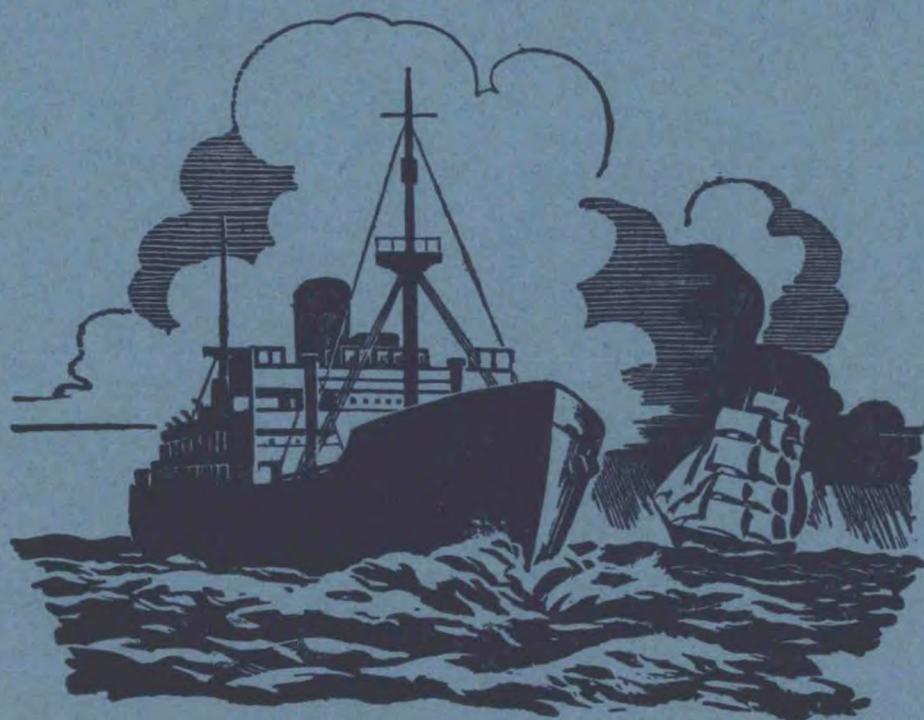


Met.O. 777

The Marine Observer

*A quarterly journal of Maritime
Meteorology*



Volume XXXVI No. 213

July 1966

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Meteorological Office (Marine Division) Atlases

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

Meteorological Atlases

Monthly Meteorological Charts of the Atlantic Ocean. M.O.483, 1948, reprinted 1959. (60°S-70°N, 80°W-40°E) 180s. (post 4s. 0d.)

Monthly Meteorological Charts of the Eastern Pacific. M.O.518, 1950, reprinted 1956. (60°S-60°N, 160°W-60°W) (17½" × 24½") 147s. (post 4s. 0d.)

Monthly Meteorological Charts of the Indian Ocean. M.O.519, 1949, reprinted 1959. (50°S-30°N, 20°E-120°E) (16½" × 22½") 126s. (post 3s. 6d.)

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

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

Monthly Sea Surface Temperatures of Australian and New Zealand Waters. M.O.516, 1949. (50°S-10°S, 100°E-180°) (19½" × 12½") 10s. (post 9d.)

Monthly Sea Surface Temperature of the North Atlantic. M.O.527, 1949, reprinted 1950. (30°N-68°N, 80°W-15°E) (19½" × 12½") 10s. (post 9d.)

Monthly Meteorological Charts and Sea Surface Current Chart of the Greenland and Barents Seas. M.O.575, 1959. (60°N-80°N, 30°W-120°E) 126s. (post 3s. 3d.)

This atlas contains a generalised surface current chart for the area and monthly charts of wind, barometric pressure, air and sea temperature, and other meteorological elements.

Current Atlases

Currents of the Indian Ocean. Met.O.772 (formerly M.O.392), 1939, reprinted 1966. (50°S-30°N, 20°E-140°E) (30" × 20")

South Pacific Ocean Currents. M.O.435, 1938, reprinted 1959. (60°S-0°, 140°E-70°W) (22" × 34") In prep.

The above two atlases contain quarterly "current arrow" and "current rose" charts.

Quarterly Surface Current Charts of the Atlantic Ocean. M.O.466, 1945, reprinted 1962. (60°S-70°N, 80°W-20°E) (22½" × 18") 32s. 6d. (post 3s. 0d.)

Quarterly Surface Current Charts of the Western North Pacific Ocean with monthly chartlets of the China Seas. M.O.485, 1949, reprinted 1962. (0°-60°N, 98°E-160°W) (21" × 16") 35s. (post 1s. 3d.)

Quarterly Surface Current Charts of the Eastern North Pacific. M.O.655, 1959. (0°-60°N, 160°W-65°W) (23" × 17") 15s. (post 11d.)

The above three atlases contain current rose charts, predominant current charts, and vector mean current charts.

Ice Atlases

Monthly Ice Charts of Western North Atlantic. M.O.478, 1944. (37°N-53°N, 72°W-35°W) (12" × 7½") 4s. (post 9d.)

Mean limits of pack, extreme limits of pack, mean limits of bergs, extreme limits of bergs.

Climatological Charts

Climatological and Sea-Surface Current Charts of the North Atlantic Ocean. M.O.615, 1958. (5°S-60°N, 100°W-40°E) (40" × 25", folded to 13" × 8") 41s. the set (post 1s. 4d.) One chart for each month, based on information in M.O. 483, M.O. 466 and M.O. 478 (above).

Her Majesty's Stationery Office

THE MARINE OBSERVER

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

VOL. XXXVI

No. 213

JULY 1966

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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

Thanks largely to the tireless activity of Samuel Plimsoll, the marking of a loadline disc on the side of British merchant ships was first made compulsory by the Merchant Shipping Act of 1875, but it was not till 1890 that its position was fixed in accordance with Tables of Freeboard and regulations were made concerning additional marks at different seasons in specific geographical zones. These rules were amended from time to time and were gradually adopted by the other principal maritime countries, but it was not until 1930 that the first International Loadline Conference was held—at the invitation of the British Government—and the loadline rules as we know them today were adopted internationally.

The ghost of Samuel Plimsoll must surely have haunted Church House at Westminster in April this year when a new International Convention on Loadlines was adopted after a five week conference under the auspices of the Inter-Governmental Maritime Consultative Organization (IMCO). Representatives of sixty nations were present, whereas only thirty were represented at the 1930 Conference; evidence of our changing world.

The new Convention is, in fact, a modification of the existing one, brought about by such considerations as the increase in size and speed of ships and improvements in design, strength, watertight integrity, including the use of steel hatches and in such important items as steering gear aboard modern ships compared with those in service or projected in 1930.

The new Convention provides for two basic types of ships—type A being those designed for the carriage of liquid cargoes in bulk and type B being all other ships. The larger ships will have appreciable reductions in freeboard compared with those permissible under existing regulations. Existing small ships of 100 metres (328 feet in length) will not be penalized but new ships of that size, if fitted with wooden hatch covers, will need to have increased freeboard and it is hoped that this will encourage owners to install steel covers. This Convention makes history by producing the first international shipping document which uses metres instead of feet as the basic measurement of length in the English text.

The possibility of assigning loadlines to fishing vessels was considered and a recommendation was made that IMCO should pursue studies on the minimum freeboard for such vessels, with a view to establishing recommended international standards for them.

Appreciable modifications were made to the zones and seasonal areas, details of which are shown on the map at page 97. It was decided that no 'stiffening up' of the limits of the zones, which were established in 1930, was necessary because experience had shown that, in general, they are satisfactory and because of the above mentioned improvements in ship design since these zones were established in 1930. It was decided, however, that the system of corridors which had been used to some extent in the existing Convention, giving access to ports in these corridors for ships with less freeboard than would be permitted further to seaward, should be extended—an arrangement which has obvious economic advantages.

A search through the working documents of the 1930 Convention showed that a summer zone was based on a criterion of not more than 10% winds of force 8 and above, a winter zone on more than 10% winds of force 8 and above and a tropical zone on not more than 1% winds of force 8 and above and nil tropical storms during the month in question. Similar criteria were used for the new Convention except that in a tropical zone not more than one tropical storm in 10 years in an area of 5° square was specified for the month in question. In certain areas, for practical reasons, some relaxation of these criteria was accepted, but broadly these criteria were adhered to. When considering modifications to the various zones, the Conference had in mind present-day forecasting facilities for shipping compared with what was available in 1930, with particular reference to storm warnings, both in temperate and tropical regions.

As can be seen from the map, 'corridors' in which summer freeboard is permitted throughout the year have been established or extended off the east coast of North America; off the Spanish/Portuguese coast south of a rhumb line extending from Cape Torinana to the vicinity of the Azores; off the coast of Argentina; round the south coast of South Africa; in the vicinity of Japan and round New Zealand. Incidental with establishing a corridor round South Africa, the southern limit of the summer zone in the Indian Ocean has been 'straightened out' somewhat. Five 'Tropical zone' corridors have been established; off the north coast of South America in the Caribbean area; in the Arabian Sea off the south-west coast of India; in the Bay of Bengal in the vicinity of Ceylon; inside the Great Barrier Reef off the Australian coast; and the existing corridor off the west coast of Africa has been extended northward to the vicinity of the Canary Islands.

In the Arabian Sea the seasonal tropical period has been simplified somewhat by making it a single season from 1st September to 31st May and the northern limit of the zone has been simplified by incorporating the little area north of 24°N . In the Bay of Bengal the tropical period has been extended a fortnight at either end to make it 1st December to 30th April. A seasonal tropical area has been established in the south Indian Ocean between 10°s and 15°s during the period 1st May to 30th November. This area includes a small corridor off the Australian coast, while off the east coast of Madagascar there is another small corridor in which tropical freeboard is permitted from 1st April to 30th November. In the South Pacific the existing seasonal tropical area off the east coast of Australia is extended southwards to the tropic of Capricorn and eastward to 150°W . The seasonal tropical corridor off the west coast of America has been extended slightly along the Californian coast to 120°W .

Considerable changes have been introduced for enclosed seas. The whole of the Mediterranean and Black Sea is now a Summer Zone, but for ships of 100 metres and under in length, the Gulf of Lyons north of 40°N between 3°E and the coast of Corsica/Sardinia and the region north of 44°N in the Black Sea are Seasonal Winter Areas from 16th December to 15th March and 1st December to 28/29th February respectively. The Baltic has also been accepted now as a Summer Zone except that for ships of 100 metres and under in length it is a Winter Area from 1st November till 31st March. The Sea of Japan is to be a Summer Zone, south of latitude 50°N , but north of rhumb line extending from 38°N on the Korean coast to $43^{\circ} 12'\text{N}$ on the coast of Hokkaido, it is to be a Winter Area for ships of 100 metres and under in length from 1st December to 28/29 February. This rhumb line follows broadly the 0°C isotherm and the winter restriction for small ships was introduced there because of the risk of their superstructures getting iced up in rough weather during these months.

Off the east coast of North America, there is a small Winter Seasonal Area, extending to the north-eastward of the summer zone corridor and embracing most of Nova Scotia and the Bay of Fundy. There has also been a minor modification to the limits of the Seasonal Winter Zone in the eastern North Atlantic. The familiar Winter North Atlantic (WNA) freeboard for ships of 100 metres and under in length remains at the Winter freeboard plus 50 millimetres (2 inches) but the area to which this applies is more clearly defined than at present.

When considering these changes in zones, meteorological atlases and tabulations compiled from observations made aboard voluntary observing ships and prepared by various nations were very carefully studied. The only area in which there was evidence that wind conditions might depart appreciably from the appropriate criterion was the Baltic, where there was some disparity between data from various sources—but even here the majority of ships observations indicated less than 10% winds of force 8 in the winter. It was felt that it was reasonable to make this a 'permanent' zone for the larger ships owing to the probability of wave heights being relatively low owing to the short fetch. The changes in the seasonal tropical areas in the Arabian Sea and Bay of Bengal were based upon advice given by the India Meteor-

logical Department using statistics from 1891 to 1960. Mariners may rest assured that the question of safety was never lost sight of by the Zones Committee, many of the members of which were seamen, and that no changes in the limits of zones or in the seasonal areas were made without very careful consideration.

The loadline mark itself and its associated lines remain in exactly the same form as at present. To prevent malpractice, for example when leaving a summer corridor on an ocean passage across a Winter Zone, the convention specifies that "the appropriate loadlines corresponding to the season of the year and the zone or area in which the ship may be shall not be submerged at any time when the ship puts to sea, during the voyage or on arrival."

The new convention does not come into force until twelve months after it has been officially accepted by the Governments of at least fifteen countries, including seven with not less than one million gross tons of shipping—so it may take some time.

C. E. N. F.

Report of Work for the Year ended 31st December 1965

(MARINE BRANCH AND MARINE CLIMATOLOGY SECTION OF THE METEOROLOGICAL OFFICE: VOLUNTARY OBSERVING FLEET AND OCEAN WEATHER SHIPS)

1. Voluntary Observing Ships

At the end of the year the British Voluntary Observing Fleet was comprised as follows:

- (a) 502 Selected Ships which are supplied with a full set of meteorological instruments on loan and which make observations in code form FM21.C every six hours and transmit them to the appropriate coastal radio station wherever their voyages take them.
- (b) 72 Supplementary Ships, including 9 trawlers, which make less detailed observations than Selected Ships and are supplied on loan with only a barometer, air thermometer and screen. They use abbreviated code form FM22.C for their messages.
- (c) 125 coasting ('Marid') vessels, and one lightship, which make sea surface temperature observations in U.K. coastal waters and transmit them in a special code by w/T or R/T. When in the North Sea, the coasting ships include in their messages wind, weather and visibility observations.
- (d) 13 lightships which make observations of wind, waves, visibility, air and sea temperatures; 11 of these send coded reports by R/T, the other two record their observations for climatological purposes only. The *Dowsing*, *Galloper* and *Royal Sovereign* lightships report barometric pressure using the precision aneroid, and their reports are included in the BBC 5-minute weather bulletins for shipping. The *Galloper* also reports barometric tendency. The time limit imposed on BBC weather bulletins does not permit the inclusion of the barometric tendencies of the other two lightships.
- (e) 16 trawlers which make non-instrumental observations only and transmit them by w/T or R/T using the first four groups of FM21.C, to radio stations in the U.K., Canada, Iceland, Norway or U.S.S.R. depending on the area in which they are fishing. In addition to these, 9 trawlers now figure in the Supplementary Ships' List.
- (f) 33 Auxiliary Ships which make and transmit visual observations similar to those made by trawlers, with the addition of pressure and air temperature readings from the ships' own instruments (using the 'Shred' code). These ships do this work only when in areas where shipping is known to be sparse.

This total of 761 ships represents nearly 19 per cent of the world's total of about 4,000 voluntary observing ships; the total number of British registered ships is about 11 per cent of the world total of merchant ships. These facts combined with a study of the trade routes in Table I will show that British shipping's contribution to world meteorology is considerable, for all these ships send observations by radio to some meteorological service or other throughout their voyages.

The British Voluntary Observing Fleet includes ships of over 100 shipping companies and the following table shows the variety of trade routes on which they are engaged:

Table 1. Average numbers of British Selected and Supplementary Ships on main trade routes to and from the U.K.

Australasia	103	South America	28
Far East	83	Pacific Coast of North America	12
Persian Gulf	31	Europe	54
South Africa	45	Falkland Islands and Antarctic	2
North Atlantic	91	World-wide 'tramping'	88
West Indies	37		

The following table gives the average daily number of radio weather messages received at the Meteorological Communications Centre at Bracknell during the year from merchant ships via GPO coastal stations.

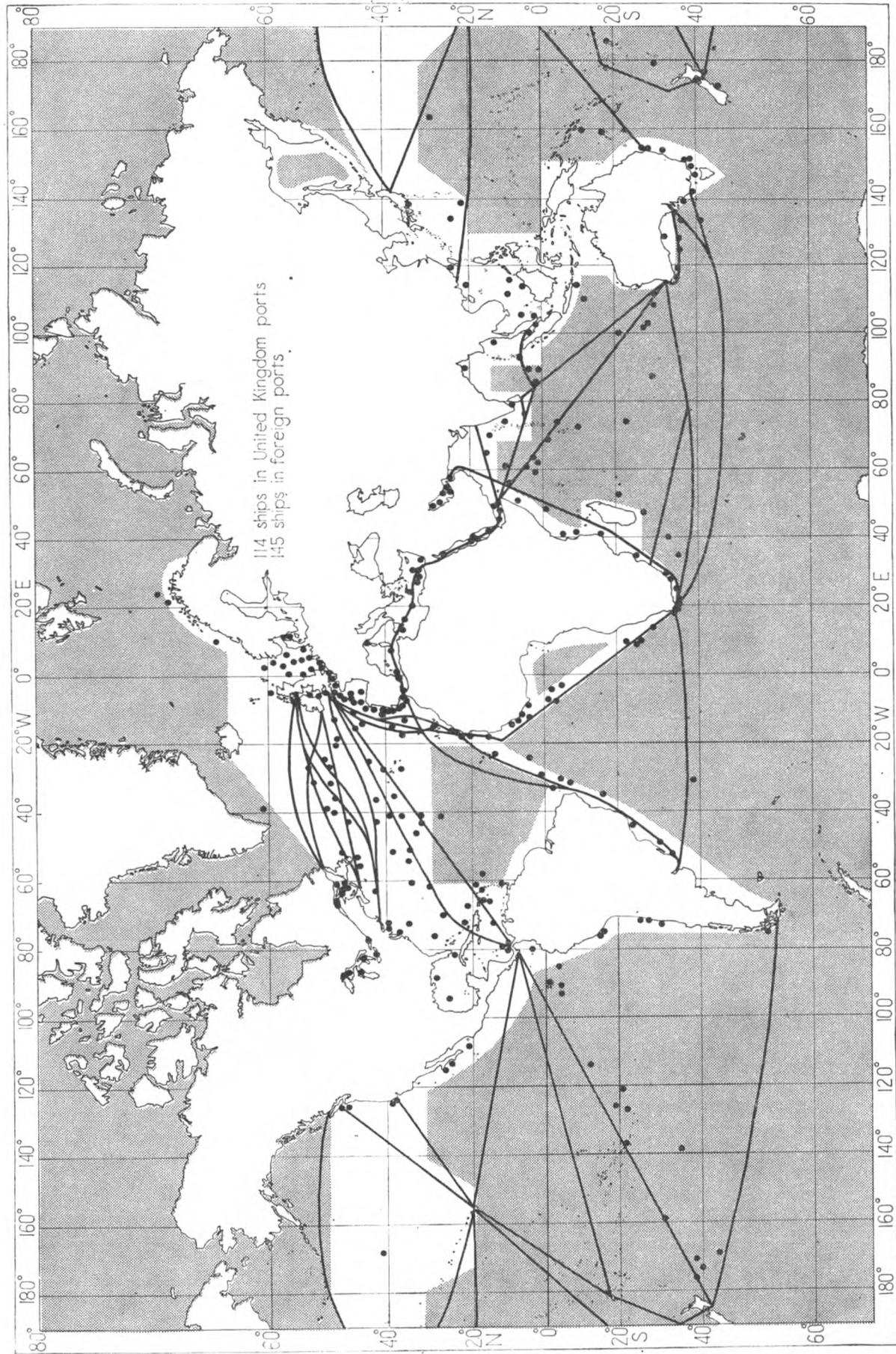
Table 2. Daily average number of reports received direct from ships

<i>(a)</i> North Atlantic (east of 40°W and north of 35°N)	
U.K. Selected and Supplementary Ships	95
'Marid' ships (coasting vessels)	13
Foreign ships	19
Trawlers	5
Total	132
<i>(b)</i> North Sea (51°30'N to 61°N and 4°W to 7°30'E)	
U.K. Selected and Supplementary Ships	9
'Marid' ships (coasting vessels)	4
Trawlers	1
Total	14
<i>(c)</i> Light-vessels	35

During two typical days, one in June and one in December, the total number of reports from ships received in the Central Forecasting Office at Bracknell from various sources is shown in Table 3.

Table 3. Total number of reports received at Bracknell by various sources from ships during two typical days in the year

	<i>JUNE</i>	<i>DECEMBER</i>
Direct reception from		
British ships in North Atlantic	73	83
Foreign ships in North Atlantic	103	103
British trawlers in North Sea	9	6
British merchant ships in North Sea	11	28
	—	—
	196	220
	—	—
Via other European countries		
Ships in North Atlantic	358	328
Ships in Mediterranean	146	57
Ships in North Sea	64	91
Ships off North Russia	13	48
Ships in Pacific	128	118
Ships in other waters	77	127
	—	—
	786	769
	—	—
Via North America		
Ships in North Atlantic	453	509
Ships in Pacific	316	323
Ships in other waters	66	23
	—	—
	835	855
	—	—



The positions of British Selected and Supplementary Ships on 30th April 1965. The shaded areas are those in which shipping is sparse and in which Auxiliary Ships make reports.

The decision, taken in 1964, to equip certain distant water trawlers with instruments and thus bring them into the category of Supplementary Observing Ships, has been amply justified and the keenness and enthusiasm of these ships has been found to be at least equal to, and in many cases greater than, that shown in some passenger liners.

The falling off in the number of radio weather messages received from trawlers, which was a matter of some concern in the early part of 1965, was traced, in part at least, to certain trawler skippers' reluctance to disclose their positions to their competitors. This difficulty has been overcome, it is hoped, by devising special cyphers, whereby the position group of the radio weather message is encyphered before transmission, the decypher being held by the meteorological station (Canada, Faeroes, Greenland, Iceland, Norway or the U.K.) to whom the message is addressed.

Altogether British Selected and Supplementary Ships sent in a total of 1087 meteorological logbooks, similar to the number submitted the previous year. Their observations have continued to be of a very high standard and there appears to be an increasing awareness on the part of shipmasters and officers of the value to shipping and to other activities of their radio weather messages and their observations recorded in the logbooks for climatological purposes. This awareness becomes apparent during the periodical visits to the Meteorological Office which are made by all grades of voluntary marine observers, from master to cadet, during their training or refresher courses ashore—as well as during the quarterly visits to the ships by Port Meteorological Officers and Merchant Navy Agents.

The data received from ships of the voluntary observing fleet have been supplemented by meteorological logbooks received from H.M. survey ships on foreign service. These ships, equipped with Meteorological Office instruments, keep Metform 911, *Selected Ship's Meteorological Logbook*; the very nature of their work which is almost invariably in waters normally unfrequented by shipping makes their observations particularly useful.

Valuable data, often from the lesser known parts of the oceans, continue to be received in the meteorological logbooks of the larger H.M. ships (cruisers and aircraft carriers) which carry a meteorological officer and staff: some of these meteorological logbooks also contain upper air data which are used climatologically.

Observations from the sparse areas of the oceans continue to be received throughout the year on the special form provided to Auxiliary Observing Ships. In this scheme, ships of the tanker companies, which frequently visit ports and pass through areas rarely used by shipping a few years ago, have been especially helpful. Whenever Port Meteorological Officers and Merchant Navy Agents visit a ship which is not a Selected or Supplementary Ship an attempt is made to persuade her Master and officers to do this auxiliary observing work, which is very simple, in areas where shipping is sparse.

2. Ocean Weather Ships

In 1965 the British Ocean Weather Ships completed eighteen years of service in the North Atlantic. The four 'Castle' class frigates which replaced the former 'Flower' class vessels between 1958 and 1961 continue to give satisfactory and reasonably economical service in their present duty. The total annual operating cost of each of the ships at present is about £145,000; this compares favourably with the average operating cost of weather ships operated by the other European countries. About 40% of this cost at present is recovered from other countries operating aircraft across the Atlantic. Seventy-five per cent of the residual cost is borne by the Ministry of Aviation.

Routine hourly surface observations and 6-hourly upper air observations were continued aboard these ships throughout the year and radar wind observations attained an average height of 67,600 ft. During upper wind ascents in light winds, the deck officers have assisted by tracking the balloon visually with sextant and gyro compass. The meteorological staff who volunteer for service in these ships have

continued to show themselves quick to settle down to the somewhat rigorous life afloat and to acquire skill in launching an upper air balloon in the severest weather conditions, a job which requires great patience and determination. Mr. Sandland, a meteorologist in *Weather Monitor*, who has done 10 years service in weatherships, was awarded the Groves Memorial Prize during the year.

Weather Reporter and *Weather Surveyor* played a useful part in an international oceanographic project lasting a whole month—the second year that British weather ships have done this. During this period they kept in constant visual and radar touch with a small moored buoy and gave navigational aid to other ships taking part in the project; over 60 bathythermograph* observations per day were made aboard *Weather Surveyor*.

Oceanographic work has continued throughout the year. Bathythermograph soundings are normally made twice daily on station to a depth of about 300 metres and at 6 hourly intervals on passage, and four deep soundings a voyage are made by each ship to a maximum depth of about 3,000 metres, using special thermometers and salinity bottles. This number has sometimes been substantially increased for short periods to meet special requirements.

Routine biological work including the towing of a plankton sampler and the release of drift bottles has continued on behalf of the Ministry of Agriculture, Fisheries and Food, and the Department of Agriculture and Fisheries for Scotland. A simple atmospheric sampling apparatus has been installed in *Weather Surveyor* for a few voyages on behalf of the Lancaster and Morecambe College of Further Education.

Total short-wave solar radiation and radiation balance were recorded throughout the year by all four weather ships and by R.R.S. *Discovery*, and solar radiation balance only by three of H.M. Survey ships and the Royal Research Ships *John Biscoe* and *Shackleton*. Other special work aboard the weather ships has included photography of aurora, magnetic variation observations, trials with special sea temperature devices and D/F experiments with the ships' lifeboats.

On 1st November, towards the end of her period on station, *Weather Monitor* answered a distress signal from the British ship *Newfoundland* bound from Liverpool to St. John's, Newfoundland. A dangerous fire had broken out in No. 1 hold and the Master required ships in the vicinity to stand by. *Weather Monitor* immediately proceeded at full speed towards the ship's position and arrived on the scene some seven hours later having been delayed by gale force winds and heavy seas. By this time the fire was under control but still considered to be dangerous. At her Master's request *Weather Monitor* escorted *Newfoundland* to Cobh—maintaining her normal meteorological programme of surface and upper air observations en route.

There were two other occasions when British weather ships took action on distress calls from merchant ships and five occasions on alerts from aircraft in difficulties, all of which were later cancelled.

Frequent air/sea rescue exercises were carried out by day and night—in which volunteer frogmen played a prominent part. R.A.F. aircraft took part in some of these exercises and dropped newspapers and mail to the ships.

3. General

Liaison with scientific bodies has continued in connection with non-meteorological observations noted in ships' meteorological logbooks. During the year the National Institute of Oceanography produced their Internal Report, No. B4, 'Notes on the Nature and Occurrence of Marine Bioluminescent Phenomena' compiled from observations made aboard British ships over the past hundred years. An abbreviated version of this report was published in *The Marine Observer*, January 1966.

* A bathythermograph is an instrument that provides a continuous record of temperature changes on its descent and ascent through the water.

The demise of all British whaling activities in the Antarctic has deprived the Office of much useful summer data, but no opportunity is lost of enlisting the help of any British ship which might occasionally visit these waters. The Royal Research Ships *Shackleton* and *John Biscoe* with their annual voyage to the British bases in Antarctica, as Selected Ships, are our main source of data in that area, whilst meteorological logbooks kept aboard *Darwin* and *FitzRoy*, the two ships which for many years have been the Falkland Islands' only surface communication with South America, were borrowed and the data extracted and punched on to cards.

4. Ice

The Marine Branch publishes monthly charts, with an interim chart every ten days, showing the distribution of sea ice in the Northern Hemisphere. Monthly average values and standard deviations of under-surface sea temperatures for ocean weather ship stations are given in diagrammatic form on the back of the ice chart. These are derived from the routine daily bathythermograph observations made aboard North Atlantic weather ships.

During 1965 the Marine Branch prepared an international set of ice symbols for the World Meteorological Organization; these are designed to depict ice observations on all types of maps and with all methods of reproduction—in accordance with the International Ice Nomenclature.

5. Surface Ocean Currents and Waves

Details of surface ocean currents are extracted from ships' meteorological logbooks and used in the preparation of ocean current atlases. This branch also arranges with H.M.S.O. for the printing of these atlases, and the meteorological and climatological atlases of the oceans.

Extraction of ocean current data from ships' meteorological logbooks and their transfer to punched cards has continued with the aim of preparing a new atlas of Indian Ocean currents with the aid of the Meteorological Office computer. Special ocean current studies were made with the help of certain merchant ships, H.M. survey ships and the weather ships. The weather ships have occasionally been using oceanographic buoys to help in this work.

The revision of the sea ice and surface ocean current sections of Admiralty Sailing Directions continued throughout the year and five volumes were amended.

6. Inquiries

The number of inquiries handled during the year was approximately 10% more than last year. They were generally of a varied nature, but as in past years the majority came from solicitors and insurance companies. Civil engineers, contractors and designers of hydrofoil craft applied on a number of occasions for weather and wave data in various parts of the world. Information in connection with the North Sea drilling operations was frequently requested.

University and Technical College research workers have on several occasions applied for data from our unique records. Yachtsmen and holiday makers also made use of the data we hold.

Particulars of the weather, sea and air temperatures at the time of the *Lakonia* disaster were sent to the Medical Research Council.

An unusual inquiry was received for weather and sea conditions off sw Ireland in April 1916 in connection with a gun-running incident in which a German vessel was scuttled.

The Treasury Solicitor and the Board of Trade were supplied with full weather reports on seven occasions in connection with shipping casualties.

A representative from the Marine Branch gave evidence at a Board of Trade Formal Inquiry and attended, to give evidence, at two civil actions.

7. Publications

The revision, editing and printing arrangements of various technical books, code cards and forms supplied to the Voluntary Observing Fleet, Ocean Weather Ships and Port Meteorological Officers as well as *The Marine Observer*, were undertaken during the year.

The 2nd edition of Met.O.593 *Meteorology for Mariners* is at 'page proof' stage. It is hoped that it will be published during 1966.

The new edition of Met.O.435 *Ocean currents of the South Pacific* and the reprint of Met.O.518 *Monthly Meteorological Charts of the Eastern Pacific* were at proof stage at the end of the year.

8. Awards to Voluntary Observing Ships

Annual awards of books were made to the master and officers of 100 Selected/Supplementary ships, 4 coasting ships making sea temperature observations and 4 non-instrumental trawlers whose work reached the required standard; barographs were awarded to four shipmasters whose long and zealous record of voluntary observing was considered as deserving special recognition.

The books selected for awards were *Cassell's English Dictionary* and *The University Atlas*.

