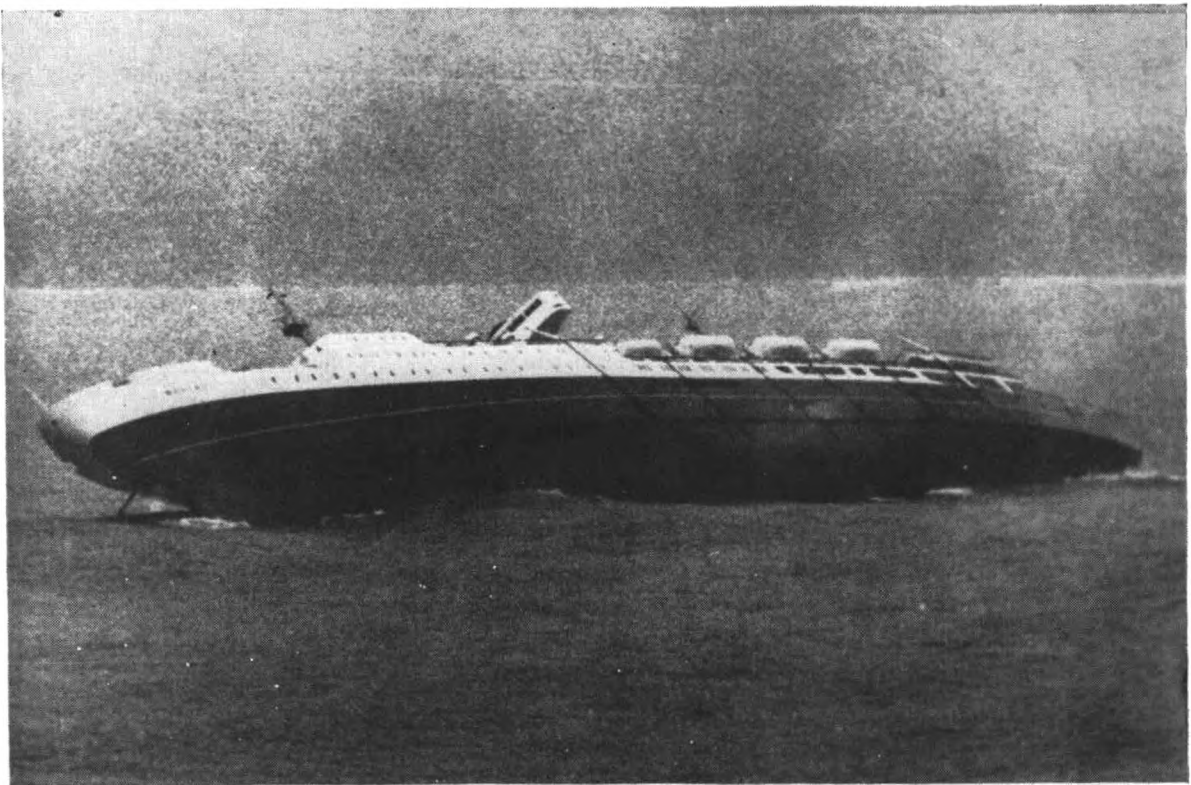
At approximately 1215 the pilot launch managed to approach close enough to the *Wahine* for the deputy harbour-master to jump on to a lifeboat ladder and climb aboard. He went to the bridge to assist the Master.

When the Chief Officer made his inspection of the damage after the grounding he noticed a small trickle of water coming from the steel door to the steering compartment on to the vehicle deck, but attached little importance to it. The Chief Engineer noticed little water there at 0900. At some time after 1000 water was noticed coming on to the vehicle deck through the ventilators from the compartments below and attempts were made to plug the ventilators with sacks, canvas and other

(Opposite page 116)



An attempt was made to tow the heavily-listed *Wahine* to Wellington Harbour but the wire soon parted (see page 114).



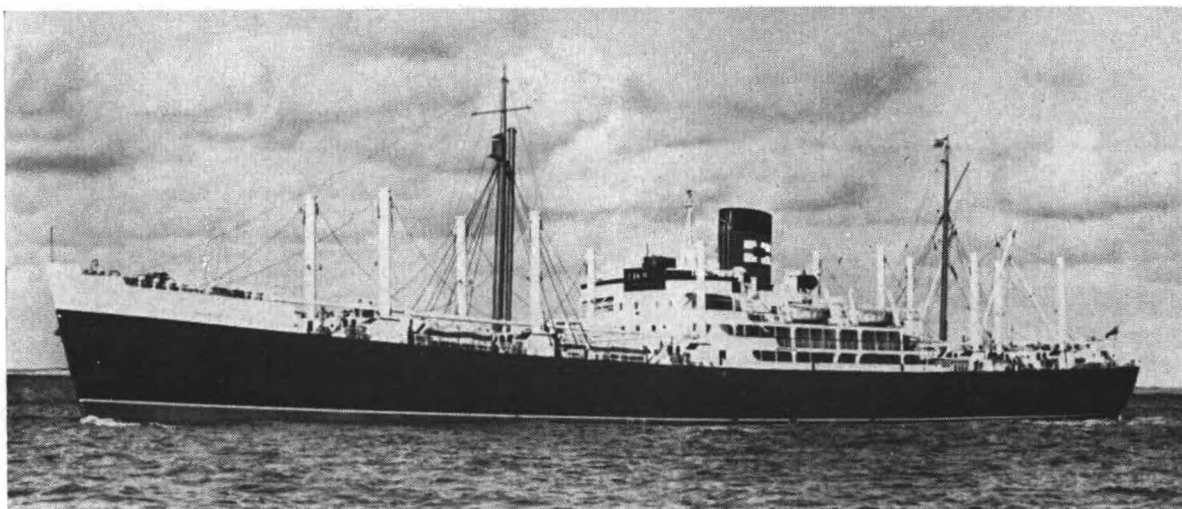
Associated Press Photos

The *Wahine* finally heeled over and sank about 800 feet from Steeple Rock (see page 114).

(Opposite page 117)



Glenfnlas (Ocean Fleets Ltd.), Captain G. W. Povey



Hurunui (New Zealand Shipping Co. Ltd.), Captain R. B. Hood

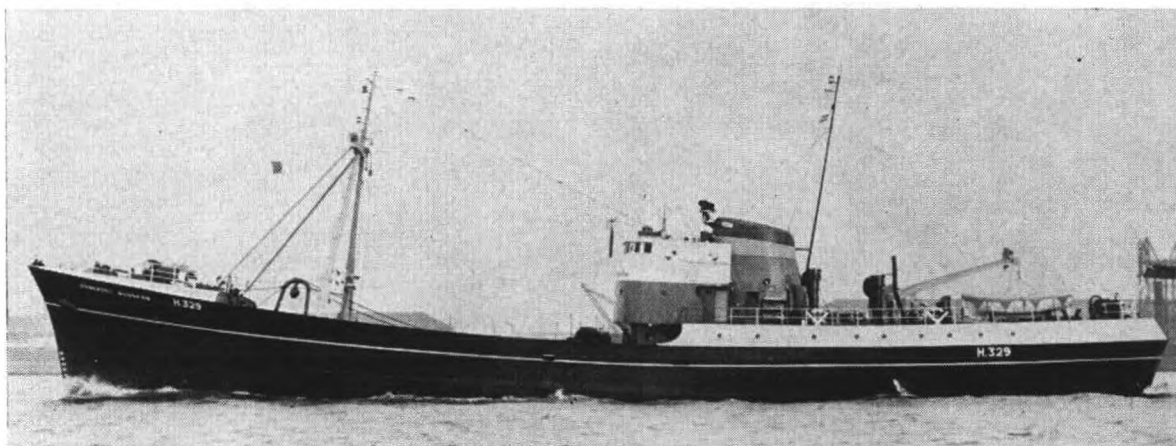


Photo by courtesy of the Trawling Times

Somerset Maugham (Newington Trawlers Ltd.), Skipper R. Taylor

THE THREE SHIPS WHICH GAINED THE HIGHEST MARKINGS FOR THEIR METEOROLOGICAL LOGBOOKS DURING THE YEAR ENDED 31st MARCH 1970 (see page 84).

materials. The vehicle deck extended across the full beam of the ship and the free-surface effect of water there would adversely affect the vessel's stability.

List increased

The deputy harbour-master noticed that the *Wahine* had a list of about 5° to starboard when he boarded at 1215. At this stage the vessel seemed fairly safe. During the next hour the list steadily increased to about 25°, then, at 1320, the *Wahine* suddenly swung beam on to wind and sea. The Master gave the order to abandon ship.

The passengers had been assembled on B deck since just after the vessel had struck Barrett Reef. Reassuring messages had been given to them every half-hour or so and, until about 1300, there was every confidence that the ship would soon be alongside her berth. Fortunately, the weather had improved by this time but the wind, which was now blowing from the west, was still at Gale Force (7-8) and sea conditions were very bad.

The Purser announced over the public address system that all passengers should proceed to the starboard side which was the right-hand side facing forward. This was later changed to 'low side' when it was realized that many passengers were going to the port side but by this time the public address system was not working properly.

A group of people jumped into the sea from the starboard quarter, preventing the tug from manoeuvring close up to the ship. Apparently one person had decided to jump and others followed his example. Only the four boats on the starboard side could be used, together with the inflatable life-rafts. The deck was sloping, due to the 30° list, and it was wet and slippery. Passengers were told by crew members to sit down and slide to the rail where they would be assisted into the boats.

About 40 people were put into the forward No. 1 boat which was intended to accommodate 50. The 3rd Officer was in charge, and there was an engineer to look after the motor. This boat got safely away from the ship's side and headed for the tug, picking up additional people from the water who had jumped overboard. Unfortunately, the engine failed and shortly afterwards the boat was swamped by a heavy sea. Many people were thrown out but most of these were able to get back to the boat which drifted north-eastwards, towards Eastbourne, in the strong tide. Finally, this boat capsized in the heavy surf on the eastern shore. Several people reached the shore safely but many lives were lost.

The 4th Engineer took charge of a boat which was towed to Seatoun wharf by a fishing vessel. Another boat drifted clear when it was only half full. An able seaman took charge and kept the boat head to sea. It drifted north-eastwards but was brought ashore safely on the eastern side of the harbour. The remaining boat took about 70 people from the ship and picked up another 20 from the water. This boat was taken in tow by a pilot launch and was brought to Seatoun.

Some of the inflatable life-rafts were launched, with people in them, from the starboard after davit; others were thrown into the sea and subsequently inflated. Several were thrown overboard from the port quarter but were blown back across the ship by the wind. At least one life-raft turned over in the heavy seas. Many people owed their lives to the life-rafts, either being taken from them by vessels in the harbour or landing safely on the eastern shore. However, some of the rafts got into difficulties in the surf and their occupants were thrown into the sea.

A large number of passengers jumped into the sea, trusting to their life-jackets. Some of these were picked up by lifeboats, life-rafts and rescue vessels. Others drifted to the eastern shore and had to cope with the surf.

The harbour-master received a message that the ship was being abandoned at 1325. He immediately dispatched a number of vessels to the scene and several fishing boats and private launches left on their own initiative when they heard the

news of the abandonment. Fortunately, the wind was abating rapidly. It was down to Force 4 by 1400 but the sea was still rough.

The *Wahine* finally heeled over and sank at about 1420 in a position 134°T about 800 feet from Steeple Rock Light. Fifty-one persons lost their lives, 44 of them passengers. There was only just enough time in the difficult conditions for the vessel to be abandoned but if the order had been given earlier the toll would have been much higher.

Court of inquiry

A formal investigation began in Wellington on 25th June 1968. A total of 81 witnesses were called and the inquiry lasted 26 days. Charges were made against the Master, Chief Officer, Chief Engineer and also, in a limited sense as the court had no criminal jurisdiction, against the Union Steam Ship Company and the Wellington Harbour Board.

Counsel for the survivors submitted that the Master should not have attempted to enter the harbour in the very severe weather conditions, but the court considered that the decision to enter harbour was not unjustified in view of the information then available.

One of the charges against the Master was that he failed to use an anchor or anchors to gain proper control of the ship in the half-hour before grounding on Barrett Reef. The court was not satisfied that there was an error of judgement in this respect as there was nobody on the forecastle head at that time and when the Chief Officer and the Boatswain went forward to let go the anchors later it took them 20 minutes because of the violence of the weather. However, in a qualification to the report, the nautical assessors expressed the opinion that the Chief Officer should have been ordered to man the forecastle head in accordance with the normal practice of good seamanship.

Charges were made against the Master and Chief Officer concerning alleged failure to ascertain the true extent of the damage after grounding. The court considered that it would have been wise to have sounded all compartments below the vehicle deck so far as this was possible, and the Chief Officer was criticized in this respect.

The court rejected allegations that the Master, Chief Officer and Chief Engineer failed to take effective measures to control flooding on the vehicle deck. All available pumps were in operation and there was little more that could have been done. A further charge was that the Master had failed to give adequate information to the shore as to the nature and extent of the damage. It was held that the failure to advise the shore of the estimated draught of 22 feet did amount to an error of judgement but in view of the great difficulty and danger this was not a wrongful act or default.

Several allegations were made about preparations for abandoning ship. It was alleged that the Master and Chief Officer had failed to make sure that the Salvus life-jackets were distributed for the use of children. The new type Board of Trade life-jackets, which had been supplied when the ship was built in the United Kingdom, were not suitable for persons weighing less than 70 lb. The older style of life-jacket was supposed to be suitable for persons of lesser weight, but it was considered that they would not have saved the three very young children who were drowned. Even the new style life-jackets for persons of less than 70 lb, which had been ordered and received ashore but had not been delivered to the ship, might not have been effective for infants.

The court found that charges made against the Wellington Harbour Board and the Union Steam Ship Company with respect to rescue measures were not established. However, it was felt that more could have been done to get information from the ship about the damage and to have it interpreted by technical officers. It was

considered that further steps could have been taken to ensure that a suitable rescue fleet was as near to the *Wahine* as possible at the end.

Among the recommendations made by the court was one to the effect that seafarers should be provided with practical training in the use of life-rafts. It was considered that they should see rafts inflated in water and learn how to cope with overturned rafts.

The court did not find the Master, Chief Officer or Chief Engineer guilty of any wrongful act or default and no order was made in respect of their certificates. However, certain serious omissions and errors of judgement were noted in the Report and it is hoped that lessons have been learned which will help to prevent, or reduce, loss of life in future casualties. Loss of life was high but it would have been very much higher if the ship had gone down at the height of the storm.

SOUTHERN RIGHT WHALE DOLPHINS

During a voyage of the *Pizarro* from Antofagasta to Valparaiso, Chile on 31st January 1970 a school of about 20 Southern Right Whale Dolphins (*Lissodelphis peroni*) were sighted by Captain R. K. C. Thomas, Chief Officer B. V. Roberts, 2nd Officer S. E. Chapman and 3rd Officer K. O. Avery. In a recent letter to the Whale Research Unit of the National Institute of Oceanography, Captain Thomas said that the dolphins were sighted at 2230 GMT in position $29^{\circ} 35'S$, $71^{\circ} 45'W$ and, in view of the apparent scarcity of the species, he was reporting direct to the Whale Research Unit although, in due course, we would read the account in the meteorological logbook.

The dolphins were moving southward; they approached closely on the port bow but did not cross, leaping well clear of the water, further out than some other species; also they appeared to move much faster. They were easily recognizable by lack of dorsal fin, giving a very sleek appearance, their white underparts contrasting with and sharply demarcated from the black upper parts. The sea temperature was $18.3^{\circ}C$. The ship's course was 185° , speed $16\frac{1}{2}$ knots.

Captain Thomas went on to say that only an hour or two previously Mr. Chapman and Mr. Avery had been studying the article concerning this species in *The Marine Observer*¹ and that their first comment on sighting the school was, "Look, they have no dorsal fin!"

Mr. S. G. Brown of the Whale Research Unit, when forwarding a copy of Captain Thomas's letter, kindly provided the following comments:

"This sighting is a valuable addition to the available information about the distribution of this species since it appears to be the northernmost record of its occurrence

yet published. The observers refer to the article by Boswall and Dobson¹ in which the paper by Fraser² is cited. He suggests that the species probably ranges round the world in the southern hemisphere and that while 'not entirely restricted to the West Wind Drift it appears to have some predilection for it, because . . . those records to the north of the Sub-tropical Convergence are, for the most part, close to that boundary and, except for one sight record, there is no evidence that it penetrates into the Antarctic Ocean'. His northernmost record is in position 38° 34's, 8° 06'E, apart from a skull, possibly of this species, from the Cape of Good Hope. Off the west coast of South America he lists no records north of 40°s but it appears that this species is of frequent occurrence off the coast of the province of Concepción, Chile (approximately 36°s).³

"Boswall and Dobson mention the scarcity of records of this species. In this connection it should be noted that Gaskin⁴ lists 13 sightings in New Zealand waters in the period October 1963 to February 1965 and 12 sightings in the area bounded approximately by latitudes 43°s to 53°s and longitudes 155°W to 180°W between January and March 1967.⁵ The National Institute of Oceanography received one record of this species during the operation of the scheme for observations on whales from ships. This was from H.M. Yacht *Britannia* in position 49° 28's, 163° 56'W on 20th December 1956 when approximately 14 animals were seen and identified from photographs in Fraser. Gaskin's data suggest that the species may not be rare in some areas and that the scarcity of records generally may be a result of a lack of observers able to identify and record the species.

"This dolphin is also interesting because of the wide range of numbers of animals present in the schools. There are records of single animals and pairs, of schools of from 3 or 4 to 20 animals, and of large schools estimated to contain over 200, over 500 and more than 1,000 animals."

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NOTES ON ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM JANUARY TO MARCH 1970

JANUARY

The wind pattern was dominated by two low pressure areas, one near the Ocean Weather Station 'Charlie' and the other in the region of Novaya Zemlya. Cold winds thus became established over the Barents Sea where a marked ice deficit reverted to normal.

Canadian Arctic Archipelago, Foxe Basin, Hudson Bay and Strait, Baffin Bay. These areas, as normal, were ice-covered throughout the month.

Davis Strait and Labrador Sea. East to north-east winds decreased to light and variable and air temperatures became generally slightly below average. At the end of the month the ice edge was about 70 miles south-east of normal near 64° to 65°N. Over the Labrador Sea there was generally less ice than normal. Off south-west Greenland some pack-ice had rounded

Cape Farewell and extended westwards to $48\frac{1}{2}^{\circ}\text{W}$ and southwards to $58\frac{1}{2}^{\circ}\text{N}$ (50 miles south of normal).

Great Bank, South Newfoundland Sea, River and Gulf of St. Lawrence. Due to north-westerly winds, air temperatures fell to a few degrees below normal though sea temperatures remained around 2 to 4 degC above average. Thus the freezing season was still 2 to 3 weeks behind normal over the greater part of this area.

Greenland Sea. North-easterly winds persisted northward of Jan Mayen and ice conditions remained excessive especially between 73 and 75°N where the ice edge, at 2°E , was about 250 miles east of normal. From Jan Mayen south-westwards to the Denmark Strait strong easterly winds prevailed and the ice edge was driven westwards beyond the normal to establish a deficit in this area. At the beginning of the month the ice edge lay 40 miles from north-west Iceland but this open-water channel later widened to 80 miles. South-westwards of the Denmark Strait ice conditions along the south-east coast of Greenland were near normal.

Barents Sea. Cyclonic activity near Novaya Zemlya caused cold north-easterly winds to become established over this area. Air temperatures dropped to 5 to 10 degC below normal and the ice edge quickly advanced southwards to a near normal position; in fact, near Bear Island, the edge was driven about 50 miles south-west of normal.

White Sea. By the end of the month close pack-ice or fast-ice, as normal, covered this area. Thin new ice and open pack-ice had formed over The Gorlo.

Baltic and North Sea. Southerly winds, of Siberian origin, prevailed over this region. As a result, temperatures remained 5 to 10 degC below normal and excessive ice conditions persisted. At the end of the month the Gulfs of Bothnia, Finland and Riga were covered by fast-ice and close pack-ice. There was ice along most remaining coasts of the Baltic; on the Swedish side this coastal ice extended seawards for 30 miles northward of Thorham Point. The Kattegat was covered by close pack-ice on the eastern side with new ice covering the remainder. In the south-west there was a patch of open water in Kiel Bay, otherwise close pack covered most of the Belts with new ice in the Sound. Ice affected coasts on both sides of the Skagerrak from Kristiansand on the northern shore and from Hanstholm on the Danish shore. Along North Sea coasts of Holland and Germany some new ice and open pack-ice had formed amongst the Frisian Islands from $6\frac{1}{2}^{\circ}\text{E}$ to $55\frac{1}{2}^{\circ}\text{N}$. Over the southern Baltic and Kattegat the ice situation was worse than in the severe season of early 1963.

FEBRUARY

Two low pressure areas once more dominated the airflow over the region, one being located in the Davis Strait and the other between south Iceland and the south-east Barents Sea. The low pressure areas were separated by a ridge of high pressure along the east coast of Greenland extending southwards from the polar anticyclone.

Canadian Arctic Archipelago, Baffin Bay, Foxe Basin, Hudson Bay and Strait. Apart from an unusually large flaw lead on the south and west sides of Ungava Bay, these areas continued to be covered by fast or close pack-ice, as usual.

Davis Strait and Labrador Sea. Winds were mainly south-easterly on the Greenland side of the Strait and north-westerly off the coasts of Baffin Island and Labrador. At the end of the month the ice edge lay from Nordre Strømfjord (there was a narrow shore lead to Disko Bay) south-south-west to 59°N , 59°W , then south-east to $52\frac{1}{2}^{\circ}\text{N}$, 50°W . Due to the south-easterly winds there was less ice than usual on the eastern side of the Strait but southward of 65°N , because of cold north-westerly winds, the ice edge was 30 miles beyond the normal position.

Great Bank, South Newfoundland Sea, River and Gulf of St. Lawrence. West to south-west winds, light over the Gulf and freshening eastwards to become strong at times over the Bank, prevailed over the area. As these winds were continental in origin, air temperatures fell to 5 to 10 degC below normal though sea temperatures remained 1 to 2 degC warmer than average. At the end of the month the ice edge lay from $52\frac{1}{2}^{\circ}\text{N}$, 50°W , southwards to 51°N , then south-west to Bona Vista Bay (this limit included a broad belt of new ice 20 to 50 miles wide over the Bank). At $52\frac{1}{2}^{\circ}\text{N}$ the ice edge was 30 miles east of normal but to the south of 51°N there was a large ice deficit with the ice edge as much as 200 miles back from normal. The easterly portions of the Gulf and Cabot Strait were ice-free, the remainder of the Gulf being covered by close pack and new ice, the former extending in a narrow coastal belt through Cabot Strait to Cape Breton.

Greenland Sea. Due to the ridge of high pressure over East Greenland, the prevailing wind pattern was north-easterly and later easterly to the north of Jan Mayen, easterly to the south of this island and through the Denmark Strait, becoming light and variable towards south Greenland. At the end of the month air temperatures were near normal everywhere though

Table 1. Icebergs sighted by aircraft and merchant ships within latitudes 40°N-65°N and longitudes 40°W-65°W
(This does not include growlers or radar targets)

LIMITS OF LATITUDE AND LONGITUDE		DEGREES NORTH AND WEST												
		66	64	62	60	58	56	54	52	50	48	46	44	42
Number of bergs re- ported south of limit	JAN.	> 61	> 61	> 50	5	0	0	0	0	0	0	0	0	0
	FEB.	> 93	> 92	> 69	35	23	23	3	0	0	0	0	0	0
	MAR.	> 51	> 43	> 23	> 3	> 3	> 3	> 3	> 1	0	0	0	0	0
	Total	> 205	> 196	> 142	> 43	> 26	> 26	> 6	> 1	0	0	0	0	0
Number of bergs re- ported east of limit	JAN.	> 61	> 61	> 61	> 61	> 61	> 61	> 61	> 53	> 46	> 28	1	0	0
	FEB.	> 93	> 93	> 93	> 93	> 93	> 93	> 93	> 47	> 31	5	5	5	1
	MAR.	> 51	> 51	> 51	> 51	> 51	> 51	> 51	> 19	> 11	> 2	> 2	> 2	> 2
	Total	> 205	> 205	> 205	> 205	> 205	> 205	> 205	> 119	> 88	> 35	> 8	> 7	> 3
Extreme southern limit	JAN.	58° 36'N, 45° 48'W on 9.1.70 53° 30'N, 51° 12'W on 16.2.70 51° 10'N, 50° 00'W on 10.3.70												
	FEB.													
	MAR.													
Extreme eastern limit	JAN.	58° 36'N, 45° 48'W on 9.1.70 58° 30'N, 41° 00'W on 11.2.70 61° 06'N, 41° 30'W on 21.3.70												
	FEB.													
	MAR.													

> ('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.

sea temperatures were a little below average to the north of Iceland. At this time the edge of open pack lay from Prince Karl's Forland at Spitsbergen south-westwards to 76°N then south-south-eastwards to 74°N, 6°E (at this point it was 180 miles east of normal), then west-south-west to Jan Mayen. It then continued west-south-west and later south-west to 63°N, 40°W where the ice edge followed the trend of the coast to round Cape Farewell (the southern limit was 59½°N) and finally terminated on the south-west coast of Greenland near 61½°N. There was a slight deficit of ice in the Denmark Strait where the open water channel was at least 80 miles wide, and a marked excess in the north between 73° and 75°N, otherwise conditions were near normal.

Barents Sea and White Sea. Winds from an easterly point prevailed over the area resulting in air temperatures of around 5 degC below normal. Sea temperatures remained 1 to 2 degC warmer than average due to the storage of heat through the warm latter half of 1969. The edge of close pack-ice lay from Mys Svyatoy Nos across The Gorlo to Mys Kanin Nos then north-north-east to 71°N, 46°E, then meandering west-north-westwards, passing about 40 miles south-west of Bear Island thence turning northwards to meet the Spitsbergen coast about 30 miles south of Bellsund. Over the Barents Sea ice conditions were near normal except near Bear Island and Spitsbergen where there was an excess. Shore leads had opened up on the southern side of the White Sea otherwise this region, as normal, was covered with fast and close pack-ice.

Baltic and North Sea. Excessive ice conditions persisted in these areas as air temperatures remained 5 to 10 degC below normal despite a change in wind direction to a more south-westerly point; sea temperatures once more were 1 to 2 degC below normal as a result of a persistently cold winter season over this area. By the end of the month the edge of close pack-ice lay across the Kalmar Sound to Oland Point then from north Oland passing northward of Gotland to the south side of the Gulf of Finland where it continued along the shore to 26°E as a lead 10 miles wide. Close pack also covered the Gulf of Riga. Open pack-ice affected remaining coasts of the Baltic Sea, at times extending seaward for about 60 miles, especially in the east. Some break-up occurred in the Kattegat but at the end of the month there were still large areas of close pack-ice especially in the east and south. Close pack-ice, about 10 miles wide, lay along the coast of Norway eastward of Kristiansand and new ice had formed across the Swedish end of the Skagerrak. Open pack-ice affected the North Sea coast of Germany from Wangerooge to Sylt. Ice conditions were severe over the Baltic Sea, Kattegat and Skagerrak. Over the former and latter areas ice conditions were as bad as they were during the severe ice seasons of early 1963 and 1966; in the Kattegat, however, ice conditions were a little worse during the season of early 1963.

Table 2. Baltic Ice Summary: January-March 1970

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	577	1	28	28	28	0	0	28	0	885	1	31	30	23	3	13	17	0	946	
Riga	1	31	31	25	1	12	14	0	530	1	28	28	28	0	0	28	0	830	1	31	19	11	0	0	11	0	858	
Pyarnu	1	31	31	31	0	0	31	0	508	1	28	28	28	0	0	27	1	808	1	31	31	31	0	0	31	0	855	
Viborg	1	31	31	31	0	0	31	0	—	1	28	28	28	0	0	0	28	—	1	31	31	31	0	0	1	30	—	
Klaipeda	1	28	22	0	13	20	0	0	491	3	28	26	0	21	26	0	0	725	1	31	8	0	6	8	0	0	738	
Ventspils	1	31	27	1	0	25	0	0	—	1	28	28	1	24	24	1	0	—	1	1	1	0	1	1	0	0	—	
Tallin	14	31	18	0	16	5	13	0	—	1	28	28	10	18	0	28	0	—	1	31	31	2	20	0	31	0	—	
Helsinki	1	31	31	31	0	0	22	0	568	1	28	28	28	0	0	28	0	928	1	31	31	31	0	0	31	0	1005	
Mariehamn	9	31	23	16	0	18	1	0	418	1	28	28	28	0	18	6	4	764	1	31	31	31	0	0	31	0	832	
W. Norrskar	7	31	20	5	7	11	4	0	—	1	28	28	0	26	0	8	20	—	1	31	31	0	23	0	0	9	22	
Turku	1	31	31	31	0	20	11	0	578	1	28	28	28	0	0	28	0	940	1	31	31	31	12	0	0	31	0	1017
Manlyuoto	1	31	28	21	0	11	14	0	—	1	28	28	28	0	0	19	9	—	1	31	31	31	0	0	23	8	—	
Vaasa	1	31	31	31	0	0	31	0	591	1	28	28	28	0	0	28	0	998	1	31	31	31	0	0	0	9	22	1105
Oulu	1	31	31	31	0	0	27	4	743	1	28	28	28	0	0	0	28	1210	1	31	31	31	0	0	0	31	1326	
Roytaa	1	31	31	3	26	0	27	4	862	1	28	28	0	28	0	0	28	—	1	31	30	0	31	0	0	31	—	
Lulea	1	31	31	31	0	0	22	9	—	1	28	28	28	0	0	0	28	1359	1	31	31	31	0	0	0	31	1525	
Bredskar	3	31	29	7	0	21	5	0	—	1	28	28	25	0	7	21	0	—	1	31	31	31	0	0	0	31	0	
Alnosund	1	31	31	31	0	25	6	0	590	1	28	28	28	0	0	19	0	947	1	31	31	31	0	0	0	31	0	
Stockholm	1	31	31	27	0	31	0	0	425	1	28	28	28	0	28	0	0	720	1	31	31	31	0	31	0	0	769	
Kalmar	1	31	31	11	12	31	0	0	301	1	28	28	11	17	26	2	0	591	1	31	31	31	0	31	0	0	518	
Skellefteå	1	31	31	28	0	3	19	9	—	1	28	28	28	0	0	28	0	—	1	31	31	31	0	0	0	31	—	
Göteborg	5	31	19	0	6	7	0	0	258	1	28	26	0	9	21	4	0	458	1	5	5	0	1	4	0	0	479	
Visby	31	31	1	0	0	1	0	0	209	12	21	10	0	5	10	0	0	392	1	31	8	0	8	0	0	0	434	
Tonning	1	29	21	0	3	17	0	3	—	2	26	10	0	9	21	0	1	—	2	23	21	0	5	16	0	5	—	
Husum	1	31	31	14	17	31	0	0	—	1	26	26	0	18	22	0	2	—	0	0	0	0	0	0	0	0	—	
Emden	1	29	25	0	4	18	0	0	—	2	22	8	0	0	3	0	0	—	0	0	0	0	0	0	0	0	—	
Lübeck	1	31	31	0	10	26	0	0	—	1	28	18	0	2	5	0	0	—	1	2	2	0	0	0	0	0	—	
Gluckstadt	1	31	31	0	13	31	0	0	—	1	28	28	0	0	28	0	0	—	1	11	5	0	0	2	0	0	—	
Bremerhaven	1	28	28	6	4	25	0	0	—	1	2	2	0	0	1	0	0	—	0	0	0	0	0	0	0	0	—	
Kiel	5	31	25	0	2	7	0	0	—	1	28	13	0	6	9	0	0	—	0	0	0	0	0	0	0	0	—	
Flensburg	8	31	24	7	10	19	0	0	—	1	28	28	6	21	26	2	0	—	0	17	17	0	8	17	0	0	—	
Stettin	1	31	31	0	0	31	0	0	378	1	28	28	0	0	28	0	0	485	1	18	18	0	0	13	0	0	493	
Gdansk	1	31	17	0	3	8	0	0	364	1	28	24	0	1	9	0	0	520	1	4	4	0	0	1	0	0	534	
Aarhus	20	31	12	0	0	8	0	0	—	1	28	28	0	20	31	0	0	—	1	5	2	0	1	1	0	0	—	
Copenhagen	20	31	7	0	0	0	0	0	136	10	28	18	0	14	10	6	0	236	1	16	9	0	4	6	0	0	245	
Oslo	0	0	0	0	0	0	0	0	—	7	28	22	0	20	22	0	0	—	1	24	24	0	18	4	20	0	—	
Kristiansandfjord	0	0	0	0	0	0	0	0	—	10	28	19	0	10	16	3	0	—	1	9	9	0	0	1	0	0	—	

CODE:

A First day ice reported.

B Last day ice reported.

C No. of days that ice was reported.

D No. of days continuous land-fast ice

E No. of days of pack-ice.

F No. of days of air temperature (°C) where known.*

I Accumulated degree-days 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.

G No. of days assistance required.

H No. of days closed to navigation.

I Accumulated degree-days 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.

J No. of days of air temperature (°C) where known.*

K Accumulated degree-days 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.

L No. of days assistance required.

M No. of days closed to navigation.

N Accumulated degree-days 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.

O No. of days of air temperature (°C) where known.*

P Accumulated degree-days 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.

Q No. of days assistance required.

R No. of days closed to navigation.

MARCH

Low pressure areas became established over the Norwegian Sea and off south-east Canada, whilst a ridge of high pressure from the Siberian anticyclone extended across the Arctic Basin into Greenland and central Canada. The resultant winds were colder than normal over the Greenland Sea southward of about 75°N and over the Baltic, where the main ice excesses were located, and relatively warm over the Barents Sea where the ice edge retreated far beyond the minimum extreme for this month.

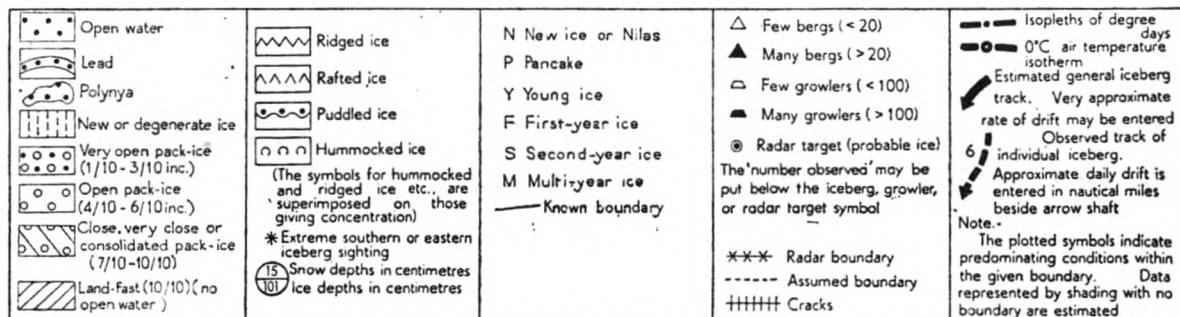
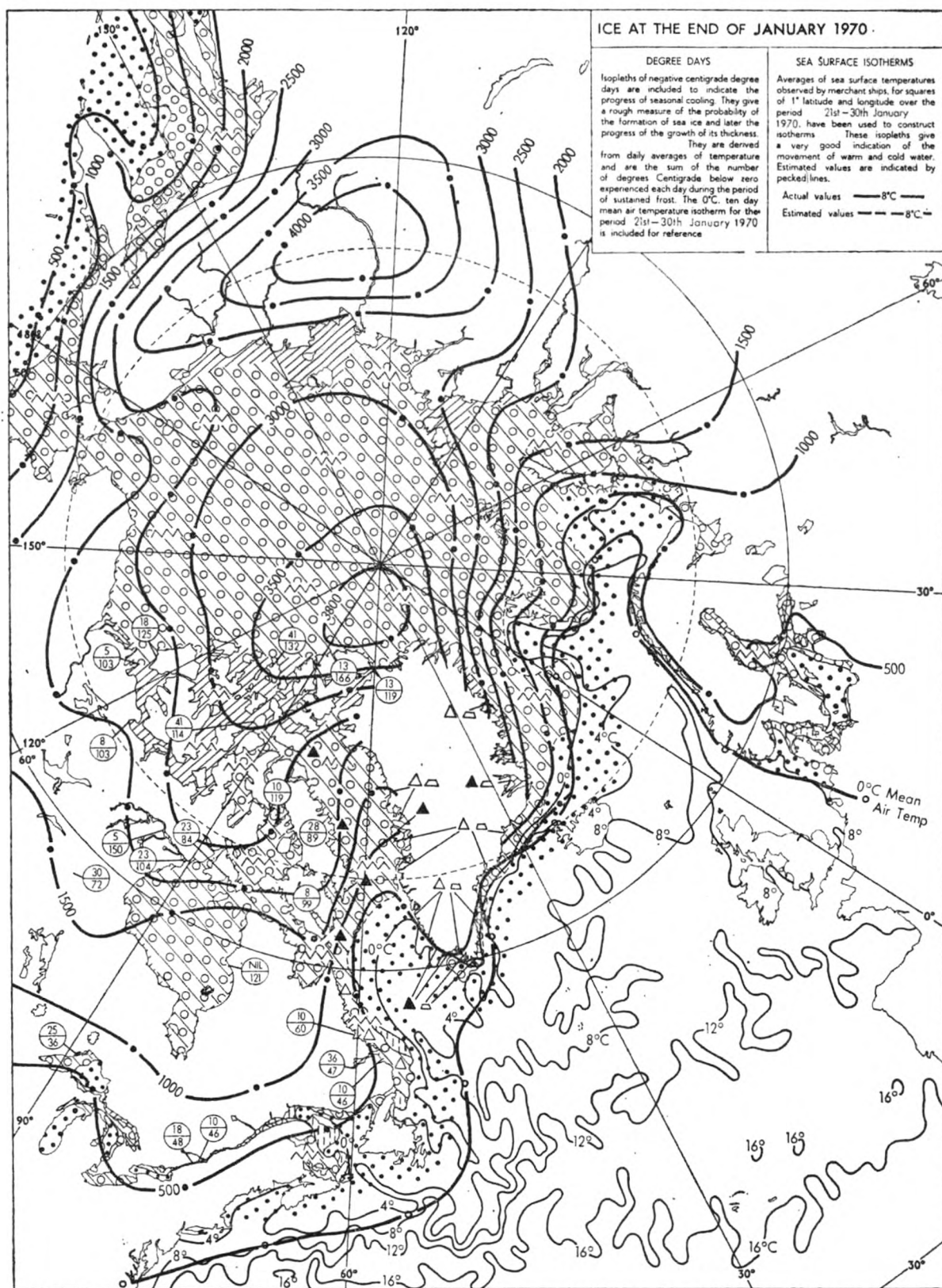
Canadian Arctic Archipelago, Baffin Bay, Foxe Basin, Hudson Bay and Strait. Shore leads opened up, due to off-shore winds, near most north and north-westward coasts southward of about 70°N and on the western side of Smith Sound, otherwise these areas remained covered by fast and close pack-ice as normal.

Davis Strait and Labrador Sea. A 10 to 30-mile-wide lead existed from the south-western end of Disko Bay to 65°N , 54°W . From this point the edge of close pack-ice lay south-westwards to $61\frac{1}{2}^{\circ}\text{N}$, $60\frac{1}{2}^{\circ}\text{W}$, thence turning south-eastwards to lie 80 to 120 miles off the whole length of the Labrador coast. An over-all slight deficit occurred in these areas due largely to winds from an easterly point earlier in the month. Off south-west Greenland some open pack-ice extended to $61\frac{1}{2}^{\circ}\text{N}$, 51°W , further north-west than normal.

Great Bank, South Newfoundland, River and Gulf of St. Lawrence. The cyclonic activity to the east of these areas resulted in relatively cool west to north-west winds and air temperatures fell to around 5 degc below normal. Despite this, sea temperatures remained 1 to 2 degc above average and there was an ice deficit over this region. The edge of the wide belt of close pack-ice on the Labrador coast extended southwards along $53\frac{1}{2}^{\circ}\text{W}$ to meet the Newfoundland coast near the eastern end of Notre Dame Bay; some open pack-ice and new ice extended about 80 miles further south-east. The Gulf was clear of ice except for a belt of broken ice (mainly open pack) in the north-east, eastward of Romaine, and an area of mainly close pack-ice in the south, around and to the southward of the Magdalen Islands. From this southern ice area a narrow belt of open pack-ice extended through the south-western side of the Cabot Strait to round Cape Breton. The river was ice-free to Quebec for the latter half of the month.

Greenland Sea. There were wide variations in the ice conditions over this region, from less than the extreme minimum in some areas to more than the extreme maximum in other areas. The main change occurred northward of about 75°N where a large 'bay' of very open pack-ice penetrated deep into the ice edge and almost cut off a large tongue of close pack-ice to the north-east of Jan Mayen. This effect was probably due to strong north-easterly winds (of southerly origin) early in the month when air temperatures rose to between 1 and 5 degc above normal and sea temperatures to the south-westward of Spitsbergen rose to about 3 degc above average. The onset, later, of east or south-easterly winds caused the ice edge in the far north to recede so that, at the end of the month, the edge of close pack lay from the north-western corner of Nordaustlandet westward along the 81st parallel to 5°E then south-west to $71\frac{1}{2}^{\circ}\text{N}$, 14°W . From this point the edge turned north-east and later recurved south-westwards to enclose a tongue of ice 70 to 110 miles wide extending north-eastwards to $73\frac{1}{2}^{\circ}\text{N}$, 2°E , before passing and almost enclosing Jan Mayen. Northward of 76°N the ice edge had retreated beyond the known minimum extreme. However, southward of this latitude, the north-eastern end of the tongue of ice was located well beyond the extreme maximum for this time. To the south of Jan Mayen relatively cold northerly winds prevailed and the ice edge was driven south-eastward of its normal position. From Jan Mayen the edge of close pack-ice curved south-west and later south to 67°N , 13°W , then rippled westwards along the 67th parallel to 25°W before turning west-south-westward to $62\frac{1}{2}^{\circ}\text{N}$, 39°W . At this point it turned south-south-westward to enclose a belt of close pack-ice 80 miles wide narrowing to 40 miles wide along the coast of Greenland. Some pack-ice rounded Cape Farewell as described under *Davis Strait*, and some open and very open pack-ice extended southward from the Cape to $58\frac{1}{2}^{\circ}\text{N}$. At this point the edge of very open pack-ice lay 100 miles south-east of normal; off the north-east coast of Iceland the ice edge was 140 miles south-east of its usual position at this time.

Barents and White Seas. Moderate to strong south to south-east winds became established over this region and air temperatures rose to around 5 degc above average especially in the east. Sea temperatures in the southern part of the Barents Sea were 2 to 3 degc above average. The ice edge was driven north and, at the end of the month, lay from 77°N on the south-west coast of Spitsbergen southward to 30 miles north of Bear Island, then east-north-eastward to 74°N at 50°E . From this point the edge meandered south-south-westwards to meet the coast at Mys Orlov Terskiy on the western side of The Gorlo. Within this edge there were large areas of very open pack-ice on the western sides of Poluostrov Kanin and Novaya Zemlya, in



Cheshskaya Guba, Perchorskaya Guba and on the eastern side of the White Sea. These almost ice-free areas resulted from the widening of shore-leads by off-shore winds. Around southern Spitsbergen there was a slight excess of ice even though the edge was 30 miles north of normal near Bear Island; in the White Sea there was a slight deficit and in the extreme south-east conditions were near normal. However, over the remainder of the area the ice edge had retreated well beyond the normal and in some areas in the north-east was located about 200 miles north of the known extreme minimum.

Baltic and North Sea. Cyclonic activity over the Norwegian Sea resulted in south to south-west winds over the Baltic and north-west winds over the Skagerrak. These winds, latterly, originated in Arctic regions and air temperatures fell from around 5 degC above to 5 degC below normal. Sea temperatures in the south remained 1 to 2 degC below average. At the end of the month the main ice edge across the Baltic lay from about 59°N on the Swedish coast to 27°E on the southern side of the Gulf of Finland, though a wide area of open water existed in the south and east of the Gulf of Bothnia northward of 60°N. The Gulf of Riga was almost completely covered by fast and close pack-ice. A thin belt of very open pack-ice persisted on the east coast of Sweden. Most of the ice in the Kattegat had melted leaving a little very open pack-ice in the Sound. Ice along the North Sea coasts of Germany had melted but some open pack-ice, and possibly fast-ice in fjords, persisted on the Norwegian side of the Skagerrak. There was more ice than normal over both areas.

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 × 27 in). These charts are published at ten-day intervals and are available at the price of reproduction on application to the Director General, Meteorological Office (Met.O.1), Eastern Road, Bracknell, Berks. Alternatively, they may be seen at any Port Meteorological Office or Merchant Navy Agency. Up-to-date ice charts are broadcast daily by facsimile.

Book Reviews

Merchant Ships: World Built, Vol. XVII, compiled by E. E. Sigwart. (New ships of 1968) 8 $\frac{3}{4}$ in × 5 $\frac{3}{4}$ in, pp. 235, *illus.* Adlard Coles Ltd., 3 Upper James Street, London, W.1., 1969. Price: 70s.

This new edition of an alphabetical register of ships of 1,000 tons gross and over built in the previous year, compiled by a retired shipmaster, retains the familiar format of previous editions. Each edition is a numbered volume so as to provide a continuous record. With so many ships now built to a standard design the publishers think that it is better to illustrate a noteworthy ship somewhat late than not show her at all, a point of view shared by the reviewer. A new section has been added showing interesting changes and modifications to existing ships and some illustrations of modern containers and loading techniques. Hovercraft and large hydrofoil vessels are included for the first time.

Of special interest is the description of the giant *Universe Ireland* and one of her five sister ships, both of 149,609 tons gross (312,000 d.w.) and a draught of 79.1 ft. As many readers will know, even larger ships are now on the stocks. At the front of the book is a list of abbreviations used and their meaning, also a conversion table—feet to metres. At the end of the book some interesting statistics are given.

The book is well produced and generously illustrated. The ugliness of so many of the ships illustrated will cause most mariners and other shiplovers a little sadness. The graceful lines of so many ships built after World War II must now give way to a design which is strictly functional and technically efficient with a minimum crew. So many of the mammoth automated ships built in recent years have a total crew of less than 30.

Shipowners, shipbrokers and others whose business requires them to keep abreast of new construction will find this a handy book of reference. The price is likely to

deter mariners, who could spend an hour or two happily browsing through the contents, from purchasing a copy of their own.

A. D. W.

Progress in Oceanography, Vol. 5, edited by M. Sears. 9½ in × 6½ in, pp. xi + 196, illus. Pergamon Press Ltd., Headington Hall, Oxford, 1969. Price: 80s.

This volume includes a series of papers dealing with time dependent effects in the ocean which were presented at a symposium held in Rome in May 1966 during the Eighth General Meeting of the Scientific Committee on Oceanic Research (SCOR). This symposium originated from a Soviet proposal in 1962 that an international effort should be made to maintain a series of 'standard oceanographic sections' lying across the major currents of the world.

Most of the papers deal with oceanographic subjects of little direct concern to seafarers and meteorologists. However, the paper by Dickson and Lee on atmospheric and marine climate fluctuations in the North Atlantic Region, in which data from numerous sources are assembled and discussed, should materially help towards a better understanding, in future, of the response of the temperature of the North Atlantic to seasonal and yearly anomalies of the atmospheric circulation. Although the time series of data used in the paper are too short to allow significant conclusions to be drawn from them, and the text may well suggest many more questions to the reader than can possibly be answered from the material in its pages, the authors' effort still seems fully justified. Their tentative conclusions clearly show up the need for closer collaboration between scientists in the related disciplines and the individual nations responsible for gathering the data.

Production of the text and tables of the book reach a high standard as might be expected from its rather high price.

R. F. M. H.

Personalities

OBITUARY.—We regret to record the death of CAPTAIN R. G. BOYD on 22nd December 1969 whilst homeward bound from Colombo.

Robert Golding Boyd first went to sea as an apprentice in 1927 with Ellerman Lines. He obtained his Master's certificate in 1937 and then joined the Blue Funnel Line. During World War II he was serving on the *Pyrrhus* when she was torpedoed and sunk. He was appointed to his first command, the *Gleniffer*, in 1954.