EXCELLENT AWARDS, 1965-1966

As has been the custom for many years, the July number of *The Marine Observer* carries a list of ships, masters and officers who have gained Excellent Awards for the quality of their meteorological logbooks received during the year ended the previous 31st March. This year's list appears on pages 107 to 110 and once again we congratulate the masters and officers named in it.

The number of Selected and Supplementary ships which may receive an Excellent Award is limited to 100, i.e. about one-fifth of the Voluntary Observing Fleet and as every year considerably more than one-fifth of the meteorological logbooks received are assessed Excellent there are inevitably many shipmasters and officers who will be disappointed at not receiving an Award. However such officers may draw some consolation from the fact that the notation EX has been placed against the record of this particular meteorological logbook on the personal card which is kept for them in the Meteorological Office and this notation carries the same weight as an Award when the officers long term record comes up for consideration.

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

1. *Asphalion* (A. Holt & Co.), Captain J. T. Knox
2. *Port Vindex* (Port Line Ltd.), Captain C. J. H. Gorley
Stella Leonis (Charleson Smith Trawlers Ltd.), Skipper R. Waller
3. *Calchas* (A. Holt & Co.), Captain D. H. Stewart R.D.
Laurentia (Donaldson Line Ltd.), Captain T. S. Graham
Mabel Warwick (Houlder Brothers & Co. Ltd.), Captain N. Oddy
Rakaia (New Zealand Shipping Co. Ltd.), Captain F. S. Angus
St. Giles (T. Hamling & Co. Ltd.), Skipper J. Humphrey

We congratulate the *Laurentia* on her fifth appearance in an annual 'short list' whilst the *Rakaia* and *Stella Leonis* are each appearing for the second time. Perhaps the outstanding feature of this year's 'short list' is the appearance in it of two fishing trawlers, one of which has secured one of the top three places and thus has her photograph published with the other two opposite page 128.

Awards to trawler Skippers and trawler Wireless Operators sailing in trawlers which at present carry no instruments but make observations of wind and weather

EXCELLENT AWARDS (Year ended 31st March 1966)

SHIP	CAPTAIN	PRINCIPAL OBSERVING OFFICER	RADIO OFFICER	OWNER/MANAGER
<i>Achilles</i>	R. G. Boyd	E. Genochio	B. V. Jones	A. Holt & Co.
<i>Albany</i>	G. C. Chatterley	J. E. Lambert	J. J. O'Sullivan	Royal Mail Lines Ltd.
<i>Apollo</i>	G. V. Barnes	W. G. Somerfield	J. S. Earl*	Bristol S.N. Co. Ltd.
<i>Aramaic</i>	E. E. Snaith	W. A. H. Anderson	F. Kirk	Shaw Savill Line
<i>Asphaltion</i>	J. T. Knox	J. P. May	G. M. Dye	A. Holt & Co.
<i>Benarmin</i>	J. C. Harvey	N. A. Ross	J. W. Kenny	Ben Line
<i>Benarty</i>	C. Donnelly	J. B. W. Edgar	W. Paterson	Ben Line
<i>Benmacdhui</i>	W. C. Watson	G. M. McCrone	G. R. Kerr	Ben Line
<i>Bristol City</i>	F. R. Neil	K. D. Miller	T. M. Jenkins, M.B.E.	Bristol City Line
<i>British Freedom</i>	A. H. Newby, M.B.E.	B. A. Moir	F. Watson	B.P. Tanker Co. Ltd.
<i>British Sailor</i>	F. W. Cuffley	A. M. Skelton	J. O'Connell	B.P. Tanker Co. Ltd.
<i>Bulimba</i>	D. P. Barry	W. K. Fullagar	C. J. A. Voutt	British India Line
<i>Calchas</i>	D. H. Stewart, R.D.	A. R. Williams	D. P. Stoker	A. Holt & Co.
<i>Caltex Edinburgh</i>	B. James	B. S. Sutherland	G. Light	Overseas Tankship (U.K.) Ltd.
<i>Caltex London</i>	D. W. Falconer	J. M. Watt	M. Buchanan	Overseas Tankship (U.K.) Ltd.
<i>City of Pretoria</i>	H. Swinney	P. G. Pike	G. W. Burgh	Ellerman Lines
<i>City of Swansea</i>	J. S. Scholfield	R. Hendy	R. C. Hayward	Ellerman Lines
<i>Clan McGowan</i>	C. M. Powell, M.B.E.	K. B. Whitting	W. Latus	Clan Line
<i>Cortona</i>	R. Allan	R. F. Muir	B. Connolly	Donaldson Line
<i>Croydon</i>	H. G. N. D'Evelin	T. Atkinson	A. W. Dixon	South Eastern Gas Board
<i>Crystal Jewel</i>	D. Patrickson	M. Y. J. Ricketts	R. E. Jenkins	Sugar Line
<i>Dalesman</i>	D. Wolstenholme	D. Skillander	J. Cooper	Harrison Line
<i>Delphic</i>	R. O. Guille	P. V. Haswell	J. F. Twoomey	Shaw Savill Line
<i>Denbighshire</i>	C. R. B. Goodman, M.B.E.	P. A. Brown	I. Gall	Glen Line
<i>Devon</i>	I. C. Davison	P. Pignéguy	K. Dougall	Federal Line
<i>Discovery</i>	R. H. A. Davies	W. C. W. Price	E. Agius	National Institute of Oceanography
<i>Dukesgarth</i>	N. Richardson	J. L. Player	J. A. H. Grant	W. Cory & Son Ltd.
<i>Durham</i>	J. R. Ramsay	B. E. Hogarth	A. F. Holmes	Federal Line
<i>Echo</i>	J. L. Jenkins	R. G. Worner	H. Grant*	Bristol S.N. Co. Ltd.
<i>Explorer (F.R.S.)</i>	E. A. Bruce, O.B.E.	A. A. Baxter	J. Steven	Dept. of Agriculture & Fisheries for Scotland
<i>Frederick T. Everard</i>	G. Brown	I. Anderson	D. J. Wilson	F. T. Everard & Sons Ltd.
<i>Glenfalloch</i>	R. B. Tiplady	J. M. E. Lease	T. Waddington	Glen Line
<i>Glengarry</i>	H. Owen	R. A. Facey	K. Bent	Glen Line
<i>Glengyle</i>	J. K. Edmonds	R. C. Flinders	A. W. Jones	Glen Line

SHIP	CAPTAIN	PRINCIPLE OBSERVING OFFICER	RADIO OFFICER	OWNER/MANAGER
<i>Glenlyon</i> ..	W. K. Hole ..	J. P. A. Clarke ..	P. T. A. Roberts ..	Glen Line
<i>Glenorchy</i> ..	H. S. Taylor ..	G. J. Sives ..	D. C. Ogden ..	Glen Line
<i>Gloucester</i> ..	J. D. Hellings ..	C. S. Baugh ..	W. J. R. Davenport ..	Federal Line
<i>Gloucester City</i> ..	D. A. Braid ..	G. D. Snowdon ..	H. Roderick ..	Bristol City Line
<i>Halifax City</i> ..	E. Irish ..	D. M. Watchorn ..	W. R. Beynon ..	Bristol City Line
<i>Hauraki</i> ..	E. F. H. Allen ..	J. Thomson ..	R. Irwin ..	New Zealand Shipping Co. Ltd.
<i>Helenus</i> ..	C. T. Collett ..	D. J. Gallagher ..	R. Hinchcliffe ..	A. Holt & Co.
<i>Hororata</i> ..	J. H. B. Weston ..	A. Allen ..	J. Bilton ..	New Zealand Shipping Co. Ltd.
<i>Huntingdon</i> ..	T. F. J. Alderman, R.D. ..	A. Duncan ..	B. H. Varrall ..	Federal Line
<i>Ionic</i> ..	R. G. E. Grant ..	A. P. W. Peacock ..	L. D. Waterhouse ..	Shaw Savill Line
<i>Iron Age</i> ..	G. Black, O.B.E. ..	R. Wood ..	D. N. Austin ..	Common Bros. Ltd.
<i>Ixion</i> ..	F. N. Fisher ..	R. H. Smith ..	E. O. Roberts ..	A. Holt & Co.
<i>Jamaica Producer</i> ..	T. A. Kidd ..	R. W. Warwick ..	D. W. James ..	Jamaica Banana Producers S.S. Co. Ltd.
<i>Jason</i> ..	H. S. Clarke, M.B.E., D.S.C. ..	H. P. Simmons ..	D. McQueen ..	A. Holt & Co.
<i>John Biscoe</i> ..	T. Woodfield ..	A. D. B. Joubert ..	A. Quin ..	British Antarctic Survey
<i>Laksa</i> ..	J. W. Ross ..	J. S. Clapperton ..	A. Hamill ..	Chr. Salvesen & Co. Ltd.
<i>Laurentia</i> ..	T. S. Graham ..	F. C. Nicol ..	A. Hogg ..	Donaldson Line
<i>Mabel Warwick</i> ..	N. Oddy ..	D. M. C. Allan ..	A. E. Fell ..	Houlder Line
<i>Mahanada</i> ..	P. A. Gunson ..	A. D. Marsh ..	F. R. Fallon ..	Brocklebank Line
<i>Manchester Freighter</i> ..	J. Hogg ..	G. A. Mackay ..	P. D. V. Cummins ..	Manchester Liners
<i>Manchester Miller</i> ..	E. W. Espley ..	R. P. Graham ..	E. Heywood ..	Manchester Liners
<i>Middlesex</i> ..	D. E. Moran ..	R. Longworth ..	R. F. McMannamon ..	Federal Line
<i>Montreal City</i> ..	E. V. Mace ..	G. R. Chawner ..	I. Humphreys ..	Bristol City Line
<i>Neleus</i> ..	D. K. Dunlop, R.D. ..	P. J. Morgan ..	J. Nolan ..	A. Holt & Co.
<i>New York City</i> ..	F. W. Harris ..	D. G. H. Smith ..	J. Moody ..	Bristol City Line
<i>Northella</i> ..	C. H. G. Drever ..	L. Fewster** ..	J. A. McCarroll ..	J. Marr & Son Ltd.
<i>Northumberland</i> ..	S. W. Lambrick ..	E. M. Smith ..	B. L. Cullimore ..	Federal Line
<i>Orsova</i> ..	W. N. Eade, R.D. ..	W. J. Thompson ..	H. R. Burch ..	P. & O. Orient Line
<i>Otaki</i> ..	M. J. Heron ..	K. M. Lingard ..	R. G. Heath ..	New Zealand Shipping Co. Ltd.
<i>Otra</i> ..	W. G. Ross ..	J. W. T. Low ..	J. V. Walgate* ..	Chr. Salvesen & Co. Ltd.
<i>Pacific Envoy</i> ..	H. J. Pine ..	C. E. Nicholls ..	I. L. Whyte ..	Furness Lines
<i>Pacific Northwest</i> ..	T. F. J. Leddra ..	P. E. Hammond ..	S. Walker ..	Furness Lines
<i>Papanui</i> ..	J. M. Burn ..	G. B. Johnson ..	D. C. B. Hepburn ..	New Zealand Shipping Co. Ltd.
<i>Paparoa</i> ..	J. R. G. Hannah ..	I. S. Roberts ..	J. W. J. Hollands ..	New Zealand Shipping Co. Ltd.
<i>Pegu</i> ..	F. Welles ..	D. M. Lucey ..	J. H. Brown ..	Henderson Line
<i>Port Auckland</i> ..	R. A. Wight ..	J. G. Hopkin ..	C. Jones ..	Port Line
<i>Port Nicholson</i> ..	F. J. Lavers ..	J. D. Farrar ..	P. E. Hornby ..	Port Line

<i>Port Pirie</i>	E. W. Dingle, M.B.E.	M. C. Pilgrim	M. Worthington	Port Line
<i>Port Sydney</i>	L. J. Skales	J. W. Martin	L. V. O'Sullivan	Port Line
<i>Port Vindex</i>	C. J. H. Gorley	C. G. W. Hunter	J. McMillan	Port Line
<i>Port Wyndham</i>	A. L. Smith	T. J. Balfour	C. J. A. Jones	Port Line
<i>Rakata</i>	F. S. Angus	W. J. N. Drummond	G. Summers	New Zealand Shipping Co. Ltd.
<i>Rangitane</i>	D. M. Chadwick	R. K. Young	L. Whittington	New Zealand Shipping Co. Ltd.
<i>Rangitoto</i>	L. W. Fulcher	M. W. Williams	W. F. Shepherd	New Zealand Shipping Co. Ltd.
<i>Ripon</i>	J. Parsloe	G. Hopkins	I. Mackenzie	Bolton S.S. Co. Ltd.
<i>Sagamore</i>	W. F. Swann	M. J. Hindmarch	R. A. Wilson	Furness Lines
<i>St. Giles</i>	J. Humphrey	G. Argumont**	K. C. Stone	T. Hamling & Co. Ltd.
<i>Salaverry</i>	D. J. Houghton	A. W. Hepburn	W. Stone	Pacific S.N. Co. Ltd.
<i>Sidonia</i>	A. J. F. Colquhoun, M.B.E.	R. Langmuir	R. Smith	Anchor Line
<i>Somerset</i>	I. Y. Batley	V. B. Anderson	S. Adams	Federal Line
<i>Southern Cross</i>	L. J. Hopkins	V. J. Williams	A. S. Higginbottom	Shaw Savill Line
<i>Stella Leonis</i>	R. Waller	M. Redfern R.N.R.**	R. R. N. Laing	Charleston Smith Trawlers Ltd.
<i>Suevic</i>	H. H. Falkner	P. E. Storey	W. Williams	Shaw Savill Line
<i>Suffolk</i>	H. J. D. Sladen	P. G. Wright	M. Moore	Federal Line
<i>Tidecrest</i>	F. J. Anderson	R. J. L. Thorn	M. N. Blythe	Ivanovic & Co. Ltd.
<i>Tolsta</i>	W. P. Watt	A. B. Gibson	C. Begg	Chr. Salvesen & Co. Ltd.
<i>Trebartha</i>	G. Joslin	L. E. Quigley	G. G. Sefton	Hain-Nourse Ltd.
<i>Tremayne</i>	J. R. Darby	G. B. Baxter	J. Ryan	Hain-Nourse Ltd.
<i>Tremeadow</i>	J. Murray	M. J. Ball	J. P. McMahan	Hain-Nourse Ltd.
<i>Treneglos</i>	S. O. Watkins	C. J. Double	A. R. Wate	Hain-Nourse Ltd.
<i>Truro</i>	J. K. Marrow, M.B.E.	J. M. Jarratt	M. J. Doyle	Ellerman's Wilson Line
<i>Turkistan</i>	W. D. H. Marker	J. S. Catlow	J. Vaughan	F. C. Strick Line
<i>Uganda</i>	J. D. Hamilton	K. W. V. Yeomans	H. H. Lyon	British India S.N. Co. Ltd.
<i>Welsh City</i>	D. Beynon	R. K. Stuart	B. Williams	Sir Wm. Reardon Smith & Sons
<i>Willowpool</i>	F. D. Lloyd	T. F. Jones	W. K. H. Limpett	Sir R. Ropner & Son Ltd.
<i>Yorkshire</i>	T. Cooper, D.S.C.	C. R. Tiller	J. Monaghan	Bibby Line
'MARID' SHIPS†				
<i>Fulham X</i>	D. Battle	J. Young	G. Brow	Central Electricity Generating Board
<i>Heron</i>	G. C. Longfield, M.B.E.	I. A. Leggat	P. Kailofer*	General S.N. Co. Ltd.
<i>Lord Tedder</i>	J. Russel	H. G. Pack***	J. Brickwood	Hellyer Bros. Ltd.
<i>Selby</i>	J. D. Griffith	R. A. Mulronev	J. McBurney*	British Railways Board

* Deck Officer ** Relief Skipper † Vessels observing and transmitting sea temperatures only

TRAWLERS

SKIPPER	WIRELESS OPERATOR	TRAWLER OWNERS
W. Fry	W. J. Teare	Kingston Steam Trawling Co.
H. Hall	G. V. Lane	Northern Trawlers
G. Atherton	—	Ross Trawlers Ltd.
B. Lee	—	Hellyer Bros. Ltd.
—	J. D. Lester	Ross Trawlers Ltd
—	E. Smith	Ross Trawlers Ltd.

and send us regular radio weather messages are listed above together with the Awards which are being made to the four 'Marid' ships (short sea traders taking sea temperatures only).

The recipients of the Awards will, as in past years, be individually notified by letter and asked for an address to which they would like us to send it, but it is quite likely that an officer will see his name in the Excellent Award List in this journal long before he receives the official notification; if this happens, we would be glad if such officer would write to us, claiming the award and giving us a forwarding address for it.

The most popular Award still seems to be a world atlas and we endeavour to send one to any officer whose name appears in the list for the first time. But if for any reason he would rather have one of the alternatives, *Cassell's English Dictionary* or *Abyss*, a book about the deep sea and the creatures that live in it, we would be glad to meet his request if possible.

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.

It sometimes happens that we are unable to offer an explanation for phenomena reported. In such cases we shall be very glad to hear from any reader who can put forward an authoritative or a possible explanation, which could be published in this journal. We should also be glad to hear from any reader who has witnessed a similar phenomenon in the past, but which has not previously been communicated to us.

HURRICANE 'ANNA'

North Atlantic Ocean

s.s. *Kenuta*. Commodore D. Idris Jones, D.S.C., R.D. Bermuda to Liverpool. Observers, the Master and Mr. P. C. Barmby, 3rd Officer.

24th August 1965.

GMT

1200: Wind increased from force 5 to 7 (from ESE). Rain squalls which had been in the vicinity for the past 4-6 hours became more frequent.

1241: First report received about Hurricane 'Anna', putting it about 120 miles astern of the vessel and moving towards NE.

1400: Bar. began to fall rapidly and wind force 9. Confused swell.

1430: Position of vessel: $41^{\circ} 49' N$, $48^{\circ} 18' W$.

1800: Bar. 1007.0 mb, falling rapidly. Wind SE's, force 10. Continuous heavy rain squalls.

1930: Winds now of force 11-12. Visibility seriously affected by rain and spray.

2230: Wind E'N, force 12.

2250: Wind suddenly changed to w's, force 12, and bar. began to rise rapidly.

25th

0000: Position of vessel: $42^{\circ} 36' N$, $45^{\circ} 18' W$. Bar. 991.8 mb. Wind now NW, force 11. Heavy rain. Confused sea. Waves over 30 ft in height.

0030: Wind force 10.

0230: Wind moderated to force 8.

0600: Bar. 1009.1 mb. Wind w, force 7.

0630: Wind force 6. Continuous heavy rain.

It was estimated that the centre of the hurricane passed about 30 miles astern of the vessel at 2250 GMT on the 24th.

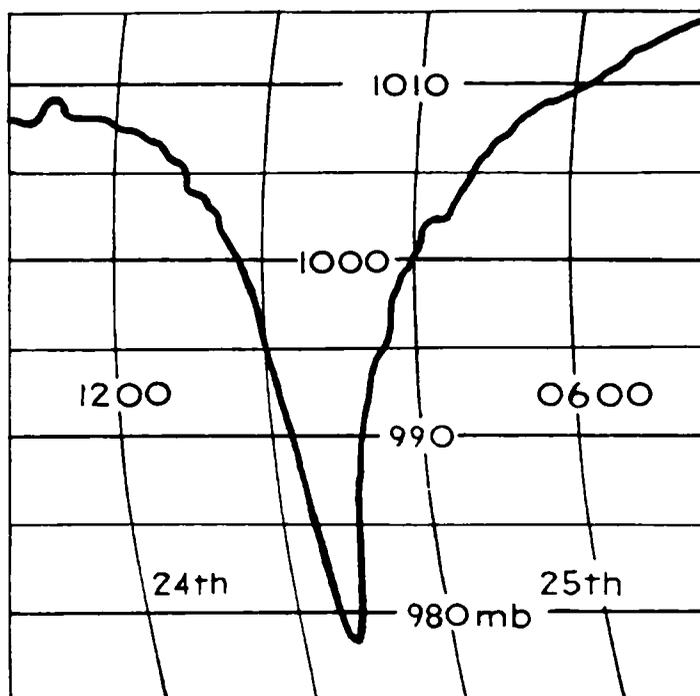


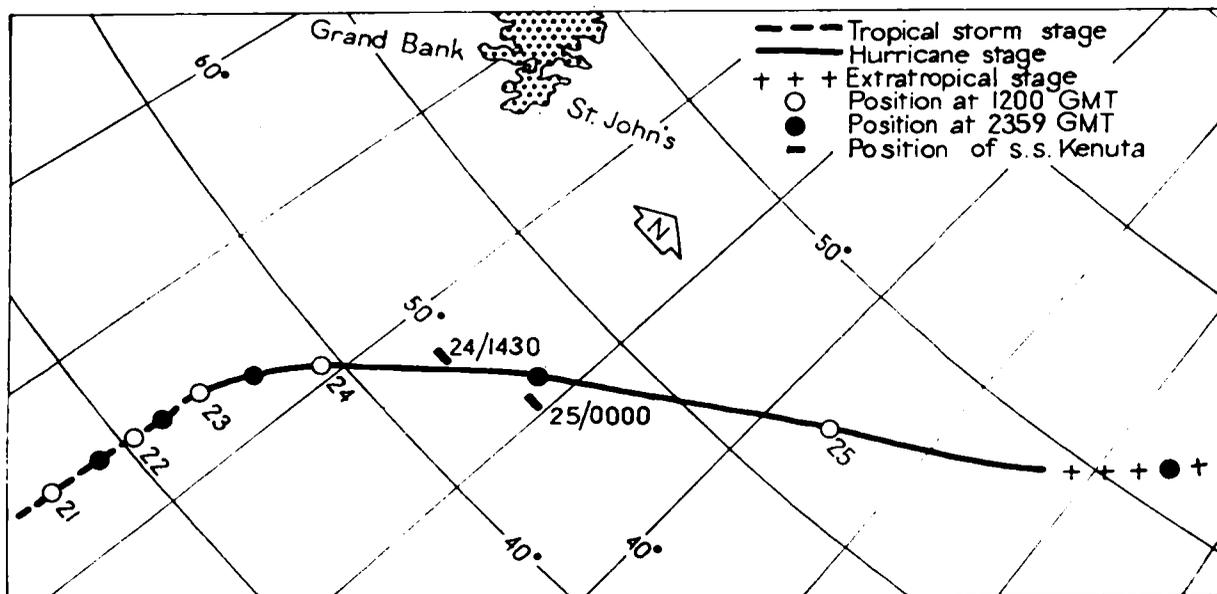
Chart set at SMT

Remarks by the Master: (All times GMT—2½ hours).

The first intimation we had of this hurricane was at 1000 SMT. It was then about 130 miles SW of our position. We were steering 060° and at noon SMT I altered course to 075° to cross its path and in the hope that it would continue as indicated in either a NNE or NE direction. The wind was mainly from 4 to 6 points on the starboard bow

with a high, long and confused swell mainly from a sw direction. I estimated that the centre would pass close astern between 2130 and 2230 SMT. From 1600–2000 the wind must have increased to at least 70 kt. The ship handled magnificently, maintaining her course during the whole period and only shipping the occasional sea. At 2130 the wind and sea veered to sw and we continued with wind, sea and swell on the starboard quarter: later these veered to astern.

It is quite a coincidence that I should start my career as an officer (3rd Officer *Bisley* Gulf Port–Gulf of Mexico) with a hurricane in September 1925: and now Anna on my last voyage. This is really coming in under someone's wing and going out on a prayer.



Note. This observation was forwarded to the U.S. Weather Bureau whose comments were as follows:

“We appreciate the information from the s.s. *Kemuta* since detailed reports on this unique storm are scarce.

“Tropical storm Anna was located about 825 miles north-east of Bermuda at 1600 GMT on 23rd August 1965 on the basis of weather reports from the U.S.N. aircraft carrier *Randolph*. It was a small storm with initial winds of 55–60 m.p.h. in a small area around the centre and with gales out to about 75 miles. Anna was unique in that it reached hurricane intensity further north than any other previous tropical storm on record.

“The storm moved on a north-easterly course with a progressive increase in forward speed from the initial 6 m.p.h. to about 44 m.p.h. when it crossed the meridian of 35°W at 1600 GMT on 25th August.

“The winds reached hurricane force at 1600 on 24th August when the storm was centred about 440 miles south-east of Cape Race, Newfoundland. Ships reported winds of 85–90 m.p.h. over a small area near the centre and gales out to 150 miles in all directions. Hurricane Anna was of the same intensity when it crossed the meridian of 35°W.”

Note 2. It seems appropriate to mention here that once again it was a ship's observation which gave the first warning of a tropical storm.

TYPHOON 'FREDA'

South China Sea

m.v. *Glenmoor*. Captain F. Lamb. Hong Kong to Queensland. Observers, Mr. G. W. Richardson, 3rd Officer.

14th July 1965.

GMT

0000: Wind NW, force 7 and increasing. Vis. 10 miles or over. Air temp. 83°F. Waves about 10 ft high.

- 0110: Heavy rain began and visibility dropped to $1\frac{1}{2}$ miles.
 0300: Wind NW, force 9. Very heavy rain reducing visibility to about 50 yd. Seas estimated to be 25 ft. NE swell, period 8 sec. Height about 15 ft.
 0400: Wind WNW, force 10-11. Torrential rain with visibility almost nil.
 0500-0700: Wind W, force 12. Swell still from NE. Sea less high believed due to the torrential rain. Air temp. fell between 0400 and 0500 from 83° to 76° . The lowest pressure reading was 985.4 mb at 0600.
 0900: Wind WSW, force 10. Visibility improved slightly. Air temp. now 78° .
 0900-1500: Wind backing steadily towards S'W and decreasing to force 7. Sea 13 ft. Confused swell, mainly from SW.
 Position of ship at 0600 GMT: $18^{\circ} 12' N$, $114^{\circ} 12' E$.

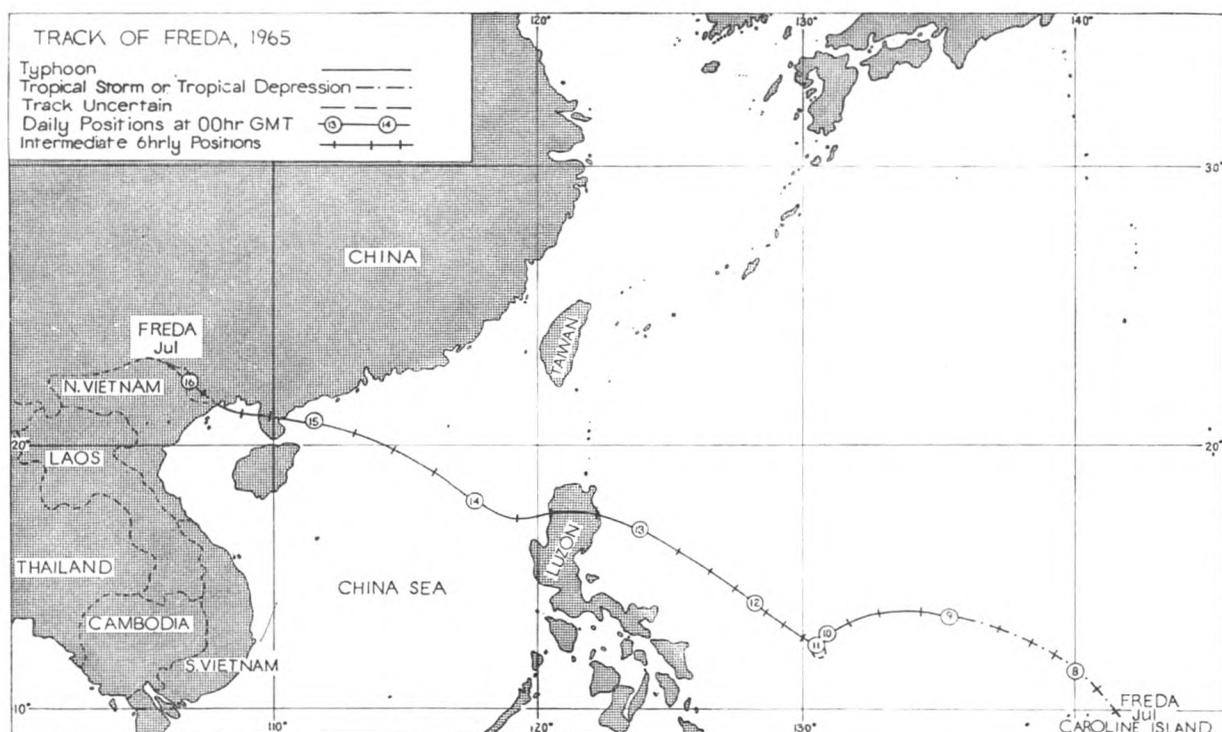


Fig. 2. Track of typhoon 'Freda'.

Note. This observation was forwarded to the Director of the Royal Observatory, Hong Kong, whose comment is as follows:

"Freda was first located on 6th July as a tropical depression near the Caroline Islands. It followed a somewhat erratic course north westwards, intensifying to become a typhoon on 9th July. American reconnaissance aircraft, based on Guam, made three or four eye fixes each day and were the main source of information about the early progress of the storm. By international agreement, the Royal Observatory in Hong Kong started issuing warnings every six hours as soon as the centre passed west of longitude $125^{\circ} E$. The typhoon crossed Luzon on 13th July causing winds of 56 kt at Casiguran and then moved into the China Sea.

"At this stage, the typhoon posed a definite threat to Hong Kong and although reconnaissance aircraft continued to provide eye fix reports it was vital to know as soon as possible whether or not the storm had weakened while crossing Luzon and also to estimate the extent of the gale area. A message was broadcast to all ships in the China Sea asking for special 3-hourly weather reports. Many ships responded to this request and in particular, the weather reports from the *Glenmoor*, the *Yamatama Maru* and from Prates Island were received every three hours during 14th July and as these three observations bracketed the storm all that day, it was possible to issue reliable warnings every three hours.