Captain Boyd forwarded his first meteorological logbook in 1963 and in 7 years of voluntary observing had forwarded 17 logbooks, 15 of which were classed as Excellent. He also received Excellent Awards in 1965, 1966, 1968 and 1969.

Captain Boyd was not married but lived with his sister to whom we extend our sympathy.

E. R. P.

OBITUARY.—We regret to record the death of CAPTAIN H. G. N. D'EVELIN which occurred suddenly in hospital a few months after he had retired.

Herbert George Norman D'Evelin was born in 1906 at Devonport. His father was a soldier but all his mother's side were in the Royal Navy, his maternal grandfather being a bos'n rigger in the dockyard, and young D'Evelin obviously took a taste for ships at a very early age. At the end of World War I the family moved to West Hartlepool where he made several trips in the local trawlers; he signed indentures in September 1923 with Messrs. Furness Withy and joined their *Thistlemore*, then on the Western Ocean run.

Passing for 2nd Mate in 1928 he joined Ropner's *Warlabby* as 2nd Mate although, as his certificate had not been received at the time of signing on, he had to sign on as

Senior Boatswain and did not actually receive his certificate until the end of the voyage of nine months and eighteen days.

In 1936 he passed for Master and in 1942 was appointed to his first command, Ropner's *Fishpool*. His chief adventure during World War II was the rescue of 88 survivors from the *Apapa* after she had been bombed and sunk in the Atlantic in 1940.

In 1946 Captain D'Evelin joined the South Eastern Gas Board as 2nd Officer of their *Redriff* on the east coast run. He was appointed permanent Master in 1956 and retired in 1969.

Our first association with Captain D'Evelin came in the post-war years when he brought the Gas Board's collier *Mitcham* in as a 'Marid' ship (coasting trader taking sea temperatures only). In this capacity he gained an Excellent Award in 1963. Later on, when in command successively of the *Croydon*, *Sydenham* and *Kingston*, he had them all equipped as Supplementary ships and had Excellent Awards in 1965 and 1966. Apart from the basic work of an observing ship, Captain D'Evelin was always willing to help when we wanted to test a sea-temperature bucket or other instrument under practical conditions and was never too busy to discuss things with a Port Meteorological Officer.

We extend our sincere sympathy to his widow.

L. B. P.

RETIREMENT.—CAPTAIN N. F. FITCH, M.B.E. has retired from the sea after 47 years' service.

Norman Frederick Fitch was born in 1907 at Gravesend where his father was Head Postmaster. He first went to sea in 1922, serving a year as an apprentice with the Hain Line and afterwards transferring to the New Zealand Shipping Company as a cadet. He obtained his 2nd Mate's certificate in 1927 and was then appointed 3rd Officer of the *Pareora*, one of the Federal 'P' steamers owned by the New Zealand Shipping Company, and remained with the Company until 1929 when ships were laid up owing to the slump in shipping. Captain Fitch then took the first berth available in order to get his qualifying sea-time in for his Master's Certificate; this was with the Constantine Shipping Company of Middlesbrough. He obtained his Master's certificate in 1932.

Captain Fitch joined the Bibby Line in 1934 and served in the Rangoon Passenger Service until the outbreak of World War II when he went to the hospital ship *Somersetshire* as 2nd Officer. The *Somersetshire* went to St. Nazaire several times to pick up wounded at the collapse of France and, although she was painted with large red crosses, she was bombed on several occasions. This ship also took part in the Dakar incident.

In January 1941 Captain Fitch was promoted to Chief Officer and appointed to the *Staffordshire*, then the only Bibby ship not requisitioned for Government service. She sailed from Liverpool with a full cargo and full passenger list for Rangoon. When 150 miles west of Cape Wrath she was attacked by German aircraft, hit several times by bombs, badly damaged and set on fire. For meritorious conduct in this action he was awarded the M.B.E.

Captain Fitch was appointed to his first command, the *Empire Pride*, in 1949 and subsequently commanded the troopships *Lancashire*, *Cheshire*, *Devonshire* and *Oxfordshire*, several passenger ships and, finally, the *Gloucestershire*.

Our association with Captain Fitch goes back to 1927 when he sent us a logbook from the *Pareora*. Since then he has sent in 59 logbooks, 23 of which were classed as excellent. In 1937 he received an Excellent Award and in 1967 he received a barograph as a Special Award.

Captain Fitch is going to spend his retirement in Malta and we wish him health and happiness.

E. R. P.

FLEET LISTS

Fleet Lists

GREAT BRITAIN (Information dated 31.3.70)

The following is a list of British ships which have been equipped with instruments and which voluntarily co-operate with the Marine Division of the Meteorological Office. The names of the Captains, Observing Officers and Senior Radio Officers are given as ascertained from the last written returns received. The date of receipt of the last return received is given in the second column; 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> ..	19.1.70	D. H. Stewart, R.D.	D. J. H. Custance, A. Tajuddin, I. K. Conroy, T. P. Dodkins	R. J. Lunt ..	Ocean Fleets Ltd.
<i>Adelaide Star</i> ..	8.12.69	A. I. Chivers ..	M. Hall, R. Guy, N. Schroeter ..	F. Huggett ..	Blue Star Line Ltd.
<i>Adventurer</i> ..	2.2.70	A. Moreton, M.B.E.	M. Haddy, J. Maddison, A. J. M. Tustain, W. Moss ..	P. Bigwood ..	T. & J. Harrison Ltd.
<i>Afghanistan</i> ..	4.3.70	J. G. Wright ..	E. Pallister, J. Rhodhouse, J. K. Keddie ..	R. L. Foggin ..	Common Bros. Ltd.
<i>Ajax</i> ..	17.3.70	D. L. Emery ..	I. P. W. Ryder, H. A. Masri, I. P. Teale, R. B. Stephens ..	R. D. Cause ..	Ocean Fleets Ltd.
<i>Akaroa</i> ..	13.3.70	M. V. Larrive ..	G. L. Ede, D. Kett, R. Ginzler, R. Baddeley ..	P. Harris ..	Shaw Savill & Albion Co. Ltd.
<i>Alaric</i> ..	10.2.70	R. J. Bland ..	J. M. Anderson, D. Sweet, J. C. Carroll, W. Marr ..	J. H. Winnard ..	Shaw Savill & Albion Co. Ltd.
<i>Albany</i> ..	26.2.69	G. Chatterley ..	A. R. B. Harding, J. L. Fraim, A. C. Herdan ..	N. Holloway ..	Royal Mail Lines Ltd.
<i>Albion</i> ..	22.1.70	M. Robinson ..	A. P. Sweeny, D. Walshe, B. Calam ..	P. Wheeler ..	Frank C. Strick & Co. Ltd.
<i>Albright Explorer</i> ..	12.2.70	J. Wise ..	J. S. Jones, M. Rossiter, K. P. Slade ..	W. P. M. Edmunds ..	James Fisher & Sons Ltd.
<i>Albright Pioneer</i> ..	15.12.69	J. H. Kitching ..	J. S. Northcott, H. Towers, D. Williams ..	W. D. Brown ..	Post Office
<i>Alert</i> ..	10.2.70	J. P. Ruddock, O.B.E.			
<i>Alinda</i> ..	28.7.69	D. Cooper ..	D. F. Cammish, D. B. Travis, G. O. Okaroh ..	A. Bevan ..	Shell Tankers (U.K.) Ltd.
<i>Amadric</i> ..	5.5.69	P. K. Murchison ..	M. I. C. Kempston, D. Arnoll, R. Bayliss, R. Hodgkinson ..	B. A. Montrose ..	Shaw Savill & Albion Co. Ltd.
<i>Amasira</i> ..	4.8.69	C. J. Whitton ..	H. M. Clifford, D. F. Cammish, W. G. Stephen ..	J. W. Cartwright ..	Shell Tankers (U.K.) Ltd.
<i>Amoria</i> ..	13.3.70	J. M. Connolly ..	I. H. Nelson, J. C. Alford ..	A. M. Gilmour ..	Shell Tankers (U.K.) Ltd.
<i>Anadara</i> ..	26.1.70	G. Bradley ..	D. O. Morris, H. J. Tibbs, P. G. Allen, M. Wilkie ..	M. Pass ..	Shell Tankers (U.K.) Ltd.
<i>Andes</i> ..	24.4.69	J. Fox ..	J. Haswell, M. R. Greenwood, P. Hart ..		Royal Mail Lines Ltd.
<i>Anmuby</i> ..	26.2.70	D. G. Munro ..	J. Miller, T. Monan ..		F. T. Everard & Sons Ltd.
<i>Antrim</i> ..	2.2.70	J. R. B. Towner ..	E. J. Dunk, E. G. Marshall, H. W. Whiston ..		Avenue S.S. Co. Ltd.
<i>Araluen</i> ..	8.9.69	T. Hastings ..	H. Goulden, W. D. Wright, R. J. Dennis ..	R. Vere-Price ..	Trinder Anderson & Co. Ltd.
<i>Aranda</i> ..	16.3.70	B. Hammond ..	C. A. Jenman, I. R. Ashford, J. H. Clamp, D. S. Sully ..	J. F. Mennel ..	Shaw Savill & Albion Co. Ltd.
<i>Arawa</i> ..	24.9.69	D. E. Aberdeen ..	P. Buckley, M. Powell, R. Farge ..	E. W. Harle ..	Shaw Savill & Albion Co. Ltd.
<i>Argentina Star</i> ..	6.2.70	D. Brewster ..	J. E. G. Wilson, P. Hutchings, R. Hesp ..	W. Long ..	Blue Star Line Ltd.
<i>Argyllshire</i> ..	12.3.69	A. S. Paethorpe-May ..	F. D. Hugo, A. R. MacIntyre ..	A. W. J. MacLeod ..	Clan Line Steamers Ltd.

<i>Armanistan</i> ..	5.2.70	D. Calvert	J. I. Woodmass	J. R. Reeve	C. V. Waddell	Frank C. Strick & Co. Ltd.
<i>Asprella</i> ..	12.12.69	P. I. Blackshaw	P. E. Dorman	P. D. Fogarty	A. R. Fletcher	Sheil Tankers (U.K.) Ltd.
<i>Asyanax</i> ..	6.11.69	J. Fisher ..	I. R. Reeve	J. R. Reeve	J. Barton	Ocean Fleets Ltd.
<i>Athelchief</i> ..	*	J. Gray ..	K. R. Deverson	K. R. Deverson	W. S. Healey ..	Athel Line Ltd.
<i>Athelcrest</i> ..	2.3.70	P. McKinney	D. J. Dunkley	T. Cheney	F. Dunn	Athel Line Ltd.
<i>Atlantic Conveyor</i> ..	*	J. A. B. Munro	A. Finlay-Notman	M. Ramsay	W. Wade	Cunard-Brocklebank Ltd.
<i>Auckland Star</i> ..	11.12.69	P. W. Hunt	Purvis, H. Anguish	D. Hampson	J. P. Stephenson	Blue Star Line Ltd.
<i>Aureol</i> ..	24.2.70	W. E. Humphreys	D. Corrie	I. Buchanan	E. Bridgman ..	Ocean Fleets Ltd.
<i>Australia Star</i> ..	6.3.70	R. Brownhill	I. Moist	T. Black	J. H. Nicholson	Blue Star Line Ltd.
<i>Australind</i> ..	6.1.70	P. D. Guernier	S. Turner	J. Holder	R. J. A. Marshall	Trinder Anderson & Co. Ltd.
<i>Author</i> ..	8.8.69	L. J. Sharmian	H. E. Jones	C. D. Wilde	F. N. Prideaux	T. & J. Harrison Ltd.
<i>Baltarian</i> ..	18.3.70	L. Seddon	G. S. Oakley	T. C. Mathews	J. D. Mosely ..	Frank C. Strick & Co. Ltd.
<i>Baltic Sun</i> ..	12.12.69	C. E. Thomson	G. S. Brazendale	J. Parker	D. Hynd	United Baltic Corporation Ltd.
<i>Balistan</i> ..	22.1.70	N. Wray ..	W. Sloan	M. C. J. Jewell	A. I. Bryant	Frank C. Strick & Co. Ltd.
<i>Bamburgh Castle</i> ..	6.3.70	G. Robison	K. Henderson	R. I. Crawford	H. Wilson	Scottish Ship Management Ltd.
<i>Bankura</i> ..	1.1.70	F. H. Blackett	R. R. Mathews	R. M. Speller	D. M. MacDonald	Bank Line Ltd.
<i>Baron Cavdor</i> ..	20.12.69	A. MacKinley	W. A. Andersen	D. S. Gordon	P. Korowski	Canadian Pacific Steamships Ltd.
<i>Barrister</i> ..	6.3.70	F. Curry ..	I. Addinall	C. H. Roberts	M. J. Corry	Canadian Pacific Steamships Ltd.
<i>Beaverbank</i> ..	19.11.69	H. J. Allan	G. A. Davies	A. Smith	J. McKenna ..	Canadian Pacific Steamships Ltd.
<i>Beaverelm</i> ..	16.9.69	R. J. Mackay	J. P. Young	D. Picken	J. Cully	John I. Jacobs & Co. Ltd.
<i>Beaverfr</i> ..	*	T. Parker	I. Donn	G. Spencer	J. W. Kenny ..	Ben Line Steamers Ltd.
<i>Beaveroak</i> ..	2.3.70	D. L. Burt	D. A. Rowan	R. D. Mallam	M. C. Murphy	Ben Line Steamers Ltd.
<i>Beaverpine</i> ..	26.3.70	N. Parker	E. ap H. T. Jones	D. Rowen	D. J. O'Brien ..	Ben Line Steamers Ltd.
<i>Bechnood</i> ..	2.4.69	T. Tuddenham	H. Glennie	M. Crawford	G. W. Dickinson	Ben Line Steamers Ltd.
<i>Benalbanach</i> ..	6.1.70	S. Murray	J. H. Martin	P. I. Ewart	J. E. Hearne ..	Ben Line Steamers Ltd.
<i>Benalligin</i> ..	26.1.70	K. C. Powell	J. C. Thomson	W. Winship	I. E. Morton ..	Ben Line Steamers Ltd.
<i>Benarinn</i> ..	15.12.69	J. C. Harvey	T. Rowat	D. Nesbitt	J. Gilhooly ..	Ben Line Steamers Ltd.
<i>Benarty</i> ..	29.12.69	A. Sinclair	G. L. Legg	D. C. MacDonald	W. Parkinson ..	Ben Line Steamers Ltd.
<i>Benattow</i> ..	28.2.69	A. S. Hamilton	P. C. Thompson	P. G. Edgar	R. J. L'Estrange	Ben Line Steamers Ltd.
<i>Benleuch</i> ..	8.12.69	R. E. Cowie	A. H. Cooke	B. W. Noble	M. C. Brown ..	Ocean Fleets Ltd.
<i>Benluachan</i> ..	5.12.69	K. H. Hardie	J. Phillips	R. Shaw	P. A. MacDonald	Prince Line Ltd.
<i>Benhope</i> ..	23.2.70	G. Reid ..	A. McCullough	J. Dickinson	T. Williams	British India S.N. Co. Ltd.
<i>Benhtlan</i> ..	19.3.70	R. C. Thomas	J. M. Anggang	P. F. Murphy	A. P. Moss ..	Booker Line Ltd.
<i>Benlmond</i> ..	9.12.69	A. McKenzie	A. Prentice	P. Anelli	I. MacDonal	Booker Bros. Ltd.
<i>Benreoch</i> ..	2.3.70	J. M. Macleod	A. I. MacFeate	A. A. Davidson	P. A. Whelan ..	Container Fleets Ltd.
<i>Benrines</i> ..	31.3.70	I. G. Adamson	C. A. Swanson	J. Lewthwaite	D. K. McQuillan	Warwick Tankers Ltd.
<i>Benstac</i> ..	*	R. S. Lumsden	D. S. Collins	T. K. Meikle	O. O'Shaughnessy	Blue Star Line Ltd.
<i>Bhamo</i> ..	25.2.70	J. S. Grassick	D. M. Lewis-Jones	K. Millett	P. T. Gavin ..	Chapman & Willan Ltd.
<i>Black Prince</i> ..	5.12.69	K. Slapp ..	W. P. Howard	I. P. H. Wallace	R. Meldrum ..	Bristol City Line Ltd.
<i>Bombala</i> ..	12.8.69	H. B. Chambers	I. A. B. Simkins	R. C. B. Cooper	R. Bradsell ..	B.P. Tanker Co. Ltd.
<i>Booker Vanguard</i> ..	26.3.70	E. J. Jones	F. Chandler	C. H. J. Allister	P. Trant ..	B.P. Tanker Co. Ltd.
<i>Booker Venture</i> ..	22.12.69	R. McKechnie	P. A. Southworth	W. Hill	G. R. Wilson ..	B.P. Tanker Co. Ltd.
<i>Border Castle</i> ..	12.2.70	E. V. Judge	C. E. Fredericksen	G. Phillips	K. Walton ..	B.P. Tanker Co. Ltd.
<i>Botary Bay</i> ..	*	— Heron	B. J. Prince	I. Roberts	S. Watson	B.P. Tanker Co. Ltd.
<i>Brandon Priory</i> ..	28.8.69	P. Saunders	D. A. Ley	T. Moor		
<i>Brasil Star</i> ..	1.7.69	H. W. McNeil	D. M. Ramsay	A. MacTavish		
<i>Brighton</i> ..	6.10.69	T. Newton	A. D. C. Payne	D. F. Williams		
<i>Bristol City</i> ..	13.10.69	M. J. Winter	C. T. Brandon	A. R. Stewart		
<i>British Ambassador</i> ..	18.9.69	R. E. Bell	D. H. Roberts	D. C. N. Jones		
<i>British Bombardier</i> ..	15.12.69	J. H. Jones	P. S. Chandler	M. J. Goulding		
<i>British Confidence</i> ..	16.3.70	A. E. Marshall	K. J. Butler	M. Gearing		
<i>British Freedom</i> ..	13.11.69	C. Herbert	P. J. Quarry	G. Ralph		
<i>British Oak</i> ..	1.8.69	C. G. Jones	P. J. Quarry	G. Ralph		

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>British Resource</i>	25.2.69	A. MacMillan	N. J. Greig, R. J. Higgins, J. A. Buchanan, P. W. Wilson	H. C. Craig	B.P. Tanker Co. Ltd.
<i>British Sailor</i>	17.4.69	I. McNaughton	P. N. Johnson, M. Dunning, I. D. Holden	C. S. Tod	B.P. Tanker Co. Ltd.
<i>British Splendour</i>	10.7.69	R. Baker	T. Ford, M. Searle, M. R. Mansbridge, M. Houlding	N. B. Ward	B.P. Tanker Co. Ltd.
<i>British Trust</i>	19.9.69	J. Murray	S. Batt	J. D. Cameron	B.P. Tanker Co. Ltd.
<i>Bucleuch</i>	4.2.70	M. Laing	R. A. Woof, I. Nanayakkara, A. A. Makhija, W. Dwelly	J. A. M. O'Neill	Hain-Nourse Ltd.
<i>Bulimba</i>	14.8.69	L. A. E. Laurent	J. W. A. Tanner, P. Simpkins, G. Thornton, J. E. Newbury	C. McCusker	British India S.N. Co. Ltd.
<i>Calchas</i>	12.12.69	H. K. Timbrell	J. P. Morgan, W. K. Vick, P. A. E. Sanbrook, P. S. Carr	D. Gunning	Ocean Fleets Ltd.
<i>Caledonia Star</i>	17.9.69	P. Davies	G. R. Aston, S. Bunney, A. Beale, K. Kilmartin	A. J. Williams	Blue Star Line Ltd.
<i>Camito</i>	20.11.69	H. McKinnon	E. Murphy, C. Jackson, R. Knowles	S. Taylor	Elders & Fyffes Ltd.
<i>Canadaian Star</i>	6.1.70	D. Newlin	D. C. Davies, W. Horgan, B. Illingworth, G. O. Pearson	G. B. Baker	Blue Star Line Ltd.
<i>Canberra Star</i>	*	M. R. Bremberg	B. V. Turner, P. Cawthorn, N. H. Lampe	R. H. Barradell	P. & O. Lines Management Ltd.
<i>Canmanore</i>	7.1.70	R. F. Underwood	R. C. Batchelor, A. T. Turner, D. C. Toon	C. D. McNeilly	Shaw Savill & Albion Co. Ltd.
<i>Canopic</i>	20.10.69	C. A. S. Borthwick	G. R. Johnson, O. H. Cook, R. Walter, J. Lock	D. Smith	Blue Star Line Ltd.
<i>Canterbury Star</i>	31.3.70	J. Hurton	A. G. F. Michie, J. E. Jennings, P. J. Brooks	D. F. Wilson	Lyle Shipping Co. Ltd.
<i>Cape Clear</i>	21.1.70	T. B. McLeod	P. A. Fenwick, I. J. I. Barclay, R. Richardson	E. Breslin	Lyle Shipping Co. Ltd.
<i>Cape Franklin</i>	23.2.70	C. G. Mallett	A. Weir, A. Neil, L. M. Hocking, P. Roche	J. Chamberlin	Lyle Shipping Co. Ltd.
<i>Cape Howe</i>	9.3.70	T. P. Edge	P. A. Fenwick, L. J. Gilhooly	E. Miller	Lyle Shipping Co. Ltd.
<i>Cape Nelson</i>	24.7.69	A. L. Milne	P. V. Flynn, G. Anderson, M. D. Pickup	W. MacLeod	Lyle Shipping Co. Ltd.
<i>Cape York</i>	20.3.70	T. C. O. Hogg	R. W. Sumner, A. J. Simmonds, N. R. Brown	E. A. Willocks	Sir Wm. Reardon Smith & Sons Ltd.
<i>Cardiff City</i>	22.12.69	H. Lloyd-Evans	R. T. Mackrell, C. Wimsitt, R. Hare	P. Barker	Ocean Fleets Ltd.
<i>Cardiganshire</i>	6.1.70	D. M. Belk	K. H. Stanley, E. H. Bocking, A. T. Willy, R. Green	— McConnell	Cunard S.S. Co. Ltd.
<i>Carmania</i>	22.5.68	J. E. Woolfenden, D.S.C.	F. P. Gunning, B. J. Gordon, M. Swanson	E. Dalton	G. Heyn & Sons Ltd.
<i>Carrigan Head</i>	9.1.70	N. W. G. Walsh	R. J. S. Squirell, A. Ross, F. Vick, R. Williams	R. Walker	Shaw Savill & Albion Co. Ltd.
<i>Cedric</i>	13.11.69	J. Street	G. P. D. Coleridge, A. Webber, M. Hancox	F. E. Page, M.B.E.	Shaw Savill & Albion Co. Ltd.
<i>Ceramic</i>	19.1.70	R. G. E. Grant	G. A. Fawcett, K. A. Long, M. Pritchard	D. B. Wright	British India S.N. Co. Ltd.
<i>Chakla</i>	16.10.69	P. H. Bidmead	L. H. Johnson, M. Pritchard, C. J. Newell, J. A. Tanner	C. I. A. Jones	British India S.N. Co. Ltd.
<i>Chantala</i>	23.2.70	J. D. Stephenson	T. Ali, A. Zebtrak, J. Cunningham	A. McDougall	John I. Jacobs & Co. Ltd.
<i>Cherrywood</i>	*	R. C. Rowland	J. Workman, M. Bentley, T. E. Wilson, J. C. Wallace	P. J. Lynch	Bamburgh Shipping Co. Ltd.
<i>Cheviot</i>	15.12.69	R. I. Charlton	D. F. Waller, P. R. Skelton, P. Pearson	R. McNeil	Elders & Fyffes Ltd.
<i>Chicanao</i>	27.6.69	N. W. Thomas	A. R. Lucas, N. W. Stephenson, J. F. Lunn, A. B. Tanner	D. D. Hammond	British India S.N. Co. Ltd.
<i>Chindacara</i>	20.11.69	P. M. Pitcairn	T. F. Gorst, C. K. Nelson	W. Chester	Ellerman Lines Ltd.
<i>City of Beiford</i>	19.1.70	T. Mallory	J. T. Bennett	M. R. W. Sheehy	Ellerman Lines Ltd.
<i>City of Birmingham</i>	6.3.70	J. Sapp	P. Rose, V. Rorey, P. N. Pennellier	W. S. McCulloch	Ellerman Lines Ltd.
<i>City of Brisbane</i>	6.2.70	L. R. Jones	N. C. Hall, M. J. P. Fagan, J. M. Waller	P. Renshaw	Ellerman Lines Ltd.
<i>City of Canberra</i>	19.12.68	T. H. Morgan	R. L. Pilkington, H. E. Rowlands, R. J. Doe, D. Brown	L. K. Dillon	Ellerman Lines Ltd.
<i>City of Cape Town</i>	6.8.69	R. Frame	D. J. Birley, H. M. Townsend, A. Brown	T. Murphy	Ellerman Lines Ltd.
<i>City of Chester</i>	20.12.69	J. Kinley	W. B. Flemington, P. J. Perham, G. M. Railson	—	Ellerman Lines Ltd.
<i>City of Eastbourne</i>	30.1.70	R. H. Bellhouse	R. Nightingale, S. Mortimer, S. Poole	—	Ellerman Lines Ltd.
<i>City of Glasgow</i>	24.10.69	G. G. Francis	—	—	Ellerman Lines Ltd.
<i>City of Guildford</i>	12.11.69	H. Swinney	—	—	Ellerman Lines Ltd.
<i>City of Karachi</i>	23.2.70	L. W. Roberts	—	—	Ellerman Lines Ltd.
<i>City of Manchester</i>	7.11.69	J. S. Grant	J. K. Wilson, W. McRitchie, M. Forrest	W. Kirstein	Ellerman Lines Ltd.
<i>City of Maitchester</i>	4.3.70	M. W. Hartley	P. C. Webber, J. A. McLeod, H. Rawcliffe	P. J. McGill	Ellerman Lines Ltd.
<i>City of Ottawa</i>	22.12.69	F. C. O'Neill, R.D.	N. Leslie, A. G. Pilkington, C. Hainsworth	K. O'Connor	Ellerman Lines Ltd.
<i>City of Oxford</i>	9.3.70	D. B. Butler	P. G. Bray, D. W. Pounder, R. P. Sargent	B. MacArthur	Ellerman Lines Ltd.
<i>City of Wellington</i>	17.10.69	T. Rigg	P. G. Dunford, C. S. Collings, A. J. Evans, F. D. McKenna	D. A. P. Galbraith	Ellerman Lines Ltd.
<i>City of Winchester</i>	26.1.70	N. F. Stewart	A. D. Slater, I. F. B. Currie, I. W. Ferguson	—	Ellerman Lines Ltd.
<i>Clan Alpine</i>					Clan Line Steamers Ltd.

Clan Macdonald	6.2.70	I. A. W. Williamson	P. Masters, C. C. Burge, J. M. M. Browne	S. V. Heron	Clan Line Steamers Ltd.
Clan Macdougall	24.2.70	R. W. D. Kenyon	F. Degersigny, H. Edwards, C. Marman	D. Imber	Clan Line Steamers Ltd.
Clan Macgillivray	24.11.69	A. Crawford	M. S. Mohamed, G. B. Charleson, E. Martin	J. Wright	Clan Line Steamers Ltd.
Clan Macgregor	6.2.70	G. A. Russ	J. A. Mortimer, K. B. Whitting, R. A. Robertson	G. K. Paterson	Clan Line Steamers Ltd.
Clan Macintyre	3.12.69	P. N. V. Rewell	W. F. Netherland, R. Menon	G. MacGarrigle	Clan Line Steamers Ltd.
Clan Macintoe	6.3.70	D. Cornwell	P. R. Lawrence, T. Alder, M. E. Guy	C. Ritchie	Clan Line Steamers Ltd.
Clan MacLaren	15.1.70	J. K. Currie	G. W. Arnot, D. Burgoyne, L. M. Roy	C. J. J. Davidson	Clan Line Steamers Ltd.
Clan MacLay	24.11.69	B. S. Biggs	A. J. Blackburn, J. N. Gartside		Clan Line Steamers Ltd.
Clan Maclean	1.12.69	P. J. Rose	G. D. Mobbs, C. J. Green		Clan Line Steamers Ltd.
Clan Maclean	*	F. Moss	J. R. Johnson, R. Flint, S. A. H. Yafai		Clan Line Steamers Ltd.
Clan Macleod	10.6.69	T. H. Graham		T. Willis	Clan Line Steamers Ltd.
Clan Macnab	10.2.70	A. M. Kennedy	A. S. Hill, R. B. Reid, J. Wise	R. Lyon	Clan Line Steamers Ltd.
Clan Macnair	26.3.70	W. H. Keith	M. G. Williamson, J. G. Hancock		Clan Line Steamers Ltd.
Clan MacLaurin	4.9.69	C. D. De F. Hedges	R. A. G. Simmonds, I. Peel	M. MacDonald	Clan Line Steamers Ltd.
Clan Malcolm	5.12.69	R. M. Bessant	W. A. Asi	N. Wynne	Clan Line Steamers Ltd.
Clan Matheson	8.10.69	J. G. Smith	R. Gebbie, R. Cawdery, S. Catton	K. R. Hughes	Clan Line Steamers Ltd.
Clan Menzies	*	T. L. Kirby	M. R. Garton, J. Simpson, R. Silverwood	K. Watkins	Clan Line Steamers Ltd.
Clan Ramsay	11.11.68	D. L'Estrange	R. Bigwood, R. Slack, J. Cowie	I. Kelly	Clan Line Steamers Ltd.
Clan Robertson	*	R. Harber	R. Strick, C. Vickers, M. L. Whiteley, B. Reid	P. G. Heald	Clan Line Steamers Ltd.
Clan Sutherland	22.4.69	F. J. Pye, M.B.E.	J. M. Cassels, A. T. Johnson, S. Saunders	D. Imrie	Clan Line Steamers Ltd.
Clan Sutherland	*	I. C. Graham	A. R. G. Everett, A. Burton	W. Saville	Clan Line Steamers Ltd.
Clanone	28.4.69	M. R. Sutcliffe	D. J. B. Jones, D. J. F. Pincher, W. Jensen,	S. Walker	Clan Line Steamers Ltd.
Clytaneus	*	L. Henshall	A. A. McKenzie	A. W. Jones	Ministry of Agriculture & Fisheries
Colorado Star	20.10.69	I. J. Tait	R. I. Chadwick, M. A. Mansfield, N. P. Colling,		Ocean Fleets Ltd.
Conon Forest		H. Munro	W. R. Houghton Boreham	J. C. Martin	Blue Star Line Ltd.
Constance Bowater		P. C. Byrne	M. K. MacLeod, D. Murray	I. D. Muir	J. & J. Denholm Ltd.
Corella	6.3.70	W. Craig	L. W. Roberts	A. R. Anderson	Cayzer Irvine & Co. Ltd.
Cotopaxi	19.3.70	L. W. Cooper, O.B.E.	R. A. Aldred		Ministry of Agriculture & Fisheries
Cotswood	19.1.70	G. A. McKay	R. D. Lothian, T. F. Hill, J. D. Davie	P. A. Murray	Pacific S.N. Co. Ltd.
Covevity City	18.8.69	J. J. Butterworth	J. A. Smeaton, M. Smith, M. Cowton, K. N. Metcalfe	B. Brewerton	Hain-Nourse Ltd.
Craigallan	10.12.69	D. MacDonald	H. A. Scott, J. R. Taylor, D. M. Dye, B. Lightfoot	H. Jones	Bibby Line Ltd.
Cretic	30.1.70	S. C. Carr	F. H. Leigh, I. G. White, J. Horgan	D. O. Williams	Scottish Ore Carriers Ltd.
Critan	10.10.69	I. Dunipace	F. T. Tregaskes, P. Destreich, N. Hunt, A. Monaghan	C. W. Cameron	Shaw Savill & Albion Co. Ltd.
Crofter	27.10.69	B. Crook	N. Campbell, I. S. Buchan, A. MacRae, W. N. Graham	J. Burke	J. & J. Denholm Ltd.
Crystal Crown	21.1.70	W. M. Shirreff	G. E. Houghton, M. G. Stratton, M. White,	J. Sharples	I. & J. Harrison Ltd.
Crystal Diamond	23.1.70	J. Wisden	W. M. Cowan	R. A. Ramwell	Sugar Line Ltd.
Crystal Gem	6.1.70	D. Sutcliffe	J. Stuart, J. King, W. H. Wilson	P. Duffy	Sugar Line Ltd.
Crystal Sapphire	4.11.69	J. R. L. Atkinson	I. D. McLeod, T. A. Smith, E. D. Want	J. J. Hanson	Sugar Line Ltd.
Cumberland	15.1.70	C. P. Robinson	E. McEwen, I. Rollo, J. Bailey	P. W. Gardner	Federal S.N. Co. Ltd.
Cynric	6.3.70	H. Davies	R. C. Sclater, J. W. Jackson, W. F. Land	P. Connrie	Ocean Fleets Ltd.
Daghestan	22.12.69	D. A. Statham	S. Wylie, R. Swabey, J. Tunmore	J. J. Cameron	Shaw Savill & Albion Co. Ltd.
Dalesman	19.1.70	D. G. Fraser	J. Houston, D. Marr, W. Downing		Common Bros. Ltd.
Dalharna	6.11.69	A. Sutherland	P. McParlin, A. Littlewood	K. Jones-Roberts	T. & J. Harrison Ltd.
Delphic	29.1.70	M. H. Hooker	B. W. Mennie, J. Jarwick, M. Malpass	K. W. Pile	Hunting & Sons Ltd.
Demodocus	23.3.70	I. S. McEwan	N. C. Sadd, R. W. Joughin, M. G. Bullock	P. Arnold	Shaw Savill & Albion Co. Ltd.
Dervont	8.1.70	W. J. S. Eynon	G. M. Poynter, S. J. Lowden, P. Kennedy	A. W. Hay	Ocean Fleets Ltd.
Devon	15.12.69	R. Phillips	B. Wilson	J. Mathers	Royal Mail Lines Ltd.
Devon City	6.1.70	J. Reid	A. Carver, P. Clegg, A. Jagers	L. A. Ryan	Federal S.N. Co. Ltd.
Diomed	8.1.69	G. F. R. Ellerby	T. E. Thistleton, R. K. Stuart, D. Hall	S. G. Whitmore	Sir Wm. Reardon Smith & Son Ltd.
Discovery	24.11.69	D. K. Dunlop, R.D.	R. F. Speedie, W. Fleming, T. G. Gray, P. C. Hewitt	A. G. Watt	Ocean Fleets Ltd.
Donegal	22.12.69	G. L. Howe			Natural Environment Research Council
		E. J. Ridout	A. H. Morrison, M. L. Doyle, A. Woods	D. Prescott	Trinder Anderson & Co. Ltd.

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Dorset</i> ..	23.2.70	C. A. Miller	K. Storey, C. Greenwood, J. M. McWilliam, D. L. Everatt	S. J. N. Griffith	Federal S.N. Co. Ltd.
<i>Duhallow</i> ..	27.11.69	L. J. Lennox	D. L. Bullingham, I. A. Wingate, R. M. Exelby, M. Tregoning	J. Walsh	Hain-Nourse Ltd.
<i>Dukesgarth</i> ..	15.12.69	N. Richardson	D. A. Rayner, F. D. Banks, L. Kruzins, H. I. Phillips	J. E. C. Tait	Cory Maritime Ltd.
<i>Dunadd</i> ..	15.12.69	E. D. MacGregor	J. Paton, D. Kerr, D. I. MacNeil, J. MacCallum	I. Stewart	J. & J. Denholm Ltd.
<i>Duncraig</i> ..	23.3.70	G. J. McIntosh	M. B. Ekine, K. Singer, G. D. Hopkin, J. C. Gillespie	A. McIver	J. J. Denholm Ltd.
<i>Dunstanburgh Castle</i> ..	*	P. Gardiner	J. H. Bullard, K. Greist, J. Davies	W. J. Byrne	W. A. Souter & Co. Ltd.
<i>Edenmore</i> ..	10.12.69	I. R. Stephens	C. W. Laycock, A. Theunissen, R. Strick	R. McCormick	Furness Withy & Co. Ltd.
<i>Edinburgh Castle</i> ..	20.2.70	D. W. Sowden, R.D.	D. Bowman, B. Mitchell, R. Newling	J. O'Leary	Union-Castle Mail S.S. Co. Ltd.
<i>Edward Wilshaw</i> ..	11.6.68	N. H. Smith	R. M. Keyzor, K. Brammer, A. F. Wilson	J. Winshurst	Cable & Wireless Ltd.
<i>Egton</i> ..	6.1.70	S. Jackson	M. Ballaam, J. Mallram, S. Stone	W. A. Thompson	Roland & Marwood S.S. Co. Ltd.
<i>Elizabeth Bowater</i> ..	23.3.70	T. Young	D. B. Thomas, C. S. Crawford	J. R. Tomlinson	Cayzer Irvine & Co. Ltd.
<i>Elmbank</i> ..	25.8.69	B. J. Peterson	W. R. Langworthy, P. Wallace, J. L. Bailey	R. H. Boatman	Bank Line Ltd.
<i>Empire Star</i> ..	16.2.70	R. Burns	H. V. Goodrick, G. R. Henderson, J. R. Leslie	J. Bradbury	Lampport & Holt Line Ltd.
<i>Empress of Canada</i> ..	16.12.68	J. Richardson	P. C. H. Adair, G. B. Drewery, A. Baker, M. J. Howden	M. R. Windley	Canadian Pacific Steamships Ltd.
<i>Empress of England</i> ..	26.3.70	G. Bowden	G. Cotton, P. Davis, R. Horth	R. Heath	Canadian Pacific Steamships Ltd.
<i>English Star</i> ..	23.9.69	E. A. Binnington	I. MacLean	D. Leeson	Ministry of Agriculture & Fisheries
<i>Ernest Holt</i> ..	14.1.70	H. C. R. Dell	J. E. M. Balfour	J. Ritchie	Federal S.N. Co. Ltd.
<i>Essex</i> ..	11.3.70	R. Hyam	F. S. Sprought, A. J. Fulton, D. J. Yeowell	R. S. Kimberley	Esso Petroleum Co. Ltd.
<i>Esso Hampshire</i> ..	12.3.70	R. E. Smith	J. Macgregor, J. Way, R. Langford, J. Moran	R. Hartland	Esso Petroleum Co. Ltd.
<i>Esso Pembrokeshire</i> ..	23.12.68	T. Rutherford	P. K. Tyler, G. F. Thomas, D. G. A. Flynn	D. Murphy	Esso Petroleum Co. Ltd.
<i>Esso Warwickshire</i> ..	25.3.70	W. Lowdes	P. N. Howard	J. Steven	Esso Petroleum Co. Ltd.
<i>Esso York</i> ..	24.7.69	A. J. F. Colquhoun, M.F.E.	W. H. Fennelly, E. J. Baines		Walter Runciman & Co. Ltd.
<i>Eucadia</i> ..	4.8.69	A. A. Baxter	J. C. Priest, I. Swann, J. Swan		
<i>Explorer (m.v.)</i> ..	24.2.70	G. W. McGuinness	W. D. Roberts, K. Long, M. J. J. Williamson		T. & J. Harrison Ltd.
<i>Explorer (F.R.S.)</i> ..	16.3.70	A. A. Baxter	J. McBride		Dept. of Agriculture & Fisheries for Scotland
<i>Faristan</i> ..	2.3.70	D. R. Carden	N. R. Peckham, J. Ridout, R. L. Stevenson	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	J. Wylie	Mavroleon Bros. Ltd.
<i>Firbank</i> ..	23.6.66	W. Watson	R. A. Bazaar, A. K. Gillespie, E. Irvine	D. Wilson	Bank Line Ltd.
<i>Flintshire</i> ..	1.12.69	J. C. Liptrot	D. P. Wallace, P. R. D. Brewer, R. A. Jones, I. M. Barlow	W. E. Gell	Ocean Fleets Ltd.
<i>Floristan</i> ..	1.8.69	R. B. Arthur	J. W. Wightman, C. M. Gibbs, I. Stroud, D. W. Parke	W. F. Stirling	Frank C. Strick & Co. Ltd.
<i>Foreland</i> ..	16.9.69	J. L. Downie	J. MacDonald, C. D. Bishop-Laggett, L. Moon	L. J. Kidd	Shipping & Coal Co. Ltd.
<i>Fortfield</i> ..	17.10.69	J. B. Bewick	P. W. Harrison, P. I. Torr, B. Mennie, J. Parker	E. Smith	Hunting & Son Ltd.
<i>Fourah Bay</i> ..	21.1.70	C. S. Mackinnon	C. M. Canavan, D. Batchelor	M. R. Palmer	Ocean Fleets Ltd.
<i>Francia</i> ..	11.12.69	H. L. de Legh, R.D.	A. T. Willy, G. Lane, R. Langmuir, W. H. Head	B. Beecham	Cunard S.S. Co. Ltd.
<i>Fremantle Star</i> ..	1.12.69	A. H. White	D. C. Davies, C. J. Poulter, G. O. Pearson	L. K. Livie	Blue Star Line Ltd.
<i>Galway</i> ..	8.1.70	R. J. Ogilvy	E. C. Davies, G. Mortimer, H. Matthews	G. Mulligan	Trinder Anderson & Co. Ltd.
<i>Geestbay</i> ..	17.10.69	O. Springett	K. Pearson, A. W. Breach	R. B. Geale	Geest Industries Ltd.
<i>Geestcape</i> ..	6.11.69	P. W. Groves	C. R. Thomas, M. M. Macleod, A. W. Breach	J. E. Conway	Geest Industries Ltd.
<i>Geesthaven</i> ..	18.3.70	O. Springett	I. McLachlan, A. W. Breach, W. J. Walpole		Geest Industries Ltd.
<i>Geestport</i> ..	24.11.69	A. MacNeil	R. E. Baker	A. Lafond	Geest Industries Ltd.
<i>Georgina V. Everard</i> ..	13.11.69	L. Andersen	R. G. MacMillan	J. McKie	F. T. Everard & Sons Ltd.
<i>Gladys Bowater</i> ..	21.1.70	T. R. Parsons	N. L. Smith, R. Hunter, T. Kearsley	M. Murry	Cayzer Irvine & Co. Ltd.
<i>Glenaffric</i> ..	12.12.69	J. O. Jones	R. J. McCombie, P. J. Catline		Ocean Fleets Ltd.

<i>Glenalmond</i> ..	10.12.69	I. R. Atkinson ..	A. R. Wilkinson, C. Bouws, J. J. Crookes, I. D. Jackson ..	J. V. Morgan ..	Ocean Fleets Ltd.
<i>Glenearn</i> ..	2.3.70	C. H. F. Hill ..	P. A. Brown, D. M. Bell, P. J. Barratt ..	A. Brown ..	Ocean Fleets Ltd.
<i>Glenfalloch</i> ..	6.1.70	P. H. Edwards ..	C. O. Clowes, N. G. Simpson, J. C. Bromfield ..	W. W. Beebe ..	Ocean Fleets Ltd.
<i>Glenfinlas</i> ..	13.1.70	G. W. Povey ..	J. B. Sutcliffe, H. J. Hathway, J. Walker ..	C. W. Knibb ..	Ocean Fleets Ltd.
<i>Glenfurry</i> ..	30.10.69	A. S. Thompson ..	R. G. J. Wiltshire, J. G. Williams, A. G. Rutherford, C. M. W. Roberts ..	J. B. Jardine ..	Ocean Fleets Ltd.
<i>Glenlyle</i> ..	29.9.69	E. L. Stubbings ..	J. E. McGregor, H. W. Simmonds, R. J. Welch ..	B. C. Evans ..	Ocean Fleets Ltd.
<i>Glenlyon</i> ..	2.3.70	J. A. Dougal ..	I. M. Grant, C. S. Moir, J. C. R. Jones, W. E. Bowden ..	T. H. Jones ..	Ocean Fleets Ltd.
<i>Glenmoor</i> ..	17.11.69	A. W. Fielding ..	K. Wind, I. M. Doyle, A. Johnston ..	I. D. Smith ..	Walter Runciman & Co. Ltd.
<i>Glenogle</i> ..	28.1.70	R. C. Riseley ..	C. Dalton Jones, J. A. C. Macgregor, J. A. Ratcliffe, R. C. McClelland ..	D. Sibley ..	Ocean Fleets Ltd.
<i>Glenorchy</i> ..	28.1.70	T. W. Willows ..	I. T. Whale, C. S. Moir, G. E. Metcalf, D. J. Robertson ..	A. Spencer ..	Ocean Fleets Ltd.
<i>Gloucestershire</i> ..	10.12.69	N. F. Fitch, M.B.E. ..	G. R. Baker, M. T. Donnellan, H. Paulusz, L. P. Weinman ..	C. Stamford-Burrows ..	Bibby Line Ltd.
<i>Gloxinia</i> ..	22.10.68	J. H. Gray ..	G. T. Parker, W. H. Selkirk, N. Farrer ..	J. Stephen ..	Stag Line Ltd.
<i>Golfito</i> ..	20.2.70	T. C. Mullings ..	D. F. Waller ..	G. Sutherland ..	Elders & Fyffes Ltd.
<i>Good Hope Castle</i> ..	13.11.69	H. Charnley ..	E. C. Brenner, P. MacMullan ..	R. N. Harris ..	Union-Castle Mail S.S. Co. Ltd.
<i>Gorjistan</i> ..	19.1.70	J. F. Ockleford ..	K. H. Gear, C. A. Baker, R. Madden ..	R. Milner ..	Frank C. Strick & Co. Ltd.
<i>Gothland</i> ..	27.10.69	J. K. Liston ..	E. G. Stout, R. G. Dickson, R. Leask, P. C. Mackay ..	B. M. Donald ..	Currie Line Ltd.
<i>Governor</i> ..	29.12.69	R. B. Simmons ..	P. J. Sayer, A. E. Hicks, O. M. Owen ..	G. West ..	T. & J. Harrison Ltd.
<i>Hadra</i> ..	6.11.69	E. A. S. Brown ..	D. A. White, I. Wragg, J. L. Ross ..	H. Roderick ..	Shell Tankers (U.K.) Ltd.
<i>Halkfax City</i> ..	24.2.70	N. Childs ..	C. Thomas ..	R. Bush ..	Bristol City Line Ltd.
<i>Haparangi</i> ..	26.3.70	J. M. Burn ..	J. A. Henderson, J. J. G. Allen, G. Dyke ..	W. R. Parsons ..	New Zealand Shipping Co. Ltd.
<i>Hauraki</i> ..	2.3.70	D. Lamont ..	N. P. Epps, M. W. Carrell, B. D. Cramond, T. E. McLaren ..	A. Sloan ..	New Zealand Shipping Co. Ltd.
<i>Hazelmoor</i> ..	2.2.70	A. McKenzie ..	D. Ilderton, M. J. Martin, J. J. Paton ..	W. C. A. Phillips ..	Walter Runciman & Co. Ltd.
<i>Hector</i> ..	13.3.70	A. G. Alison ..	J. M. Zippert, P. M. Watt ..	F. E. D. Barritt ..	Ocean Fleets Ltd.
<i>Helanus</i> ..	6.1.70	N. D. Martin ..	D. Fellowes, A. Terras, A. J. Stewart, F. D. Hugo ..	S. J. Chappell ..	Hector Whaling Ltd.
<i>Helisoma</i> ..	25.3.70	A. G. Phillips ..	M. Mason, J. E. Tumilty, M. J. Foster, H. A. Masri ..	E. Lyons ..	Ocean Fleets Ltd.
<i>Hemifusus</i> ..	6.2.70	W. Cairns ..	P. L. Jones, J. D. Brown, D. S. Fuller ..	A. Rose ..	Shell Tankers (U.K.) Ltd.
<i>Hemimactra</i> ..	18.3.70	M. P. Lee ..	C. G. Hills, A. Jebson, J. Board ..	W. F. Law ..	Shell Tankers (U.K.) Ltd.
<i>Herford</i> ..	27.2.70	A. B. Stalker ..	G. J. T. Drummond, G. Wilson ..	B. McDonach ..	Federal S.N. Co. Ltd.
<i>Himalaya</i> ..	18.12.69	I. W. Terry ..	R. K. Blake, J. W. Gill, S. Gillman, P. Middleton ..	C. J. Elliott ..	P. & O. Lines Management Ltd.
<i>Himakura</i> ..	15.5.69	I. Paterson ..	M. R. Winn, D. N. Kean, M. Douglas, M. Derrick ..	A. R. McCormick ..	New Zealand Shipping Co. Ltd.
<i>Historian</i> ..	23.3.70	R. A. Blackaby ..	P. L. Phillips, H. C. Hynard, M. H. Lawrence, D. Sheldon ..	H. Sparkes ..	Shell Tankers (U.K.) Ltd.
<i>Horomya</i> ..	16.3.70	C. R. S. Monk ..	W. Grant, J. Thompson, M. J. O'Neill ..	M. J. W. Higgins ..	British India S.N. Co. Ltd.
<i>Houra</i> ..	17.3.69	T. J. Dillon ..	J. A. Northam, E. Maxwell, H. Jackson ..	A. B. Loane ..	Shell Tankers (U.K.) Ltd.
<i>Humiliaria</i> ..	2.2.70	D. E. Moran ..	G. J. Taylor, J. Appadurai, P. J. Whitehead ..	G. M. Turner ..	Federal S.N. Co. Ltd.
<i>Huntingdon</i> ..	26.1.70	F. B. Cocking ..	B. E. Foster, A. D. McKaig, B. D. Snazell, G. Bradley ..	J. Mathers ..	O. Gross & Sons Ltd.
<i>Huntland</i> ..	23.3.70	J. G. Cormack ..	D. J. Walker, M. Eglon, S. A. Mieszkowski, D. R. Stainton ..	M. J. Sutherland ..	New Zealand Shipping Co. Ltd.
<i>Hurumai</i> ..	30.10.69	J. L. Stobbs ..	L. G. Keizer, B. Wright, R. S. James ..	A. R. McCormick ..	Shell Tankers (U.K.) Ltd.
<i>Iberic</i> ..	19.1.70	J. L. Stobbs ..	H. M. Close, A. W. Farrow, W. A. F. Killackey, M. J. Sutherland ..	M. Breathnach ..	Shaw Savill & Albion Co. Ltd.
<i>Illyric</i> ..	8.1.70	A. Stevens ..	C. G. Rowsell, C. O'Connell, C. J. Selfe, R. T. Wigg ..	H. A. Sirett ..	Shaw Savill & Albion Co. Ltd.
<i>Imperial Star</i> ..	23.7.69	G. Stubbings ..	J. R. Penson, T. Griffith, T. Noonan ..	A. Henshaw ..	Blue Star Line Ltd.
<i>Ingleton</i> ..	27.2.69	W. Wilson ..	T. Miller, P. Simmonds, R. Wooding, J. Bradley ..	J. Vidal ..	Chapman & Willan Ltd.
<i>Inishaven Head</i> ..	7.8.68	R. A. Maxwell ..	D. J. Stansbury, R. R. Mimmack, R. P. Harrison ..	J. McKenna ..	G. Heyn & Sons Ltd.
<i>Inverbank</i> ..	17.11.69	C. R. Downes ..	A. Whittard, P. Hoiles ..	C. J. Randall ..	Bank Line Ltd.
<i>Ionic</i> ..	4.3.70	D. Flett ..	D. Blom, M. W. Murrish, T. R. Fuithorpe ..	J. Butler ..	Shaw Savill & Albion Co. Ltd.
<i>Iron Barque</i> ..	3.12.69	J. C. Carr ..	W. Garrett, F. Newbold, P. Sherriff ..	G. R. Williams ..	Common Bros. Ltd.
<i>Iron Crown</i> ..	2.2.70	D. Martucci ..	J. Leesmoft, W. J. Garnett ..	C. Murray ..	Common Bros. Ltd.
<i>Iron Horse</i> ..	2.2.70	D. Martucci ..	K. Lines, K. Gellie, J. Neill, K. Fuge ..		
			I. W. Davidson ..		
			W. R. D. McLaughlin, C. Veitch, F. W. Allen, A. Smith ..		