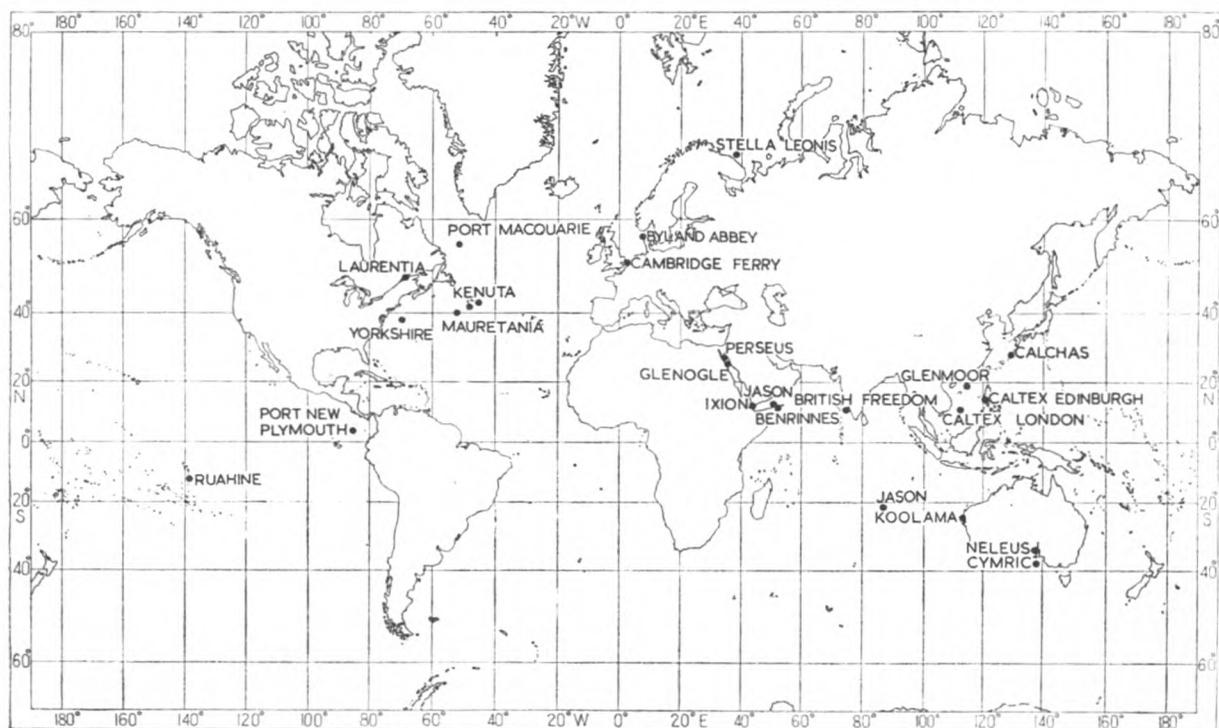
"At 0001 GMT the *Yamatama Maru* reported a wind of 58 kt and at 0600 GMT the *Glenmoor* reported 64 kt. These reports confirmed that Freda was a fully fledged typhoon. Special statements were prepared for local broadcasts in Hong Kong and storm signals were hoisted as a warning to local shipping. Many junks and sampans promptly took shelter in special typhoon anchorages. At 0855 GMT a reconnaissance aircraft reported that the storm was

centred at 19.3°N, 115.3°E, and that the eye was 15 miles in diameter and was open to the south. The pilot estimated that the maximum winds were 95 kt in the NE quadrant about 10 miles from the centre. The minimum sea level pressure was estimated to be 965 mb. Fig. 1, opposite p. 129, shows the weather chart for 0600 GMT on 14th July and Fig. 2, on p. 113, shows the track of typhoon Freda.

“Microseisms, recorded on the Observatory’s seismometers, increased to about five times their normal amplitude during the approach of typhoon Freda. Although they give no indication of the whereabouts of the centre, microseism amplitudes have been measured for a large number of previous storms and they can be related to the distance and intensity of the storm centre.

“Typhoon Freda passed about 135 miles s of Hong Kong and although there were a large number of echoes on the Observatory’s 3 cm radar, the eye could not be identified due to the attenuation caused by heavy rain. There were gales in exposed parts of the colony with maximum gusts of 80 kt at Tate’s Cairn, 71 kt at Waglan Island and 61 kt at the Observatory. Although two people were killed and cross harbour services were disrupted, damage in Hong Kong was generally slight, only one junk was reported sunk and three acres of low-lying land were flooded with sea water.

“Typhoon Freda continued to move WNW at 15 kt and crossed the China coast about 240 miles wsw of Hong Kong on 15th July. The centre must have passed very close to Weichow (Guie-chau on some Admiralty charts) Island in the Gulf of Tonkin, where sustained hurricane force winds and a pressure of 974 mb were reported. After crossing the coast the storm weakened rapidly over land but widespread rain persisted over sw China.”



Position of ships whose reports appear in “The Marine Observers’ Log”.

HURRICANE 'BETSY'

North Atlantic Ocean

m. v. *Yorkshire*. Captain T. Cooper, D.S.C. Quebec to Pensacola

DATE	TIME GMT	POSITION, COURSE AND SPEED	WIND DIRECTION FORCE	PRESSURE MB	AIR TEMP. °F	CLOUD	SEA STATE	POSITION OF BETSY AND REMARKS
5th Sept.	2330	Star position 37° 52'N 70° 09'W 221° 16.7 kt 221° 14.0 kt						2200. Betsy stationary in 28° 42'N, 75° 24'W.
	1000		NE'E 3	1020.6	74	Cumulus (fair weather) 1/8 Cumulus 3/8	Swell from s'w	1000 Betsy 27° 00'N, 76° 00'W. At 1030 Betsy reported moving SW'ly at 8.0 kt.
	1230		NE'E 4	1021.3	79		Short moderate swell s'w	1300 Betsy 26° 42'N, 76° 30'W, moving SW at 8 kt. First indication of Cirrus cloud.
7th Sept.	2000	221° 16.5 kt	NE 5	1019.7	79	Medium or towering cumulus, altocumulus, cirrus in filaments	Moderate sea, moderate swell	
	0430		ENE 5	1016.5	77	Small cumulus (fair weather) 2/8	Moderate sea and swell SW'ly	Vessel rolling heavily at times.
	0900		ENE 6	1012.7	78	Stratocumulus from spreading out of cumulus 6/8	Rough sea, moderate swell	0815 Sea and swell increasing wind freshening, fall of 3 mb—limit of diurnal range.
	1030	Star position 30° 48'N 77° 33'W 222° 17.3 kt						1000 Betsy 25° 15'N, 17° 15'W.
8th Sept.	1120		NE 6	1013.0	77	Cirrus 6/8	Rough sea, moderate swell	1120 Precipitation north distance 8 miles. A rain squall approached from E'N and came to within 3 miles of ship, it appeared to increase in intensity as it proceeded W'S. To NW of vessel, clouds began to disperse and cirrus, hook shaped, invaded the sky to NW followed by scud.
	2300	Hove to	ENE 8	1009.4	80	Towering cumulus	Rough sea, heavy swell	Vessel rolling and pitching heavily. 2200 Betsy 25° 12'N, 78° 24'W 120 miles ESE of Miami. Vessel encountering rain squalls moving slowly SW, low cloud moving SW.
	0500	Hove to	ENE 7	1009.9	79	Cumulus and alto-cumulus from spreading out of cumulus 6/8	Rough sea, heavy swell	0500 Betsy 25° 12'N, 79° 00'W.
9th Sept.	1500	225° 12 kt	E'N 6	1010.9	81	Cumulus, altocumulus and dense cirrus 7/8	Moderate-rough sea, heavy swell	1500 Betsy 25° 6'N, 81° 18'W.
	0100	175° 11 kt	ESE 6	1010.1	81	Cumulus 7/8	Moderate-rough sea, heavy swell	Lenticular shaped forms of cumulus visible, stretching from a direction SW of ship.

Note. This is a small selection of the many observations made and reported during this period. The full narrative was sent to the U.S. Weather Bureau and a short article on Hurricane Betsy appears on page 132.

VIOLENT STORM

Manila Bay

s.s. *Caltex Edinburgh*. Captain B. James. At anchor. Observers, the Master and all deck officers.

23rd August 1965. At 0630 GMT a storm of exceptional violence, which caused considerable flooding in the Manila area, passed over the vessel. The wind, which was light NW'ly at first, quickly rose to gale force from NE. There was lightning which was uncomfortably near and continuous deafening thunder, accompanied by a wind of force 9-10 at least. Driving rain reduced the visibility so much that the forecastle was barely discernible. The wind remained on the starboard beam while swinging the vessel from a 305° heading, through N, E and S to 280°, when the anchor was weighed and the vessel proceeded to sea. Because of the storm's violence no temperature readings were taken.

Position of ship: 14° 24'N, 120° 56'E.

Note. The synoptic charts issued by the Japan Meteorological Agency, Tokyo, reveal no special meteorological features which could account for the violent storm. Over a wide area the pressure gradient was slack and winds were mainly light from a general N'ly direction. At noon the air temp. was 77°F and the relative humidity high. It seems probable that the storm was due to the development of very large Cb clouds, by the forced ascent of the unstable humid air over the neighbouring high ground.

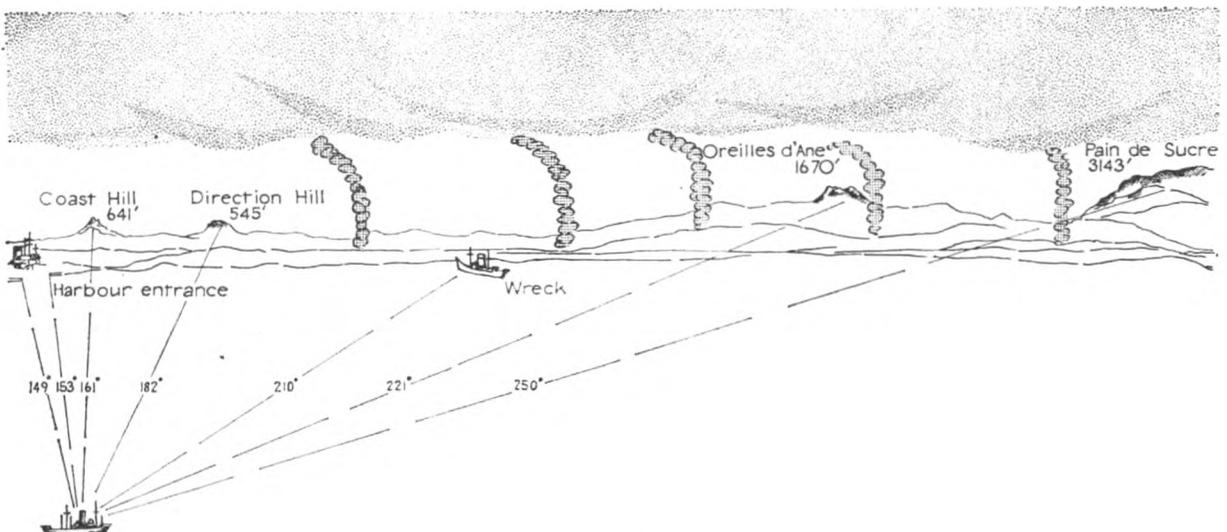
SAND DEVILS

off Djibouti

s.s. *Ixion*. Captain F. N. Fisher. At anchor. Observers, Officer Cadet D. L. Jones and all officers.

16th August 1965. Numerous small whirlwinds were seen occurring most of the day, but they became more pronounced in the afternoon. They appeared to move along with the wind in the valley approx. 2 miles inland, remaining upright for about a mile as they moved, then bending and breaking up near the base of the low fair weather Cu cloud. Their colouring was a reddish brown. In the late afternoon, probably due to storm clouds coming in from the sw, the area embracing Coast Hill and Direction Hill experienced a large dust storm which obscured the land. The general impression of these sand devils is shown in the accompanying sketch. Air temp. 97°F, wet bulb 80°, sea 86°. Wind w'ly, force 3.

Position of ship: 11° 37'N, 43° 07'E.



Note. The synoptic chart for 1200 GMT, issued by the United Arab Republic, shows that a trough of low pressure extended ssw'wards from a low centre lying to the east of Mecca. The wind at Djibouti was NW'ly, force 3, while that in the Aden area was SE'ly, force 3. In the circumstances local circulations had developed, at times taking the form of dust devils. These would tend to increase during the afternoon as the temperature rose.

LIGHTNING

Eastern Pacific Ocean

m.v. *Port New Plymouth*.

12th July 1965. Thunder and lightning accompanied by heavy rain had been occurring at intervals since 0300 GMT. At 1005 the vessel entered extremely heavy rain and 15 min later it appears to have been struck by lightning, there being a tremendous clap of thunder simultaneous with the flash. The foremast and cross-trees were outlined with a bluish white light, which also encircled No. 2 hatch topping-lifts. This condition lasted about 5 sec during which time an alarming sizzling noise was clearly audible in the wheel house, the whole phenomenon being quite frightening. After this incident the ship continued to pass through heavy rain showers, and sheet lightning was seen in the west until dawn at 1130. Neither the magnetic compass nor the chronometer appeared to be affected by the lightning. Air temp. 77°F, dewpoint 73°, sea 78°. Wind SSE, force 4.

Position of ship: 2° 50'N, 84° 33'W.

Note. We are pleased to print the report of this incident from m.v. *Port New Plymouth*, which is an Australian Selected Ship.

WATERSPOUTS

North Atlantic Ocean

R.M.S. *Mauretania*. Captain W. E. Warwick, R.D. New York to Lisbon. Observers, Mr. P. Jackson, Senior 1st Officer and Mr. G. R. Yeatman, Junior 3rd Officer.

31st August 1965. A well defined waterspout was sighted at 1300 GMT, 5 miles off on the starboard beam. It formed very rapidly as part of a Cb cloud base dipped downwards towards the sea. The sky over all had the 'greasy' appearance associated with As cloud. The usual agitation of the sea surface took place and heavy spray carried aloft to a height of about 100 ft could be seen in the vicinity of the disturbed water. Through binoculars the column could be seen revolving in a counter-clockwise direction, the total height, by sextant angle, being 1600 ft. After 8 min the base of the 'tube' moved rapidly to the westward and a well defined bend appeared at about 500 ft. Two minutes later the whole spout disintegrated and the dark funnel quickly retracted to the cloud base.

During the night which followed, the ship passed through very severe electrical storms, the thunder and lightning lasting till morning, with periods of torrential rain. The wind was very erratic, suddenly increasing to force 6 from various directions, and minutes later falling to flat calm, then each time returning to SE, force 3. Air temp. 74°F, wet bulb 69°, sea 79°.

Position of ship: 39° 40'N, 52° 20'W

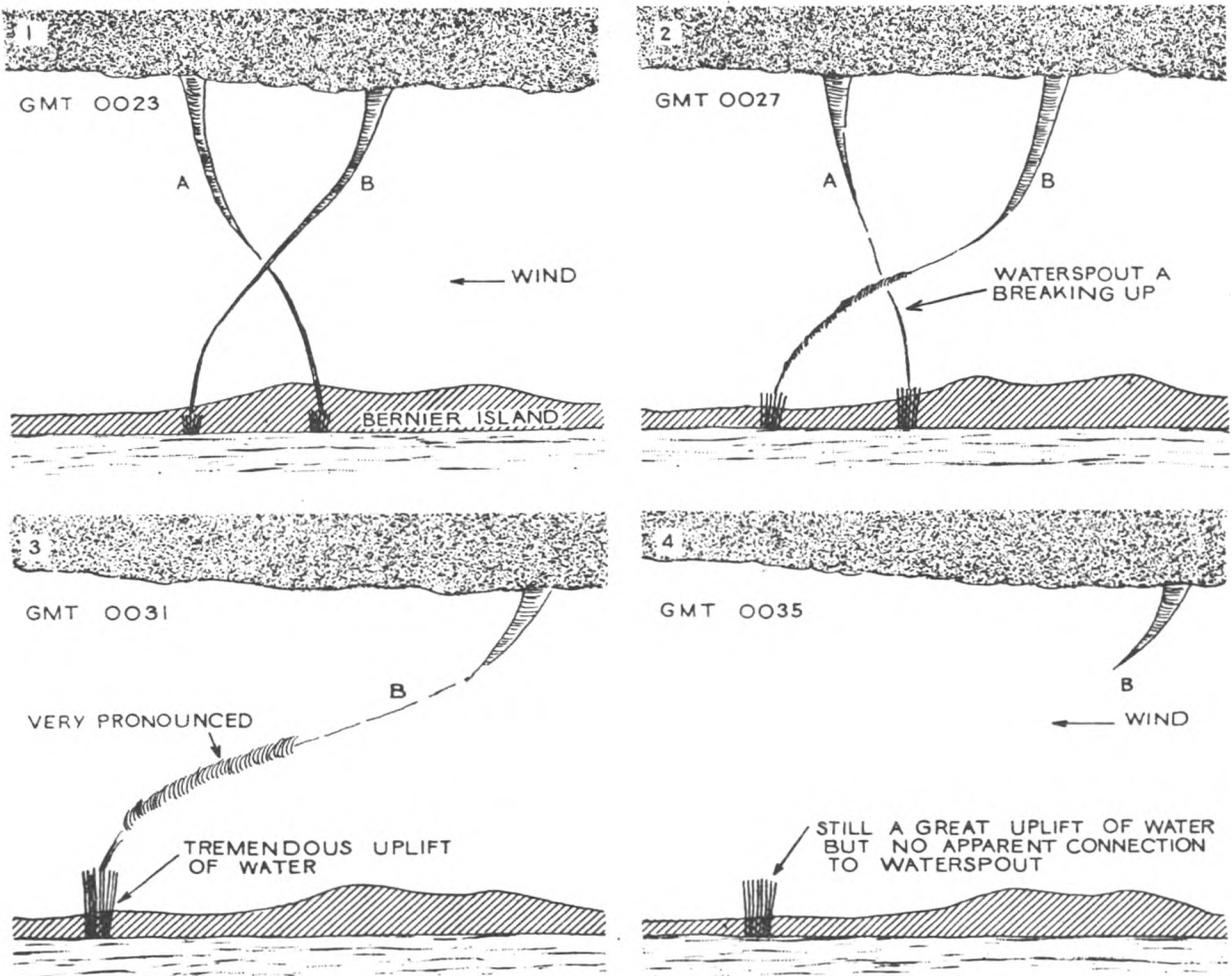
Note. In the case of the waterspout observed on 31st August by R.M.S. *Mauretania*, the vessel was very close to a slow-moving front associated with a large shallow depression. Considerable instability can be expected in such a situation. See *Note* to observation by *Cambridge Ferry*.

off Western Australia

m.v. *Koolama*. Captain R. E. Marsh. Geraldton to Onslow. Observers, the Master and Mr. J. D. Cranswick, 3rd Officer.

3rd July 1965. The two waterspouts shown in the sketches were first seen at 0023 GMT (0823 SMT) at a distance of 8 miles from the ship, checked by radar. They appeared to move in opposite directions, spout A disintegrating within 5 min, while B lengthened a good deal. The disturbance at the base of the column increased and the water was carried up to a considerable height, very pronounced spiralling being seen, but there was little sign of this between the top of the disturbed water and the end of the column at the cloud base. A few minutes later the column disintegrated to a large extent but the area of turbulence at the surface persisted for a short time. Air temp. 66°F, sea 75°. Wind sw's, force 3.

Position of ship: 24° 54'S, 113° 03'E.



North Sea

m.v. *Cambridge Ferry*. Captain J. Tully. Harwich to Zeebrugge. Observer, Mr. D. B. Goswell, 2nd Officer.

6th September 1965. Three waterspouts were seen within three miles of the vessel between 0750 and 0850 GMT. They were associated with a heavy Cb cloud which was near the North Hinder light. One of the spouts was passed at a distance of about a mile on the starboard bow, close enough to observe the brisk anti-clockwise rotation of the disturbed sea surface.

Some thunder and lightning occurred and this was followed by a heavy rain and hail squall lasting about 10 min. The wind was NNE, force 2, increasing to force 4.

Position of ship: 51° 35'N, 2° 33'E.

Note. The formation of a waterspout is visual evidence that the air in the region is highly unstable at the time. The weather charts of the 5th and 6th September show that a shallow, slow-moving depression covered the North Sea, the air in the system having been drawn-in from the Arctic regions. In such circumstances the temperature of the air falls rapidly with increasing height above the surface, and when this occurs in conjunction with a plentiful supply of moisture, thunderstorms are likely, and in certain cases waterspouts may form.

UNUSUAL VISIBILITY

Red Sea

s.s. *Perseus*. Captain S. C. Llewellyn. Aden to Suez. Observer, Mr. D. V. Custance, 4th Officer.

27th September 1965. At 1947 SMT the Brothers Light ($26^{\circ} 19'N$, $34^{\circ} 51'E$) was seen at a distance of 30 miles: the normal distance at which it should be visible for a height of eye of 51 ft is 21 miles. Air temp. $84.5^{\circ}F$, wet bulb 74.0° , sea 80.8° .

A short time later at 2205 SMT the Ashrafi Reef Lt. ($27^{\circ} 47'N$, $33^{\circ} 42'E$) was seen at 38 miles instead of the normal distance of 21 miles. Ships were visible when 25 miles away. Air temp. $83.9^{\circ}F$, wet bulb 73.6° , sea 80.5° . Wind NNW'ly, 5 kt. Visibility excellent. Little or no cloud.

Position of ship at 1800 GMT: $27^{\circ} 06'N$, $34^{\circ} 24'E$.

Note. The reason for the unusual visibility reported would appear to lie in the fact that the sea was colder than the overlying air. See *Note* to observation by m.v. *Calchas*.

East China Sea

m.v. *Calchas*. Captain D. H. Stewart. Kobe to Hong Kong. Observers, the Master and all deck officers.

18th July 1965. At 0300 GMT, Iheya Shima (960 ft) was sighted at a distance of 81 miles, the position being ascertained by bearings of nearer islands. It remained in sight until 0415 when it became indistinguishable from the horizon, which was razor-sharp. The normal distance would be 43 miles. Air temp. $84.5^{\circ}F$, wet bulb 77.0° , sea 82.0° .

Position of ship: $28^{\circ} 23'N$, $128^{\circ} 22'E$.

Note. The synoptic charts issued by the Japan Meteorological Agency show a slack pressure gradient and light winds over a wide area. Unstable air was indicated by the presence of Cu and Cb clouds, this would tend to carry any atmospheric impurity away from the surface. The fact that the sea was colder than the air above it would increase the range at which distant objects could be seen, by bending the light rays to conform to the curvature of the earth.

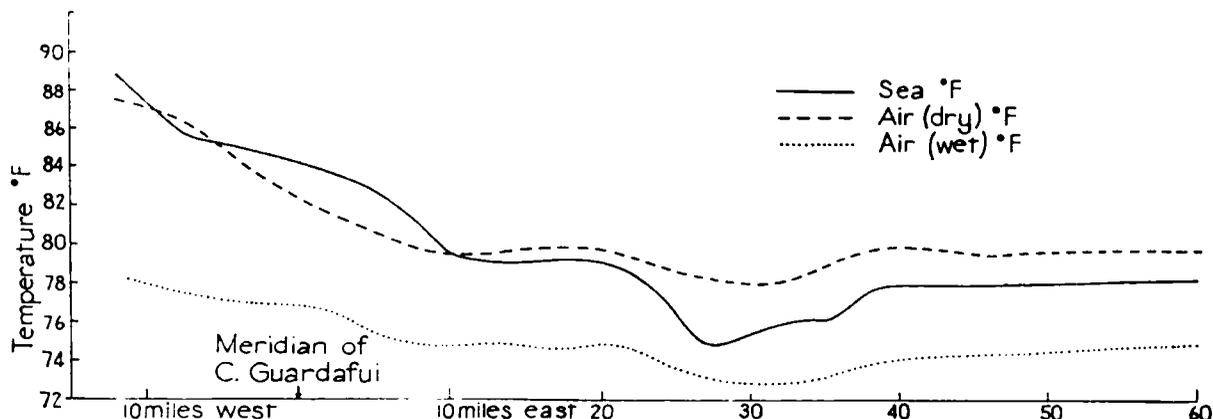
AIR AND SEA TEMPERATURE VARIATIONS

Vicinity of Cape Guardafui

s.s. *Benrinnes*. Captain R. Griffiths. Suez to Singapore. Observer, Mr. A. Clish, 2nd Officer.

11th September 1965. Between 1045 and 1615 SMT, readings of air and sea temperatures were taken at 15 min intervals. The vessel passed 11 miles to the North of Cape Guardafui at 1130, a course of 100° being made good throughout the period of observations. The lowest sea temperature observed was $74.8^{\circ}F$ at 1325 when the vessel was $27\frac{1}{2}$ miles east of Guardafui. At 0930 the wind was w'ly, force 1; at 1530 it was s'w, force 6. The sea changed from calm to rough with waves about 14 ft in height. Throughout the period the sky was cloudless. The results of the observations are shown in the accompanying graphs.

Position of ship at 1200 GMT (1530 SMT): $11^{\circ} 54'N$, $52^{\circ} 18'E$.



Note. This is an interesting series of readings and we are grateful to Mr. Clish for providing them. The reasons for the fluctuations in sea temperature in the vicinity of Cape Guardafui are fully discussed in a paper by G. A. Tunnell, in *The Marine Observer* for October 1963.

DISTURBED WATER

Indian Ocean

s.s. *Jason*. Captain H. S. Clarke. Albany to Aden. Observer, Mr. H. P. Simmons, 4th Officer.

6th September 1965. Heavy turbulence was observed in the water in a line lying $060^{\circ}/240^{\circ}$ and extending as far as the eye could see in both directions. On the NW side of the line, there was an obvious upsurging of the water from below. To the SE of the line the sea temperature was 67.2°F , the value rising to 69.9° as the turbulent area was crossed. There was no noticeable change in the colour of the water. Wind S'E, force 5. Sea moderate from SSE with moderate swell from the S.

Position of ship: $21^{\circ} 51'S$, $86^{\circ} 20'E$.

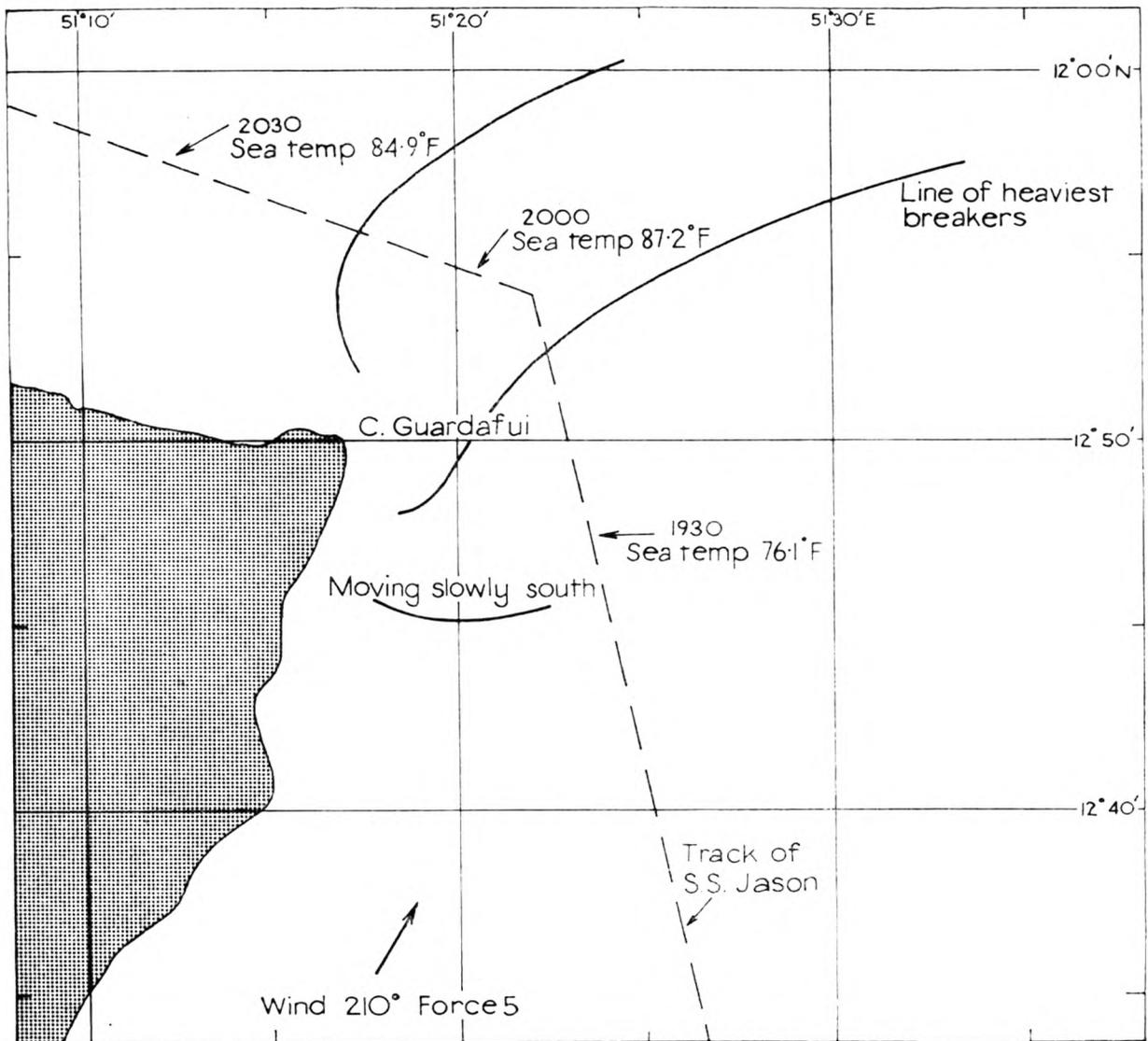
CURRENT RIPS: SEA TEMPERATURE VARIATIONS

off Cape Guardafui

s.s. *Jason*. Captain H. S. Clarke. Albany to Aden. Observer, Mr. H. P. Simmons, 4th Officer.

11th September 1965. At 1800 GMT when the vessel was some 10 miles south of Guardafui three lines of what proved to be heavy breaking seas were observed on the radar, as shown in the sketch. The most southern line appeared to be moving southward while the other two were stationary. At this time the sea temperature was 76.9°F : by 1930 it had fallen to 76.1° . On passing through the second line of breakers the sea temperature rose in a matter of seconds to 87.2° , remaining steady until the vessel passed through the last line of breakers at 2030, when the reading fell to 84.9° . The wind was SW's, force 5, moderating to force 4 by 2030. There was a short 8 ft swell from the SW and moderate seas.

Position of vessel at 1800: $11^{\circ} 18'N$, $51^{\circ} 30'E$.



DISCOLOURED WATER

North Sea

m.v. *Byland Abbey*. Captain H. Boyes. Copenhagen to Goole. Observers, the Master, Mr. F. W. Cooper, Chief Officer, Mr. G. Calem, 2nd Officer and Mr. J. Hewetson, 3rd Officer.

23rd July 1965. Red streaks on the water were seen in the western part of the Skagerrak, and samples taken. On close observation they seemed to consist of microscopic marine life in the form of spawn, some of which appeared to have hatched, as small tails were visible. Later, after sunset, dancing lights were seen on the water in a SE-NW direction, and the sea was lit up with brilliant luminescence whenever the ship passed through the discoloured areas. Sea temp. 51°F at 1800.