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Ivernia</i> ..	19.11.69	A. M. Thomson	J. S. Wolstencroft, T. H. L. Boyd, A. D. Marsh, T. H. Owen	P. Madden ..	Cunard S.S. Co. Ltd.
<i>Ixion</i> ..	26.3.70	A. S. Thompson	K. F. Vickery, M. Edward	G. E. Clark ..	Ocean Fleets Ltd.
<i>Jamaica Planter</i> ..	23.3.70	M. C. Harper ..	R. W. Warwick, A. G. L. Chippendale, P. King, D. S. Olden	R. F. Collins ..	Kaye Son & Co. Ltd.
<i>Jamaica Producer</i> ..	14.2.69	G. A. Foulds	J. P. H. Fisher, N. R. Moon, J. L. R. Savatimutto	J. P. R. Binding ..	Kaye Son & Co. Ltd.
<i>Jason</i> ..	8.12.69	J. Peticrew	A. D. Donald, P. E. Howells, R. S. Kelkar	D. J. Glennie ..	Ocean Fleets Ltd.
<i>Yelunga</i> ..	15.12.69	H. C. Walker	C. R. Elliott, W. Taylor, S. Wormald, J. A. Martin	H. M. S. O'Gorman ..	British India S.N. Co. Ltd.
<i>John Biscoe</i> ..	27.5.69	M. J. Cole	G. M. Brown, R. J. Richards		British Antarctic Survey
<i>John Murray</i> ..	22.12.69	M. J. Perry			Natural Environment Research Council
<i>Yunna</i> ..	15.1.70	J. F. Ashbridge ..	R. L. Mitchel, G. B. Baxter, M. T. Barwell, J. M. Worman	S. J. Schuster ..	Hain-Nourse Ltd.
<i>Juwara</i> ..	*	T. D. Dumont	D. Hamilton ..	W. Henderson	British India S.N. Co. Ltd.
<i>Karaghistan</i> ..	15.10.69	A. S. MacLean ..	P. Quayle, S. Chapman, P. C. Barrnby, H. G. N. Lloyd, A. Shaw	D. R. Dunning	Frank C. Strick & Co. Ltd.
<i>Kenuta</i> ..	19.1.70				Pacific S.N. Co. Ltd.
<i>King Arthur</i> ..	10.2.70	J. K. Currie	I. Walbridge, J. Cotton, R. Day	M. A. Heaton ..	Cayzer Irvine & Co. Ltd.
<i>King George</i> ..	29.1.70	A. A. Graham	I. MacAlpine, T. S. Ammani, D. J. Owiatto	J. A. Cardownie ..	Cayzer Irvine & Co. Ltd.
<i>King Malcolm</i> ..	12.12.69	F. G. King	J. W. Callow, P. MacArthur, W. G. Wilson	G. D. Pople ..	Cayzer Irvine & Co. Ltd.
<i>Kinnaird Castle</i> ..	13.3.70	J. S. Catterall	T. E. Dubicki, P. G. Atkinson, A. J. Blackler	C. E. G. Pratt ..	Union-Castle Mail S.S. Co. Ltd.
<i>Kohistan</i> ..	4.9.69	W. H. D. Marker	W. Bolitho, B. Bartlett, S. Yousef, R. Atkinson	M. Lavan ..	Frank C. Strick & Co. Ltd.
<i>Laganbank</i> ..	13.11.69	T. D. Scott	D. G. Beresford, D. Stewart, J. C. E. Stuart	G. B. Randall ..	Bank Line Ltd.
<i>Laksa</i> ..	20.11.67	W. G. Ross			Chr. Salvesen & Co. Ltd.
<i>Landuade</i> ..	*	W. J. Tatem	R. G. Laurensen, W. Locker, D. Rattray ..	R. Mortimer ..	W. J. Tatem Ltd.
<i>Laurentic</i> ..	30.1.70	J. L. Stobbs	M. Scanlan, B. Lloyd, M. A. Wrey	C. W. Lomax ..	Shaw Savill & Co. Ltd.
<i>Lindisfarne</i> ..	1.7.69	J. Dunn ..	A. Stobbs, K. E. Greest, G. D. Sandercrook	J. McMillan ..	W. A. Souther & Co. Ltd.
<i>Loch Loyal</i> ..		G. W. C. Meldrum, M.B.E.	L. A. S. Cooper, R. C. Phillips, G. Anderson, D. Mortimore		Royal Mail Lines Ltd.
<i>Loch Ryan</i> ..	13.3.70	H. J. Pirie	C. Arnold, D. Mortimore, A. Jones	M. Pearson ..	Furness Withy & Co. Ltd.
<i>Lombardy</i> ..	23.3.70	J. Hogg ..	T. P. Whalley, M. G. Imrie, P. Griffin	J. P. Doris ..	Royal Mail Lines Ltd.
<i>Longstone</i> ..	12.2.70	I. Walker	P. McConochie, K. Raisbeck, R. I. Crawford, D. Newham	G. E. A. St. Gate	W. A. Souther & Co. Ltd.
<i>Lord Strathcona</i> ..	23.12.68	P. Denham	P. Woods, N. Johnson	M. Ennis ..	Canadian Pacific (Bermuda) Ltd.
<i>Mabel Warwick</i> ..	7.11.69	G. Boothby	M. Atkinson, R. M. Frederick, D. Buckingham	A. McGeachie ..	Houlder Bros. Co. Ltd.
<i>Machoon</i> ..	*	I. K. Edmunds	J. W. Rigg, T. D. A. Murphy	A. J. Thompson	Ocean Fleets Ltd.
<i>Macharda</i> ..	23.12.69	W. H. C. Hicks ..	J. Bingley, P. Seymour, C. Allport ..	W. B. Bickham	Cunard-Brocklebank Ltd.
<i>Mahout</i> ..	14.1.70	P. J. Pembroke ..	G. Kay, I. Henderson, R. J. Frearson	D. W. Williamson	Cunard-Brocklebank Ltd.
<i>Mahseer</i> ..	*	D. A. M. O'Byrne			Cunard-Brocklebank Ltd.
<i>Makrana</i> ..	15.12.69	G. W. Sinclair	H. G. Carter, E. L. Jackson, D. Stone	I. A. Hamilton	Cunard-Brocklebank Ltd.
<i>Manapouri</i> ..	24.2.70	J. D. Guyler	R. R. Walker, S. Chatfield, J. Martin	B. E. Bewley ..	New Zealand Shipping Co. Ltd.
<i>Manchester Challenge</i> ..	26.1.70	P. N. Fielding		D. Hodgson ..	Manchester Liners Ltd.
<i>Manchester City</i> ..	19.1.70	A. Starnier	D. R. Llewellyn, L. Street, D. Smith, P. Cullen	I. McDonald ..	Manchester Liners Ltd.
<i>Manchester Commerce</i> ..	15.1.69	J. E. Askew	D. Harper, A. Scotland, J. Baker, F. Shepherd	W. F. Harrison	Manchester Liners Ltd.
<i>Manchester Concorde</i> ..	15.9.69	L. C. Taylor	M. I. Miles, J. W. Williamson, F. Shepherd	K. M. Smith ..	Manchester Liners Ltd.
<i>Manchester Courage</i> ..	23.9.69	B. G. Thomas	R. Webb, D. Gregson, C. J. Hunt ..	P. M. Byrne ..	Manchester Liners Ltd.
<i>Manchester Faith</i> ..	31.7.69	T. B. Hancock	T. Smith, J. C. Birkenhead, D. R. Perry, G. Hughes-Jones		Manchester Liners Ltd.
<i>Manchester Fame</i> ..	4.9.69	D. P. Humphrey			Manchester Liners Ltd.
<i>Manchester Miller</i> ..	24.4.69	E. W. Espley	M. R. Thompson, A. Milroy, K. W. Rourke	W. Maudsley ..	Manchester Liners Ltd.

Manchester Port	29.1.70	G. R. Thompson	F. F. Perrott, R. J. Young, D. Smith	J. MacDonald	Manchester Liners Ltd.
Manchester Progress	22.5.69	D. Thomas	M. Sebborn, D. Perry, K. W. Rourke, D. Nunton, R. Galloway	E. Heywood	Manchester Liners Ltd.
Manchester Renown	4.9.69	J. Illingworth	M. Sebborn, J. Birkenhead, A. W. Ellis	F. Rook	Manchester Liners Ltd.
Marabank	16.10.69	L. W. Thorne	W. M. Marshall, W. B. Geddes, R. Kent	R. J. Leppard	Bank Line Ltd.
Marion	19.11.69	R. M. McWilliam	A. Hodgson, B. Welch	D. Cridland	Ocean Fleets Ltd.
Matara	29.12.69	E. F. H. Allen	J. W. Murt, A. C. Anson, J. Vercoe, D. Lacey	R. D. Sharpe	New Zealand Shipping Co. Ltd.
Mawana	26.3.70	G. B. Thomas	H. N. Gibson, J. D. Cook, R. Roberts	W. J. Mullarkey	Cunard-Brocklebank Ltd.
Media	26.1.70	A. Bull	J. M. Bubb, S. L. Gilchrist, A. MacVean, R. B. Bradbury	R. L. Baker	Cunard-Brocklebank Ltd.
Megantic	21.1.70	W. J. Stanger	J. T. Batchelor, P. F. W. Tozer, R. I. Bennet	E. O. Barnfather	Shaw Savill & Albion Co. Ltd.
Melampus	6.2.67	H. K. Martin	P. Dawson, P. J. Hamilton, D. J. Metcalf, D. J. Tatham	G. Higham	Ocean Fleets Ltd.
Melbourne Star	11.7.69	J. S. Hunter	N. Orr, D. Ramsay, J. Stessor	E. Milburn	Blue Star Line Ltd.
Menestheus	6.2.70	D. Campbell	J. R. K. Corrin, J. Stewart, R. E. Skinner, W. F. Wood	Ocean Fleets Ltd.	Ocean Fleets Ltd.
Mercury	17.1.68	P. B. Henderson	G. C. J. Wilkins, D. Flower, D. Makin, J. Rogers	Cable & Wireless Ltd.	Cable & Wireless Ltd.
Montreal City	26.9.69	A. F. Ashton	J. R. Williams, R. T. Wood, R. A. Wilson	Bristol City Line Ltd.	Bristol City Line Ltd.
Moreton Bay	*	G. Gibson	N. C. E. Spencer, I. Farquharson, B. W. Dyson	Container Fleets Ltd.	Container Fleets Ltd.
Mystic	19.3.70	G. Roberts	M. B. Harvey, R. G. Dance, R. O'Callaghan	Furness Withy & Co. Ltd.	Furness Withy & Co. Ltd.
Nardana	*	J. S. Stephenson	J. Lord, A. Z. Kowalewski, J. C. Goble, D. S. Walker	British India S.N. Co. Ltd.	British India S.N. Co. Ltd.
Narus	24.2.70	B. Hill	M. A. Bechley, D. H. Williams, G. G. Milne	Ocean Fleets Ltd.	Ocean Fleets Ltd.
Nevasa	2.11.70	F. A. J. Downer, D.S.C.	M. A. Cully, D. A. Wale, A. Geels	British India S.N. Co. Ltd.	British India S.N. Co. Ltd.
Newcastle Star	6.11.69	J. G. King	T. A. Willars, J. A. Ramsay, B. Witton, J. Gray	Blue Star Line Ltd.	Blue Star Line Ltd.
Newfoundland	10.10.69	J. T. Sheffield, M.B.E.	J. T. Mackereith, J. Harris, J. Rowman	Furness Withy & Co. Ltd.	Furness Withy & Co. Ltd.
New Zealand Star	3.2.70	A. Reeve	R. A. Barratt, I. C. McKendrick, C. Vickers	Blue Star Line Ltd.	Blue Star Line Ltd.
Nicolas Bowater	*	A. Sillars	C. P. Stockings, R. D. J. Rees, B. T. Smith, N. S. Durant	Cayzer Irvine Co. Ltd.	Cayzer Irvine Co. Ltd.
Nina Bowater	9.3.70	G. Beaumont	D. A. Fyson, A. J. Ward, W. N. Pointon, J. W. Spence	Cayzer Irvine & Co. Ltd.	Cayzer Irvine & Co. Ltd.
Northern Star	6.11.69	D. T. Mouldley	G. C. Stalker, S. P. Hockley, J. Rutherford	Shaw Savill & Albion Co. Ltd.	Shaw Savill & Albion Co. Ltd.
Northernland	11.3.70	R. G. Hollingdale	G. C. Stalker, S. P. Hockley, J. Rutherford	Federal S.N. Co. Ltd.	Federal S.N. Co. Ltd.
Nottingham	22.12.69	G. W. McCathie, R.D.	M. F. Berne, M. J. Ingamells, R. Atkins	New Zealand Shipping Co. Ltd.	New Zealand Shipping Co. Ltd.
Nova Scotia	23.10.69	J. Chester	D. C. S. Thompson, G. H. M. Grant, P. A. Golding	Furness Withy & Co. Ltd.	Furness Withy & Co. Ltd.
Nurnahal	14.10.69	F. M. Marchant	M. Bishop, M. Hall-Tompson, S. M. Burgoine	Hain-Nourse Ltd.	Hain-Nourse Ltd.
Obuasi	23.1.69	D. Howe	D. A. Boffey, H. M. Cogan	Ocean Fleets Ltd.	Ocean Fleets Ltd.
Orcades	21.1.70	E. V. Harris	I. Randall, A. Smith, W. Stockton	P. & O. Lines Management Ltd.	P. & O. Lines Management Ltd.
Orcoma	28.4.69	A. A. Lang	B. Minter, I. R. Thompson, C. J. N. Curran	Furness Withy & Co. Ltd.	Furness Withy & Co. Ltd.
Orita	16.12.69	T. F. J. Leddra	M. A. Barnett, A. W. Noble, A. J. Davies, C. M. Turner	Pacific S.N. Co. Ltd.	Pacific S.N. Co. Ltd.
Oronsay	11.12.69	R. J. H. Cutler	A. J. T. Gray, I. Thompson, S. Chamberlain, W. B. Anderson	P. & O. Lines Management Ltd.	P. & O. Lines Management Ltd.
Orsino	4.3.70	E. Wooldridge	J. Huddleston, D. Lycett, I. Dalgarno	Hellyer Bros. Ltd.	Hellyer Bros. Ltd.
Orsova	31.3.70	M. R. Prowse	R. I. Kinner, K. Swinburne, P. Howes, M. Imrie	P. & O. Lines Management Ltd.	P. & O. Lines Management Ltd.
Otato	6.3.70	F. S. Angus, R.D.	I. C. McLean, A. S. Hardy, J. S. McKechnie	New Zealand Shipping Co. Ltd.	New Zealand Shipping Co. Ltd.
Otati	24.12.69	J. H. B. Weston	C. R. Jenkins, J. H. Smith, P. Warne, J. Barkess	New Zealand Shipping Co. Ltd.	New Zealand Shipping Co. Ltd.
Pacific Northwest	19.11.69	M. E. Musson	H. E. P. Durell, R. S. Hall, R. S. Coldham	Furness Withy & Co. Ltd.	Furness Withy & Co. Ltd.
Pacific Ranger	13.3.70	P. D. O'Driscoll	B. J. Warner, J. F. Swan, R. M. N. Godfrey, M. Bickham	P. & O. Lines Management Ltd.	P. & O. Lines Management Ltd.
Pacific Reliance	14.10.69	J. Ferrer	A. R. Wilson, J. B. Fairgrieve, J. E. Reeves	Furness Withy & Co. Ltd.	Furness Withy & Co. Ltd.
Pacific Stronghold	15.12.69	G. G. Killick	R. C. Hart	Furness Withy & Co. Ltd.	Furness Withy & Co. Ltd.
Pando Cape	24.9.69	G. C. Barrett	M. H. Davidson, W. J. C. Clarke, M. E. Skipper	Furness Withy & Co. Ltd.	Furness Withy & Co. Ltd.
Pando Cove	*	E. A. W. Mortleman-Lewis, R.D.	D. A. Pickett, P. A. Messenger, D. E. Turrall	P. & O. Lines Management Ltd.	P. & O. Lines Management Ltd.
Pando Head	26.3.70	R. Bullock-Webster	R. A. Nixon, P. Grimes, R. A. Newnham, P. Alexander	P. & O. Lines Management Ltd.	P. & O. Lines Management Ltd.
Pando Point	25.3.70	I. M. Aide	A. R. Fryatt, H. V. Anguish, J. Longstaffe, M. S. England	New Zealand Shipping Co. Ltd.	New Zealand Shipping Co. Ltd.
Pando Sound	13.1.70	A. J. Field	K. M. Vlasto, D. W. Sims, M. P. Carr	Cunard S.S. Co. Ltd.	Cunard S.S. Co. Ltd.
Pando Strait	23.1.70	B. S. C. Mordaunt	D. M. Lucey, M. S. Brown, I. Bower	Ocean Fleets Ltd.	Ocean Fleets Ltd.
Paparoa	23.3.70	A. Dorkins			
Parthia	15.12.69	J. B. Clemenson			
Patonga	13.3.70	R. E. Lowther			
Patroclus	26.3.70	W. R. Willis			
Pegu	20.8.68	J. C. Morris			