Position of ship: 57°N, 8°E to 57½°N, 9°E.

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

"This sounds to me like an admixture of swarming *Noctiluca* with *Oikopleura* (Appendicularia), and possibly other large luminescent plankton animals. *Noctiluca miliaris* is an unusually large globose species of dinoflagellate often exceeding large pin-head size. It has some superficial resemblance to fish-eggs, but the latter are not known ever to be concentrated sufficiently to be visible, whereas reddish discolouration by *Noctiluca* is not uncommon. *Noctiluca* also has one of its flagella modified into the form of a stout tentacle, which could be taken for a tail, but the appendage of the slightly larger *Oikopleura* is more readily seen without a microscope. *Oikopleura* has very rarely been seen in concentration sufficient to cause

discolouration by day. There are a whole host of luminescent animals belonging to most groups of plankton organisms, that tend to reach their maximum numbers at about that season. Individually they are not known ever to have been so thick as to cause visible discolouration by day, but luminescence is readily apparent with much sparser populations so that many of them would probably combine to cause the overall visual effect described."

MOTHS

Barents Sea

m.t. *Stella Leonis*. Skipper R. Waller. At the fishing grounds. Observer, Mr. R. R. Laing, Radio Officer.

29th August 1965. Between the hours of 0200 and 0300 GMT, clouds of moths passed over the vessel, so numerous that the bridge windows had to be closed against them. During the rest of the day there were many in the vicinity of the vessel and the sea was at times littered with the dead insects. They were of a fairly uniform size, grey in colour with three dark bands across the wing area. The nearest land, the North Russian Coast, was about 70 miles distant. At the time, the wind was S'E, force 1-2. As this is the first occasion we have experienced a visitation of such a kind, we would like to have an explanation of the reason, if this can be given.

Position of vessel: 69° 30'N, 38°E.

Note. Dr. C. B. Williams, the entomologist, comments:

"Swarms of moths quite far out at sea are not very unusual but this is the first time that I have heard of one so far north of the Arctic Circle.

"It would have been really exciting if some specimens could have been obtained because to us specialists there is no such thing as an 'ordinary moth'. Any moth in such a situation is extraordinary and should be identified. What a pity they do not seem to have caught any. Please ask them to put a few dead ones between newspaper in a cigarette tin or something of that nature if it happens again.

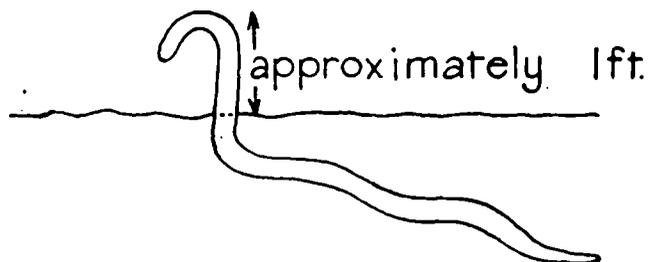
"The only related observation that I know was on 8th August 1924, Mr. C. S. Alton recorded large numbers of greenfly and hover flies on the snow on Spitzbergen. The aphids (greenfly) were identified as one which feeds on conifers, and the nearest of such trees were said to be on the Kola Peninsula, 800 miles away. In this case, and also in the case of the moths, it is likely that the insects were blown by the wind but this does not explain why such great numbers kept so close together."

SEA SNAKE

South China Sea

s.s. *Caltex London*. Captain D. W. Falconer. Abadan to Kawasaki. Observer, Mr. J. M. Watt, 2nd Officer.

18th July 1965. At 1535 SMT a piece of what was thought to be driftwood sticking up out of the water was seen ahead. However when it was about 60 ft away on the beam, it was observed to be a sea snake approx. 4 ft long, yellow in colour with some dark markings. It was lying in the water with about a quarter of its length above the surface, as shown in the sketch, the rest of the body being under the water at a depth of about 6-12 in.



When it was just abaft the beam the snake slid back into the sea and started swimming down. It did not collapse with a splash but went down with the 'neck' erect like a submarine periscope. The 'head' section did not straighten out till well below the surface. The snake was in sight for about 20 sec before it submerged. Sea temp. 83°F.

Position of ship: 10° 24'N, 112° 17'E.

Note. This observation has been forwarded to the Natural History Museum.

FISH

Red Sea

m.v. *Glenogle*. Captain W. J. Moore, D.S.C., R.D. Suez to Singapore. Observer, Mr. C. J. Parker, 3rd Officer.

4th July 1965. At 0730 GMT when 5 miles off the Daedalus Reef a fish of the general appearance shown in the sketch jumped clear of the water and propelled itself above the surface by vibrating its tail. Each 'hop' was about 50 ft, when the fish returned to the sea to get enough speed to become airborne again. It was about 4 ft long and of a transparent dark blue colour, with some features in deep green. A sword-like projection jutted ahead from near the mouth. Some flying fish of usual type were seen in the vicinity. Sea temp. 84°F. Wind NW'ly, force 4. Sea slight.

Position of ship at 0600: 25° 24'N, 35° 36'E.



Note. Dr. P. H. Greenwood of the Natural History Museum comments:

"The fish described and illustrated so neatly is called the Sawry or Skipper *Scomberesox*. This fish is related to the flying fishes and, as the observer has noted, it has some of the characteristics of the flying fish. If the pectoral fins were wing-like as in the flying fishes, then the fish would have become rather more airborne between hops."

LUMINESCENCE

Barents Sea

m.t. *Stella Leonis*. Skipper R. Waller. At fishing grounds. Observer, Mr. R. R. N. Laing, Radio Officer.

24th September 1965. Between 1926 and 1935 GMT, the vessel, when on a course of 070°, speed 14½ kt, passed through a large patch of bioluminescence taking the form of very rapid flashes of light just beneath the surface of the sea. They were a light electric blue in colour and visible for quite a distance from the ship. Some flashes were larger than others and had the shape of a leaf. It was not possible to try any experiments, but with the port side of the ship in darkness and the starboard side brilliantly lit, the flashes observed to starboard were not nearly so brilliant. The echo-sounder (fishgraph) was running at the time and a noticeable 'thickening' of the water directly under the ship took place when passing through the display. The radar was also on at the time. Wind NNE'ly, force 3. Visibility very good.

Position of vessel: 70° 41'N, 37° 08'E.

Note. It is unusual for us to record an observation of this nature from such a high latitude.

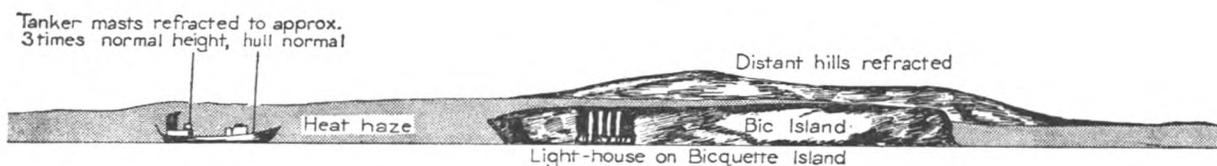
ABNORMAL REFRACTION

Gulf of St. Lawrence

s.s. *Laurentia*. Captain T. S. Graham. Montreal to Glasgow. Observers, Mr. A. McGugan, Chief Officer and Mr. D. Barr, Apprentice.

4th July 1965. At 0945 GMT, due to conditions of abnormal refraction the lighthouse on Bicquette Island seen at a distance of $7\frac{1}{2}$ miles, showed four distinct towers side-by-side. Bic Island and the hills behind were also affected, and the masts of a tanker appeared to be about three times their proper length. The general appearance is shown in the sketch. Air temp. 47°F , wet bulb 46° , sea 39° .

Position of ship: $48^{\circ} 26' \text{N}$, $69^{\circ} 05' \text{W}$.



Note. The most probable explanation of the multiple images of the lighthouse would seem to be that the rays of light from the tower underwent refraction on passing through several surfaces of discontinuity lying in vertical planes. These surfaces of discontinuity must be the result of variations of air temperature and therefore density (humidity may also be a factor), but just how they had been arranged in space is uncertain. It seems possible that the discontinuities may have arisen by reason of very local irregularities of sea temperature which, in turn, caused irregularities in the overlying air.

ABNORMAL REFRACTION AND ICEBERGS

Vicinity of Belle Isle

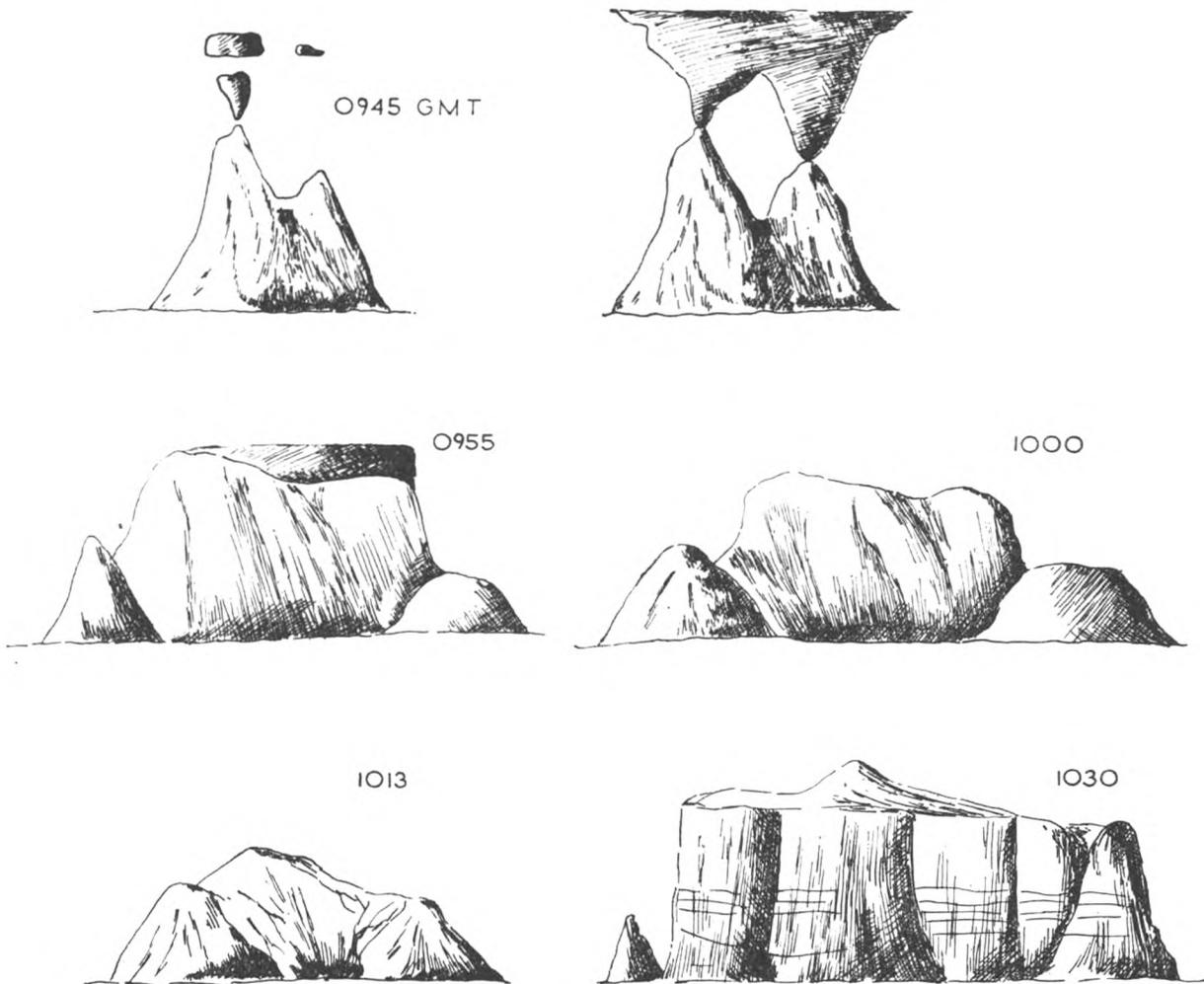
m.v. *Port Macquarie*. Captain V. A. Hunt. Montreal to London. Observers, the Master, Mr. J. Clarke, 2nd Officer and Mr. A. M. Stevenson, Apprentice.

18th July 1965. Icebergs were sighted at a number of positions between $51^{\circ} 40' \text{N}$, $56^{\circ} 17' \text{W}$ and $51^{\circ} 42' \text{N}$, $54^{\circ} 59' \text{W}$. From 0945 to 1040 GMT there was evidence of considerable abnormal refraction which distorted the shape of icebergs and that of a passing vessel. The changes seen in the appearance of one berg, 10 miles away, are shown in Figs. 1-6.

Between 0945 and 0950 (approx.) the iceberg at first appeared to be emitting what looked like 'puffs' of black smoke from its highest parts, as seen in Fig. 1. Soon afterwards these developed into the inverted shapes shown in Fig. 2. By 0955 the top of the berg had a flattened appearance, with a dark cap covering the upper parts and the space between the peaks, as illustrated in Fig. 3. Soon afterwards the berg became more squat in appearance and assumed its normal shape, allowance having been made for the changes in aspect as the vessel proceeded on its course. Figs. 4 and 5 show the normal shape of the berg. By 1030, abnormal refraction again caused the marked distortion seen in Fig. 6. Air temp. 47.1°F , wet bulb 45.0 , sea 45.9 . Visibility excellent.

Position of ship at 0945: $51^{\circ} 46' \text{N}$, $55^{\circ} 15' \text{W}$.

Note. This type of abnormal refraction is liable to occur when the air aloft in the first few hundred feet above the sea is substantially warmer than the air at the surface. Such a distribution of temperature is known as an inversion. It is normal for such inversions to be found in anticyclonic situations, due to the subsiding air in these systems. The synoptic chart for 1200 GMT shows that an area of relatively high pressure covered the St. Lawrence Estuary and the Strait of Belle Isle.



Figs. 1-6

ABNORMAL REFRACTION AT SUNRISE

South Australian waters

m.v. *Cymric*. Captain G. V. Conolly, D.S.C. Aden to Melbourne. Observer, Mr. W. G. Lockie, Junior 3rd Officer.

22nd January 1965. At 1955 GMT (0555 LMT on the 23rd) a horizontal double image of the top of the sun's disc was seen as it was rising. The angle between the true sun and its image was $0^{\circ} 57'$. Each, with exception of the intensity of the light, was of the same size and appearance. As the two gained altitude the brighter of the two 'suns' moved horizontally to meet the other. Although the sky was almost overcast with Sc, the horizon in the direction of the sun and its image was clear, over a 32° horizontal arc, to an altitude of $0^{\circ} 23'$. Slight sea low swell. (No other details available.)

Position of ship: $38^{\circ} 07'S$, $137^{\circ} 30'E$.

Note. At the moment of sunrise or sunset, the sun's disc can assume a variety of greatly distorted shapes, and it is not unusual for the disc to appear roughly rectangular, sometimes with small projections at the upper corners. In the present case it seems probable that the two 'images' were in fact the projections referred to, seen just on the horizon. The spacing between them of $0^{\circ} 57'$, could quite well be the diameter of the distorted disc, instead of the normal $0^{\circ} 32'$. The rapid moving together of the two 'images' could be expected as the sun's disc gained altitude above the horizon by only a very small amount. Distortion of this type is liable to occur when the air at the surface is colder than the air above, i.e. when there is a temperature inversion.

LUNAR HALO PHENOMENA

vicinity of Cape Comorin

m.v. *British Freedom*. Captain A. H. Newby, M.B.E. Kwinana to Bombay. Observer, Mr. F. MacLennan 3rd Officer.

5th June 1965. The three arcs of contact associated with the halo, the usual 22° type, were seen for a few minutes during the evening. They were a pale white in colour and there was a general fuzziness where they met the main halo. The halo proper remained visible for several hours. The general appearance is shown in Fig. 1.

Position of ship: $7^\circ 10'N$, $77^\circ 08'E$.

6th June 1965. Observers, Mr. D. McGeachy, Chief Officer and Mr. F. MacLennan, 3rd Officer.

When off the Malabar coast, the halo complex shown in Fig. 2 was seen at 1500 GMT. The halo was of the usual 22° type again, and predominantly whitish in colour. The arcs of contact whose lengths varied from 35° – 40° remained white and were seen for 20 min: the halo persisted for several hours.

Position of ship: $11^\circ 08'N$, $74^\circ 54'E$.

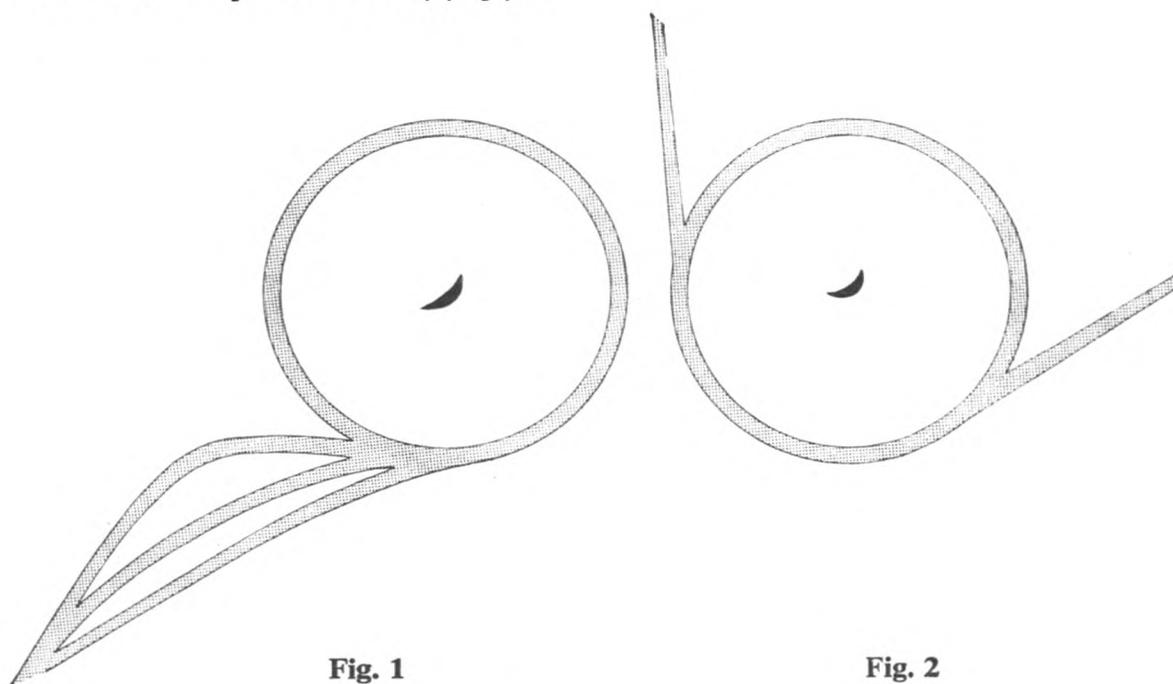


Fig. 1

Fig. 2

GREEN MOON

South Pacific Ocean

m.v. *Ruahine*. Commodore H. N. Lawson, R.D. Balboa to Tahiti. Observers, the Master and Mr. P. J. B. Low, Senior 3rd Officer.

6th February 1965 at 1220 GMT. Being a particularly fine evening it was hoped to observe the 'green flash' as the sun set. Roughly on the same bearing as that of the sun, the moon was also in process of setting. As the sun set, no green flash was visible but the moon turned a very bright green. This lasted for about 50 sec before reverting to a pale yellow.

Wind ESE, force 3, $\frac{2}{8}$ cloud (fair weather cumulus with slight vertical extent). Air temp. $81^\circ F$, sea temp. 82° , dewpoint 73° .

Position of ship: $12^\circ 33'S$, $138^\circ 32'W$.

Note 1. Dr. D. J. K. O'Connell, S.J., Director of the Vatican Observatory and author of *The Green Flash and Other Low Sun Phenomena*, the standard work on the subject, comments:

"The observation is indeed a puzzling one and I cannot recall one quite similar to it. I have been trying to think of an explanation and suggest the following possibilities:

a The observers had just been watching the setting sun, which was presumably red or reddish. On looking immediately afterwards at the moon, the after-image may have caused the moon to appear green. On the other hand, the fact that the green appearance lasted for about 50 sec, before the moon regained its yellow colour, makes this explanation appear unlikely. I have not heard of after-images lasting so long.

b Dust in the atmosphere, such as that from a volcanic eruption, may cause the moon to appear greenish. Against this explanation is the fact that the colour reverted to yellow after 50 sec."

Dr. O'Connell forwarded the observation to Professor M. Minnaert, former Director of Utrecht Observatory and author of the standard work *Light and Colour in the Open Air*. Professor Minnaert comments:

"I know several such cases in which we are confronted with an apparently incomprehensible observation. If we could have been present ourselves, most probably an explanation would have presented itself to our mind. Nevertheless I think that such notes should be published, because this might incite others to look for similar phenomena.

"I am inclined to consider this 'green moon' as a subjective phenomenon, perhaps due to the presence of pink clouds, coloured by the setting sun. It is well known that in such cases the moon often appears in the complementary colour. Note that there were clouds: 'fair weather cumulus'. Why did it only last for 50 sec? This might be a psychological reaction . . . fatigue of the eye . . . quickly diminishing brightness of the clouds . . . the clouds drifting away from the moon . . . ?

"A more objective explanation would require a scattering smoke or haze passing temporarily across the moon. Moreover the particles ought to be just of the size, giving rise to a green colour. I have a note that during appearances of the Bishop Ring, an optical perturbation, the moon sometimes appears to be green. But I cannot believe that this would be a phenomenon of short duration. Of course there are the well known cases of blue moon or green moon, due to forest fires or other sources. But here also the duration would be so much greater."

Note 2. At the time of observation the moon was nearly 5 days old; sunset would have been about 1832 SMT with amplitude 254° and moonset about 2200 SMT., three and a half hours later, with amplitude 274° .

We discussed these details with Commodore Lawson when he visited the Meteorological Office at Bracknell some nine months later but, beyond confirming what he saw, he was unable to remember more precise details. In later correspondence Mr. P. J. B. Low agreed that, although he also could not remember the actual position of the moon at the time, the phrase 'in process of setting' was intended to indicate that the moon was well past its zenith.

ABNORMAL MAGNETIC DISTURBANCES

Spencer Gulf, S. Australia

s.s. *Neleus*. Captain D. K. Dunlop, R.D. Whyalla to Melbourne. Observers, Mr. P. Morgan, 3rd Officer and Mr. M. Emerson, Officer Cadet.

23rd August 1965. While proceeding through the Spencer Gulf the following abnormal magnetic disturbances were experienced near the eastern coast in the positions shown:

$34^\circ 01.5'S$, $137^\circ 16.5'E$ to $34^\circ 06'S$, $137^\circ 14.5'E$. Disturbance $12^\circ W$.

$34^\circ 06'S$, $137^\circ 14.5'E$ to $34^\circ 08.5'S$, $137^\circ 13.2'E$. Disturbance $15^\circ E$.

$34^\circ 09.5'S$, $137^\circ 12.7'E$ to $34^\circ 16.5'S$, $137^\circ 09'E$. Disturbance $6^\circ W$.

$34^\circ 22'S$, $137^\circ 06.3'E$ to $34^\circ 27.5'S$, $137^\circ 03.5'E$. Disturbance $6^\circ W$.

Variation $7^\circ E$, deviation for ship's head nil, compass error $7^\circ E$.

The disturbances obtained by comparing magnetic and gyro compasses have been corrected for compass error.

The initial deflection of 12° took about one min to complete, but the second deflection of 27° took only about 20 sec and when it returned to normal it did so at the same speed. The compass returned to its correct heading between each disturbance; only between the first two did it cross straight over. A note on the chart draws attention to magnetic disturbances, especially towards the western side of the Gulf.

Note. This observation was forwarded to the Hydrographer of the Navy.

AURORA

Reports of aurora from British ships during July–September 1965 are listed briefly below. We are delighted to have so many new names appearing in the list with the weather ships. We appreciate the quality of the observations and accompanying sketches, and thank all concerned.

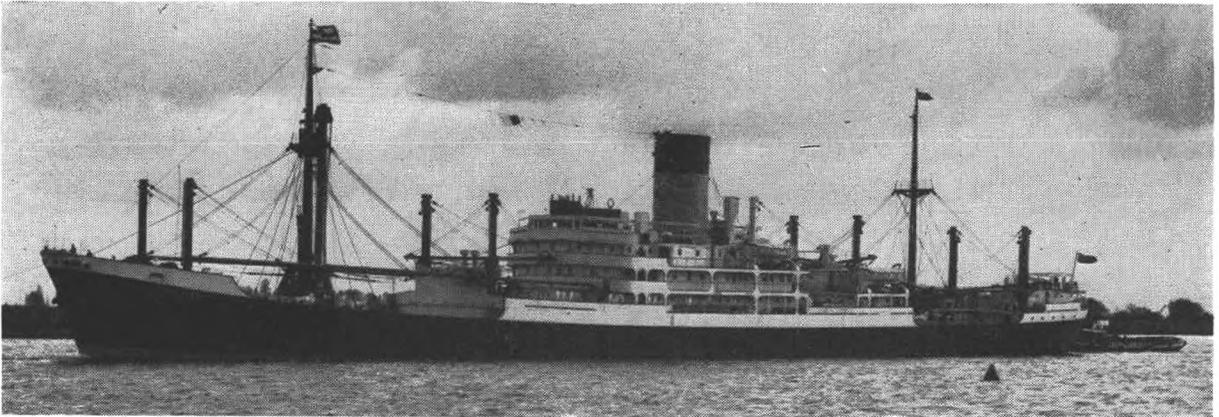
During the three months there were no periods of very high geo-magnetic activity, and it is our good fortune that so many ships were in fairly high latitudes and in positions to see the aurora in 'home' territory.

There is some evidence now of renewed solar activity. With the prospect of the next solar maximum in about two years—one prediction suggests March 1968—the graph of sunspot activity will no doubt soon be showing a sharp upward trend, with the allied result of auroral displays visible at more southerly latitudes. Data have been collected over 20 cycles of solar activity, i.e. for about 200 years, but scientists need still more information, and we hope you will continue to help.

All auroral reports are sent to us at the Balfour Stewart Auroral Laboratory, Edinburgh University, by way of the Meteorological Office or the Ocean Weather Ship Base. All northern hemisphere data are interchanged with New York and Moscow.

DATE (1965)	SHIP	GEOGRAPHIC POSITION	Λ	Φ	I	TIME (GMT)	FORMS
8th July	<i>Bristol City</i>	50°36'N 58°25'W	010	62	+75	0230	RB
28th	<i>Ripon</i>	53°18'N 51°42'W	020	64	+74	0400–0600	HA, RA
2nd Aug.	<i>Trevaylor</i>	60°54'N 90°30'W	350	71	+85	0001–0400	B, P
3rd	<i>Welsh Herald</i>	57°20'N 34°30'W	050	66	+73	2320–2355	RA, RR, P
4th	<i>Weather Reporter</i>	61°42'N 32°47'W	060	70	+76	0100 0240–0330	HA, RR
6th	<i>Welsh Herald</i>	52°43'N 52°33'W	020	63	+74	0230–0240	HA, RA
18th	<i>Weather Adviser</i>	59°00'N 19°00'W	070	65	+72	2250	N
21st	<i>Weather Reporter</i>	61°36'N 31°26'W	060	70	+76	0030–0400	HB, RR, N
	<i>Bassano</i>	49°19'N 65°20'W	360	61	+75	0045–0127	HA
23rd	<i>Halifax City</i>	53°18'N 35°06'W	050	62	+71	2330–0200	RA, RR, N
	<i>Mabel Warwick</i>	55°22'N 40°33'W	040	65	+73	2345–0130	HA, HB, RA, RR, P, N
	<i>Stella Leonis</i>	66°00'N 06°00'E	100	66	+75	2355–2357	RB
24th	<i>Weather Surveyor</i>	61°50'N 33°05'W	060	70	+76	0200–0400 2340–0300	RB HB, RB, RR, P, V, N
25th	<i>Alert</i>	50°30'N 51°30'W	020	61	+74	0115–0600	HA, RA, RB, RR, P
26th	<i>Weather Surveyor</i>	62°05'N 33°20'W	060	70	+76	0022–0100	N
28th	<i>Weather Surveyor</i>	62°00'N 33°20'W	060	70	+76	0040–0300	N
29th	<i>Weather Surveyor</i>	62°05'N 32°55'W	060	70	+76	2330–0400	HB, RR, P, N
30th	<i>Mabel Warwick</i>	50°00'N 59°56'W	010	61	+75	0110–0200	HA, HB, RA, RR
	<i>Weather Monitor</i>	58°50'N 19°55'W	070	65	+72	0135–0400	RA, P, N
31st	<i>Weather Monitor</i>	58°50'N 19°35'W	070	65	+72	0200–0300	HA, RA, N
1st Sept.	<i>Weather Surveyor</i>	61°50'N 33°20'W	060	70	+76	0100 2335–0500	N HB, RB, RR, N
2nd	<i>Weather Surveyor</i>	61°50'N 33°00'W	060	70	+76	2300–0100	HA, N
3rd	<i>Weather Monitor</i>	59°00'N 19°00'W	070	65	+72	2325	N
	<i>Weather Surveyor</i>	61°35'N 32°50'W	060	70	+76	2328–0300	RR, N
4th	<i>Weather Monitor</i>	59°00'N 19°00'W	070	65	+72	0200–0300	N
5th	<i>Weather Surveyor</i>	61°55'N 33°05'W	060	70	+76	2300–0100	RR, N
6th	<i>Weather Surveyor</i>	61°40'N 33°40'W	060	70	+76	2325	RR
7th	<i>Weather Surveyor</i>	61°50'N 33°30'W	060	70	+76	0200	RB, RR
	<i>Rapallo</i>	52°15'N 54°06'W	020	63	+74	0330–0540	HB
8th	<i>Weather Monitor</i>	58°35'N 19°35'W	070	65	+72	0300	N
	<i>Weather Surveyor</i>	61°55'N 33°05'W	060	70	+76	0400, 0500	HB, N
11th	<i>Weather Surveyor</i>	61°53'N 32°14'W	060	70	+76	2334–0008	RR
12th	<i>Weather Monitor</i>	59°10'N 18°40'W	070	65	+72	0200	RR
15th	<i>Weather Monitor</i>	58°55'N 19°20'W	070	65	+72	2140–0130	HA, RB, N
16th	<i>Weather Monitor</i>	59°00'N 19°25'W	070	65	+72	2130–2300	HA, RB
17th	<i>Weather Monitor</i>	58°55'N 19°00'W	070	65	+72	2100–2300	N
	<i>Orelia</i>	53°00'N 46°42'W	030	63	+73	2330–0100	HA, RA, RR
18th	<i>Weather Monitor</i>	58°55'N 19°00'W	070	65	+72	0100, 0300	RA, N
	<i>Silversand</i>	70°46'N 21°30'E	120	67	+78	2000–2100	HB, RB
23rd	<i>Pennyworth</i>	52°48'N 46°30'W	030	63	+73	0110–0231	HA, RA, RR
	<i>Weather Reporter</i>	59°05'N 18°50'W	070	65	+72	0145–0310	N
	<i>Stella Leonis</i>	70°00'N 35°00'E	130	65	+78	1900–1925	HA, HB, RB, RR, P
	<i>Weather Reporter</i>	59°04'N 18°46'W	070	65	+72	2300	N
24th	<i>Weather Reporter</i>	59°07'N 18°38'W	070	65	+72	0300–0400	N
	<i>Weather Adviser</i>	52°27'N 19°53'W	060	59	+69	0445	RA
25th	<i>Weather Reporter</i>	58°58'N 19°01'W	070	65	+72	0001–0500	N
26th	<i>Sagamore</i>	50°00'N 62°30'W	010	62	+75	0415–0515	HA
						0740–0900	RA
		51°05'N 57°24'W	020	62	+75	2300–0030	RA
27th	<i>Cape Howe</i>	52°25'N 52°18'W	020	63	+74	2330–0030	N
	<i>Gothland</i>	52°10'N 54°30'W	020	63	+75	2300–0600	HA, RB
28th	<i>Rialto</i>	52°50'N 52°40'W	020	64	+74	0030–0100	HA, HB, RA, RB
	<i>Lindisfarne</i>	55°55'N 30°35'W	050	64	+72	0050–0245	HB, RA, RR, N
	<i>Carmania</i>	53°58'N 38°16'W	040	63	+72	0130–0400	HB
	<i>Cape Howe</i>	50°00'N 62°00'W	010	61	+75	0430–dawn	HB, RB, RR, P, N
30th	<i>Weather Adviser</i>	52°24'N 20°02'W	060	59	+69	0350	RR, V

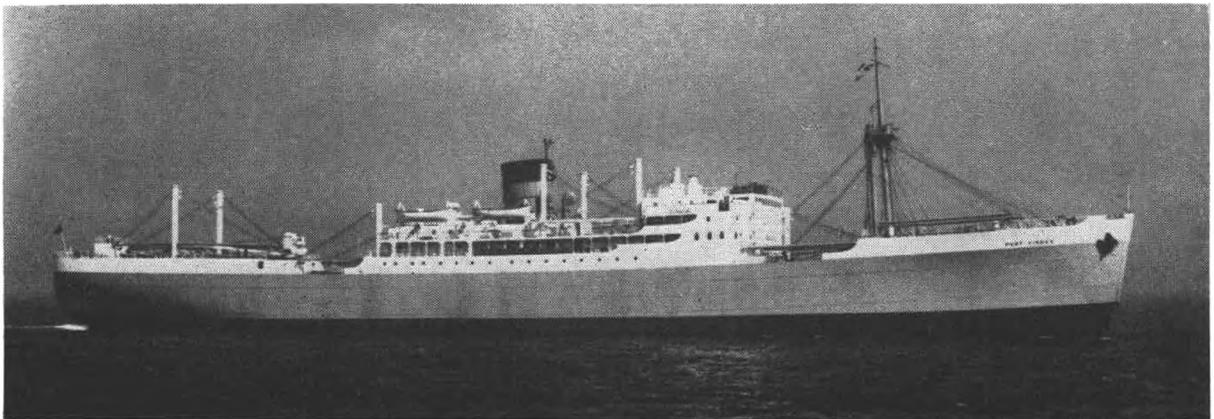
KEY: Λ = geomagnetic longitude; Φ = geomagnetic latitude; I = inclination; HA = homogeneous arc; HB = homogeneous band; RA = rayed arc; RB = rayed band; R(R) = ray(s); P = patch; V = veil; N = unidentified auroral form.