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Peisander</i> ..	17.3.70	H. Owen ..	S. L. Russell, A. A. Railton, F. T. Bullen, A. C. Jenkins	A. White ..	Ocean Fleets Ltd.
<i>Peleus</i> ..	6.1.70	F. N. Curphey ..	K. D. Campbell, G. A. Jones, M. Powell ..	R. McSorley ..	Ocean Fleets Ltd.
<i>Pembrokehire</i> ..	6.2.70	R. B. Tiplady ..	S. Brown, P. R. Davies, H. W. Simmonds, A. J. Palmer	H. N. Kinley ..	Glen Line Ltd.
<i>Pendennis Castle</i> ..	13.1.70	J. P. Smyth, D.S.C., R.D. ..	R. E. Fisher, D. C. Thompson, B. J. Goldsworthy	D. G. Bristow ..	Union-Castle Mail S.S. Co. Ltd.
<i>Pennyworth</i> ..	19.1.70	W. D. Beatie ..	S. Third, F. W. Mordey, A. H. Downs ..	D. Roche ..	R. S. Dalgliesh Ltd.
<i>Perseus</i> ..	29.1.70	D. D. McIntosh, R.D. ..	I. E. McGregor, H. B. Woods, D. L. Smith, J. Hanney	R. J. Ashworth ..	Ocean Fleets Ltd.
<i>Photinia</i> ..	22.7.69	R. J. Freeman ..	E. Patrick, P. Slack, D. M. J. Bliss ..	J. Duignan ..	Stag Line Ltd.
<i>Phoko</i> ..	13.12.68	H. I. D. Sladen ..	D. E. Spencer, R. K. Young, C. J. Armstrong	S. J. Braithwaite ..	New Zealand Shipping Co. Ltd.
<i>Picardy</i> ..	8.12.69	R. M. Box ..	M. R. Greenwood, K. Lancaster, —, Clark	R. F. Gaul ..	Furness Withy Co. Ltd.
<i>Pizarro</i> ..	14.1.70	R. M. Michael ..	R. J. Fraser, D. Scott, F. J. Helme, T. Wright	C. E. Hughes ..	New Zealand Shipping Co. Ltd.
<i>Plagiola</i> ..	4.7.69	R. K. C. Thomas ..	D. Lake, B. Snazell, M. Hapson ..	I. Boyle ..	Shell Tankers (U.K.) Ltd.
<i>Platidia</i> ..	6.3.70	J. A. Potts ..	C. Rogers, D. B. Travis, G. Caldecott	B. McDonach ..	Shell Tankers (U.K.) Ltd.
<i>Port Adelaide</i> ..	9.3.70	D. Hart ..	L. J. Dove, A. D. Piqué, M. Thwaite	W. Bradbury ..	Blue Star Port Lines Ltd.
<i>Port Auckland</i> ..	28.11.69	G. Carling ..	P. V. P. Holmes, D. A. Brown, A. J. R. May	T. J. Courtenay-Kirkpatrick	Blue Star Port Lines Ltd.
<i>Port Brisbane</i> ..	9.1.70	A. J. Hawkins ..	R. W. S. Barnes, R. S. Bolton, R. B. Snuth	T. J. Britt ..	Blue Star Port Lines Ltd.
<i>Port Burnie</i> ..	19.12.69	M. H. C. Twomey ..	N. R. Wood, M. W. Philips ..	H. B. Hughes ..	Blue Star Port Lines Ltd.
<i>Port Caroline</i> ..	17.2.70	R. A. Holmes ..	D. W. Lax, J. Cullen, G. Lascelles ..	E. M. Torpay ..	Blue Star Port Lines Ltd.
<i>Port Chalmers</i> ..	3.10.69	M. L. Coombs ..	F. E. Beer, R. H. Givan, D. W. Lax ..	R. T. Greer ..	Blue Star Port Lines Ltd.
<i>Port Hobart</i> ..	1.7.69	H. B. Conby ..	B. E. Langman, J. D. Sadler, P. F. Lockwood	M. M. Garrett ..	Blue Star Port Lines Ltd.
<i>Port Invercargill</i> ..	28.8.67	E. E. Chapman ..	R. G. Howell, O. G. Barry, E. R. Bacon ..	P. S. Henderson ..	Blue Star Port Lines Ltd.
<i>Port Laureston</i> ..	18.3.70	J. R. dit-Leschery ..	J. W. Fair, O. G. Parry, A. Pritchard, J. Parish	F. L. Laurence ..	Blue Star Port Lines Ltd.
<i>Port Lincoln</i> ..	27.10.69	J. Whyte ..	W. R. Owen, R. B. Lloyd, R. E. Jones ..	D. R. Uglow ..	Blue Star Port Lines Ltd.
<i>Port Lyttelton</i> ..	1.8.69	T. S. Ward ..	C. Brammer, D. J. Fisher ..	J. Lyons ..	Blue Star Port Lines Ltd.
<i>Port Nelson</i> ..	28.4.69	R. H. Finch ..	W. Brooks, J. Oscroft, R. Givan ..	W. C. Doyle ..	Blue Star Port Lines Ltd.
<i>Port Nicholson</i> ..	4.11.69	D. M. Kissane ..	D. J. Roberts, R. G. Howell, P. Lockwood	J. Chadwick ..	Blue Star Port Lines Ltd.
<i>Port Phillip</i> ..	20.2.70	V. A. Hunt ..	A. E. Kearn, N. Johnson, J. Brennan	A. M. Worthington	Blue Star Port Lines Ltd.
<i>Port Pirie</i> ..	30.10.69	A. M. Downes ..	G. R. Waugh, J. M. Laing ..	L. V. O'Sullivan	Blue Star Port Lines Ltd.
<i>Port Sydney</i> ..	1.7.69	E. R. Jenkins ..	J. A. Hawkins, E. T. Watkins ..	T. Slattery ..	Blue Star Port Lines Ltd.
<i>Port Townsville</i> ..	9.12.69	B. Collier ..	J. Lewis, R. A. Cunningham, C. F. Wood	M. J. Foran ..	Blue Star Port Lines Ltd.
<i>Port Victor</i> ..	17.10.69	A. J. L. Smith ..	J. L. Wright, R. D. Theobald ..	J. A. Foreman ..	Blue Star Port Lines Ltd.
<i>Port Vindex</i> ..	21.11.69	J. McManus ..	J. H. Bowering, B. Link, L. J. Dove, J. B. O'Reilly	E. J. Appleton ..	Blue Star Port Lines Ltd.
<i>Port Wellington</i> ..	20.12.69	R. T. Riley ..	C. G. G. Hawken, D. E. C. Tripp, M. A. Fry ..	F. J. Curran ..	Blue Star Port Lines Ltd.
<i>Potosi</i> ..	5.12.69	R. Webb ..	M. E. Peake, M. P. Stone, J. A. Whitaker, M. G. Morrison	E. C. McKee ..	Pacific S.N. Co. Ltd.
<i>Priam</i> ..	24.2.70	J. K. Winn ..	R. I. Smart, B. J. Kay, M. J. Knight ..	C. O. Roberts ..	Ocean Fleets Ltd.
<i>Prometheus</i> ..	29.1.70	—, Rippon ..	M. S. Browning, P. G. Taylor, H. R. Teare	R. A. Knight ..	Ocean Fleets Ltd.
<i>Protesilaus</i> ..	•	A. G. Surtrees ..	D. K. Marsh, P. D. Green, I. R. D. Hall, J. W. Nibblock	D. H. Power ..	Ocean Fleets Ltd.
<i>Pyrrhus</i> ..	17.10.69	G. E. Smith ..	R. K. Sturge, R. D. Green, I. R. D. Hall, J. W. Fisher	D. Butterworth ..	Cunard S.S. Co. Ltd.
<i>Queen Elizabeth 2</i> ..	16.3.70	G. Jeffrey ..	Clifford, W. J. Ross, W. Y. Wilson ..	J. T. Prince ..	Cory Maritime Ltd.
<i>Queensland Star</i> ..	8.1.70	D. S. Gilmour ..	J. H. Mockett, D. McNeil ..	S. Matthews ..	Blue Star Line Ltd.
<i>Rakata</i> ..	30.1.70	P. Lay ..	M. L. Martin, L. J. Hicks, P. G. Starkey, E. B. Daubeny	R. J. Parkinson ..	Ellerman's Wilson Line Ltd.
<i>Rapallo</i> ..	9.3.70	F. Metham ..	G. Mitchell, S. L. Moorby, M. R. Bowler, D. M. Risby	T. T. Micallef	Lampart & Holt Line Ltd.
<i>Raphael</i> ..	8.12.69	S. M. Williams ..	D. E. Picking, D. Ganderton, G. Lathan, G. W. Houston	A. A. Chalk ..	Bolton Steam Shipping Co. Ltd.
<i>Redcar</i> ..	29.8.69	J. Parsloe ..	I. Woodier, W. E. Barnes ..	..	Regent Petroleum Tankship Co.
<i>Regent Falcon</i> ..	3.1.68	P. Howells ..	A. J. Cavey ..	..	..

<i>Registan</i> ..	15.12.69	M. H. Wilson ..	D. F. Gates, R. A. Atkinson ..	T. P. Ryan ..	Frank C. Strick & Co. Ltd.
<i>Ribblehead</i> ..	5.2.70	J. J. Grugan ..	R. H. Jenkins, M. Pitcock, D. W. Parry, C. R. Ingham ..	G. M. Savage ..	Bolton Steam Shipping Co. Ltd.
<i>Richmond Castle</i> ..	24.2.70	W. J. Howson ..	A. Edwards, T. G. Wilson, R. L. E. Belcourt ..	H. Chesters ..	Union-Castle Mail S.S. Co. Ltd.
<i>Rievaulx</i> ..	6.1.70	J. Parsloe ..	G. M. Long, M. Farrell, D. Gillings ..	M. Sullivan ..	Bolton Steam Shipping Co. Ltd.
<i>Ripon</i> ..	2.2.70	G. W. Brown ..	N. M. Holman, M. A. Gater, J. T. Brown, M. Jessup ..	R. M. Rigg ..	Bolton Steam Shipping Co. Ltd.
<i>Ripond</i> ..	27.3.69	W. A. Sparks ..	J. R. Webber, C. Waterson, W. G. Wood ..	P. J. Hall ..	Lampport & Holt Line Ltd.
<i>Romney</i> ..	*	M. L. Mylchreest ..	J. G. Prebble, J. R. Webber, —, Jones ..	C. S. Curry ..	Lampport & Holt Line Ltd.
<i>Ronsard</i> ..	2.2.70	B. M. Metcalfe ..	F. P. Gunning, A. T. Roach, J. Bryan, F. Newbold ..	B. P. Kennedy ..	G. Heyn & Sons Ltd.
<i>Roonagh Head</i> ..	31.3.70	F. R. N. Best ..	J. P. Skinner, G. J. Broome, J. W. R. Daniels ..	D. I. Caterall ..	F. T. Everard & Sons Ltd.
<i>Rosemary Everard</i> ..	24.10.69	W. G. Hunt ..	D. Raddings, J. McLeod, C. A. Roy ..	M. P. Elliott ..	Lampport & Holt Line Ltd.
<i>Rossetti</i> ..	6.2.70	E. D. Spooner ..	P. Armitage, G. H. Sayle, R. Grubb ..	A. Brown ..	Lampport & Holt Line Ltd.
<i>Rossini</i> ..	*	J. Souter ..	M. Bedford, J. Madge, P. Austin ..	I. E. Jackson ..	Union-Castle Mail S.S. Co. Ltd.
<i>Rowallan Castle</i> ..	28.8.69	A. W. Cameron ..	M. J. Brown, R. I. Blackburn, M. Hindmarch, D. Milburn ..	N. S. Reeve ..	Furness Withy & Co. Ltd.
<i>Ronanmore</i> ..	14.8.69	S. Ward ..	J. W. Thomson, M. Turton, E. C. Glass ..	R. Cuthbert ..	Headlam & Son Ltd.
<i>Runswick</i> ..	24.9.69	N. Oddy ..	D. C. Lewis, M. Boland, J. Bailey ..	W. Delaney ..	Houlder Bros. & Co. Ltd.
<i>St. Margaret</i> ..	20.2.70	R. Ross ..	N. Collingwood, D. Aitchison, A. Woodley ..	P. Curson ..	Furness Withy & Co. Ltd.
<i>St. Marriel</i> ..	8.12.69	S. J. Lavis ..	G. Richard, I. F. Fair, L. Miles, C. Flockhart ..	A. P. G. Gray ..	Chr. Salvesen & Co. Ltd.
<i>Sagamore</i> ..	16.12.69	C. J. Nicholson ..	D. N. Barr, M. B. Connor, A. G. Soppitt ..	R. Hanigan ..	G. Heyn & Sons Ltd.
<i>Salmela</i> ..	13.11.69	E. L. Seaton ..	A. Reid, J. T. West, J. B. Wilson, A. H. Lord, D. J. McManus ..	..	Cunard S.S. Co. Ltd.
<i>Santona</i> ..	9.3.70	J. R. Lidgely, D.S.C., R.D. ..	G. F. Poste, P. Walton, M. S. England, N. H. Osborne ..	B. C. Nichol ..	Cunard S.S. Co. Ltd.
<i>Saxonia</i> ..	20.1.70	G. D. Williams ..	A. L. MacLeman, E. G. Bee, J. McNeill ..	J. Hunter ..	Blue Star Line Ltd.
<i>Scotland</i> ..	1.7.69	M. R. Bremberg ..	C. J. Sabine, B. Vaughan, J. G. Jackson, A. W. Jones ..	J. Thompson ..	Frank C. Strick & Co. Ltd.
<i>Scottish Star</i> ..	16.2.67	D. F. J. de Neumann ..	D. M. E. Brogan, R. Bridgwood, G. Kinley ..	A. O'Neill ..	Shell Tankers (U.K.) Ltd.
<i>Serbistan</i> ..	24.2.70	S. W. Dean ..	Z. Greber, R. Fletcher, L. Lurnley ..	H. Samuel ..	Frank C. Strick & Co. Ltd.
<i>Serenia</i> ..	26.1.70	S. A. Booker ..	J. Gill, R. Cordon, B. G. Longley ..	H. Bassford ..	W. A. Souter & Co. Ltd.
<i>Shakristan</i> ..	12.12.69	E. Lakin ..	J. P. Thompson, L. San, D. Mawhinney, J. D. Robinson ..	J. O'Toole ..	W. A. Souter & Co. Ltd.
<i>Sheaf Crest</i> ..	20.12.69	J. MacVean ..	M. Watts, A. Preshaw, A. H. Peters ..	V. J. Love ..	Bibby Line Ltd.
<i>Sheaf Tyne</i> ..	15.1.70	F. Gurney ..	R. Singer, M. Laferty, P. Curry, V. Easby, K. Duggan ..	W. Anderson ..	R. S. Dalghiesh Ltd.
<i>Shropshire</i> ..	12.6.69	I. B. Gault ..	L. M. Skelhorn, D. Cormack, H. N. Lawson ..	W. F. O'Sullivan ..	Silver Line Ltd.
<i>Silkeworth</i> ..	23.3.70	F. Moorcraft ..	P. W. Rowe, H. N. Lawson, W. A. Davies, J. Stoppard ..	D. Brooks-Daw ..	Silver Line Ltd.
<i>Silverbeach</i> ..	16.10.69	D. W. Bowen ..	A. Page, C. Forth, T. G. Kirkpatrick ..	J. Rush ..	Silver Line Ltd.
<i>Silverland</i> ..	30.12.69	J. B. Wyness ..	R. W. O'Reilly, J. G. St. John, I. Stoppard, V. Ross ..	J. A. Connor ..	British India S.N. Co. Ltd.
<i>Silversea</i> ..	21.1.70	P. L. Hopkins ..	A. R. Wyman, A. L. King ..	R. Cooper ..	British India S.N. Co. Ltd.
<i>Silvershore</i> ..	5.2.70	J. Swan ..	R. Thake, T. J. Bearder ..	A. W. Stephen ..	Ministry of Technology
<i>Sir Galahad</i> ..	17.2.70	A. I. Walker ..	R. W. Rayfield, T. Gibson, P. J. Zealley, N. S. Williams ..	R. McManamon ..	Federal S.N. Co. Ltd.
<i>Sir Lancelot</i> ..	6.2.68	A. W. Whittleton ..	D. J. Hewitt, R. J. Knight, K. S. Cruden, P. A. Chandler ..	R. M. Arnold ..	Shaw Savill & Albion Co. Ltd.
<i>Sir William Hardy</i> ..	7.1.70	W. F. T. Dan ..	S. H. Gibson, W. A. Ralton, P. H. S. Coventry ..	C. L. Beyer ..	Bibby Line Ltd.
<i>Somerset</i> ..	5.12.69	W. M. Wheatley ..	C. R. S. Wall, T. J. Greene, D. W. Scott ..	P. D. Price ..	Anchor Line Ltd.
<i>Southern Cross</i> ..	8.1.70	L. H. Sheldrake ..	K. R. S. Wall, T. J. Greene, D. W. Scott ..	B. Gaston ..	Bowring S.S. Co. Ltd.
<i>Staffordshire</i> ..	4.3.70	T. R. Rowe ..	I. Stutt, M. A. C. Laurie, J. R. P. Tadman ..	J. D. Rice ..	P. & O. Lines Management Ltd.
<i>Star Acadia</i> ..	*	W. P. Tait ..	J. W. Woodhead, J. J. Noakes, P. G. Wilson ..	D. S. Panton ..	P. & O. Lines Management Ltd.
<i>Stephano</i> ..	20.4.69	E. Snowden ..	M. R. Clowes, P. Scott-Turner, K. Byrne ..	G. G. Graham ..	Shaw Savill & Albion Co. Ltd.
<i>Strathardle</i> ..	26.1.70	D. P. Blois ..	A. Moore, B. Walmsley, D. J. Stansbury, A. G. Shaw ..	A. T. Riordan ..	Sugar Line Ltd.
<i>Strathbrora</i> ..	16.3.70	G. McGowan, R.D. ..	J. McNeill, C. N. L. Davies, K. R. Morris ..	R. Higgenbotham ..	Sugar Line Ltd.
<i>Strathconon</i> ..	17.2.70	J. F. Mason ..	J. H. Tier, P. Wilmot, R. Thompson ..	M. N. Coulter ..	Sugar Line Ltd.
<i>Suevic</i> ..	10.7.69	J. E. Leaver ..	T. M. Tait, J. E. Sherwood, D. C. T. Amos ..	C. Watson ..	John Kilgour & Co. Ltd.
<i>Sugar Crystal</i> ..	6.2.70	G. Pirie ..	R. F. Galea, W. McOnie, S. Baker ..	R. J. Harris ..	Federal S.N. Co. Ltd.
<i>Sugar Exporter</i> ..	16.3.70	R. M. Pitts ..	I. MacK. Murray, —, Marryat, K. M. Lingard, A. E. Robinson ..	..	..
<i>Sugar Importer</i> ..	17.12.69	J. R. L. Atkinson ..	R. Newnham, T. D. McArthur, R. I. Harvey, P. D. Kelly ..	A. Young ..	Mobil Shipping Co. Ltd.
<i>Sugar Producer</i> ..	20.2.70	J. Dewar ..	J. S. Blakeley, J. M. Procter, J. M. Newby ..	F. P. Lawton ..	T. & J. Harrison Ltd.
<i>Sunek</i> ..	6.10.69	J. S. Laidlaw ..	..	..	..
<i>Sussex</i> ..	6.2.70	C. Perry ..	..	..	..
<i>Sylvan Arrow</i> ..	8.8.69	R. Ledger ..	..	..	..
<i>Tactician</i> ..	19.12.69	..	..	..	..

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
Tamworth ..	26.3.70	A. Mathison	I. Marsh, G. Turnbull, D. Robinson, B. Simpson	R. Spence	R. S. Dalglish Ltd.
Tantallon Castle ..	23.9.69	T. Coats ..	W. D. J. Salm, G. Brice, A. Rapkin	A. E. Fell	Union-Castle Mail S.S. Co. Ltd.
Tasmania Star ..	12.2.70	L. Allsford	J. R. Sawyer, A. Bilawski, W. Wood	R. Groves	Blue Star Line Ltd.
Taupo ..	23.12.69	F. C. Taylor	B. O'Dea, J. Read, R. Vincent, R. C. Anderson	J. Diggle	New Zealand Shipping Co. Ltd.
Tekoa ..	4.3.70	T. F. J. Alderman	A. D. Evans, J. Withington, D. Venning, D. Mountford	J. Hocking	New Zealand Shipping Co. Ltd.
Teviotbank ..	31.10.69	H. Barker	G. Morris, G. Skipp, R. Mackinnon	G. Thowburn..	Bank Line Ltd.
Texaco Brussels ..		N. E. Nute			Texaco Overseas Tankship (U.K.) Ltd.
Texaco Edinburgh ..	14.4.69	W. McCullough..	R. F. Brass, J. Campbell, S. Wozniak	K. Green	Texaco Overseas Tankship (U.K.) Ltd.
Texaco Gloucester ..	16.6.69	G. L. Munday	R. Jolly, A. H. J. Leadbeater		Texaco Overseas Tankship (U.K.) Ltd.
Texaco Pembroke ..	26.11.69	R. S. Hawkins	P. J. Langdon, M. T. Hutton, M. Gray, R. Mackinnon	R. M. Botteley	Texaco Overseas Tankship (U.K.) Ltd.
Texaco Saigon ..	9.7.68	R. G. A. Barnes..	R. A. Russell, J. Campbell, R. R. Brooks	G. Cockburn ..	Texaco Overseas Tankship (U.K.) Ltd.
Thesus ..	8.12.69	I. Webster	W. E. L. Godsell, S. T. Houldsworth, J. H. Russell, D. L. Cockin	P. M. Weldon	Ocean Fleets Ltd.
Tongariro ..	9.4.69	L. T. Rowland	C. J. Armstrong, P. R. Simpson, B. Richardson	D. Byne	New Zealand Shipping Co. Ltd.
Toronto City ..	13.2.70	D. Hine ..	M. Begg, J. Jewell, H. Owen	I. W. Ranson ..	Bibby Line Ltd.
Torr Head ..	29.1.70	E. G. Davey	J. Gaul, N. C. Stark, H. Thompson, J. McAllister	M. Thomas	G. Heyn & Sons Ltd.
Tower Bridge ..	22.10.68	J. W. H. Whitelaw	J. A. Guy, I. F. Harrison, C. Flanagan		Silver Line Ltd.
Trebartha ..	6.1.70	D. A. Field	J. Davies, B. Newlove, C. Flanagan	K. F. Lancashire	Hain-Nourse Ltd.
Treearne ..	29.1.70	C. B. Thorpe	A. E. Kitchingham, T. C. McDowell, P. W. Wiggs	W. J. Quinn ..	Hain-Nourse Ltd.
Trecarrell ..	6.3.70	F. Newell	J. A. Sincton, J. E. Noble, J. R. D. Peterkin	A. L. Dobson..	Hain-Nourse Ltd.
Trefusis ..	10.3.69	J. Reilly ..	S. R. E. Pardon, S. Haleem, J. Wallace, W. V. Venning	R. F. Horsley..	Hain-Nourse Ltd.
Tremeadow ..	18.12.69	J. Darby ..	H. O'Mullan, R. I. Cape, W. R. Paterson..	M. Hurley	Hain-Nourse Ltd.
Treneglos ..	5.6.69	L. Annett			Hain-Nourse Ltd.
Trevalgan ..	14.10.69	A. V. Rowles	Wimbush, M. Robinson, M. F. Fawcett	J. Riley	Hain-Nourse Ltd.
Trevaylor ..	13.2.70	W. J. Perkins	I. L. Roberts, M. Robinson, C. Welch	J. Wiseman	Hain-Nourse Ltd.
Trevewiden ..	19.12.69	C. D. Abbott	D. W. Carsey, R. G. Whisker, M. T. Barwell	A. Lafond	Hain-Nourse Ltd.
Trinculo ..	19.8.69	K. J. Lyall	R. D. Clarke ..	W. G. Watt	Bowring S.S. Co. Ltd.
Turakina ..	25.11.69	B. Austen-Smith	M. Austin, M. H. Lawrence, A. D. G. Bell	G. D. Lawrence	New Zealand Shipping Co. Ltd.
Turkistan ..	4.10.68	J. F. Ockleford	P. J. Strachan, I. Ridout, B. G. Peck	A. P. H. Stevenson	Frank C. Strick & Co. Ltd.
Uganda ..	8.1.70	E. C. Plowman	C. A. Blake, G. F. Lack, R. T. Dunn	G. M. Robinson	British India S.N. Co. Ltd.
Uenasa ..	20.5.69	J. Y. Cox	F. D. L. Goodwin, J. Atkinson, M. Harkes	A. H. G. Wall	Shell Tankers (U.K.) Ltd.
Victoria ..	18.12.69	J. A. McCulloch	C. D. Broughton, P. Rodgers-Gray, C. Davidson, R. Singer	P. Stanway	Mavroleon Bros. Ltd.
Volabattella ..	10.2.70	M. E. Holdron, M.B.E.			
Wantuu ..	12.1.67	J. W. G. Wilby	P. D. Fogarty, I. H. Jolly, D. H. Rayfield	D. Smith	Shell Tankers (U.K.) Ltd.
Warkearth ..	26.3.70	K. B. Jewell	J. N. Bolton, I. Milward, D. R. Parkinson	Tang Yuen	China Navigation Co. Ltd.
Warwickshire ..	26.11.69	A. R. Moore	N. O. Morrice, H. F. Bond, A. Grainger ..	S. I. Polden	R. S. Dalglish Ltd.
Welsh City ..	28.8.69	W. J. Cross	J. L. W. Williams, M. J. Horn, R. I. Taylor	S. W. A. Stenton	Bibby Line Ltd.
Welsh Herald ..	8.8.69	W. Knight	S. Barnish, A. D. Lightfoot, M. C. Hurst	I. R. Mathews	Sir Wm. Reardon Smith & Sons, Ltd.
Western Prince ..	12.12.69	E. Gregson	M. O. Wilson, M. Lester, R. MacLeod, S. Stone	R. Spence	Welsh Ore Carriers Ltd.
Westminster Bridge..	12.3.70	M. G. King	C. Arnold, M. Newall, P. J. Goodwin, J. Bletscoe	J. Ferguson	Furness Withy & Co. Ltd.
Westmorland ..	26.3.70	J. A. North	R. F. A. Kendrick, K. Anderson, K. Appleton	R. Bateman	Britain S.S. Co. Ltd.
			T. E. Hartnell, M. A. Hill, D. MacDonald, R. T. White	E. Lamb	New Zealand Shipping Co. Ltd.

<i>Windsor Castle</i>	..	11.12.69	A. J. Hort	..	..	A. J. McCann, D. W. Latter, M. J. M. Strong, D. Tucker	C. Leung	..	..	Union-Castle Mail S.S. Co. Ltd.
<i>Woosung</i>	..	12.2.70	M. J. Tidey	..	..	R. Maddison, M. D. Green, A. G. Preshaw	D. Alcock	..	..	China Navigation Co. Ltd.
<i>Yorkshire</i>	..	16.12.69	M. C. Mills	..	..	J. I. Mayson, R. G. Brown, I. R. Couper		..	..	Bibby Line Ltd.
<i>Zaphon</i>	..	25.2.70	T. R. Bowlerwell, M.B.E.	..	..					Shell Tankers (U.K.) Ltd.

Supplementary Ships

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Aaro</i>	31.3.70	W. White	D. M. Risby, J. M. Jarratt, P. Hudson, D. J. C. Martin	F. H. Nichols	Ellerman's Wilson Line Ltd.
<i>Angelo</i>	31.3.70	W. White	T. A. Wren		Ellerman's Wilson Line Ltd.
<i>Apollo</i>	18.3.70	G. V. Barnes	J. S. Earl, E. H. Jones		Bristol S.N. Co. Ltd.
<i>Arcadian</i>		C. R. Kilby	J. R. Lee, S. A. Sorrell, J. Niven	B. Holdsworth	Ellerman Lines Ltd.
<i>Aristo</i>	6.3.69	A. Gillis	B. T. Wood, D. Martin, J. E. Scholey, G. Pittock	J. Cullen	Ellerman's Wilson Line Ltd.
<i>Bendoran</i>	28.11.69	R. L. Bruce	A. M. Wight, J. Fleming, D. O'Neil	G. R. Kerr	Ben Line Steamers Ltd.
<i>Benmacdhui</i>	26.9.69	T. Ryfe	A. Lim, W. F. P. Cargill, A. R. Niel, B. Lee	M. O. B. Bunce	Ben Line Steamers Ltd.
<i>Bervorlich</i>	18.3.70	R. A. Lynn	A. Lim, J. Furey, G. Byers, I. T. Henderson	J. O'Sullivan	Common Bros. Ltd.
<i>Boston Shepherd</i>	27.6.69	R. J. C. Findlay	D. Dudley, E. Taylor, J. McGlashan		Boston Deep Sea Fisheries Ltd.
<i>Boston Viscount</i>	30.5.68	V. E. Crisp	P. Cullin		Boston Deep Sea Fisheries Ltd.
<i>British Chivalry</i>	6.1.70	W. A. Deacon			B.P. Tanker Co. Ltd.
<i>British Destiny</i>	9.10.69	G. Barber	J. O. Bailey, C. Kelly, F. Betts, C. Hick	P. Holland	B.P. Tanker Co. Ltd.
<i>British Energy</i>	16.2.70	D. Corp.	C. Wright, J. C. Bryson, P. R. Waller	R. C. Williamson	B.P. Tanker Co. Ltd.
<i>British Patrol</i>	22.5.69	J. Candlish	C. I. Watson, I. T. Anderson, J. A. Little	S. Watson	B.P. Tanker Co. Ltd.
<i>British Reliance</i>	4.3.69	W. P. Budge	R. Dukes, R. B. Eckerley, P. J. Marten	W. G. A. Cowe	B.P. Tanker Co. Ltd.
<i>British Robin</i>	2.12.69	L. H. Hayward	A. de Ste. Croix, D. A. Kinniburgh, P. Brownlee	D. Bone	B.P. Tanker Co. Ltd.
<i>Camellia</i>	25.9.69	W. R. Hunter	J. C. Gemmeken, G. W. Robinson, I. Blower, S. D. Hyland	E. Conlon	J. Robinson & Sons Ltd.
<i>Cape Wrath</i>		T. Sutherland	T. Reid, M. Smith, J. Tattersall	D. A. Macleod	Lytle Shipping Co. Ltd.
<i>Cicero</i>	9.12.68	C. Everingham	A. M. Cowie, L. R. Cooper, M. S. Bean, D. W. Matingly	R. Hanlon	Ellerman's Wilson Line Ltd.
<i>Clan Grant</i>	17.2.70	H. M. Walden	W. D. B. Davidson	H. Mackay	Clan Line Steamers Ltd.
<i>Clan Ross</i>		A. Mair	D. I. Brunskill, A. T. MacMillan, C. E. Finch	D. Laing	Clan Line Steamers Ltd.
<i>Echo</i>	16.3.70	A. Stacey	S. H. Duckworth, J. McLaren, D. B. Bougourd	G. Walsh	Bristol S.N. Co. Ltd.
<i>Esso Lancashire</i>	26.2.70	J. L. Jenkins	R. W. Gunns, J. W. Hughes, R. G. Whitford, J. M. Pratt	D. A. L. Sutherland	Esso Petroleum Co. Ltd.
<i>Esso Westminster</i>	26.9.69	F. Verbist	A. M. Kehoe, A. E. L. Sargeant, J. G. Bean		Esso Petroleum Co. Ltd.
<i>Ethel Everard</i>	9.1.70	G. Euston	D. G. Green, H. Tan, J. Emanuel	R. Walsh	F. T. Everard & Sons Ltd.
<i>Hudson Deep</i>	3.7.69	H. O. Roberts	G. T. Bell, A. Gordon, A. K. Ewing	J. S. Hallam	Hudson S.S. Co. Ltd.
<i>Joseph Conrad</i>	20.3.70	D. Willey	J. E. Billany	J. E. Billany	Newington Trawlers Ltd.
<i>Kingston Pearl</i>		B. Taylor	W. M. Davies	W. M. Davies	British United Trawlers Ltd.
<i>Kirkella</i>	31.12.69	A. Osler		C. Sheen	I. Marr & Sons Ltd.
<i>Lady Parkes</i>	16.3.70	L. Fewster	G. W. Taylor	G. W. Taylor	St. Andrew's Steam Fishing Co. Ltd
<i>Lord Nelson</i>	31.10.69	P. Donoghue	W. H. Benna, D. M. G. Murphy, N. Avison	T. Maddell	Hellyer Bros. Ltd.
<i>Manila</i>	2.12.68	S. Baxter	F. Wilson	G. R. Smith	Cunard-Brocklebank Ltd.
<i>Marbella</i>	9.3.70	R. Boughen	N. A. Brocklesby, P. R. White, S. J. Cutler	J. Hind	I. Marr & Sons Ltd.
<i>Maretha</i>	13.3.69	S. Christy	T. D. Robson, A. Charlesworth, T. M. Fitzpatrick	R. M. Elliot	Shell Tankers (U.K.) Ltd.
<i>Methane Princess</i>	17.11.69	D. E. Belk	D. A. M. Williams, R. G. Barker, D. R. Porter,	A. I. Almond	Shell Tankers (U.K.) Ltd.
<i>Methane Progress</i>	1.12.69	A. Andrews	R. B. Walker	K. Walsh	Mobil Shipping Co. Ltd.
<i>Mobil Acme</i>	14.8.69	J. Miller	J. A. Reedman, P. I. Walters, R. Newnham, J. R. King	M. A. Place	Mobil Shipping Co. Ltd.
<i>Mobil Endurance</i>	19.2.69	J. George	D. L. Holland, K. E. Wright, J. C. May	D. I. Griffiths	Mobil Shipping Co. Ltd.
<i>Mobil Energy</i>	4.12.69	A. K. Morland	C. J. C. Harker, J. McGarth, C. W. Parven	C. Neil	British United Trawlers Ltd.
<i>Mobil Enterprise</i>	10.1.69	J. A. Miller		R. Baillie	J. Marr & Sons Ltd.
<i>Newby Wyke</i>		A. Regan		S. B. Barr	Northern Trawlers Ltd.
<i>Northella</i>	23.3.70	I. A. Ness			Talisman Trawlers Ltd.
<i>Northern Reward</i>	20.3.70	W. Harris			
<i>Oulton Queen</i>		R. C. Newrick			

<i>Phyllis Bowater</i>	..	29.8.69	M. P. R. Turner	..	A. Hodges	..	..	..	..	I. A. Maxwell..	..	Cayzer Irvine Co. Ltd.
<i>Ross Implacable</i>	..	23.3.70	G. Whur..	..	..	..	..	..	..	A. Ramsay ..	..	Ross Trawlers Ltd.
<i>Ross Orion</i>	..	18.3.70	R. S. Hinchliff ..	..	..	..	..	..	..	R. R. N. Laing	..	Ross Trawlers Ltd.
<i>Rothsay Castle</i>	..	6.1.70	P. St. Q. Beadon	..	M. G. Ward, G. Jackson, T. Petch	..	..	..	..	P. I. Pegg ..	..	Union-Castle Mail S.S. Co. Ltd.
<i>St. Jason</i>	..	30.5.69	T. Sawyers	..	..	..	..	..	..	R. Murphy ..	..	T. Hamling & Co. Ltd.
<i>St. Jasper</i>	..	20.2.70	E. J. Johnson	..	A. Ball	..	..	..	..	R. T. Murphy	..	T. Hamling & Co. Ltd.
<i>St. Jerome</i>	..	26.3.70	M. F. Hough	..	..	..	..	..	..	K. C. Stone ..	..	T. Hamling & Co. Ltd.
<i>Sea Captain</i>	..	17.12.69	R. E. Huggins ..	..	A. M. Ellington, C. C. Walker, E. Spiratos, M. G. L. Hubble	..	..	..	..	C. R. Wordsworth	..	Vergocean S.S. Co. Ltd.
<i>Somerset Maugham</i>	..	25.3.70	R. Taylor	..	..	..	..	..	..	B. E. K. Robinson	..	Newington Trawlers Ltd.
<i>Streambank</i>	..	27.2.70	D. M. Ward	..	G. F. H. Caughey, H. Macdonald, F. L. Boyer	..	..	..	..	N. Moore ..	..	Bank Line Ltd.
<i>Taharistan</i>	..	23.3.70	P. W. A. Filcek	..	P. C. J. Edgecombe, M. J. Sterland, R. W. Lorains	..	..	..	..	E. Marks ..	..	Frank C. Strick & Co. Ltd.
<i>Tolsta</i>	..	8.10.68	G. Barrie	..	J. Liddle	..	..	..	..	..	..	Chr. Salvesen & Co. Ltd.
<i>Tudor Prince</i>	..	7.5.69	A. H. Kent, D.S.C., R.D.	..	P. Howe, K. V. Lewis, G. F. Swaine	..	..	..	..	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
H. Bowman	F. R. Hailstones .. ..	..	..	..	..	R. Irvin & Sons Ltd.
B. Boyce	W. J. Teare .. ..	..	..	..	..	Hellyer Bros. Ltd.
J. W. E. Boyle	C. Bird .. ..	..	..	..	..	Boyd Line Ltd.
T. Carroll	G. Cracknell .. ..	..	..	..	..	J. Marr & Sons Ltd.
E. Favell	A. S. Wittlin .. ..	..	..	..	..	Northern Trawlers Ltd.
C. K. Gill	B. Hargraves .. ..	..	..	..	..	Boyd Line Ltd.
W. Gouldson	G. A. Osborne .. ..	..	..	..	..	T. Hamling & Co. Ltd.
J. Humphrey	H. G. Pask .. ..	..	..	..	..	T. Hamling & Co. Ltd.
J. N. Kerr	R. H. Wilson .. ..	..	..	..	..	Ross Trawlers Ltd.
B. McCall	J. L. Thorpe .. ..	..	..	..	..	Ross Trawlers Ltd.
E. March	A. J. Nettleship .. ..	..	..	..	..	Hellyer Bros. Ltd.
F. Myers	J. Brickwood .. ..	..	..	..	..	Ross Trawlers Ltd.
R. Pepper	P. R. Hickson .. ..	..	..	..	..	Northern Trawlers Ltd.
M. Redfearn	W. Brown .. ..	..	..	..	..	Hellyer Bros. Ltd.
J. Stevens	B. Rowbotham .. ..	..	..	..	..	Abunda Fishing Co. Ltd.
B. Stipetic	C. Hodder .. ..	..	..	..	..	T. Hamling & Co. Ltd.
D. Whiting	G. Duffield .. ..	..	..	..	..	Ross Trawlers Ltd.

Light-vessels

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

‘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
*Ashington	A. Arkley	Stephenson Clarke Ltd.
Avalon	W. Bramhill	British Railways Board
Bardic Ferry	— Hughey	Atlantic S.N. Co. Ltd.
*Brenda	J. Henderson	Dept. of Agriculture & Fisheries for Scotland
*Caesarea	B. A. Cause	British Railways Board
Cambria	W. J. Roberts	British Railways Board
*Cerdic Ferry	C. Tanner	Atlantic S.N. Co. Ltd.
Claymore	D. Gunn	David MacBrayne Ltd.
Clupea	J. Jappy	Dept. of Agriculture & Fisheries for Scotland
*Corbank	F. H. Lamming	Wm. Cory & Sons Ltd.
Corbrae	W. Costley	Wm. Cory & Sons Ltd.
*Corkbrook	R. Alexander	Comben Longstaff & Co. Ltd.
Darlington	J. Boyes	Associated Humber Lines Ltd.
Doric Ferry	R. Hockings	Atlantic S.N. Co. Ltd.
Dorset Coast	K. J. Dudgeon	Coast Lines Ltd.
Duke of Argyll	L. C. Mills	British Railways Board
Duke of Lancaster	D. A. Ponting	British Railways Board
*Elk	P. Baker	British Railways Board
Elwick Bay	W. G. Dennison	Elwick Shipping Co.
Ettrick	G. Patience	G. Gibson & Co. Ltd.
Fallowfield	R. Saunders	Coast Lines Ltd.
Ferryhill	J. Innes	Aberdeen Coal & Shipping Co. Ltd.
Fingal	R. McEachern	Northern Lighthouse Board
*Fulham X	C. Duke	Stephenson Clarke Ltd.
Hamble	H. Jack	Shell-Mex & B.P. Ltd.
Harrogate	J. R. Rowlands	British Railways Board
*Hebrides	J. C. Hodgson	David MacBrayne Ltd.
*Helmsdale	A. F. Ross	Northern Trading Co. Ltd.
*Hesperus	D. MacCorquodale	Northern Lighthouse Board
Hibernia	R. Roberts	British Railways Board
Innisfallen	T. C. Davies	British & Irish Steam Packet Co. Ltd.
Ionic Ferry	W. Close	Atlantic S.N. Co. Ltd.
Killingholme	J. McNeil	Shell-Mex & B.P. Ltd.
*Kinnaird Head	A. Bohler	Henry & MacGregor Ltd.
Lancashire Coast	A. Cochrane	Coast Lines Ltd.
Lairdsglen	A. Palmer	Burns & Laird Lines Ltd.
Loch Ard	D. Watson	David MacBrayne Ltd.
Loch Carron	R. Johnston	David MacBrayne Ltd.
Loch Dunvegan	A. C. Mathieson	David MacBrayne Ltd.
*Loch Seaforth	J. Smith	David MacBrayne Ltd.
Navigator	R. D. Yeil	Decca Navigator Co. Ltd.
*Oliver Bury	J. Purvis	Stephenson Clarke Ltd.
*Oredian	D. W. Luff	Ore Carriers Ltd.
*Oreosa	L. F. Slevin	Houlder Bros. Ltd.
Orselina	T. M. Jarvis	Continental Cargoes Ltd.
Penelope Everard	J. Jewsbury	F. T. Everard & Sons Ltd.
Pentland	A. Wallace	Currie Line Ltd.
*Pharos	C. Campbell	Northern Lighthouse Board
*Plover	R. H. Urquhart	General S.N. Co. Ltd.
Pointer	— Sanders	Burns & Laird Lines Ltd.
*Pole Star	A. Walker	Northern Lighthouse Board
*St. Clair	J. Johnston	North of Scotland Shipping Co. Ltd.
St. David	D. O. Griffiths	British Railways Board
St. George	F. Patterson	British Railways Board
*St. Patrick	D. Deadman	British Railways Board
*Sarnia	H. Walker	British Railways Board
*Scotia	A. M. Finlayson	Dept. of Agriculture & Fisheries for Scotland
*Selby	N. Stirzaker	British Railways Board
Slieve Bawn	C. R. Jones	British Railways Board
Slieve Bearnagh	J. D. Nash	British Railways Board
Slieve Donard	R. Howell	British Railways Board
Spartan Prince	V. O. Shepherd	Coast Lines Ltd.
Spero	F. Briggs	Ellerman's Wilson Line Ltd.
*Spray	J. Andrews	Ellis & McHardy Ltd.
Stormont	F. G. Fisher	Belfast S.S. Co. Ltd.
Thelma P	A. E. Guest	General S.N. Co. Ltd.
Torquay	G. Proctor	J. D. Davidson Ltd.
Treviscoe	H. S. Shugar	Channel Shipping Co. Ltd.
Ulster Queen	W. W. Lucas	Belfast S.S. Co. Ltd.
W. J. H. Wood	D. Battle	Stephenson Clarke Ltd.
*Warwickbrook	D. J. Moyes	Comben Longstaff & Co. Ltd.
Westminsterbrook	J. H. Shaw	Comben Longstaff & Co. Ltd.
William J. Everard	T. L. Vaughan	F. T. Everard & Sons Ltd.
*Winchester	W. P. Laity	British Railways Board

*These ships report wind and weather.

BRITISH COMMONWEALTH

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

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

AUSTRALIA (Information dated 31.3.70)

NAME OF VESSEL	OWNER/MANAGER
Selected Ships:	
<i>Abel Tasman</i>	H. C. Sleigh Ltd.
<i>Al Mahrosa</i>	Sheiks of Kuwait
<i>Andros</i>	Australia-West Pacific Line
<i>Aradina</i>	Eastern & Australian S.S. Co. Ltd.
<i>Arakawa</i>	Eastern & Australian S.S. Co. Ltd.
<i>Arawatta</i>	Eastern & Australian S.S. Co. Ltd.
<i>Australasia</i>	Austasia Line
<i>Balarr</i>	Howard Smith Industries Pty. Ltd.
<i>Bamora</i>	British India S.N. Co. Ltd.
<i>Barpeta</i>	British India S.N. Co. Ltd.
<i>Bogong</i>	Associated S.S. Pty. Ltd.
<i>Bolnes</i>	Kristian Jebsen Rederi
<i>B.P. Endeavour</i>	B.P. Tanker Co. Ltd.
<i>B.P. Enterprise</i>	B.P. Tanker Co. Ltd.
<i>Braeside</i>	Burns, Philp & Co. Ltd.
<i>Cape Don</i>	Dept. of Shipping & Transport, Australia
<i>Cape Pillar</i>	Dept. of Shipping & Transport, Australia
<i>Carpentaria</i>	British India S.N. Co. Ltd.
<i>Cathay</i>	Eastern & Australian S.S. Co. Ltd.
<i>Centaur</i>	Ocean Fleets Ltd.
<i>Chakdina</i>	British India S.N. Co. Ltd.
<i>Chakrata</i>	British India S.N. Co. Ltd.
<i>Chandpara</i>	British India S.N. Co. Ltd.
<i>Clutha Oceanic</i>	Clutha Development Co.
<i>Coral Chief</i>	China Navigation Co. Ltd.
<i>Delamere</i>	Western Australian State Shipping Service
<i>Delos</i>	Australia-West Pacific Line
<i>Dongara</i>	Melbourne S.S. Co.
<i>Dorrigo</i>	Western Australian State Shipping Service
<i>Dulverton</i>	Western Australian State Shipping Service
<i>Eigamoiya</i>	Nauru Government
<i>Empress of Australia</i>	Australian National Line
<i>Halifax Star</i>	Blue Star Line Ltd.
<i>Hobart Star</i>	Blue Star Line Ltd.
<i>Iron Derby</i>	Broken Hill Pty. Co. Ltd.
<i>Iron Flanders</i>	Broken Hill Pty. Co. Ltd.
<i>Iron Kimberley</i>	Broken Hill Pty. Co. Ltd.
<i>Island Chief</i>	China Navigation Co. Ltd.
<i>Juna</i>	British India S.N. Co. Ltd.
<i>Kabbarli</i>	Western Australian State Shipping Service
<i>Kangaroo</i>	Western Australian State Shipping Service
<i>Kamubla</i>	Associated S.S. Pty. Ltd.
<i>Koojarra</i>	Western Australian State Shipping Service
<i>Koolama</i>	Western Australian State Shipping Service
<i>Koorunga</i>	Associated S.S. Pty. Ltd.
<i>Lemnos</i>	Australia-West Pacific Line
<i>Marsina</i>	Burns, Philp & Co. Ltd.
<i>Milos</i>	Australia-West Pacific Line
<i>Moana Raoi</i>	The Wholesale Society of Betio, Tarawa, Gilbert & Ellice Islands
<i>Montoro</i>	Burns, Philp & Co. Ltd.
<i>Moresby</i>	Burns, Philp & Co. Ltd.
<i>Mundoora</i>	Associated S.S. Pty. Ltd.
<i>Nimos</i>	Australia-West Pacific Line
<i>Port Albany</i>	Blue Star Port Lines Ltd.
<i>Port Alfred</i>	Blue Star Port Lines Ltd.
<i>Port Huon</i>	Blue Star Port Lines Ltd.
<i>Port Melbourne</i>	Blue Star Port Lines Ltd.
<i>Port Montreal</i>	Blue Star Port Lines Ltd.
<i>Port New Plymouth</i>	Blue Star Port Lines Ltd.
<i>Port St. Lawrence</i>	Blue Star Port Lines Ltd.
<i>Rhexenor</i>	Ocean Fleets Ltd.
<i>Rona</i>	Colonial Sugar Refining Co. Ltd.
<i>Samos</i>	Australia-West Pacific Line
<i>Sletholm</i>	Karlander (Papua) Pty. Ltd.
<i>Stentor</i>	Ocean Fleets Ltd.
<i>Tanda</i>	British India S.N. Co. Ltd.
<i>Tenos</i>	Australia-West Pacific Line
<i>Townsville Star</i>	Blue Star Line Ltd.
<i>Triadic</i>	British Phosphate Commissioners
<i>Tri-Ellis</i>	British Phosphate Commissioners
<i>Troubridge</i>	Adelaide S.S. Co. Ltd.
<i>Tulagi</i>	Burns, Philp & Co. Ltd.
<i>Windarra</i>	Melbourne S.S. Co.
<i>Wongala</i>	Tucker Shipping Pty. Co.
Supplementary Ships:	
<i>Bass Trader</i>	Australian National Line
<i>Mittagong</i>	Associated S.S. Pty. Ltd.

CANADA (Information dated 1.4.70)

NAME OF VESSEL	OWNER/MANAGER
Selected Ships:	
<i>Alert</i>	Government of Canada
<i>Arcadia</i>	P. & O. Lines Management Ltd.
<i>A. T. Cameron</i>	Government of Canada
<i>Baffin</i>	Government of Canada
<i>Bluenose</i>	Canadian National Railways
<i>Bridgepool</i>	Sir R. Ropner & Co. Ltd.
<i>Camsell</i>	Government of Canada
<i>Canberra</i>	P. & O. Lines Management Ltd.
<i>C. D. Howe</i>	Government of Canada
<i>Cygnus</i>	Government of Canada
<i>Dawson</i>	Government of Canada
<i>Derbyshire</i>	Bibby Line Ltd.
<i>d'Iberville</i>	Government of Canada
<i>Frank H. Brown</i>	White Pass & Yukon Ltd.
<i>G. B. Reed</i>	Government of Canada
<i>Gulf Canada</i>	Gulf Oil Ltd.
<i>H 1060</i>	Kent Line Ltd.
<i>H 1070</i>	Kent Line Ltd.
<i>H. R. MacMillan</i>	Canadian Pacific Steamships
<i>Hudson</i>	Government of Canada
<i>Iberia</i>	P. & O. Lines Management Ltd.
<i>Imperial Bedford</i>	Imperial Oil Ltd.
<i>Imperial Acadia</i>	Imperial Oil Ltd.
<i>Imperial Ottawa</i>	Imperial Oil Ltd.
<i>Imperial Quebec</i>	Imperial Oil Ltd.
<i>Imperial St. Lawrence</i>	Imperial Oil Ltd.
<i>Irvingstream</i>	Irving Oil Co.
<i>Ixia</i>	Stag Lines Ltd.
<i>John A. Macdonald</i>	Government of Canada
<i>John Cabot</i>	Government of Canada
<i>J. V. Clyne</i>	Canadian Pacific Steamships
<i>Kapuskasing</i>	Government of Canada
<i>Labrador</i>	Government of Canada
<i>Limnos</i>	Government of Canada
<i>Louis S. St. Laurent</i>	Government of Canada
<i>Martin Karlsen</i>	Government of Canada
<i>Montcalm</i>	Government of Canada
<i>N. B. McLean</i>	Government of Canada
<i>Nego Anne</i>	Wallem & Co. A/S
<i>Norman McLeod Rogers</i>	Government of Canada
<i>Northern Shell</i>	Shell Canada Ltd.
<i>N. R. Crump</i>	MacMillan & Clyne Ltd.
<i>Oriana</i>	P. & O. Lines Management Ltd.
<i>Porte Dauphine</i>	Government of Canada
<i>Quebec</i>	Messabec Ltd.
<i>Queen of Prince Rupert</i>	British Columbia Ferry Authority
<i>Silvercape</i>	Silver Line Ltd.
<i>Simon Fraser</i>	Government of Canada
<i>Sir Humphrey Gilbert</i>	Government of Canada
<i>Texada</i>	Wingate International Shipping Co.
<i>Thomas Carleton</i>	Government of Canada
<i>Thor I</i>	Thor Dahl A/S
<i>Thorshope</i>	Thor Dahl A/S
<i>Thorsriver</i>	Thor Dahl A/S
<i>Thorstrem</i>	Thor Dahl A/S
<i>Wheat King</i>	Upper Lakes Shipping Co. Ltd.
Supplementary Ships:	
<i>Alexander Mackenzie</i>	Government of Canada
<i>Anna Bakke</i>	Knut Knutsen O.A.S.
<i>Astrid Bakke</i>	Knut Knutsen O.A.S.
<i>Bonneville</i>	A. F. Klaveness & Co. A/S
<i>Bougainville</i>	A. F. Klaveness & Co. A/S
<i>Bronxville</i>	A. F. Klaveness & Co. A/S
<i>Emerillon</i>	Shell Canada Ltd.
<i>Gosforth</i>	Burnett Steamship Ltd.
<i>Maxwell</i>	Government of Canada
<i>Princess of Acadia</i>	Canadian Pacific Steamships
<i>Sunnyville</i>	A. F. Klaveness & Co. A/S
<i>William Carson</i>	Canadian National Railways

Auxiliary Ships:

Canada has 52 ocean-going Auxiliary Ships and 52 Auxiliary Ships operating on the Great Lakes.