Photograph by Print-O-Colour

Asphalion (A. Holt & Co.), Captain J. T. Knox.

The photograph was taken whilst she was under her original name of *Achilles*. As an observing ship she has also been known as the *Radnorshire*. She is now the *Polyphemus* and operated by the Netherlands branch of the company.



Port Vindex (Port Line Ltd.), Captain C. J. H. Gorley.



Photograph by 'Burton', Grimsby

Stella Leonis (Charleson Smith Trawlers Ltd.), Skipper R. Waller.

THE THREE SHIPS WHICH GAINED THE HIGHEST MARKINGS FOR THEIR METEOROLOGICAL LOGBOOKS DURING THE YEAR ENDED 31st MARCH 1966 (see page 106).

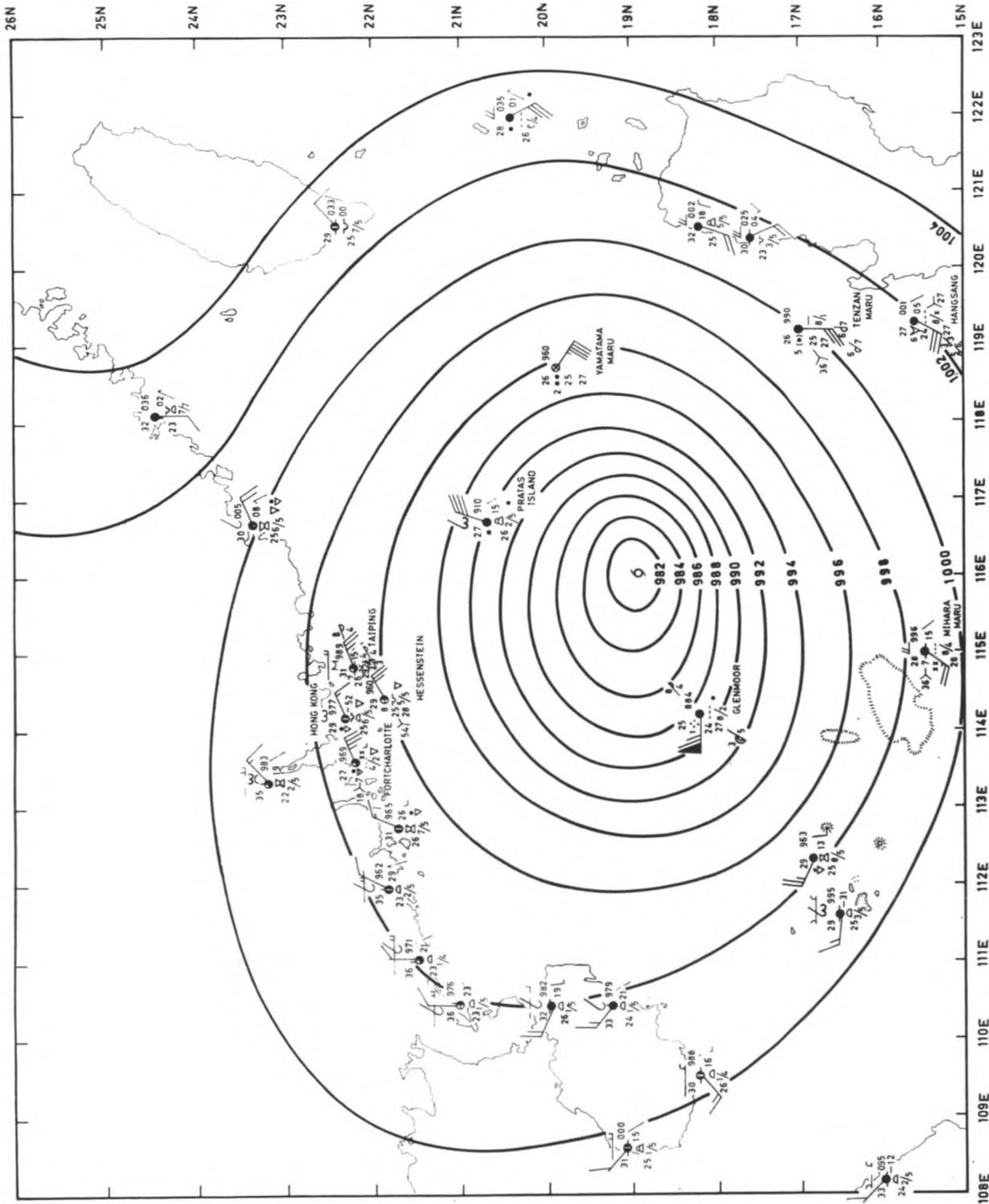


Fig. 1. Typhoon 'Freda'. Synoptic weather chart for 0600 GMT on Wednesday, 14th July 1965. Prepared by the Royal Observatory, Hong Kong (see page 112).

Observations on Whales from Ships, 1952-1966

By N. A. MACKINTOSH, C.B.E., D.SC.
(National Institute of Oceanography)

In 1951 a plan was formulated, with the kind co-operation of the Meteorological Office, for inviting mariners to record observations on whales and other Cetacea. Its purpose was to assist in studies which are carried out in the National Institute of Oceanography, and it was initiated with an article in *The Marine Observer* in April 1952¹. The response was good both at the start and in subsequent years. It was originally supposed that such observations could usefully be collected for several years, but that the scheme should be wound up sooner or later according to results. In fact it met with considerable success and has therefore been continued for fourteen years, and reports from hundreds of voyages, referring to some thousands of observations, have provided quite new information on the world distribution of Cetaceans. It was necessary to build up a large mass of data before firm conclusions could be drawn, but beyond a certain point it becomes more difficult to make new inferences from further accumulations of routine observations, so that the work involved brings diminishing returns. It is felt that we have now reached this stage, at least in respect of regular observations from the usual shipping routes. One of the purposes of this article therefore is to give notice of the termination of the scheme in its present form (though certain further observations would still be welcome) and to express our thanks to all those who have organized and made the observations.

First a little should be said of the uses to which the reports have been put. Forms for recording observations, and an explanatory booklet, were supplied by the National Institute of Oceanography and distributed by the Meteorological Office, largely with the kind assistance of Port Meteorological Officers, or sometimes directly from the Institute, to observers in a large number of ships. One or more forms covering each voyage are received at the Institute and normally give enough data for the ship's route to be plotted approximately on a chart, with the points at which Cetaceans were observed. To obtain any good evidence on their distribution it is necessary to estimate, however roughly, the relative numbers present (or the 'population density') in different ocean regions, and it was found most convenient to take as a criterion the number seen per thousand miles' steaming by ships crossing the area in question. It is generally difficult to distinguish one species from another with certainty, though sperm whales and humpbacks can often be identified. Therefore calculations were generally made separately for sperm, humpback, rorquals (i.e. fin, blue, sei, and minke whales which are much alike) and 'large whales' (i.e. those only specified as such). The distribution of small whales, dolphins, etc., has also been examined, but analysis of these groups has not yet been carried so far as for the larger species.

When reports are received they are carefully examined, usually by two members of the staff, so that any points of interest can be noted, and then filed until a large number can be analysed together. This has nearly all been done by my colleague, Mr. S. G. Brown, who has published some of the results so far obtained in several papers. Among these are two papers on whales observed in the Indian and Atlantic Oceans^{2,3}. These have brought out a number of facts which could scarcely have been demonstrated by any other means. For example the relatively high concentration of whales in the Gulf of Aden and Arabian Sea, and their scarcity in the central Indian Ocean are clearly established; and the fact that whales are widely scattered over the Atlantic and Indian Oceans, and not grouped towards the continental coasts, has an important bearing on certain problems of the location of the breeding grounds and migration routes. Again the estimates of numbers seen per 1,000 miles provide for the first time a rough basis for comparing population densities in different parts of these oceans with densities in the Antarctic, which is the only ocean region in which good estimates of numbers of whales have yet been made.

Mr. Brown has also published a paper⁴ on the distribution and behaviour of pilot whales, *Globicephala*, in the North Atlantic Ocean. This is based on records received from Ocean Weather Ships and some merchant vessels and the observations provide new information on the seasonal distribution and range of this species.

An interesting observation of swordfish and whales seen together provided the basis for a short study of the relationship of these two animals⁵.

These are only examples from among the findings already published but the value to be extracted from the observations by no means ends with what has been published so far. Knowledge of such inaccessible and scattered animals as whales has to be gradually built up through the piecing together of such evidence as we can get from all available sources, including the marking of whales and the seasonal and geographical distribution of whaling. Taken as a whole however the recorded sightings alone have given us a broad view of the way in which the populations are spread through the oceans which is of material assistance in planning other lines of work, or in suggesting where to look for further evidence on specific problems. Moreover they constitute a permanent fund of data for both predictable and unpredictable purposes in the future. There are further analyses of more recent observations to be made and of the distribution of the smaller Cetacea. There are also numerous observations on the behaviour, schooling, and movements of whales and smaller species, and at any time some new problem or hypothesis may be formulated for which evidence or support may be sought among the filed records.

The position now is that the scientific value of further accumulations of routine observations, at least on the normal shipping routes, can scarcely be sufficient to justify the trouble so kindly taken by observers in maintaining a look-out and recording the results. Therefore if any more of such routine reports are received they would now be put away with the filed data, to be referred to if necessary rather than be the subject of further special analysis.

This, however, does not apply to all kinds of reports, for it is thought well worthwhile to continue the collection of certain types of observation or of sightings from certain ships, as follows.

- (a) From all ships: information (with date and position) of any exceptional numbers or concentrations of large whales, or of any remarkable incidents which seem worth recording. (Twelve or more large whales sighted in one day's steaming can be taken as an exceptional number.)
- (b) Routine observations and reports as before from naval, surveying, or research vessels, or any others on passages which depart from the normal shipping routes.
- (c) Reports, etc., as before from Ocean Weather Ships, since observations at more or less fixed points have a special value.

Copies of the booklet and forms for recording observations can still be supplied direct from the National Institute of Oceanography.

Although this article implies the winding up of the scheme of observations in its present form it does not exclude the possibility that some new reason may arise for resuming observations from as many ships as possible, but any such resumption would probably take the form of a newly organized scheme rather than of an extension of the present one.

Finally I should like to express, on behalf of the National Institute of Oceanography, our sincere thanks to all those who have contributed to the success of the scheme. It depended in the first place on the kind assistance and advice of Commander C. E. N. Frankcom and, in later years, of Lt. Cdr. L. B. Philpott. We are much indebted also to the Port Meteorological Officers through whom the invitations to record observations were distributed and the reports collected. Lastly we are specially grateful to numerous observers who voluntarily took so much trouble in watching for Cetaceans and for the clear and detailed reports they have supplied.

Perhaps we may hope that such work occasionally went a little way to relieve the tedium of watch keeping on long ocean voyages.

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4. BROWN, S. G.; Observations of Pilot Whales, *Globicephala*, in the North Atlantic Ocean. *Norsk Hvalfangsttid*, **50** Arg.(6), 1961.
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551.507.22:598.2

Bird Migrants and Weather Ships

BY T. ROGERS

(Meteorological Office)

This article is based on the author's experience while serving aboard *Weather Reporter* and is reproduced here by permission of the editor of *Birds*, the magazine of The Royal Society for the Protection of Birds.

Weather ships are on duty at various stations in the Atlantic, including positions in the Denmark Strait (between Greenland and Iceland), due west of the Hebrides and due west of the River Shannon in western Ireland. Because these stations are spread over some 800 miles from north to south it is difficult, of course, to cover the subject without broad generalizations.

As these ships are all about 300-400 miles from the nearest land the number of migrants is very small. During a year I usually see about 100-150 individuals of 20-25 species, but only five species are seen regularly each year. These are Wheatears, Meadow Pipits, Whimbrels, Snow Buntings and Purple Sandpipers, but I also see Redwings, Blackbirds and Redshanks in most years. Of the fifty or so species I have seen, most are quite irregular.

The most favourable weather for migration is a large anticyclone positioned over Ireland. The wind at the ship (presumably on station 'Juliett') is then light and variable or easterly and the sky completely covered with cloud. In this sort of weather birds might arrive every day for a week or more. In the autumn when a 'col' (an area of slack pressure between two depressions) was to the south of Iceland, there was often a rush of migrants for one day only. Whatever the weather, birds would arrive at any time of the day and I could never tell which was the best time for them to be seen.

Migration is almost totally absent during the winter. I was very lucky if I saw one bird a month from mid-November to the end of March. The bad weather of early 1963 proved a notable exception to this, when I saw some seventy birds of six species in a few hours. Even during the most favourable conditions in the autumn I have never seen as many as this in a whole month.

Any migrant which lands on a ship at sea is usually very weak, and as there is an absence of suitable food it often succumbs within a few hours. I have done my best for these birds whenever possible, but some species, such as Swallow and House Martin, I have never been able to help. Any very weak birds are easily caught and as there is little hope for the weaker ones I originally kept them in my cabin and released them in the Clyde at the end of the trip, which lasts one month. This was possible at first for I had only small birds such as Snow Buntings, Lapland Buntings, Meadow Pipits, Wheatears, Dunlins, Turnstones, Redwings, and Blackbirds, all of which I kept successfully. But on one trip I had five starlings and a Mistle Thrush, and on the next, a racing pigeon, so I decided that I would have to stop keeping them in my cabin. As there was no other room in which I could keep them I had to feed them on deck. Depending on the type of bird, I threw mealworms or birdseed to them. The only trouble was the high wastage of food.

I have had Wheatears feeding on deck for up to a week, a Meadow Pipit for seventeen days, another for ten days, many Snow Buntings for up to a week, and Purple Sandpipers for several days. Other species have eaten food and then flown away the same day, or that night. These include Siskins, Bramblings, Ringed Plovers, Linnets, Redpolls, Redwings, Blackbirds, Starlings and Grey Wagtails. Most migrants arrive singly or in pairs; it is unusual to see flocks. Waders are more commonly seen in groups.

Of all the birds I have kept in my cabin the most delightful were a pair of Lapland Buntings I picked up exhausted one spring day in the Denmark Strait. They were immediately very tame and caused me little bother. After I had had them about a week, though, they tore my plant from its pot near the port-hole, ripped up a magazine from the bookshelf, and made a nest out of it in the flowerpot. I released them before any eggs were laid, if indeed any would have been, but this does show how easily some birds can reconcile themselves to captivity. Others have not been so easy. A Blackbird would continually fly round the room whenever I was in it (I always let them fly around free, except at night) and a Turnstone had the annoying habit of overturning its food dish to see what was underneath. As its food was a mixture of sardines and other fish I was glad to get rid of the bird!

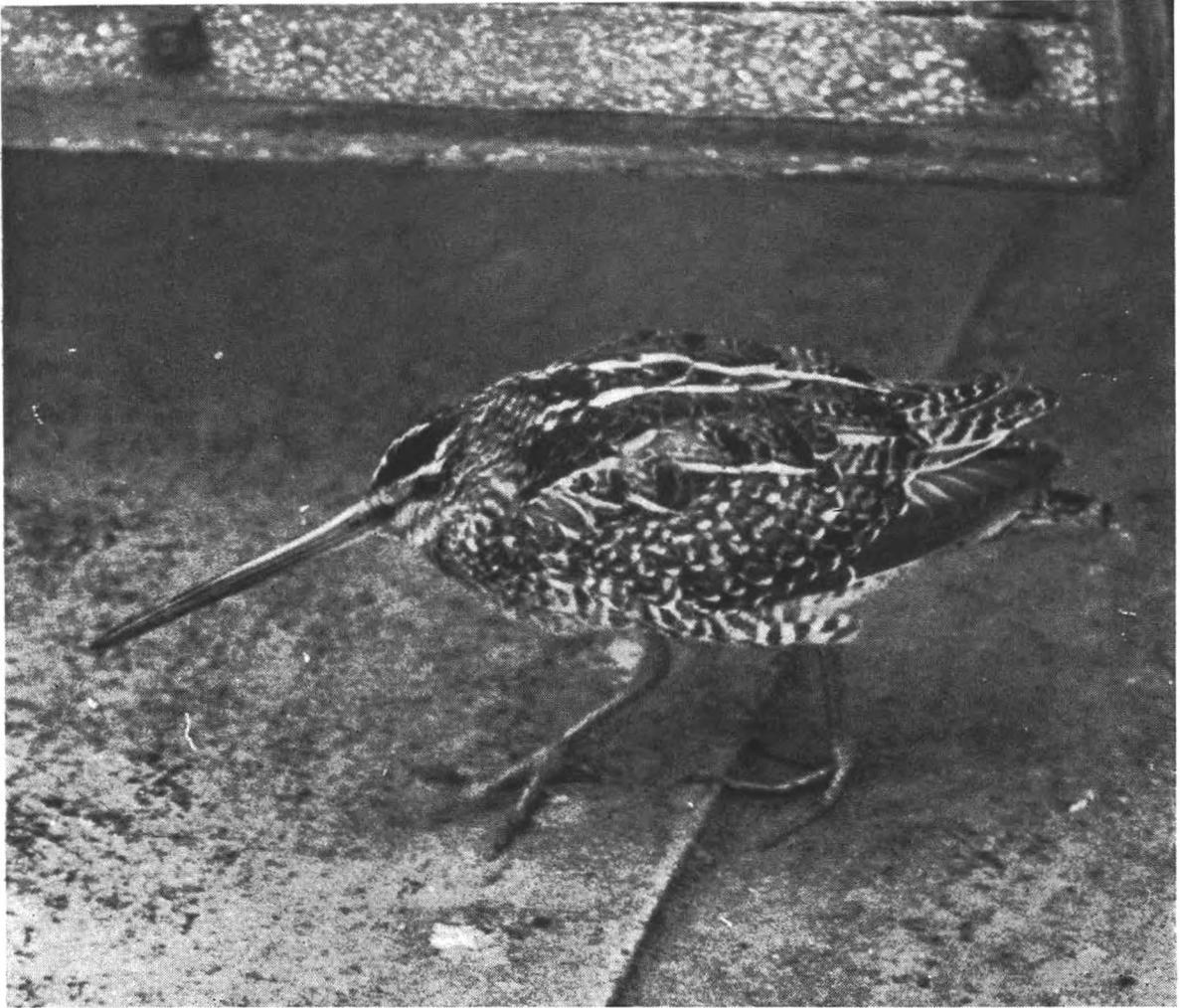
One problem associated with the feeding of birds on deck is the continual disturbance the birds suffer. Most of this is caused accidentally by people walking around to get some fresh air, but often I have found ignorant deckboys chasing birds and trying to catch them. In spite of pleas or threats they still continue to do it and I remember several instances where birds that I had been feeding for some days were hounded so much that they were blown into the sea. Because of their attractive appearance Snow Buntings were the most frequent victims. Another difficulty is that the few places with enough shelter for food to be put down without being washed or blown away are also favourite places for people to gather.

Sea-bird migrants are much more common than land birds, of course. In the autumn Arctic Terns are seen on most days, and Great, Manx and Sooty Shearwaters are often around in numbers. Great Shearwaters are the most common and there are sometimes flocks of 200 or more of them. The rarest bird I have ever handled on board was also a sea-bird; it was a Frigate Petrel which I found one night when we were positioned west of Ireland. I do not believe it has been seen in Britain this century. Storm Petrels, too, sometimes stumble on board at night, apparently dazzled by the lights, but they seem to be unharmed by the experience.

The recent articles in *Bird Notes* (Vol. 31, No. 6) about birds and oil pollution remind me that fortunately this menace is a rare occurrence in mid-ocean. Not long ago, though, I had a Great Black-backed Gull which was badly oiled. It was so weak from lack of food that I was able to catch it quite easily. After being cleaned and fed it was released, and it seemed to recover and get stronger in the following few days that it stayed with the ship.

'BETSY'

On 27th August 1965 at 1408 GMT, Tiros X photographed a circular storm at 13°N, 52°W. There were two distinct coiled cloud bands around the centre covering 4° of latitude which is indicative of winds of about 50 kt. At 1530, about an hour and a half later, a U.S.N. hurricane reconnaissance aircraft discovered a tropical depression at 13°N, 54°W, about 350 miles ESE of Barbados; maximum surface winds were about 38 kt and minimum sea level pressure was 1010 mb which soon fell to 1006.5 mb. By 2200 the disturbance had intensified to tropical stage and the first warning was issued; the storm was named 'Betsy'. During its formative stages it moved rapidly on a north-westward path. On 28th August it moved through the Lesser Antilles at 21 kt.



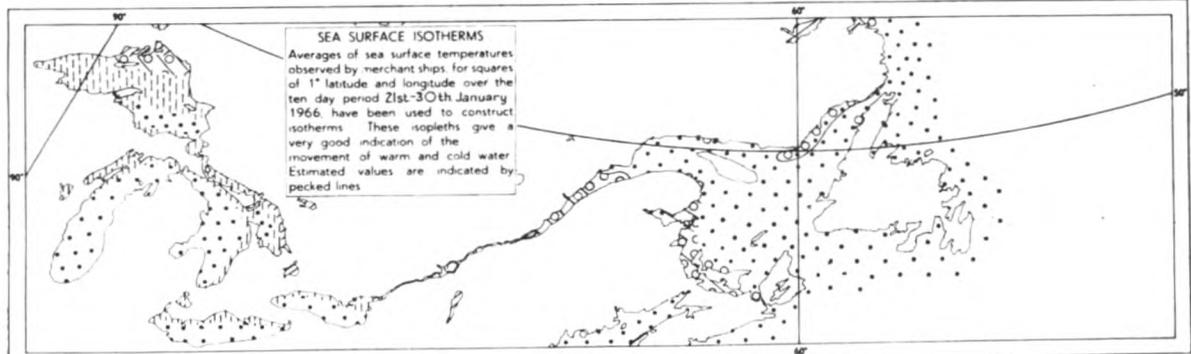
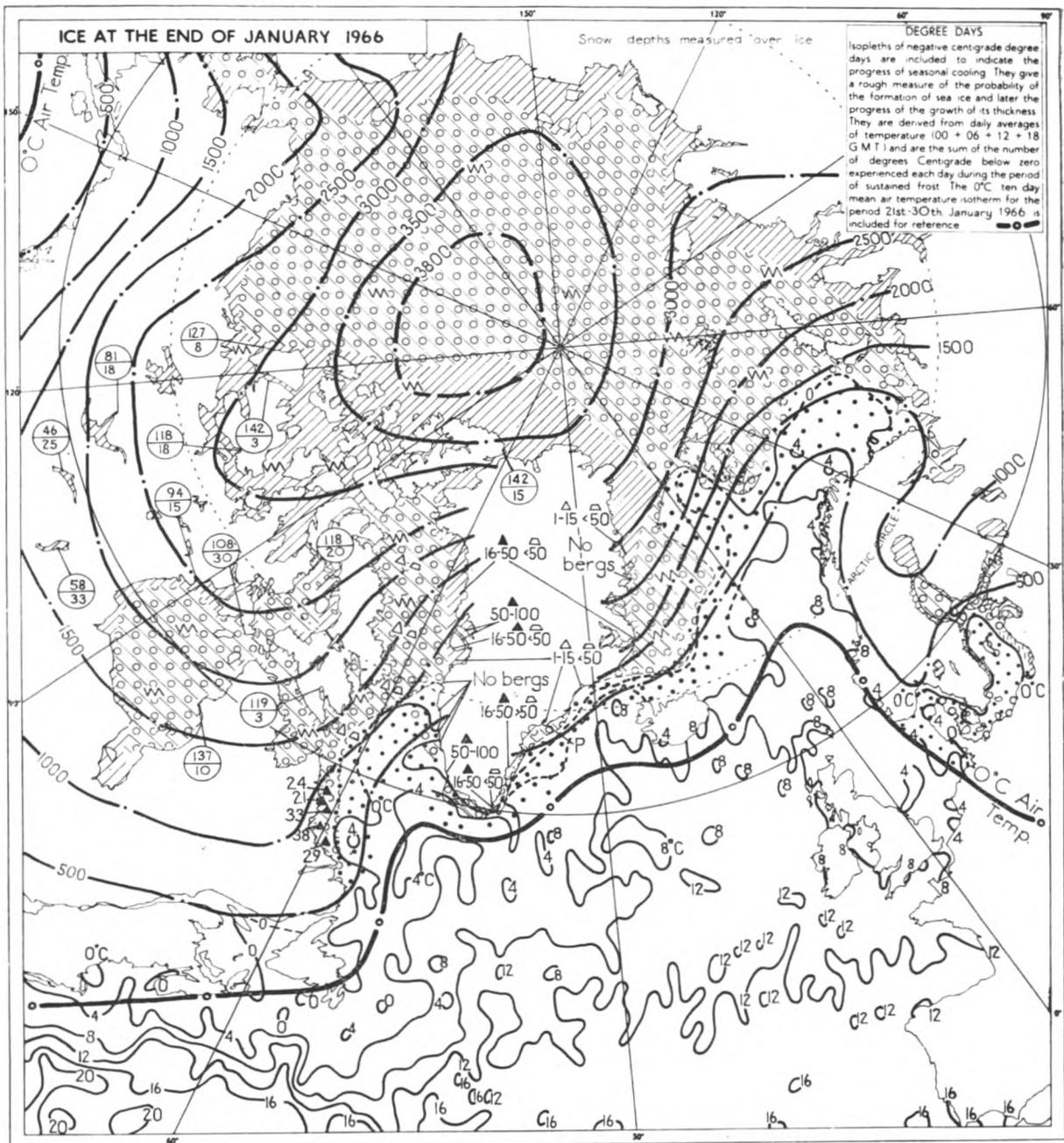
Snipe are among the 50-odd species likely to be seen aboard a weather ship, depending on the vessel's position (see page 131).



A White Wagtail aboard *Weather Reporter*. A migrant which lands on a ship at sea is usually very weak.



A badly oiled Great Black-backed Gull was one of the author's 'patients'.



<ul style="list-style-type: none"> Open water Lead Polynya New or degenerate ice Very open pack-ice (1/10 - 3/10 inc) Open pack-ice (4/10 - 6/10 inc) Close or very close pack-ice (7/10 - 9+/10 inc) Land-fast or continuous field ice (10/10) (no open water!) Ridged ice Ratted ice Puddled ice Hummocked ice (The symbols for hummocked and ridged ice etc are superimposed on those giving concentration) Extreme southern or eastern-iceberg sighting Ice depths in centimetres (120) Snow depths in centimetres (14) 	<ul style="list-style-type: none"> Y Young ice (2' - 6' thick) W Winter ice (6' - 64' thick) P Polar ice (> 64' thick) A suffix to YWP indicates the predominating size of ice floes s small (11 - 220yd) m medium (220 - 880yd) b big (4 - 5miles) v vast (> 5miles) c ice cake (< 11yd) Known boundary 	<ul style="list-style-type: none"> △ Few bergs (< 20) ▲ Many bergs (> 20) △ Few growlers (< 100) ▲ Many growlers (> 100) ⊙ Radar target (probable ice) — Against ice-berg growler or radar target symbols the date of observation may be put above and the number observed below ■ Position of reporting station 	<ul style="list-style-type: none"> × × × Radar boundary --- Assumed boundary ◆◆◆ Limit of visibility or observed data □□□ Undercast +++++ Cracks ----- Isoleths of degree days ○ 0°C air temperature isotherm --- Max limit of all known ice --- Max limit of close pack ice --- Min limit of close pack ice 	<ul style="list-style-type: none"> — Estimated general ice-berg track. Very approximate rate of drift may be entered — Observed track of individual ice-berg — Approximate daily drift is entered in nautical miles beside arrow shaft <p>Note: The plotted symbols indicate predominating conditions within the given boundary. Data represented by shading with no boundary are estimated.</p>
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On 29th August, reports from aircraft, ships and island stations indicated that Betsy had now intensified to hurricane strength, the centre being some 200 miles NNE of San Juan, Puerto Rico. During the next two days the hurricane slowed down, moved rather erratically and lost some intensity. Maximum winds decreased to about 55 kt and the central pressure rose by 10 mb. On 1st September, however, the hurricane began moving to the westward and by the night of 2nd September winds had increased to 110–130 kt near the centre with a pressure of 945 mb. On 3rd September hurricane Betsy skirted the Bahamas moving north-westward, slowed down on the 4th and gradually moved in a small clockwise loop, its northward movement being then blocked by a large high pressure area over the eastern United States. Late on 5th September, Betsy began an unusual southward to south-westward movement through the northern Bahamas. On 6th September the hurricane moved slowly parallel to Great Abaco Island where hurricane force winds were reported for some 20 hours, reaching a maximum of 128 kt during the late afternoon. On the morning of the 7th, the centre, now about 40 miles in diameter, swept westward just north of Nassau. Lowest pressure at this time was 957 mb and violent winds and high tides caused moderate to heavy damage throughout the northern and central Bahamas.

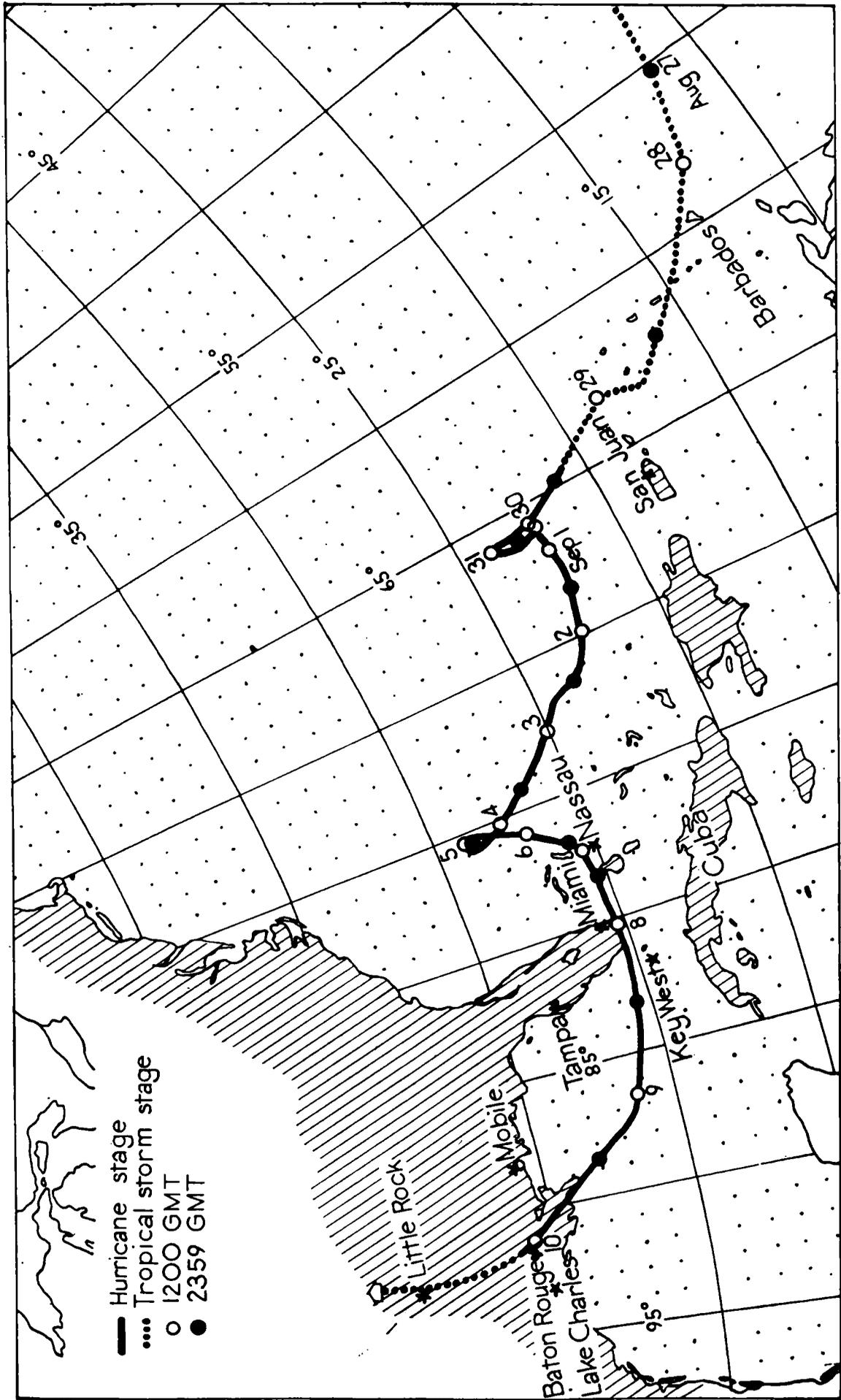
Betsy moved westward during the afternoon and evening of the 7th September and was the second recorded major hurricane to approach Florida after moving south-westward, the previous one being on 4th November 1935. Reports at this time indicated that its eye was at least 35 miles in diameter.

On the morning of 8th September, Betsy moved into the Gulf of Mexico after nearly two weeks of recalcitrant behaviour in the open waters of the North Atlantic Ocean, to cause what the Chairman of the Institute of London Underwriters at the Annual General Meeting described as “possibly the worst marine underwriting disaster arising from one incident which has ever occurred”.

By the morning of 9th September it was apparent that Betsy was coming close to the delta region of the Mississippi River and all persons in the Louisiana, Mississippi and Alabama coastal areas were advised to evacuate. By nightfall the eye of the storm was nearing the river delta and a tremendous surge of water, being pushed ahead, was beginning to cause havoc in the lower reaches of the Mississippi. As Betsy moved inland, with winds estimated at over 130 kt and a central pressure of 948 mb, this surge of water, estimated to be from 8 to 10 ft high, continued up the Mississippi River. At about 0300 GMT on the 10th, five cargo ships moored at the Andry Street wharf, broke from their moorings. Several of the ships carried away bollards from the docks and one ship carried a part of the wharf with it into the river. A floating dock at the Todd Shipyard, which contained a ship nearing completion, was rammed by one of these drifting ships and continued up-stream with her until it sank, leaving the new ship to continue the drift with disastrous results.

Further up river a tide gauge showed the water to have risen from 2.2 ft to 9.5 ft in four hours and then continue to rise to 12.4 ft. Nearly 200 barges, 7 ships and an oil drilling barge broke from their moorings and went adrift. An unknown number of these barges sank and the rest were scattered and driven aground. Two nearly completed hulls were blown about 7 miles up river and sank with one resting on top of the other. On this item alone, it was stated at the Annual Meeting of the Institute of London Underwriters, above mentioned, that the Underwriters had paid out over 18,000,000 dollars, which was said to be one of the largest peacetime marine insurance settlements known.

Betsy continued her destructive course up the Mississippi to the Baton Rouge area where barges, numbering some hundreds, were sunk or driven aground. One barge at the port contained 600 tons of chlorine and after nearly a week of search was found in 60 ft of water near the Louisiana State University Campus.



Track of hurricane 'Betsy' Aug. 27th-Sept. 12th, 1965.

As a result of the storm 90 per cent of south eastern Louisiana was without electric power; over 330,000 telephones were put out of service and an estimate of a quarter of a million people abandoned their homes. Nearly every building, home and business suffered some damage; property damage caused by Betsy has exceeded that of any previous natural disaster in the United States in modern times.

The value of good reports which enable early warnings to be given and timely evacuation of danger areas is amply shown by the fact that even Betsy caused only 75 fatalities compared with more than 2,000 deaths in south-eastern Louisiana which were caused by a somewhat similar, though undoubtedly less severe, hurricane which occurred in October 1893. See the reports from m.v. *Yorkshire* in *The Marine Observers' Log* on page 115.

Acknowledgement is gratefully made to the U.S. Environmental Science Services Administration for permission to quote from their report *Hurricane Betsy* and their *Mariners Weather Log*, for this article.

L. B. P.

551.3.26.7(261)

NOTES ON ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM JANUARY TO MARCH 1966

JANUARY

This was a month with an extremely marked contrast in the conditions between the two sides of the Atlantic. In the east, especially in the Baltic, ice was very heavy while off the Canadian Atlantic coasts very mild weather had the effect of keeping the seas much more open than usual.

Canadian Arctic Archipelago and Baffin Bay north of 75°N. Here the month was cold with temperatures 6°C below average in some places. All these areas were ice covered as usual.

Baffin Bay south of 75°N Foxe Basin, Hudson Bay and Davis Strait north of 65°N. Air temperature was variable fluctuating about the seasonal mean, the ice situation being roughly normal.

Hudson Strait. Although it was cool at first the temperature gradually rose to above average but here again there was little significant difference from the normal ice pattern.

Davis Strait south of 65°N. This area was consistently very warm—up to 10°C above normal—and consequently there was, especially in the western half, rather less ice than usual. There seemed to be considerable mobility.

Labrador Sea and Great Bank. Although the month started cool, air temperatures being 8°C below mean, there was a rapid and substantial warming up with temperatures becoming as much as 14°C above normal in some places. The sea, too, reacted and became much warmer than usual. As a result, by the end of the month ice had cleared from much of this sea area leaving only a narrow strip of pack along the Labrador coast. At the end of the period Belle Isle Strait itself was, quite exceptionally, open although earlier it had, indeed, been partially closed.

Southern Newfoundland Sea. Here, although the water near Nova Scotia was cool, temperatures were generally normal and a whole area was ice free.

Gulf of St. Lawrence and River St. Lawrence. At first temperatures were near the seasonal mean or somewhat below but they rose during the period and with the water temperature being a degree or so higher than usual it was, in fact, a very light month for ice, amounts being the least for the past six years.

Greenland Sea and Denmark Strait. Except in the areas to the east and south of Iceland where they were normal or slightly above, air temperatures were generally some 4–8°C below the mean but, as in the previous month, sea temperatures were as much as 5°C above normal in the Denmark Strait. It is believed that very considerable sub-surface convection was taking place. Consequently the distribution of ice was somewhat confused, there being less than usual in the extreme north (north of 75°N) and also south of 65°N. In between these parallels, however, ice fields were extensive reaching in some places, for example near Scoresby Sound, 100–150 miles further from land than usual.

Table 1. Icebergs sighted by aerial observation and merchant ships in the North Atlantic

(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
Number of bergs reported south of limit	JANUARY	*	*	*	219	141	30	0	0	0	0	0
	FEBRUARY	138	136	122	88	66	66	39	21	3	0	0
	MARCH	*	*	*	233	218	146	42	20	11	0	0
	Total	*	*	*	540	425	242	81	41	14	0	0
Number of bergs reported east of limit	JANUARY	*	219	185	50	1	0	0	0	0	0	0
	FEBRUARY	*	138	85	66	66	42	4	0	0	0	0
	MARCH	*	233	231	169	142	50	4	0	0	0	0
	Total	*	590	501	285	209	92	8	0	0	0	0
Extreme southern limit	JANUARY	54° 57'N, 57° 18'W on 20.1.66										
FEBRUARY	49° 05'N, 53° 10'W on 28.2.66											
MARCH	48° 46'N, 52° 35'W on 14.3.66											
Extreme eastern limit	JANUARY	54° 57'N, 57° 18'W on 20.1.66										
FEBRUARY	49° 25'N, 52° 50'W on 25.2.66											
MARCH	48° 46'N, 52° 35'W on 14.3.66											

* Probably large numbers, but none sighted in excess of those reported in further south positions or in further east positions.

Table 2. Baltic Ice Summary: January-March 1966

STATION	JANUARY 1966						FEBRUARY 1966						MARCH 1966													
	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
Kiel	0	31	0	0	0	0	0	—	11	20	10	0	8	3	0	0	—	1	31	31	0	0	0	0	0	—
Tønning	7	31	25	0	24	25	0	—	10	22	13	0	12	13	0	0	—	1	30	30	5	17	0	0	0	—
Husum	7	30	23	0	20	23	0	—	10	22	13	8	2	13	0	0	—	1	31	31	0	0	0	0	0	—
Emden	18	31	14	0	14	13	0	—	15	21	7	0	6	6	0	0	—	1	31	31	0	0	0	0	0	—
Lubeck	18	30	13	3	9	8	0	—	10	22	13	1	11	4	0	0	—	1	31	31	0	0	0	0	0	—
Gluckstadt	7	31	25	0	18	22	0	—	10	22	13	0	10	10	0	0	—	1	31	31	0	0	0	0	0	—
Bremerhaven	17	27	11	0	11	1	0	—	15	17	2	0	0	0	0	—	1	31	31	0	0	0	0	0	0	—
Flensburg	0	0	0	0	0	0	0	—	11	25	15	3	8	8	6	0	—	1	31	31	0	0	0	0	0	—
Leningrad	1	31	31	31	0	0	31	810	1	28	28	28	0	0	28	0	1224	1	31	31	31	0	0	0	0	1332
Riga	1	31	29	27	0	15	11	447	1	28	28	28	0	0	28	0	650	1	30	30	5	17	0	0	0	638
Pyarnu	1	31	31	30	0	12	18	549	1	28	28	28	0	0	4	24	831	1	31	31	31	0	0	0	0	857
Viborg	1	31	31	31	0	0	31	—	1	28	28	28	0	0	28	0	—	1	31	31	31	0	0	0	0	—
Stettin	6	30	22	0	6	16	0	104	9	24	16	1	7	13	0	0	105	0	0	0	0	0	0	0	0	—
Gdansk	19	20	6	0	0	0	0	147	4	20	12	0	5	6	0	0	181	0	16	11	0	4	7	0	0	93
Klaipeda	5	31	26	1	0	5	0	336	3	22	20	0	1	17	1	0	486	0	16	11	0	4	7	0	0	406
Ventspils	1	30	28	8	1	6	0	—	2	23	22	0	22	22	0	0	—	10	16	5	0	3	1	0	0	—
Tallin	15	31	15	0	14	2	13	—	1	28	28	16	10	0	27	0	—	1	31	31	0	31	0	0	0	—
Helsinki	1	31	31	31	0	3	28	694	1	28	28	28	0	0	28	0	1066	1	31	31	31	0	0	0	0	1139
Mariehamn	5	31	27	19	0	24	1	452	1	28	28	28	0	0	2	26	810	1	31	31	31	0	1	27	3	899
W. Norrskar	1	31	31	1	24	15	3	—	1	28	28	0	28	0	28	0	—	1	31	31	0	31	0	0	0	—
Turku	1	31	31	29	0	12	19	671	1	28	28	28	0	0	2	26	1045	1	31	31	31	0	0	31	0	1133
Mantwoto	1	31	30	15	0	15	15	—	1	28	28	28	0	0	7	21	—	1	31	31	31	0	0	17	14	—
Vaasa	1	31	31	31	0	0	12	919	1	28	28	28	0	0	0	28	1426	1	31	31	31	0	0	0	0	1639
Oulu	1	31	31	31	0	0	5	1136	1	28	28	28	0	0	0	28	1602	1	31	31	31	0	0	0	0	2006
Roytaa	1	31	31	31	0	0	0	—	1	28	28	28	0	0	0	28	—	1	31	31	31	0	0	0	0	—
Lulea	1	31	31	31	0	0	0	1218	1	28	28	28	0	0	0	28	1790	1	31	31	31	0	0	0	0	2150
Bredskar	1	31	31	30	0	11	12	—	1	28	28	28	0	0	0	28	—	1	31	31	31	0	0	0	0	—
Alvosund	1	31	31	31	0	0	30	765	1	28	28	28	0	0	0	28	1181	1	31	31	31	0	0	0	0	1300
Stockholm	1	31	31	31	0	31	0	460	1	28	28	28	0	27	1	0	742	1	31	31	31	0	31	0	0	763
Kalmar	1	31	31	21	6	31	0	255	1	28	28	8	1	10	18	0	408	1	19	19	0	9	11	8	0	372
Visby	0	0	0	0	0	0	0	174	7	28	15	0	9	11	6	0	350	1	30	28	0	28	3	27	0	352
Goteborg	20	31	12	0	9	4	0	264	1	28	28	15	13	24	0	0	441	1	12	11	0	11	3	0	0	416
Skelleftea	1	31	31	31	0	0	2	—	1	28	28	28	0	0	0	28	—	1	31	31	31	0	0	0	0	—
Aarhus	0	0	0	0	0	0	0	—	10	25	16	0	16	15	0	0	—	0	0	0	0	0	0	0	0	—
Copenhagen	25	27	3	0	2	2	0	67	15	23	11	6	3	5	5	0	103	0	0	0	0	0	0	0	0	15
Oslo	0	0	0	0	0	0	0	567	10	28	14	7	7	5	0	0	881	1	23	23	0	23	19	0	0	—
Kristiansandfjord	0	0	0	0	0	0	0	—	8	27	18	0	10	17	0	0	—	0	0	0	0	0	0	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 dangerous to navigation, but assistance not required.

G No. of days assistance required.
H No. of days closed to navigation.

I Accumulated degree-days of air temperature (°C) where known.*

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

Spitsbergen, Barents Sea and White Sea. The whole of this area was abnormally cold, air temperatures being 9–12°C below average and the sea as much as 2°C down. Pack ice covered, as a result, a far greater area than in a normal January, the White Sea being completely blocked. Near Spitsbergen the ice edge reached well south of Bear Island.

Baltic. For the Baltic it was an exceptionally cold month, the air temperature being 5–10°C below normal and the water about 2°C lower than average. Pack ice, as could be expected therefore, was more extensive and also much thicker than usual, certainly than reported during the past six years. It became a topic of international news interest. This state of affairs existed in most areas except, perhaps, along the German-Polish coastline. The Kattegat was also affected.

North Sea. The North Sea area, too, was cooler than usual—up to 4°C in air temperature and about 2°C in sea temperature. Even greater departures from means were experienced in the Skagerrak. There was some ice here and also in inlets on the Danish and northern German North Sea coast.

FEBRUARY

The previous month's pattern of weather lasted into February with much more severe conditions on the east side of the Atlantic than on the west.

Canadian Arctic Archipelago. The whole area was, as usual, ice covered although north of 75°N air temperatures were, by the end of the month, much higher than usual.

Baffin Bay and Davis Strait. This was definitely a warm area with the air in some places up to 10°C warmer than usual. The few ship reports available suggested, also, that the sea was, in general, warmer than normal. Ice amounts, especially over the western half of these seas, were below average.

Hudson Bay, Foxe Basin and Hudson Strait. Here again it was generally relatively warm but the ice situation was roughly normal.

Labrador Sea, Great Bank, Southern Newfoundland Sea and Gulf of St. Lawrence. Over these areas the month was quite unusually warm with air temperatures as much as 9°C higher than usual in places and the sea 2°C up on mean. Much less ice than usual was reported and off the Labrador coast the pack, under the influence of steady north-westerly winds, was well broken. Relatively few icebergs were seen.

River St. Lawrence. Cover was much as usual here except that, as a result of the persistent mild conditions, 6°C warmer than usual, the ice was exceptionally thin.

Greenland Sea and Denmark Strait. The transition from the mild west to cooler east was seen in this area where from Iceland northwards air temperatures were about 6°C below the seasonal mean, the sea was also cooler and, generally, much more ice than usual was reported. South of Iceland and in the Denmark Strait conditions were much more akin to those off the Canadian mainland, both air and sea being relatively warm and the ice along the south-east coast of Greenland rather less extensive than usual. It may be of interest to note that during this period, probably for the first time, British meteorologists made an aerial survey of the ice in this area.

Spitsbergen and Barents Sea. It was very cold here, temperatures at the beginning of the month being as much as 14°C below normal. The ice encroached therefore much further than usual reaching up to 300 miles or so further south than in a normal February.

White Sea. Early in the month air temperature was 17°C below average and ice as usual completely covered this area.

Baltic. The exceptional cold persisted from the previous month and at times air temperatures in the Gulf of Bothnia were as much as 17°C below normal, the lowest for many years. Ice there was more widespread and thicker probably than in any year this century although there was some alleviation in the conditions towards the end of the month. In the south though, the ice was not so bad as in 1963. On several occasions the Kattegat and the Oslo Fjords, too, were completely frozen over.

North Sea. In the Skagerrak with unusually low sea temperatures there was much more ice than usual particularly along the Norwegian and Danish coasts. The southern North Sea however was warmer than normal and there was no ice along the Dutch coast.

MARCH

There was a tendency for the sharp difference between the conditions on either side of the Atlantic to become less marked, all areas showing rather smaller departures from normal than earlier in the winter.

Canadian Arctic Archipelago. Here, apart from the area west of Banks Island where early cracks and leads developed, conditions were roughly normal although north of 75°N it was colder than usual for the time of year.

Baffin Bay and Davis Strait. In spite of mainly northerly winds air temperatures were not very far from normal but once again there was more open water than usual, this pattern having lasted from February.

Foxe Basin and Hudson Strait. Early in the month mainly north-westerly winds brought air temperatures somewhat lower than usual but later, with easterly winds, it again warmed up. Both stretches of water were completely ice covered.

Hudson Bay. Variable or light south-easterly winds had the effect of raising temperatures slightly above normal at first but north-easterly winds at the end of the month caused a cooling off. As usual the whole Bay was covered with ice.

Labrador Sea, Great Bank and Southern Newfoundland Sea. In the north of the area air temperatures fell to normal but to the south it continued warm. The sea everywhere retained much of its heat, water temperature being two or three degrees higher than usual. The pack, especially off the Newfoundland coast, was extremely variable in extent, changing quite rapidly from day to day. Overall it was a light month for ice.

Gulf of St. Lawrence and River St. Lawrence. Both air and water temperatures were higher than usual and the ice less than in a normal March, especially at the end of the month. Spring ice-breaking between Lake Ontario and Lake St. Francis commenced.

Greenland Sea and Denmark Strait. North of 70°N a persistently strong north-easterly wind kept air temperatures some 8 or 9°C below normal although towards the end of the month conditions became a little less severe. In spite of the fact that in places the sea was relatively warm the ice pack extended up to 150 miles further out than usual. To the north and west of Iceland air temperatures fell during the period to an extreme 7°C below normal but off southern Greenland conditions were above the mean. Sea temperatures south of the Arctic circle were, nevertheless, distinctly higher than normal and consequently there was less than the usual amount of ice.

Spitsbergen and Barents Sea. A mainly south-easterly airstream brought cold air from Russia and over the sea temperatures were as much as 9°C below normal. As a result the ice extended much further out than usual, e.g. up to 200 miles south of Spitsbergen.

White Sea. Here there was the normal cover of pack ice but the air was up to 8°C cooler than average.

Baltic. The extremely harsh conditions of the previous month lasted into March, there being still far more ice than in most years, but with quickly rising temperatures (especially in the south) there were, except in the Gulf of Bothnia, signs of a break-up, quite rapid in places. Surface water temperatures tended to move in step with the fast changing air temperatures and in the south rose almost to normal. This was particularly noticeable in the Kattegat where ice dispersed quite quickly.

North Sea. There was still rather more ice than usual along the Norwegian coast, the water temperature being a degree or so below normal. Air temperatures were variable. Towards the end of the month the area became completely free of ice.

Note. The notes in this article are based on information plotted on ice charts each month, similar to the map opposite p. 133, but on a much larger scale (39 in × 27 in). They 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.

N. B. M.

Book Reviews

Wind and Sailing Boats, by Alan Watts. 10 in × 7 in, pp. 224, *illus.* Adlard Coles Ltd., 36 Soho Square, London, W.1, 1965. Price: 55s.

This is a well produced and comprehensively illustrated book by an ex-professional meteorologist who is also an experienced yachtsman.

There is no shortage of good books on the subject of sailing, all of them of necessity devoting much of their contents to an explanation of wind effect. But Mr. Watts claims in his introduction that experience has shown that there exists a need for more information on the wind as it applies to small craft and observations on which it is based.

In eight chapters he has explained in fairly readable form such matters as the measure of the wind, pressure systems and wind, gusts and eddies, barriers to the wind (cliffs, hills and promontories), local winds, wind shifts, the wind and waves, the real wind and yacht research. Everything in fact that the sailing enthusiast can possibly wish to know about the structure of the wind as it affects sailing craft is described.

It is not a book which can be read in haste. The subject requires a good deal of concentrated study to be well understood, but will certainly repay the effort necessary to acquire this skill. Fortunately it is not essential to possess such detailed knowledge of wind structure to become a competent helmsman, otherwise sailing would not have the vast number of adherents it has at the present time. But as Mr. Watts has so rightly pointed out it is superior helmsmanship, which includes the ability to predict and then act on wind changes as they occur which is the deciding factor in racing. No amount of careful design can counter a failure in this respect.

At 55s. the book is good value but this price must put it beyond the means of many for whom it is primarily intended to appeal.

A. D. W.

The Principles of Diving, by Mark Terrell. 9½ in × 6 in, pp. 240, *illus.* Stanley Paul Co. Ltd., 178-202 Great Portland Street, London, W.1, 1965. Price: 50s.

Meteorology and oceanography are so interwoven that many of the readers of *The Marine Observer* are probably as much interested in oceanography as in meteorology, so it seems quite appropriate to review this book here. A study of the book shows that the diver—professional or amateur—can, and does make an appreciable contribution to our knowledge of oceanography and is likely to contribute even more in the future. Meteorology comes into the picture quite a lot. After all, the physical processes encountered in diving are, to some extent, the reverse of those encountered when ascending into the atmosphere. Cousteau and others have done much to popularize sub-aqua activities as a sport, associated largely with photography and fishing or for the mere joy of looking under water. Quite a few professional seamen no doubt dabble in these activities when an opportunity arises; so perhaps it is just as well for them to know something of the technicalities and safety precautions.

The author is well qualified to speak about what happens under the sea because he has had some 25 years sea experience, including service in the Royal Navy as a submarine officer and a diving officer of an experimental diving team.

The preface tells us that the book was written both for the technically minded and for non-technical readers. It goes on to remind us of the enormous food resources and other sources of wealth that lie beneath the ocean, yet how little is spent on oceanography compared with that on satellite programmes and schemes for outer space exploration.

For the non-technical reader, the first chapter, in particular, entitled 'The Sea as an Environment', which explains the physiological aspects of diving is very heavy going, but it is difficult to think how such a complicated subject, involving the effect on a human being of greatly increasing pressure and of breathing various gases at various pressures can be made simple. It seems impossible to avoid having to use words like anoxia, narcosis, and alveolar CO₂ tension! Parts of some of the other chapters are also a bit heavy going, particularly when discussing apparatus for deep diving. Generally, however, the book provides fascinating reading and one is left in no doubt of the author's familiarity with his subject.

The important questions of safety and communications are dealt with quite early in the book and then we move on to diving without apparatus, using a surface air supply and finally to deep diving and self-contained equipment. In the chapter about diving without apparatus, useful advice is given to the beginner, including comments about the most efficient use of fins and the best type of face-mask to use. In all these

chapters the effect of temperature and its effect upon the diver is gone into quite thoroughly and the author emphasizes that diving should never be done unattended and that there must always be strict discipline and fully understood communication procedure. This applies particularly in the case of divers using a surface air supply or self-contained equipment. The chapter on submarine medicine is positively blood curdling; one wonders if anybody would go in for diving if they read it beforehand! The unpleasant things that can happen to a diver and the treatment that can be provided are gone into in some detail. Obviously artificial respiration including the mouth to mouth method (referred to also as the biblical method, 2 Kings IV, 34) is described. There is a table at the end of this chapter giving the type of injuries that may be expected from the animal population of the sea and the author tells us they are either "violent or poisonous". A table in the book shows that this is no exaggeration—it is comforting to read therein however that sharks don't attack if the water temperature is below 60°F; on the other hand if you meet a killer whale you are unlikely to survive and the advice is to "leave the water immediately on sighting".

The subject of navigation both at the surface and underwater is dealt with at some length and there are also a few brief seamanship notes (primarily about such things as bends and hitches, storm warnings, buoys and handling of boats). The underwater navigation chapter is particularly fascinating and it is perhaps surprising to learn the varied techniques that are used, involving, for example, swimming on a compass course carrying a watch and compass on a small board and the use of marked lines, magnetic leader cables and powered underwater vehicles. The intricacies of underwater searching and surveying are described briefly with some fascinating drawings and a table of search patterns. After a chapter on underwater work, involving such jobs as examining and removing wrecks, the author gives us a peep into the future. It appears that the most useful future activity is likely to be in relation to fish farming, while the nuclear powered submarine may lead the way to submarine cargo ships. The book finishes with the hope that we in Britain will play an active part in this exploitation of the realm, in and under the sea, which has so much to offer.

C. E. N. F.

Radar Watchkeeping, by Captain W. D. Moss. 8½ in × 5½ in, pp. 96, *illus.* The Maritime Press Ltd., 13 Long Acre, London, W.C.2, 1965. Price: 8s. 6d.

The author of this book, who is a lecturer at a navigation school, has had much practical experience of radar at sea and is in charge of the radar simulator course at Hull, so he knows what he is talking about. In a foreword to the book, Captain J. H. Quick, formerly professional officer and chief nautical surveyor of the Board of Trade, having in mind that "we still have far too many collisions between ships fitted with radar", gives the book his blessing with the hope that "it may inspire those who do not behave as they should to think afresh".