INDIA (Information dated 1.3.70)

NAME OF VESSEL	OWNER/MANAGER
Selected Ships:	
<i>Andamans</i>	Shipping Corporation of India Ltd.
<i>Bahadur</i>	Asiatic S.N. Co. 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>Jalagouri</i>	Scindia S.N. Co. Ltd.
<i>Jalakerishna</i>	Scindia S.N. Co. Ltd.
<i>Jalamanyari</i>	Scindia S.N. Co. Ltd.
<i>Jalapalak</i>	Scindia S.N. Co. Ltd.
<i>Jalavihar</i>	Scindia S.N. Co. Ltd.
<i>Jalazad</i>	Scindia S.N. Co. Ltd.
<i>Jaljawahar</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 Ambika</i>	Surrendra Overseas Ltd.
<i>APJ Akash</i>	Surrendra Overseas Ltd.
<i>APJ Sushma</i>	Surrendra Overseas Ltd.
<i>Ashoka Jayanti</i>	Jayanti Shipping Co. Ltd.
<i>Bande Nawaz</i>	Hind Agencies Ltd.
<i>Chanakya Jayanti</i>	Jayanti Shipping Co. Ltd.
<i>Damodar Mondovi</i>	Damodar Bulk Carriers Ltd.
<i>Desh Bandhu</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>Jagat Neta</i>	Dempo S.S. 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 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>Jaladharati</i>	Scindia S.N. Co. Ltd.
<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>Jalagirija</i>	Scindia S.N. Co. Ltd.
<i>Jalagomati</i>	Scindia S.N. Co. Ltd.
<i>Jalagopal</i>	Scindia S.N. Co. Ltd.
<i>Jalayoti</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.

INDIA (contd.)

NAME OF VESSEL	OWNER/MANAGER
<i>Jalamaya</i>	Scindia S.N. Co. Ltd.
<i>Jalamoti</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>Jalaratna</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 Jag Mitra</i>	South East Asia 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>Sagar Sudha</i>	Africana 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 Chetana</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 Marg</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 Sandesh</i>	Shipping Corporation of India Ltd.
<i>Vishva Shobha</i>	Shipping Corporation of India Ltd.
<i>Vishva Siddhi</i>	Shipping Corporation of India Ltd.
<i>Vishva Tilak</i>	Shipping Corporation of India Ltd.
<i>Vishva Tej</i>	Shipping Corporation of India Ltd.
<i>Vishva Usha</i>	Shipping Corporation of India Ltd.
<i>Vishva Vandana</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 Vikas</i>	Shipping Corporation of India Ltd.
<i>Vishva Vinay</i>	Shipping Corporation of India Ltd.
<i>Vishva Vir</i>	Shipping Corporation of India Ltd.

Auxiliary Ships:

India has 6 Auxiliary Ships.

NEW ZEALAND (Information dated 27.3.70)

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>Holmburn</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>Koraki</i> ..	..	..	..	..	Union S.S. Co. of New Zealand Ltd.
<i>Koraniui</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>Maheno</i> ..	..	..	..	..	Union S.S. Co. of New Zealand Ltd.
<i>Maori</i> ..	..	..	..	..	Union S.S. Co. of New Zealand Ltd.
<i>Marama</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>Sedco 135 F</i> ..	..	..	..	..	Shell B.P. Todd Oil Services Ltd.
<i>Taranui</i> ..	..	..	..	..	South Seas Shipping Co. (Suva) Ltd.
<i>Tarawera</i> ..	..	..	..	..	Union S.S. Co. of New Zealand Ltd.
<i>Taveuni</i> ..	..	..	..	..	Union S.S. Co. of New Zealand Ltd.
<i>Tofua</i> ..	..	..	..	..	Union S.S. Co. of New Zealand Ltd.
<i>Valetta</i> ..	..	..	..	..	British Phosphate Commissioners
<i>Waikare</i> ..	..	..	..	..	Union S.S. Co. of New Zealand Ltd.
<i>Waimate</i> ..	..	..	..	..	Union S.S. Co. of New Zealand Ltd.
<i>Waimea</i> ..	..	..	..	..	Union S.S. Co. of New Zealand Ltd.
<i>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.
Supplementary Ships:					
<i>Aotearoa</i> ..	..	..	..	..	Seatrans Consolidated
<i>Aramoana</i> ..	..	..	..	..	New Zealand Government Railways Department
<i>Aranui</i> ..	..	..	..	..	New Zealand Government Railways Department
<i>Carnatic</i> ..	..	..	..	..	Crusader Shipping Co. Ltd.
<i>Hawea</i> ..	..	..	..	..	Union S.S. Co. of New Zealand Ltd.
<i>James Cook</i> ..	..	..	..	..	New Zealand Government

Auxiliary Ships:

New Zealand also has a fleet of 18 Auxiliary Ships currently reporting.

HONG KONG (Information dated 11.3.70)

NAME OF VESSEL	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Anking</i> ..	M. T. Anderson	T. S. Payne, C. R. Finney, F. J. Thorogood	Ng Chiu Keung	China Navigation Co. Ltd.
<i>Anshun</i> ..	B. A. Owen	A. L. Carter, G. K. Grylls, D. A. Hawker, C. W. Billimore	Choi Pong Cheung	China Navigation Co. Ltd.
<i>Bragernes</i> ..	I. Eide	R. Rernes, L. Brestrup, J. Andersen	Yung Wing Ching	Thoresen & Co. Ltd.
<i>Cape St. Mary</i> ..	Fu Chiu-Wan	Chan Hok Min, Kwok Yung Sing	Wong Kam Tim	Agriculture & Fisheries Dept., H.K. Govt.
<i>Cardross</i> ..	I. D. Shearman	J. P. Shardi, Cheung Hi Loi, Chan Kwon Yu	Chan Kun	Kian Hin Leong Enterprises Ltd.
<i>Carl Offersen</i> ..	H. P. Fallesen	F. Poulsen, A. P. Schmidt, H. L. Petersen	W. G. McLaren	Jebsen & Co.
<i>Chefoo</i> ..	B. G. Dixon-Ward	R. J. Mullan, P. Appleyard, M. J. M. Strong, J. L. Taylor	Leung Man Hin	China Navigation Co. Ltd.
<i>Chengtu</i> ..	W. B. Jones	R. B. Crick, P. R. Eamer, A. S. Urquhart	Wai Fung Man	China Navigation Co. Ltd.
<i>Cree</i> ..	G. T. Colbeck	J. P. H. Dunn, M. A. Horridge, Li Ping Sum	Mak Wai Lam	Indo-China S.N. Co. Ltd.
<i>Eastern Argosy</i> ..	J. M. Marshall	P. L. Ballantyne, M. S. Wilkinson, H. R. Crowther, C. Hamerton	F. McGuckin	Indo-China S.N. Co. Ltd.
<i>Eastern Cape</i> ..	I. G. Boyle	M. G. Lever, T. R. Falk, Lau Wah Chee	V. Trebartha	Indo-China S.N. Co. Ltd.
<i>Eastern Cliff</i> ..	D. R. Cole	N. A. H. Funston, N. C. E. Cook, R. G. Lyon, Wan Hak Chung	J. C. Logan	Indo-China S.N. Co. Ltd.
<i>Eastern Maid</i> ..	G. G. Taylor	M. J. Sawyer, A. MacGilchrist, C. V. D. Smith	G. M. Battery	Indo-China S.N. Co. Ltd.
<i>Eastern Moon</i> ..	D. Smith	P. Hold, I. J. H. Alexander, H. N. P. Apin	F. J. Bateman	Indo-China S.N. Co. Ltd.
<i>Eastern Muse</i> ..	D. P. Gibbons	J. P. Kosidowski, J. Cable, W. R. Fitzgerald	E. A. Dunford	Indo-China S.N. Co. Ltd.
<i>Eastern Queen</i> ..	G. C. Taylor	I. R. Denney, E. W. Pretymann, P. J. Davey	H. D. Bray	Indo-China S.N. Co. Ltd.
<i>Eastern Ranger</i> ..	P. J. Sullivan	J. H. Pring, J. Elliott, B. Trevorrow	M. M. B. Philpott	Indo-China S.N. Co. Ltd.
<i>Eastern Rover</i> ..	D. N. Greenhaigh	P. W. Campbell, J. M. Stanaway, R. H. James	F. P. McLoughlin	Indo-China S.N. Co. Ltd.
<i>Eastern Trader</i> ..	M. G. Bishop	P. M. Gray, M. A. Smith, P. d'A. Kilgour	V. Williams	Indo-China S.N. Co. Ltd.
<i>Eredine</i> ..	I. M. K. Kelly	S. Jones, A. D. Hotchkiss, C. J. Walford, L. J. C. Findlay	Chiu Tze Yin	China Navigation Co. Ltd.
<i>Erskay</i> ..	R. Kennett	J. N. Edwards, W. H. Blake, J. D. S. F. Bird	U In San	China Navigation Co. Ltd.
<i>Foh Kim</i> ..	M. B. M. Tallack, O.B.E.	K. S. Khambay, Kwok Chuen, Lam Lung-Ki	Cheung Shing-Cheung	Lai Fook Kim Shipping Co. Ltd.
<i>Fortune Glory</i> ..	W. F. Allan	R. E. Herman, Lai Siu Ming	Pang Ping Man	Continental Navigation & Enterprises Ltd.
<i>Francis Drake</i> ..	D. James	H. Bricks, H. Dunsford, J. Falconer, J. McGrath	F. Isaac	Indo-China S.N. Co. Ltd.
<i>George Anson</i> ..	A. Dyason	W. Byers, P. Hopkins, M. Sampson, N. Wheeler	D. Murphy	Indo-China S.N. Co. Ltd.
<i>Hai Hing</i> ..	N. O. Wilhelmsen	E. Knutsen, B. Egeland, D. Osmundsen	Chan Kam Tsun	Thoresen & Co. Ltd.
<i>Hai Meng</i> ..	A. Johnsen	E. Iversen, I. Hestholm	M. L. Narasimham	Thoresen & Co. Ltd.
<i>Hallborg</i> ..	A. Solbak	H. S. Carlsten, L. Bang, T. Angen	Chan Siu Ming	Thoresen & Co. Ltd.
<i>Hallbor</i> ..	O. Schibsted	R. L. Andersen, I. O. Evjen, S. Holand	Lau Kam Pui	Thoresen & Co. Ltd.
<i>Hallvard</i> ..	H. Yndestad	R. Skotgaard, H. Engelsen, A. Djeseland	Lai Kwong Yin	Thoresen & Co. Ltd.
<i>Helios</i> ..	A. Lerstang	J. Stiles, J. Fosen, H. Nicolaisen	Ip Yuk Fai	Thoresen & Co. Ltd.
<i>Hermad</i> ..	R. Frydenlund	L. Lie, J. Jensen, I. Myhren	Poon Chee Pooi	Thoresen & Co. Ltd.
<i>Hoi Kung</i> ..	O. G. Espeseth	B. B. Vold, T. Johannessen, J. Akselsen	K. Haakonsen	Karsten Larsen & Co. (H.K.) Ltd.
<i>Hoi Wong</i> ..	J. Bjerkenes	L. Moen, R. Rasmussen, O. Stenseth	I. Bjelland	Karsten Larsen & Co. (H.K.) Ltd.
<i>Hupoh</i> ..	R. F. Brooks	S. K. Toon, K. R. Emmerson, R. Groombridge	Leung Kwok Ming	China Navigation Co. Ltd.
<i>Hyria</i> ..	M. T. John	D. Fuller, J. Rankin, B. Muir	R. Young	Shell Bermuda (Overseas) Ltd.
<i>Jacob Jebsen</i> ..	G. T. Andersen	J. I. Toennesen, F. Nolte, R. E. Soerensen	C. H. Carney	Jebsen & Co.
<i>Kuala Lumpur</i> ..	R. C. W. Gorman	P. Gardener, R. C. Dundas, P. J. Drake, D. J. Shute	Zimmon Marr	China Navigation Co. Ltd.
<i>Kwangsi</i> ..	K. H. Nettleship	L. R. Jones, P. F. Buffett, G. Robins	U Chun Yee	China Navigation Co. Ltd.
<i>Kwangtung</i> ..	J. H. Gomersall	B. R. Gifford, A. C. Davidson, A. G. Quaife	Wai Pun Un	China Navigation Co. Ltd.
<i>Kweichow</i> ..	R. J. Shipp	I. D. Fletcher, K. R. Strudwick, M. A. J. Dawes	Kwong Shek Hee	China Navigation Co. Ltd.
<i>Kwelin</i> ..	M. R. M. Seale	D. A. Dash, G. E. Garrett, R. J. Evans	Fung Kwok Cheung	China Navigation Co. Ltd.
<i>Manoloveretti</i> ..	V. P. Rondain, Jr.	C. G. Villanueva, G. Gaviola, E. Gonzales	T. Bullicer	Everett-Orient Line Inc.
<i>Ninghai</i> ..	T. J. Wilson	D. R. Walker, M. A. Marshall, T. L. Jeffrey, Li King Yim	Chan Hak Wai	China Navigation Co. Ltd.

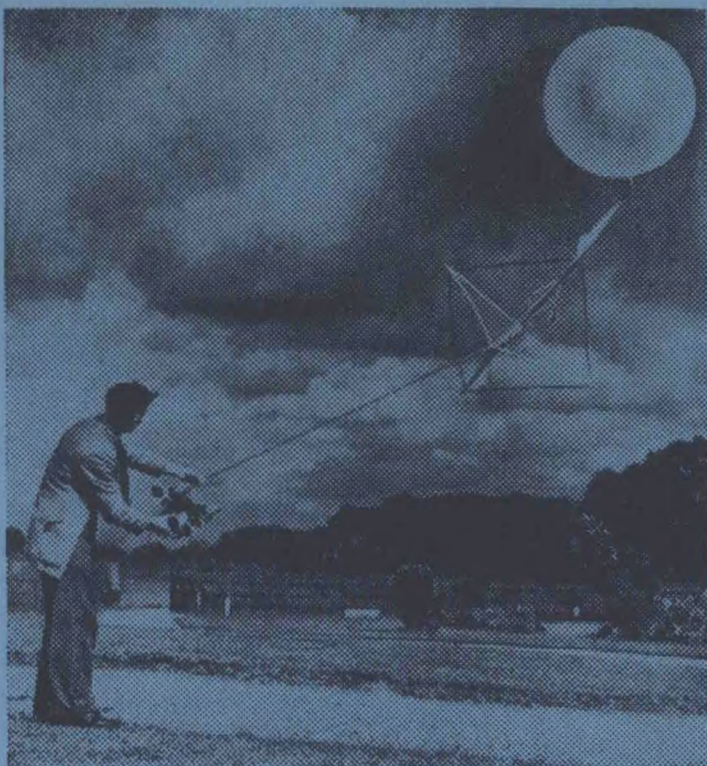
Hong Kong (contd.)

NAME OF VESSEL	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Ningpo</i> ..	C. J. Coy ..	B. Keeble, D. R. Ewings, G. Ingram, Leung Lai Kit ..	Li Kar Wai ..	China Navigation Co. Ltd.
<i>Shanxi</i> ..	G. Cornforth ..	G. A. Drewery, K. G. Sutherland, A. G. Boudouy ..	Freddie Chan ..	China Navigation Co. Ltd.
<i>Star Aldebaran</i> ..	F. A. J. Hartmann ..	K. J. E. Luning, H. O. B. Eriksen, A. I. Pihlman ..	O. I. Jonson ..	Everett-Orient Line Inc.
<i>Star Altair</i> ..	S. A. Bengtsson ..	N. P. Krantz, G. Lindgren, D. T. Arstrand ..	L. E. W. Karlsson ..	Everett-Orient Line Inc.
<i>Star Antares</i> ..	R. Vabasalu ..	T. Lumsden, B. Thornberg, C. Magnusson ..	R. Reslow ..	Everett-Orient Line Inc.
<i>Star Betelgeuse</i> ..	P. G. J. Osterling ..	K. Thomsen, J. A. Strobberg, S. F. Lagerlof ..	S. L. B. Davidsson ..	Everett-Orient Line Inc.
<i>Tai Lang Shan</i> ..	K. J. Ko ..	Li Chi Yee, Shek Wai, Lau Chi Chiu ..	Cheung Chun Lun ..	Shun Cheong S.N. Co. Ltd.
<i>Tai Poo Shek</i> ..	C. J. Farren ..	L. W. Mathieson, Wong Kwok Hing, Ng Chiu Ming ..	Tsui Wai Leung ..	Shun Cheong S.N. Co. Ltd.
<i>Tai Poo Shan</i> ..	W. M. Pearson ..	C. S. Barboza, Ip. Kwok Ping, Fung Nim Tsang ..	Chan Keng Chuen ..	Shun Cheong S.N. Co. Ltd.
<i>Tai Wah Shan</i> ..	R. A. Kent ..	Yu Chi Tai, Ip Hung Wai, Chan Hoi ..	Wong Tsz Ying ..	Shun Cheong S.N. Co. Ltd.
<i>Taiyuan</i> ..	F. Cunningham ..	D. R. Groves, J. S. Lambourn, R. Bennett, S. T. D. Quail ..	Ma Yau Sun ..	China Navigation Co. Ltd.
<i>Thomasverrett</i> ..	D. P. Lopez ..	A. Q. Lirio, C. I. Relles, M. K. Sacedon ..	L. R. Vicente ..	Everett-Orient Line Inc.
<i>Tong Yit</i> ..	G. Roberts ..	I. M. Reynolds, Roseli Bin Sendang ..	R. Stanislaus ..	Kie Hock Shipping (H.K.) Co. Ltd.
<i>Wenchow</i> ..	D. T. Hollands ..	N. J. Alexander, C. I. Hanwell, R. R. Freeman ..	Pang Kwok Lam ..	China Navigation Co. Ltd.
<i>Yochow</i> ..	J. B. P. Blamey ..	B. N. Whitehead, C. L. Pickles, A. P. Mellor ..	Chau Wing ..	China Navigation Co. Ltd.
<i>Yunnan</i> ..	R. J. Smith ..	J. R. Haines, N. R. Howlett, W. S. Cheng ..	Tang Yuen ..	China Navigation Co. Ltd.

SINGAPORE (Information dated 20.4.70)

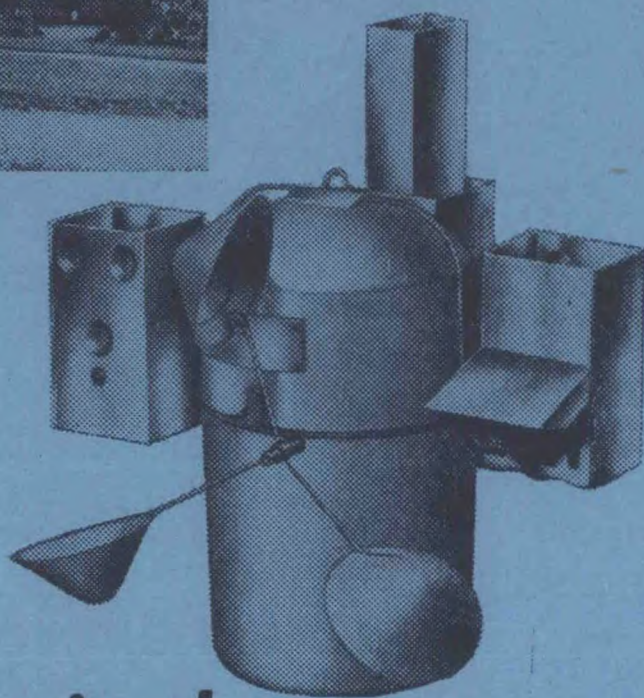
NAME OF VESSEL	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
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<i>Golden Lion</i> ..	Khim Maung ..	Gulam Yusoff, M. Peris, Koh Pak Thong	Guan Guan Shipping Ltd.
<i>Golden Spring</i> ..	— O'Conner ..	Chua Khim Chuan, Tan Chor Wee	Guan Guan Shipping Ltd.
<i>Golden Summer</i> ..	J. Cullen ..	W. Coules, — Damping, Tan Kim Seng	Guan Guan Shipping Ltd.
<i>Golden Wonder</i> ..	T. A. Sheppard ..	— Craig, R. Law, Chia Tien Hoe	Guan Guan Shipping Ltd.
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<i>Kinah</i> ..	Peter Ho Kim Tuan ..	Yan Chow Gang	Guan Guan Shipping Ltd.
<i>Neptune Agate</i> ..	A. C. Ezekiel ..	N. D. Marinda, Lim Gam Hing, Teddy Yap	Straits S.S. Co. Ltd.
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<i>Neptune Tobaz</i> ..	H. Shuermann ..	M. W. L. Tozer, Ghandhi, Freddy Chan	Neptune Orient Lines Ltd.
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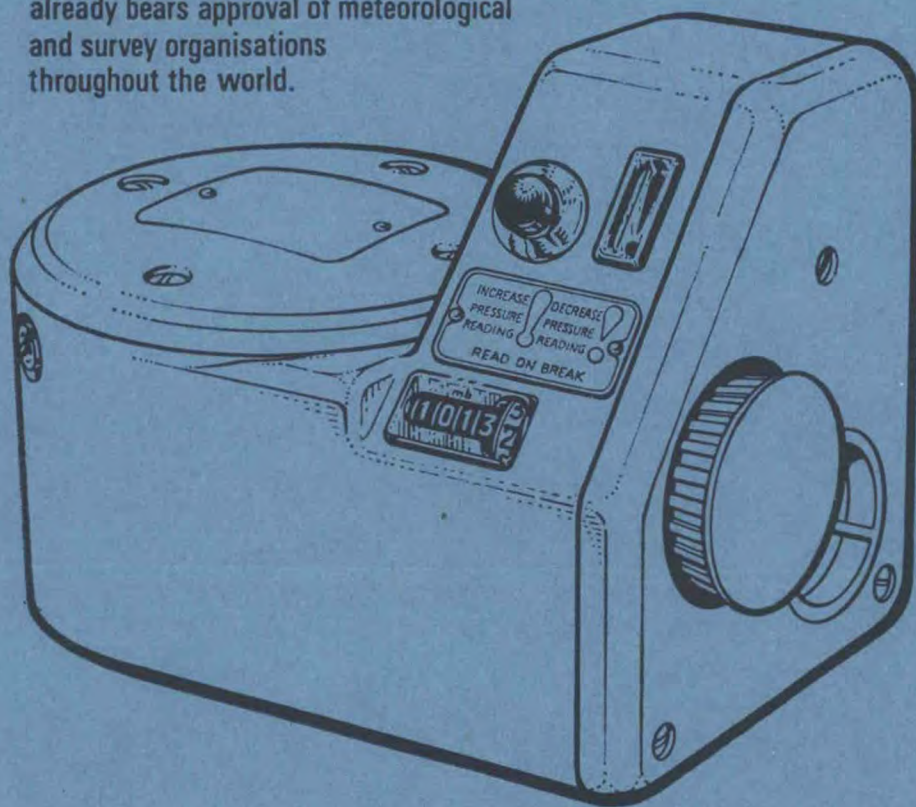


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