In the introduction the author reminds us that "the advent of radar, heralded by over-enthusiastic reports, led many to believe that dangers due to fog would be eliminated and that the mariner would be able to proceed much as he did in clear weather. Subsequent collisions between radar equipped vessels, however, have proved that this is not so . . . the purpose of this booklet is an attempt to put radar into its correct perspective and to provide a simple guide to its correct use". This paper-backed book, at its very modest price, fulfils admirably the author's intention. This reviewer has no hesitation in recommending it to every navigating officer.

The author doesn't waste words and he leads the reader straight into the problem. In the beginning of the first chapter about why collisions occur despite radar he points out that "radar does not take the place of the navigator's eyes in fog: indeed it is little better than the blind man's stick probing out to feel if the way is clear and at times to help him find out where he is". With the aid of simple drawings and

simulated photos of PPI displays, various incidents, involving ship targets are illustrated and the reader is instructed as to the most prudent action to take. In most cases the wrong action is also indicated. The desirability of plotting, whenever possible, is rightly emphasized and the question of more than one target is touched upon, but it would have perhaps been helpful if a few more instances of multiple targets had been given and if a little more had been said about the problem of plotting in coastal waters where there is a lot of traffic. Practical advice is given about lining up and checking radar performance and various effects and errors are described.

It is gratifying to note how the advice given in this book conforms to that given in Ministry of Transport Notices M445 *Navigation with ship borne radar in reduced visibility* and M463 *The use of radar* both of which are reproduced as appendices to the book. Pitfalls concerning the use of radar for fixing a ship from land targets are discussed and advice is also given about practising the use of radar in clear weather. In the final chapter information is given about the use of various plotting aids.

C. E. N. F.

Personalities

RETIREMENT.—CAPTAIN D. A. BRAID of the Bristol City Line completed his last voyage to sea when the *Gloucester City* docked in the Bristol Channel in December 1965 and has now retired after fifty years of continuous service in the Merchant Navy.

David Alexander Braid commenced his sea service with the Ben Line of Leith in 1916 and remained with that Company until he obtained his Master's Certificate in 1924. He then joined the Pacific Steam Navigation Company and after two years in their service spent twenty-five years in ships of Messrs Elders & Fyffes Ltd. He joined the Bristol City Line in 1950 and remained with them until retirement, obtaining command of the *Gloucester City* in 1963.

Captain Braid describes his sea service as uneventful, but since he served through part of the first world war and the whole of the second conflict, there is no doubt that, in common with many fine seamen of his generation, he gave of his best in the country's interest in addition to that meticulous attention to duty which brings a man through fifty years of sea service without ever having been involved in an accident to his ship.

Captain Braid's association with the Meteorological Office commenced in 1937 when he was in the *Cavina* and since then 18 logbooks bearing his name have been received, covering 12 years of observing. Thirteen of these books have been assessed Excellent. He received Excellent Awards in 1965 and 1966.

We wish him good health and many years of happy retirement.

F. G. C. J.

Notice to Mariners

BBC WEATHER BULLETINS FOR SHIPPING: CHANGES OPERATIVE FROM 6TH JUNE 1966

The bulletin for shipping originated by the Meteorological Office, and previously broadcast on the BBC Light Programme, 200 kc/s (1500 m) at 0645 are now broadcast at 0640 (clock time). [*Met.O. Leaflet No. 3* and *A.L.R.S. Vol. III.*]

To help the forecasters reduce the length of some forecasts, a slight change in the order of coastal sea areas has been made. The new order is . . . Sole, Lundy, *Fastnet*, Irish Sea, Shannon, Rockall, Malin, Hebrides, *Bailey*, Fair Isle, Faeroes, South-east Iceland. Those areas printed in italic have moved position in the broadcast.

Notice to Marine Observers

CHANGE OF ADDRESS

Mr. J. C. Matheson, Master Mariner,
Port Meteorological Officer,
Movements Control Building,
South Side,
Victoria Dock,
London, E.16.

(Telephone: 01—476—3931)

MERCHANT NAVY AGENT—CHANGE IN APPOINTMENT

Southampton . . Mr. J. W. E. Thwaites, Master Mariner, Merchant Navy
Agent,
Southampton Weather Centre, 160 High Street below Bar,
Southampton.
(Telephone: Southampton 20632)

Editor's Note

In the article on "The Climate and Weather of the North Sea" in the October 1965 issue of this journal, it was not intended that the last sentence of the first paragraph on p. 186 should convey the impression that the worst gales, taking all depressions into account, occur with a falling barometer, in advance of the depression. Indeed the most severe gales, in the sense of the one in ten or twenty years occurrence, are more likely to be in westerlies or north-westerlies with a steady or rising barometer.

Fleet Lists

GREAT BRITAIN (Information dated 31.3.66)

The following is a list of British ships which have been equipped with instruments and which voluntarily co-operate with the Marine Branch of the Meteorological Office. The names of the Captains, Observing Officers and Senior Radio Officers are given as ascertained from the last written returns received. The date of receipt of the last return received is given in the second column; an asterisk indicates a new recruitment who has not yet sent in a logbook.

All returns received from observing ships will be acknowledged, direct to the ship, by the Marine Superintendent of the Meteorological Office. The Port Meteorological Officers and Merchant Navy Agents will make personal calls on the Captains and Observing Officers as opportunity offers, or on notification from the ship at any time when their services are desired.

Excellent Awards are made at the end of each financial year. The names of the Captains, Principal Observing Officers and Senior Radio Officers gaining these awards are published each July in *The Marine Observer*.

It is requested that prior notification of changes of service, probable periods of lay-up, transfer of Captain, or other circumstances which may prevent the continuance of voluntary meteorological service at sea, may be made to a Port Meteorological Officer or Merchant Navy Agent, or to the Marine Superintendent of the Meteorological Office at Bracknell.

Captains and Officers are invited to point out any errors or omissions which may occur in the list.

Selected Ships

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Accra</i>	10.3.66	F. St. H. Webber	I. Tunstall, R. Skinner, S. Bonner	M. F. Conroy	Elder Dempster Lines
<i>Achilles</i>	15.2.66	R. G. Boyd	C. D. Elton, M. L. Morgan, D. G. S. Thompson	A. F. Janicki	A. Holt and Co.
<i>Adelaide Star</i>	27.1.66	C. R. Horton, D.S.C.	J. R. Kennedy, R. Sapsford, L. Duffin, K. Procter	R. Thorburn	Blue Star Line
<i>Aden</i>	11.5.65	W. B. Thompson	M. H. Julian, J. W. Paston, D. A. Rodger	D. Drummond	P. & O.-Orient Line
<i>Adventurer</i>	10.1.66	R. Ledger	H. Shaw, J. M. Procter, D. Eastgate, T. G. Oxley	P. Goulden	Harrison Line
<i>Afghanistan</i>	3.2.66	G. Black	C. D. Louis, R. Cameron, J. M. Allison	J. M. Balfe	Common Bros Ltd.
<i>Africa</i>	9.12.65	P. K. Murchison	W. M. Douglas, G. Stewart, J. Simpson	M. Doyle	Shaw Savill Line
<i>Albania</i>	*	T. H. Davies	B. C. Goulotherpe, A. Cattell, B. Brush	B. Farrow	Cunard Line
<i>Albany</i>	31.1.66	G. G. Chatterley	J. E. Lambert, R. C. Little, H. G. N. Lloyd	T. Hoyle	Royal Mail Lines
<i>Albatan</i>	2.9.65	W. Mackenzie	V. L. Cox, J. Woodmass, D. J. Coulson, P. Cleife	V. Patterson	Strick Line
<i>Aldersgate</i>	30.12.65	P. L. Hopkins	A. M. Collic, V. Isadoro, M. Gower	J. Rush	Silver Line
<i>Alert</i>	2.2.66	J. P. Ruddock, O.B.E.	A. L. Preston, A. M. Wineberg, J. D. Lakeman	H. O'Sullivan	H.M. Postmaster General
<i>Alinda</i>	31.1.66	L. J. P. Courts	W. Kraemer	Jones	Shell Tankers (U.K.) Ltd.
<i>Alva Bay</i>	1.2.66	L. L. Wellings	J. C. Blake, I. S. M. Condie, J. R. A. Pepper	J. Ryan	Alva S.S. Co. Ltd.
<i>Amalric</i>	5.1.66	J. R. Richmond	M. Odgers, M. Rason, R. Dabinett, M. F. Carter	E. Winslow	Shaw Savill Line
<i>Amazon</i>	10.2.66	R. D. Jones	J. R. Ashley, C. G. Pogue, J. McP. Pratt, P. Blackshaw	C. Duggan	Royal Mail Lines
<i>Amoria</i>	20.11.64	G. E. Thorton	N. T. Alford, J. O. Atkinson, R. G. P. Paine	F. A. Dynn	Shell Tankers (U.K.) Ltd.
<i>Andania</i>	17.3.66	A. J. G. Barff	P. Baker, R. Kersall, J. Currie	J. Hands	Cunard Line
<i>Andes</i>	17.9.65	R. McWilliam	M. Sterry, R. W. P. Magee, M. M. Begg, J. M. Murray	R. Brackenridge	Royal Mail Lines
<i>Apapa</i>	1.7.65	J. Fox	K. A. MacLeod, M. J. Butler	R. P. Dugher	Elder Dempster Lines
<i>Aragon</i>	3.1.66	R. Brown	A. N. Fletcher, E. Bubeer, E. Snow, R. Barton	F. Kirk	Royal Mail Lines
<i>Araluen</i>	24.9.65	I. P. N. Cameron	D. Craddock, J. R. Hawkins, O. H. Cook, A. P. Leason	D. Hill	Trinder, Anderson & Co. Ltd.
<i>Aramaic</i>	8.11.65	E. R. Pearce, O.B.E.			Shaw Savill Line
<i>Argentina Star</i>	29.12.65				Blue Star Line

<i>Argyllshire</i> ..	4.1.66	I. C. Scott	M. J. W. Baker, A. S. Grant, T. H. Bryans	A. McLeod	Clan Line
<i>Ariana</i> ..	16.9.65	T. W. F. Bolland	P. Griffin, R. Pennington, J. R. Jardine, C. Sturke	R. F. Dunk	Royal Mail Lines
<i>Arthur Albright</i> ..	25.2.66	J. H. Kitching	M. B. L. Dearness	C. M. Jackson	James Fisher & Co. Ltd.
<i>Asprella</i> ..	24.3.66	I. J. Greener	E. Wilkinson, P. C. Koops, P. J. M. Nelson	H. M. Carr	Shell Tankers (U.K.) Ltd.
<i>Asyanax</i> ..	20.12.65	D. L. Emery	A. S. Jackson, R. G. Pritchard, J. W. Rigg	J. B. Carr	A. Holt & Co.
<i>Athelcrest</i> ..	8.11.65	S. W. Waldron	A. M. Finlay-Notman, M. Hancock, R. Hamilton	P. H. Bates	Athel Line Ltd.
<i>Athelduke</i> ..	3.2.66	R. H. Lonsdale	D. Cronk, D. Sharp, S. Thacker	R. Hindmarsh	Athel Line Ltd.
<i>Athelmere</i> ..	10.2.66	C. R. J. Roberts	P. Morrissey, H. Flanagan, H. Pevy, N. Paterson	D. Schofield	Athel Line Ltd.
<i>Athenic</i> ..	10.12.65	G. Heywood	R. A. Atkinson, M. B. Sandell, F. C. Watkins	C. G. T. McCusker	Shaw Savill Line
<i>Aureol</i> ..	24.11.65	W. E. Humphreys	I. R. Muir, J. Byard, A. McAlmnot-Woods, P. Hewit	M. Higgins	Elder Dempster Lines
<i>Australia Star</i> ..	18.11.65	D. M. McPhail	D. M. Hulme, A. Kinghorn, P. Howorth	B. Williams	Blue Star Line
<i>Australind</i> ..	4.2.65	T. Hastings	C. D. Riley, R. Myles, M. Williams, F. Quick	M. J. Cankem	Trinder, Anderson & Co. Ltd.
<i>Ayrshire</i> ..	29.12.65	R. Sutcliffe	B. D. Thomson, D. F. Meredith, A. T. Campbell,	G. L. Macindoe	Harrison Line
<i>Balistan</i> ..	8.7.65	P. MacMillan	R. McLachlan		Clan Line
<i>Bamburgh Castle</i> ..	1.4.65	J. F. Ockleford	R. A. Francis, D. F. Gates, E. Wells, M. Robinson	A. Sloan	Strick Line
<i>Bankura</i> ..		I. G. Goldie	M. J. Tune, S. Stone, R. Charlton, J. Gyte	A. C. Merchant	W. A. Souter & Co. Ltd.
		J. E. Wills	R. Pattenden, A. Barker, W. MacDonald,	M. Nash	British India Line
			A. D. Horscroft		
<i>Baron Pentland</i> ..	9.9.65	T. Macleod	D. J. Dickson, T. Dutt, J. McNeil	W. D. Thompson	Hogarth Line
<i>Barrister</i> ..	22.3.66	I. W. Cubbin	J. A. Fletcher, A. F. Perry, S. J. P. Lamerton	B. M. Boynes	Harrison Line
<i>Baskerville</i> ..	10.11.65	R. J. Lungley	M. K. Austin, N. Cheshire, G. A. Simmons E. G. Brady	G. Burke	Canatlantic Ltd.
<i>Bassano</i> ..	18.8.65	B. Waldie	M. Atkinson, R. Ward, E. Metham, H. Blagdon	P. Curwell	Ellerman's Wilson Line
<i>Beaverash</i> ..	18.11.65	I. D. Jeavons	P. Adair, M. Brewer, E. R. Cumming, A. Bettles	J. C. Hales	Canadian Pacific Line
<i>Beaverbank</i> ..	16.12.65	G. D. Scott	E. R. Bruce, A. MacBain, F. Hunter	J. A. D. Power	Bank Line
<i>Beaverelm</i> ..	4.10.65	J. Waling	B. Duncan, D. Bruce, P. Hansell	V. Merriott	Canadian Pacific Line
<i>Beaveroak</i> ..	7.1.66	B. Ford	N. A. Ross	J. W. Kenny	Canadian Pacific Line
<i>Beaverpine</i> ..	10.3.66	C. Beck	J. B. W. Edgar, D. Green, —, McKenzie	W. Paterson	Canadian Pacific Line
<i>Benarmin</i> ..	15.10.65	J. C. Harvey	D. E. P. Nicholson, E. P. Gibb, J. D. Lewthwaite	J. M. Alston	Ben Line
<i>Benatona</i> ..	28.7.65	A. McKenzie	R. G. N. Aiken, A. E. Johnston, G. D. Stobbs	J. Morton	Ben Line
<i>Benclough</i> ..	28.2.66	R. S. Lumsden	I. M. Greig	G. R. Kerr	Ben Line
<i>Benhope</i> ..	11.10.65	W. D. Cowie	G. M. McCrone, T. M. Robertson, R. Arkless	W. Parkinson, M.B.E.	Ben Line
<i>Benlomonad</i> ..	2.12.65	D. S. Sinclair	A. Clish, D. H. Campbell, A. C. Davidson	Y. G. Duggan Hills	Ben Line
<i>Benmacdhui</i> ..	3.3.66	W. C. Watson	E. A. Masson, I. R. G. Donaldson, E. O. Olsen	J. McCool	Ben Line
<i>Benrimnes</i> ..	17.9.65	R. Griffiths	P. Crebbin	G. W. Harris	Henderson Line
<i>Benvennoch</i> ..	25.11.65	W. J. Kinnaird	M. J. Paine, J. H. Cloke, M. J. Crawford	J. Horrocks	Silver Line
<i>Bharno</i> ..	11.10.65	M. R. Duke	I. Chadwick, K. Hume, I. Middleton, B. Roberts		Prince Line
<i>Bishopsgate</i> ..	19.10.65	E. A. Kemp	J. P. Butler, M. Plant, R. Alderman		British India Line
<i>Black Prince</i> ..		D. M. Gill	T. M. D. Hunter, B. V. Peters, J. Davidson	W. Morrissey	Booth Line
<i>Bombala</i> ..	17.1.66	J. Whayman, C.B.E., D.S.C.	J. B. Fillingham, R. G. Williams, G. R. Cowap	A. P. Moss	Booker Line
<i>Boniface</i> ..	21.3.66	S. Armitage	A. M. Smith, R. McKechnie	D. MacKae	Booker Line
<i>Booker Vanguard</i> ..	9.2.66	T. W. Jones	T. E. Thomas, C. Brown, H. Tristram	M. J. Farrelly	Warwick Tanker Co. Ltd.
<i>Booker Venture</i> ..	9.12.65	D. S. Craven	R. N. Johnston, D. Ramsey, A. Taylor, A. Keenan	J. O'Shaughnessy	Blue Star Line
<i>Brandon Priory</i> ..	20.12.65	L. Vernon, M.B.E.	A. Storey, J. A. Fettinger, M. A. Morrill	P. Kenneally	Ellerman's Willson Line
<i>Brasil Star</i> ..	21.3.66	W. Tadmán	T. T. Kent, F. Hillsdon, M. C. Smith	T. O'Driscoll	Medomsley S.S. Co. Ltd.
<i>Bravo</i> ..	2.2.66	G. A. Austen	A. J. Child, T. S. Harley, D. Robertson	S. R. McQuire	Glen Line
<i>Brecon Beacon</i> ..	23.7.65	D. D. McIntosh	C. P. Hickling, W. A. Hurse, M. Winter P. Hickling	T. M. Jenkins, M.B.E.	Chapman & Willan Ltd.
<i>Breconshire</i> ..	11.3.66	D. Nicholas	E. C. Evans, C. J. Graham, N. Groves, T. M. Carrick	J. R. Power	Bristol City Line
<i>Brighton</i> ..	14.2.66	R. E. Neil	R. J. Higgins, M. J. Cannell, A. L. Watson, I. Black	A. Hemlin	B.P. Tanker Co. Ltd.
<i>Bristol City</i> ..	22.11.65	F. E. Bell	C. A. Robins, D. J. Briggs, D. T. Rudd, L. B. Nichols	A. Butler	B.P. Tanker Co. Ltd.
<i>British Ambassador</i> ..	2.3.66	J. E. V. T. Robinson	J. Strange, J. Thomson, N. I. Cadman	S. A. Penn	B.P. Tanker Co. Ltd.
<i>British Bombardier</i> ..	4.10.65	P. D. Waller			
<i>British Freedom</i> ..		W. O. Burns			
<i>British Resource</i> ..					

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>British Sailor</i>	19.5.65	F. W. Cuffley	A. H. Skellern, R. J. P. Gumbrell, C. Young,	J. O'Connell	B.P. Tanker Co. Ltd.
<i>British Splendour</i>	15.2.66	A. Richardson	R. Simpson	J. Smith	B.P. Tanker Co. Ltd.
<i>British Trust</i>	29.9.65	T. B. Halvorsen	J. Sharples, T. P. Dimmock	B. Carson	B.P. Tanker Co. Ltd.
<i>Bulimba</i>	10.8.65	D. P. Barry	W. K. Fullagar, J. J. Grimwood	C. J. A. Voutt	British India Line
<i>Cairnesk</i>	•	J. Watson	W. A. Herman, C. E. Banks	J. Barrie	Cairn Line
<i>Cairnglen</i>	•	J. Illingworth	K. Hunter, A. Milroy, G. Bell		Cairn Line
<i>Calchas</i>	17.1.66	J. F. C. Dowie	J. Halliwell, C. Shadbolt, D. Smith		A. Holt & Co.
<i>Caledonia Star</i>	2.2.66	A. H. White	D. M. Ramsay, T. C. Black, R. Randle	D. P. Stoker	Blue Star Line
<i>Caltex Camberra</i>	17.3.66	E. H. Adams	R. R. Brooks, D. Saunders, P. M. Deslandes	V. Ryan	Overseas Tankship (U.K.) Ltd.
<i>Caltex Edinburgh</i>	8.11.65	B. James	B. S. Sutherland, J. Lees, R. Backler, J. Rhydderch	G. Light	Overseas Tankship (U.K.) Ltd.
<i>Caltex London</i>	16.2.66	A. Thompson	R. L. Lees, D. E. Kerrigan, P. A. Heckingbottom	N. Buchanan	Overseas Tankship (U.K.) Ltd.
<i>Caltex Saigon</i>	1.11.65	J. G. Smith	C. Jowett	G. R. McCarroll	Elder & Fyffes
<i>Camito</i>	29.3.66	P. Chubb	M. A. Bovill, R. M. Eaton, J. F. Swann	H. V. Hall	P. & O.-Orient Line
<i>Canamoro</i>	2.2.66	L. C. Kingswood	R. W. Fedlow, J. Weber, L. Mounsey W. Virtue	D. M. MacDonald	Shaw Savill Line
<i>Canopic</i>	15.12.65	B. Hammond	R. Johnston, C. D. Churcher, D. Wale	G. Arnup	Blue Star Line
<i>Canterbury Star</i>	23.3.65	T. A. Ireland	J. W. M. King, E. Morrison, P. Cooney, D. Cory	A. MacEachen	Lyle Shipping Co. Ltd.
<i>Cape Franklin</i>	7.2.66	T. P. Edge	P. Richardson, A. R. MacRae, S. J. Readman,	A. Chambers	Lyle Shipping Co. Ltd.
<i>Cape Howe</i>	31.1.66	T. R. Baker	J. Roberts		
<i>Cape Nelson</i>	17.11.65	A. Hunter	C. MacLean, J. Roberts, G. Anderson, R. P. Davis	D. Runciman	Lyle Shipping Co. Ltd.
<i>Cape Sable</i>	10.9.65	A. B. Sutherland	P. Richardson, S. J. Readman, B. J. Coombe	L. Cameron	Lyle Shipping Co. Ltd.
<i>Capetown Castle</i>	29.3.66	D. W. Sowden	R. Belcourt, M. Andrews, I. Bell, H. Jones	J. Eager	Union Castle Line
<i>Cardiff City</i>	14.10.65	I. Williams	T. Lawson, D. C. Griffith-Jones, R. W. Sumner	J. R. Mathews	Sir Wm. Reardon Smith & Sons
<i>Cardiganshire</i>	10.2.66	S. E. Allerton	G. R. E. Yeatman, A. M. Watt, A. V. Anguish,	C. W. Knubb	Glen Line
<i>Carinhia</i>	7.2.66	R. J. N. Nicholas, R.D.	J. M. Bubb	A. McPherson	Cunard Line
<i>Carmania</i>	9.12.65	W. J. Law, R.D.	D. M. Henderson, P. Walton, M. Pratt	C. H. Pennington	Cunard Line
<i>Caronia</i>	30.3.66	G. T. Marr, D.S.C.	H. Williams, R. Hardman, V. Doyle	G. Parson	Cunard Line
<i>Carrigan Head</i>	9.12.65	T. Sellers	D. Mahon, H. Stewart, J. Knox	P. G. Murray	Head Line
<i>Caxton</i>	19.5.65	J. G. Wilson	I. C. Rollo, P. Roberts		Transatlantic Carriers Ltd.
<i>Ceramic</i>	24.11.65	N. S. Milne	P. J. Marchbank, I. P. Carr, C. J. Bland	R. O'Shaughnessy	Shaw Savill Line
<i>Chakia</i>	21.1.66	P. M. Pitcairn	J. W. Edwards, D. Wood, G. Lack	F. T. Davenport	British India Line
<i>Chantala</i>	12.7.65	F. A. Everett	R. J. Hull, D. Cherry, T. E. Russell	J. W. Field	British India Line
<i>Cheshire</i>	26.10.65	G. L. Hagley	M. M. Reeves, C. Martin, F. Gurney	C. Beyer	Bibby Line
<i>Chesvit</i>	22.3.66	R. Robinson	Q. K. Guttridge, A. Magrath, J. Walker	S. C. Ripron	Bamburgh Shipping Co. Ltd.
<i>Chandwara</i>	24.11.65	J. McCowan	I. G. F. Harwood, R. J. Cox, D. M. Monro	J. Hanly	British India Line
<i>City of Birmingham</i>	18.1.66	G. E. Greenhow	P. F. Lisle-Taylor, T. Weatherly, T. Mallory,	D. Herdman	Ellerman Lines
			A. Westlake		
<i>City of Brisbane</i>	3.9.65	H. Swinney	J. A. R. Heaney, C. Baxter, G. J. Latcham	B. L. Baker	Ellerman Lines
<i>City of Brooklyn</i>	19.10.65	T. H. Fairhurst	P. Rose, J. G. Hill, R. M. Herring	P. W. R. Day	Ellerman Lines
<i>City of Camberra</i>	27.9.65	T. Rigg	K. Murtitt, R. Purkiss, R. A. H. Bloss	M. Rigg	Ellerman Lines
<i>City of Chester</i>	28.1.66	T. Lovell	R. Shearar, M. Taylor, K. M. Ele Sedy	T. Millett	Ellerman Lines
<i>City of Coventry</i>	9.2.66	F. C. O'Neill	P. Rose, J. Petter, A. Free	G. H. Batcheler	Ellerman Lines
<i>City of Glasgow</i>	26.10.65	R. K. Walker	C. D. Campbell, R. A. Lindsay, G. G. Johnston,	C. B. Smith	Ellerman Lines
			C. S. Wood		

City of Johannesburg	20.12.65	L. R. Jones	P. W. Jackson, R. F. Mantle, A. R. Miller	M. H. Crocker	Ellerman Lines
City of Yohannesburg	2.9.65	M. Graham	J. Peddie, P. Penellier, R. M. Ashworth	P. Jones	Ellerman Lines
City of Liverpool	31.5.65	F. C. O'Neill	V. M. Rore, D. D. Turner, J. N. MacDonald	P. B. Mooney	Ellerman Lines
City of London	17.11.65	R. H. Bellhouse	N. Wigglesworth, B. W. Noble, J. Netterberg, D. D. Jameson	R. Wilgress	Ellerman Lines
City of Manchester	28.2.66	G. R. Jackson	M. G. Sewell, T. D. Parkhouse	J. R. Dunne	Ellerman Lines
City of Melbourne	4.3.66	A. M. Bowman	R. P. Dougal, J. Addison, R. J. Doe	S. J. Schuster	Ellerman Lines
City of New York	11.3.66	R. H. Broadbent	M. R. Donaghy, A. R. Rogerson, N. H. Willott, A. A. Ramsden	J. Wuille	Ellerman Lines
City of Oxford	24.3.66	G. E. Greenhow	C. S. Wood, —, Matson, K. Graham	A. J. McNeil	Ellerman Lines
City of Pretoria	12.1.66	H. Swinney	P. G. Pike, W. Donn, C. L. Knowles, D. Brown	G. W. Burgen	Ellerman Lines
City of Swansea	28.1.66	J. S. Schofield	R. Hendy, K. Crow, N. H. Willott	R. C. Hayward	Ellerman Lines
City of Wellington	25.6.64	H. Lewis	C. W. Rapley, C. J. Pickering, A. E. C. Struthers	W. Beverley	Ellerman Lines
Clan Macdonald	9.9.65	A. Mair	C. MacIver, O. Barnsley, M. Jackson	D. C. J. Laing	Clan Line
Clan Macdougall	2.11.65	W. Graham	R. L. Stephens, H. Edwards, P. J. Mahoney, M. D. Whiteley	A. Leeder	Clan Line
Clan Macgillivray	31.3.66	F. H. S. Petherbridge	J. K. Currie, D. L. Bark, J. F. Berry	D. A. P. Galbraith	Clan Line
Clan Macgregor	8.7.65	C. M. Powell, M.B.E.	K. B. Whitting, F. G. King, C. Thomson	W. Latus	Clan Line
Clan Macintyre	31.3.66	A. M. Kennedy	D. M. Hawker, D. Williams, P. MacNiven, —, Cook	I. Kelly	Clan Line
Clan Macleod	20.1.66	A. Crawford	J. Cotton, R. A. Slack	N. Birnie	Clan Line
Clan Macleod	3.2.66	L. Fogson	J. S. Santamaria, D. J. Burgoyne, W. H. Walker	D. Kink	Clan Line
Clan Macleod	18.11.65	T. R. Kendra	W. B. Rebello, D. F. Wray-Cook, D. J. Innes	M. Heskeith	Clan Line
Clan Macleod	20.11.65	P. N. V. Rewell	R. Bell	D. Withern	Clan Line
Clan Macleod	18.11.65	W. J. Freestone, M.B.E.	D. R. Johnson, L. H. Richardson, D. Richards	P. J. Whelaw	Clan Line
Clan Macleod	20.11.65	S. R. J. Woods, D.S.C.	P. Atkinson, P. Fleming, C. Abbott	J. Blackwell	Clan Line
Clan Macleod	16.2.66	J. Browne	P. Lightbody, S. M. Grant, M. J. Kemp	J. N. Wright	Clan Line
Clan Macleod	20.9.65	G. S. Gann	J. Simpson, D. Paterson, J. W. Costley	P. Entwistle	Clan Line
Clan Macleod	14.1.66	A. F. Banks	G. H. Ball, J. B. Woomble	W. Gay	Clan Line
Clan Macleod	11.8.65	R. Allan	A. J. Hopper, D. Campbell, A. Johnston, D. Harrower	M. A. Rooney	Donaldson Line
Clan Macleod	29.12.65	H. O. V. Anderson, M.V.O.	S. R. Finney, M. Lindsay, V. Ridges	R. W. A. Crone	Shaw Savill Line
Clan Macleod	22.12.65	J. Cosker	I. F. H. Taylor, G. F. Everitt, G. F. Morris, R. C. Ford	M. A. Thompson	Federal Line
Clan Macleod	14.9.65	J. H. Allenby	M. H. Child, C. Rowntree, P. T. McGonical	P. G. Lyons	Pacific S. N. Co. Ltd.
Clan Macleod	29.12.65	V. H. Vizer	J. W. Neil, J. A. Thompson, I. Sayward, N. Beecroft	E. Cathcart	Shaw Savill Line
Clan Macleod	26.7.65	—, Dewar	O. M. Owen, T. G. Orley, C. Hebden	F. Murrant	J. & J. Denholm Ltd.
Clan Macleod	20.12.65	H. G. Skelly	E. McCudden, I. Cleaver, J. Moorhouse, F. Bowden	P. V. O'Donnell	Harrison Line
Clan Macleod	17.9.65	I. E. Leaver	V. R. Gibson, R. L. Bhattachargee, A. Rankin, J. T. Merrick	M. F. Hayes	Sugar Line
Clan Macleod	8.3.65	R. M. Pitts	N. C. Horton, F. Bowden, H. H. Scally, G. Spenser	G. Jones	Sugar Line
Clan Macleod	29.12.65	A. F. Lunn	H. H. Scally, D. Roberts, E. Duffield	R. Thorpe	Sugar Line
Clan Macleod	24.2.66	T. Day	M. S. W. Humphrey, P. D. Goodman, B. E. Evans	L. C. Taylor	Sugar Line
Clan Macleod	29.12.65	N. S. Lancaster	M. V. J. Ricketts, W. Hill, J. E. Sherwood	R. E. Jenkins	Sugar Line
Clan Macleod	3.12.65	D. Patrickson	M. J. Murphy, J. D. Mercer, D. N. L. Thomson	S. K. Stannin	Sugar Line
Clan Macleod	7.1.66	S. Gorrell	J. R. Collins, A. J. Champion, B. Eagle	K. R. Lamdin	Federal Line
Clan Macleod	14.9.65	C. P. Robinson	J. N. K. Mansell, W. G. Lockie, T. N. O'Driscoll	J. J. Cameron	Shaw Savill Line
Clan Macleod	21.2.66	G. V. Conolly, D.S.C.	F. W. Quick, J. A. Billington, P. G. Rylands	E. Forrest	Harrison Line
Clan Macleod	20.1.66	D. C. Meldrum, M.B.E.	P. L. Morley	T. Hoyle	Royal Mail Lines
Clan Macleod	28.2.66	R.N.R.	W. F. R. Whiting, S. Williamson, B. Bass, D. Roberts	M. Lebbon	Wm. France, Fenwick & Co. Ltd.
Clan Macleod	9.12.65	J. Elliott	M. H. Murray, M. Sargeant, B. Fraser, M. Holleyoak	J. F. Twomey	Shaw Savill Line
Clan Macleod	3.3.66	C. A. Borthwick	P. A. Brown, J. M. Hughes, P. J. Wood	I. Gall	Glen Line
Clan Macleod	11.2.66	M. B. Goodman, M.B.E.	M. T. Crimp, M. Boulton, J. Neary, G. B. Pines	T. Walker	Royal Mail Lines
Clan Macleod	24.1.66	J. I. Jones, D.S.O., D.S.C.	C. B. Middleton, R. Braddley, R. Jones, S. Bryson	P. H. Cruise	Lampport & Holt Line
Clan Macleod	11.10.65	G. W. McCathie	D. A. Davies, P. Pigneguy, R. P. Irving	D. A. Macaulay	Federal Line
Clan Macleod	11.3.66	A. B. Parkhouse	J. J. Kalnins, W. Cross, M. Sullivan	C. Knight	Sir Wm. Reardon Smith & Sons

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Devonia</i>	17.6.65	B. A. Rogers, O.B.E., D.S.C. R.D.	G. A. Thornton	D. Easton	British India Line
<i>Diomed</i>	30.11.64	W. T. D. McMillan	P. G. Taylor, D. Hamilton, P. Lloyd-Jones	R. B. Paley	A. Holt & Co.
<i>Discovery</i>	9.12.65	R. H. A. Davies	J. Walker, G. L. Howe, R. De B. Riches	E. Agus	National Institute of Oceanography
<i>Donegal</i>	9.8.65	E. J. Ridout	H. Goulden, J. Peirce, W. Gent	I. Watson	Trinder, Anderson & Co. Ltd.
<i>Dorset</i>	4.1.66	C. A. Miller	M. G. Bishop, A. C. Anson, T. Hughes, J. Gibbard	M. E. McEwen	Federal Line
<i>Duhallow</i>	*	G. McKay	Cracknell, D. C. Penberthy	— Patience	Hain-Nourse Ltd.
<i>Dukesgarth</i>	11.3.66	W. J. Ross	K. W. Reithley, I. G. R. Russell, H. O. L. Phillips, M. J. Lee, T. A. Spencer	B. D. McSweeney	Wm. Cory & Son Ltd.
<i>Dunedin Star</i>	14.3.66	R. H. Stark	A. P. Leason, D. Hope, R. Cameron	T. Twisleton	Blue Star Line
<i>Dunera</i>	3.3.66	H. N. Severs	P. R. White, N. F. Hockings, D. I. Armstrong, A. P. Miles	J. C. Furlong	British India Line
<i>Eden</i>	28.3.66	F. M. Dickenson	E. ap H. T. Jones, J. L. Frain, P. J. Boucher	I. Duignan	Royal Mail Lines
<i>Edenmore</i>	25.11.65	A. L. Wiles	L. P. Lambourne, J. Rutherford, P. Bennisson, J. Bolt	F. Wilson	Furness Lines
<i>Edinburgh Castle</i>	4.2.66	W. S. Byles, R.D.	R. D. M. Lenthal, A. O. Stewart, T. Kersey	J. H. Summers	Union Castle Line
<i>Edward Wilshaw</i>	23.2.66	R. B. Riddle	T. M. Acher, K. D. Watt, K. Brammer	S. B. Haslett	Cable & Wireless Ltd.
<i>Egton</i>	16.8.65	E. Magson	M. T. Phillips, A. Ferguson, W. Gatenby, P. Boyle	R. W. Moloney	Roland & Marwood S.S. Co. Ltd.
<i>Elmbank</i>	13.7.65	E. J. Ray	A. M. Marquiss, L. E. Steers, R. E. Looker	D. R. Lloyd	Bank Line
<i>Empire Star</i>	22.12.65	G. T. King	M. R. Smith, J. McNeill, D. Wilcox	J. L. Glanton	Lampport & Holt Line Ltd.
<i>Empress of Canada</i>	11.5.65	L. H. Johnson, M.B.E.	A. L. Morris	P. B. McNab	Canadian Pacific Line
<i>Empress of England</i>	31.3.66	R. Walgate		G. Arnup	Blue Star Line
<i>English Star</i>	20.12.65	G. Seaye	T. Crookall, W. Macintyre, C. Baker, M. Delany		Ministry of Agriculture, Fisheries & Food
<i>Ernest Holt</i>	18.2.63	E. A. Binnington			Royal Mail Lines
<i>Essequibo</i>	17.3.66	J. M. F. Anderson	A. J. Love, P. Brown, M. Imrie	H. Gerard	Federal Line
<i>Essex</i>	27.1.66	A. B. Stalker	A. I. MacKinnon, E. D. Jones, J. W. Gill, P. W. Sawyer	P. Dickson	Esso Petroleum Co. Ltd.
<i>Esso Cambridge</i>	28.4.65	H. W. Brice	M. Stacey, J. C. Gall, T. Potts	I. W. Lowrey	Esso Petroleum Co. Ltd.
<i>Esso Canterbury</i>	12.11.65	D. J. S. Davies	R. R. J. Watton, M. G. King, M. Stacey, R. A. Harvey	P. J. Kilbane	Esso Petroleum Co. Ltd.
<i>Esso Exeter</i>	10.9.65	T. Gay	R. R. J. Watton, J. P. O'Sullivan, D. M. Pope, I. Campbell	S. Hanes	Esso Petroleum Co. Ltd.
<i>Esso Hampshire</i>	25.2.66	B. L. Bater	G. Harrison, A. W. Eadie, H. N. McQuaid, C. B. Nicholais	— Clark	Esso Petroleum Co. Ltd.
<i>Esso Pembrokehire</i>	21.3.66	R. E. Smith	G. T. R. Jones, D. G. Boothroyd, P. D. Gow	R. Kimberley	Esso Petroleum Co. Ltd.
<i>Esso Warwickshire</i>	4.3.66	T. Jernison	H. Taylor, F. L. Rowden, R. W. Noakes, A. Fry	P. V. Cagney	Esso Petroleum Co. Ltd.
<i>Esso York</i>	11.3.66	R. R. Phillips	L. L. Cook, W. Moore, K. A. Eustace Pedar	D. Lister	Esso Petroleum Co. Ltd.
<i>Explorer (m.v.)</i>	11.8.65	W. S. Eustance, O.B.E.	R. R. L. Jones, J. Pearson, A. G. Hill, K. Long	L. A. G. Ricard	Harrison Line
<i>Explorer (F.R.S.)</i>	20.9.65	E. A. Bruce, O.B.E.	A. A. Baxter, J. Craig, W. Gatt	J. Steven	Dept. of Agriculture & Fisheries for Scotland
<i>Faristan</i>	10.12.65	R. B. Arthur	C. E. J. Simmons, G. Keen, E. W. Wells, B. E. Peck	A. N. Stevens	Strick Line
<i>Fidra</i>	4.2.66	G. Waterson	C. Duncan, C. Begg, S. McGilivray		Chr. Salvesen & Co. Ltd.
<i>Firbank</i>	7.10.65	W. Watson	R. A. Bazire, A. K. Gillespie, E. Irvine	D. Wilson	Bank Line
<i>Flamenco</i>	25.1.66	W. A. E. Johnston	A. Shaw, P. Barry, J. Owen	C. McCarthy	Pacific S.N. Co. Ltd.
<i>Flintshire</i>	24.3.66	F. A. Punchard	D. S. Holme, M. J. Moore, M. G. Morrison	A. W. Jones	Glen Line
<i>Forthfield</i>	8.3.66	J. T. Alexander	I. Thain, R. Vincent, J. C. May, T. A. West	J. A. Marnell	Hunting & Son Ltd.
<i>Franconia</i>	16.11.65	P. A. Read, D.S.C.	W. H. Head, M. Wyndram, R. Green	A. N. Henderson	Cunard Line
<i>Galway</i>	11.10.65	R. J. Ogilvy			Trinder, Anderson & Co. Ltd.
<i>Geestby</i>	17.3.66	D. G. Powell			Geest Industries Ltd.

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Iron Crown</i>	1.2.66	D. Martucci	N. F. Harris, T. Thornton, R. Childerstone, W. Graham	G. Burnett	Common Bros. Ltd.
<i>Ivernia</i>	31.8.65	J. W. Killan	M. England, P. Lawley, P. Walton, M. Williamson	A. Turner	Cunard Line
<i>Ixion</i>	1.3.66	F. N. Fisher	J. P. A. Clarke, R. B. Lough, P. A. Crabtree, V. B. Webster	E. O. Roberts	A. Holt & Co.
<i>Jamaica Planter</i>	7.12.64	G. E. M. Jenkins	C. Simons, E. Lisk, S. Eunson	J. E. Conway	Kaye Son & Co. Ltd.
<i>Jamaica Producer</i>	15.12.65	G. Foulds	R. W. Warwick, P. H. Hadfield, J. Marvad, R. T. Palmer	D. W. James	Kaye Son & Co. Ltd.
<i>Yason</i>	31.3.66	H. S. Clarke, M.B.E., D.S.C.	H. W. Simmonds, H. B. Goby	D. M. Miller	A. Holt & Co.
<i>John Biscoe</i>	27.5.65	T. Woodfield	B. Joubert, R. Cumbers, M. Phelps	A. Quinn	British Antarctic Survey
<i>Kemalworth Castle</i>	14.7.65	P. J. Rose	M. J. W. Baker, J. M. Smout, J. R. Hobbkirk, B. Batchelor	J. Delefortrie	Union Castle Line
<i>Kenuta</i>	14.9.65	D. I. Jones, D.S.C.	P. C. Barmby, J. S. Ross, G. Roe, I. Kely	N. T. Roberts	Pacific S.N. Co. Ltd.
<i>Kenya</i>	17.3.66	I. K. Bowerman	P. R. White, J. F. Farquharson, L. H. Johnson, R. G. Dando, T. E. Kelso	J. Masterman	British India Line
<i>King Arthur</i>	23.11.65	R. Wise	T. R. Falk, E. E. Talbot, P. W. Brown	R. Charles	King Line
<i>King City</i>	10.3.66	O. J. T. Lindsay	T. E. Thistleton, J. C. Lee, R. Ferguson-Jones	K. J. Lake	Sir Wm. Reardon Smith & Sons
<i>Kimminrd Castle</i>	8.9.65	J. G. Smith	I. B. Dale, W. Sutherland, J. S. Catterall	K. Clarke	Union Castle Line
<i>Kimburne Castle</i>	8.9.65	H. Lockyer	D. E. Walshe, J. Brown, N. R. Peckham	W. H. Gordon	Union Castle Line
<i>Kohistan</i>	3.12.65	E. C. Thompson	R. S. Lynch, D. Stewart, R. W. Millen	C. Mannion	Strick Line
<i>Laganbank</i>	1.10.65	J. B. Mitchell	A. H. Copeland	A. Hamill	Bank Line
<i>Lakta</i>	20.8.65	J. W. Ross	C. J. Willard, M. J. Horn	W. J. Ferry	Chr. Salvesen & Co. Ltd.
<i>Lancashire</i>	22.2.65	N. F. Fitch, M.B.E.	F. C. Nicol, A. McCugan, P. G. Edgar	A. Hogg	Bibby Line
<i>Laurentia</i>	4.10.65	T. S. Graham	M. C. Hurst, E. A. Tickner, P. G. Radford	G. Davies	Donaldson Line
<i>Leeds City</i>	18.1.66	F. J. Johns	P. B. Webb, N. Luck	D. Finlayson	Sir Wm. Reardon Smith & Sons
<i>Limerick</i>	22.11.65	I. D. Blake	R. Stead, D. A. B. Walker, J. Conn, W. F. Firman	A. Law	Trinder, Anderson & Co. Ltd.
<i>Limerick</i>	3.1.66	I. G. Goldie	P. Mantz, M. J. Dean, W. G. Davison	D. Scott	W. A. Souter & Co. Ltd.
<i>Linkmoor</i>	24.11.65	J. P. Hogg	E. Hamilton, D. Gosden	D. Scott	Moor Line
<i>Lisimoria</i>	22.9.65	J. L. Downie	A. Medforth, R. A. Jones, R. Ward, J. Scholey	G. R. McCarrroll	Donaldson Line
<i>Lisorno</i>	7.3.66	J. F. Tognola	P. R. C. Gillard, D. J. Glennie, D. Petty, B. Wilson	W. Walsh	Ellerman's Wilson Line
<i>Loch Avon</i>	3.3.66	W. B. Avison	M. T. Crimp, J. Pearson, R. Pennington, R. L. Few	C. Blane	Royal Mail Lines
<i>Loch Garth</i>	8.11.65	C. D. Ratcliff	J. D. Brown, P. C. Love, M. Rayson, R. Haggard	F. E. Page, M.B.E.	Royal Mail Lines
<i>Loch Gowan</i>	1.6.65	J. A. Phillips	R. Newell, G. N. Coombe, W. J. Image	I. Greenhalgh	Royal Mail Lines
<i>Loch Loyal</i>	29.3.66	G. C. Meldrum	J. Pykett, H. Pyle, K. E. Roberts, B. G. Longley	I. Hobson	Royal Mail Lines
<i>Longstone</i>	16.2.66	F. Surtees	D. M. C. Allan, A. P. Bartholomew, K. P. Campbell, M. C. Harper	R. J. T. Hemmings	W. A. Souter & Co. Ltd.
<i>Longstone</i>	19.10.65	N. Oddy	R. H. Newton, R. E. Roberts, J. B. Watson, M. Gadd	A. E. Fell	Houlder Line
<i>Magdapur</i>	13.4.65	S. E. Turner	A. D. Marsh, A. C. Stallard, R. E. Beson	J. Leary	Brocklebank Line
<i>Maitanada</i>	18.3.66	P. A. Gunson	M. R. N. James, C. P. Margeson, D. A. Evans	F. R. Fallon	Brocklebank Line
<i>Mahout</i>	28.2.66	O. Pritchard	R. I. Taylor, T. Williams, J. Watson, W. R. Oldfield	D. Butterworth	Brocklebank Line
<i>Mahseer</i>	16.12.65	P. D. McKenzie	H. R. Owen, M. W. Young, G. D. Symonds	T. McGinty	Brocklebank Line
<i>Makrana</i>	18.10.65	A. Starmar	W. MacMeikan, J. M. Rimmer, P. D. Cullen		Manchester Liners
<i>Manchester City</i>	20.1.66	G. R. Thompson	D. Deer, D. Gregg, W. S. Worthington	D. Hodgson	Manchester Liners
<i>Manchester Commerce</i>	31.1.66	D. Aitchinson	J. H. Craiger, R. Andrews, J. MacLaughlan	I. Macdonald	Manchester Liners
<i>Manchester Engineer</i>	3.3.66	J. M. Rushworth	J. D. Reynolds, D. Smith, D. R. Perry, J. Bell	F. M. Berry	Manchester Liners
<i>Manchester Exporter</i>	3.3.66	J. Hogg	G. Mackay, A. Quinan	J. Buchanan	Manchester Liners
<i>Manchester Freighter</i>	31.1.66	F. Lewis	D. Pickles, D. Morton, D. Smith, A. G. Rowlands	T. Berry	Manchester Liners

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Perseus</i>	14.3.66	S. C. Llewellyn	I. H. Morris, I. S. Grant, J. Tumilty	D. G. Gunning	A. Holt & Co.
<i>Persic</i>	2.2.66	G. W. Houchen, O.B.E., R.D.	R. M. Howse, D. I. Robertson, J. S. Merrells	J. W. Peat	Shaw Savill Line
<i>Photinia</i>	2.8.65	R. J. Freeman	P. M. Swan, B. Thomas, R. Setchell, G. Goldsbrough	A. Page	Stag Line Ltd.
<i>Piako</i>	31.8.65	I. C. Davison	M. G. C. Holt, T. E. Laren, P. Pignegy	W. R. Hocking	New Zealand Shipping Co. Ltd.
<i>Pipiriki</i>	24.3.66	P. Lay	A. M. Shaw, R. Davies, P. Chadwick, A. S. Adams	J. Newman	New Zealand Shipping Co. Ltd.
<i>Pizarro</i>	22.3.65	A. Lang	G. E. Oliver, R. S. Butler, M. Swallow	B. E. Bromley	Pacific S.N. Co. Ltd.
<i>Port Adelaide</i>	28.2.66	W. J. Williams	C. L. Macaskill, T. T. Steddy, R. G. Howell	H. Percival	Port Line
<i>Port Brisbane</i>	15.7.65	V. G. Battle	C. W. Hay, D. S. Heilier, B. Money	A. I. Thomson	Port Line
<i>Port Hobart</i>	31.3.66	I. S. Stannard	M. Jarrold, R. H. Givan	M. M. Garrett	Port Line
<i>Port Invercargill</i>	17.3.66	H. B. Conby	P. J. F. Bush, A. G. Williamson, D. D. Taylor	T. Brady	Port Line
<i>Port Jackson</i>	21.6.65	W. J. Williams	J. Priestley, I. R. E. Hoeben, J. S. Howard	J. M. Brogden	Port Line
<i>Port Launceston</i>	7.2.66	A. J. Hawkins	B. R. Stephenson, J. H. Pring, R. S. Bolton	R. A. Jones	Port Line
<i>Port Lincoln</i>	28.2.66	A. M. Downes	J. J. Gladstone, J. L. Robertson, P. T. Pullen	D. R. Uglow	Port Line
<i>Port Lyttelton</i>	28.3.66	V. A. Hunt	J. Johnson, L. J. Carman, D. N. Ford	M. G. Murphy	Port Line
<i>Port Maquarie</i>	29.12.65	M. L. Coombs	R. L. Jones, P. J. F. Bush, R. M. Hales	T. P. Wilkinson	Port Line
<i>Port Napier</i>	20.12.65	J. G. A. Dunn	R. E. Clifford, P. A. Bates, D. C. Ray	W. Cumming	Port Line
<i>Port Nelson</i>	24.11.65	J. R. King	J. D. Farrar, J. A. Osofrot, H. J. Conybeare	P. E. Hornby	Port Line
<i>Port Nicholson</i>	11.2.66	F. J. Lavers	B. F. Medcroft, G. G. Blackler, B. R. Link	R. E. Maskell	Port Line
<i>Port Phillip</i>	27.1.66	P. E. Packwood	M. C. Pilgrim, R. Wheelhouse, E. T. Watkins,	M. Worthington	Port Line
<i>Port Pirie</i>	9.3.66	E. W. Dingle, M.B.E.	D. Marriott		
<i>Port Sydney</i>	29.12.65	L. J. Skalles	J. W. Martin, K. Cruden, D. Cowland	L. V. O'Sullivan	Port Line
<i>Port Townsville</i>	18.11.65	R. A. Holmes	P. J. Hayman, G. N. R. Squire, W. L. Roberts	A. Thompson	Port Line
<i>Port Victor</i>	7.1.66	J. S. Moate	O. G. Parry, B. J. Hayball, J. Williams	T. J. Britt	Port Line
<i>Port Vindex</i>	23.2.66	C. J. H. Gorley	C. G. W. Hunter, M. E. Hughes, R. Soanes	J. McMillan	Port Line
<i>Port Wellington</i>	15.3.66	K. W. Allen	I. P. B. Snape, D. J. D. Atkinson, R. L. Goodworth	R. Dawson	Port Line
<i>Port Wymidham</i>	4.3.66	E. R. Jenkins	R. G. Howell, J. W. Goldsmith, C. Allport	D. T. Tremayne	Port Line
<i>Potosi</i>	18.3.65	P. D. O'Driscoll	J. Gardner, D. B. Bird, F. Strachan	F. J. Curran	Pacific S.N. Co. Ltd.
<i>Queen of Bermuda</i>	20.12.65	M. E. Musson	M. G. East, B. Higgins, A. S. Hardy, — Buchanan	W. F. Fryer	Furness Lines
<i>Queensland Star</i>	20.8.65	R. White, D.S.C.	T. C. M. Johnson, D. McNeil, A. L. MacLernan	I. Anderson	Blue Star Line
<i>Rakata</i>	1.2.66	F. S. Angus	W. J. N. Drummond, J. Crowder, M. Eglon,	G. Summers	New Zealand Shipping Co. Ltd.
		J. R. Jackson			
<i>Ramon De Larrinaga</i>	8.3.65	W. McKechnie	D. Parry, J. Crane, B. Milligan, J. Ross	W. Noonan	Larrinaga S.S. Co. Ltd.
<i>Ramore Head</i>	29.9.65	J. J. Gomez	W. Morrison	T. Walker	Head Line
<i>Rangitane</i>	11.8.65	D. H. Chadwick	A. Duncan, R. K. Young, C. R. H. Vicary,	L. Whittington	New Zealand Shipping Co. Ltd.
		G. W. Chatfield			
<i>Rangitoto</i>	17.3.66	L. W. Fulcher	M. C. Payne, M. J. R. Jackson, B. C. Davis, P. E. Keyes	G. A. Parker	New Zealand Shipping Co. Ltd.
<i>Rapallo</i>	10.11.65	F. Metham	J. E. Scholey	J. Pye	Ellerman's Wilson Line
<i>Raphael</i>	24.5.65	C. E. Legg	C. Bush, J. J. Deignan, A. Edmunds	J. Marnell	Lamport & Holt Line
<i>Rathlin Head</i>	1.12.65	W. A. Haddock, O.B.E.	H. I. Lavery, E. P. Gunning, P. J. Sherriff	A. V. Davidson	Head Line
<i>Redcar</i>	29.12.65	I. C. Pratt	D. J. Hunkin, A. Young, T. Keen, A. Philips	P. Renshaw	Bolton S.S. Co. Ltd.
<i>Regent Eagle</i>	15.2.65	B. Rehse	J. M. Acton, R. Hawkins, D. G. Blair	R. Milner	Regent Petroleum Tankship Co. Ltd.
<i>Regent Falcon</i>	9.9.65	R. Armstrong	M. T. Hutton, P. J. Stead, R. Mitchell	J. Jenkins	Regent Petroleum Tankship Co. Ltd.
<i>Regent Pembroke</i>	31.3.66	R. Armstrong	J. S. Taylor, J. L. P. Taylor, I. E. McVicar	R. Stringer	Regent Petroleum Tankship Co. Ltd.

<i>Regent Royal</i>	22.11.65	B. S. Goodland ..	L. G. Alling, R. S. Hawkins, A. J. Jameson ..	R. R. Bromham ..	Regent Petroleum Tankship Co. Ltd.
<i>Rhodesia Castle</i>	6.8.65	A. C. M. Black, O.B.E.	I. C. Gibson, D. Smees, H. Blanchon, D. Shorthouse	G. D. Lever ..	Union Castle Line
<i>Rialto</i>	12.1.66	J. F. O'Rourke ..	I. G. Walker, J. Sullivan, J. P. Cullen, R. I. Thomas	J. R. Cullen ..	Ellerman's Wilson Line
<i>Richard De Larrinaga</i>	22.10.65	L. G. Daniel ..	B. D. Thomson, A. A. Melia, F. G. Moss	I. G. Henderson ..	Larrinaga S.S. Co. Ltd.
<i>Richmond Castle</i>	24.8.65	W. D. Anson ..	R. B. Middleton, I. Gibson, R. Wayton	I. MacKenzie ..	Union Castle Line
<i>Ringdove</i>	15.2.66	A. Sugden ..	G. Hopkin, S. Peters, C. Allison	L. Keeble ..	General S.N. Co. Ltd.
<i>Ripon</i>	17.3.66	J. Parsloe ..	B. Chapman, R. B. Brown, D. J. Bridger ..	L. Rowe ..	Bolton S.S. Co. Ltd.
<i>Romanby</i>	11.3.66	C. Dixon ..	J. A. Randall, J. Lilloco, R. Simmonds	R. Shepherd ..	Sir R. Ropner & Sons Ltd.
<i>Romantic</i>	14.1.66	M. Larrive ..	B. Skillen ..	J. Berry ..	Royal Mail Lines
<i>Roanagh Head</i>	3.5.65	A. Fee ..	J. P. Skinner, J. Mallam, W. I. Taylor		Head Line
<i>Rosemary Everard</i>	18.10.65	W. G. Hunt ..	J. I. Pitman, A. G. Cruickshank, A. Parr-Morley,		F. T. Everard & Sons Ltd.
<i>Roswallan Castle</i>	10.12.65	H. N. Dryden ..	A. White		Union Castle Line
<i>Ruahine</i>	21.1.66	R. G. Hollingdale	T. Pollard, M. H. Lawrence, L. Ellis, R. Laycock	W. F. Shepherd	New Zealand Shipping Co. Ltd
<i>Runswick</i>	30.6.65	S. Ward ..	B. J. Goodall, D. A. Rayner ..	P. T. F. Costelloe	Headlam & Son Ltd.
<i>Rushpool</i>	17.3.65	A. C. Duncan ..	W. Burdon, W. B. Rial, S. Beckett ..	M. MacNeil ..	Sir R. Ropner & Son Ltd.
<i>Ruthenic</i>	18.3.66	J. L. Perkins ..	D. Pearse, R. Bland, W. Strevens ..	G. Dickson ..	Royal Mail Lines
<i>S.A. Oravi</i>	14.1.66	J. B. D. Fisher ..	R. Hobson, G. King, S. K. Watson, D. Dudley,	A. Kilmister ..	Union Castle Line
<i>S.A. Vaal</i>	14.2.66	N. M. Lloyd ..	R. Newlands		Union Castle Line
<i>Sagamore</i>	17.3.66	W. Swann ..	A. B. Woodley ..	R. Murray ..	Furness Lines
<i>Salamanca</i>	29.12.65	P. L. Whitaker ..	P. D. Fogarty, D. Ellis, J. M. B. Owen, W. J. Turner		Pacific S.N. Co. Ltd.
<i>Salaverry</i>	3.3.66	D. J. Houghton ..	A. W. Hepburn, T. J. D. Erskine, I. M. Wright,		Pacific S.N. Co. Ltd.
			L. M. Haylor		
<i>Salinas</i>	27.1.66	E. J. Pepper ..	S. W. Wilson, A. Hamill ..	I. MacMorran ..	Pacific S.N. Co. Ltd.
<i>Salmela</i>	10.2.66	A. F. Baike ..	F. J. Dobell, J. King, D. F. Potter, R. Paine ..	M. G. Maclean	Chr. Salvesen & Co. Ltd.
<i>Samaria</i>	1.10.65	M. F. Hehir ..	D. A. Boffey, D. J. Bishop, P. W. Howes ..	C. Gammell ..	Cunard Line
<i>Santander</i>	3.12.65	R. T. Riley ..	R. I. Kinnier, T. R. Williams, P. A. Chadwick,	W. Elliott ..	Pacific S.N. Co. Ltd.
<i>Sarmiento</i>	31.12.65	E. Gowland ..	D. J. Bishop		Pacific S.N. Co. Ltd.
<i>Saxonia</i>	29.12.65	G. E. Smith ..	J. M. Bubg, G. Cooke, J. Wolstencroft ..	J. MacDonald	Cunard Line
<i>Scottish Star</i>	23.2.66	M. R. Bremberg ..	A. Goodman, K. Abbott, R. Bremner, E. Bee ..	J. Hunter ..	Blue Star Line
<i>Scythia</i>	8.9.65	D. C. Drummond ..	A. K. Davies, M. J. Mills ..	D. J. Kelly ..	Cunard Line
<i>Serenia</i>	18.6.65	J. Kell, M.B.E.	H. E. Mortimer, G. E. Bennison M. Williams ..	J. V. Winchester	Shell Tanker (U.K.) Ltd.
<i>Shackleton</i>	27.5.65	D. H. Turnbull ..	J. Bruce, J. Frost, G. Bechard, J. Wightman	H. Finlay	British Antarctic Survey
<i>Shahristan</i>	26.10.65	R. Hodgson ..	S. J. Lee, M. J. Horn, G. F. Dobson, R. W. Bell	W. S. Hopwood	Strick Line
<i>Shropshire</i>	25.3.66	A. E. Young ..	D. B. Bisset, W. Kenyon, P. McDowall, W. McCrindle,	O. Riches ..	Bibby Line
<i>Sicilia</i>	17.1.66	R. W. L. Crawford	R. R. Watt, W. Miller, A. MacDonald		Anchor Line
<i>Sidonia</i>	11.3.66	W. Yeaman ..	W. R. Miller, W. S. Stockley, A. McColl, W. G. Downie	J. Beavins	Anchor Line
<i>Silkworth</i>	7.10.65	A. Hurst ..	R. H. Henson, W. D. Beattie, W. F. Firman ..	B. T. Holden ..	R. S. Daigleth Ltd.
<i>Silvercrag</i>	20.12.65	J. Kennar ..	H. N. Lawson, B. Margerison, G. Hernell ..	C. D. Hammatt	Silver Line
<i>Silverpoint</i>	23.4.65	A. N. Hirst ..	D. Fielding, J. Whitelaw ..	I. R. Francis ..	Silver Line
<i>Silversand</i>	25.2.66	J. Wyness ..	C. H. M. Colchester, H. R. Williams, C. D. Mason	D. F. Drage ..	British India Line
<i>Sir Lancelot</i>	24.3.66	J. Swan ..	E. Kavanagh, A. D. Stuart		Torry Research Station
<i>Sir William Hardy</i>	9.3.65	A. Whittleton ..	W. B. Anderson, W. Marshall, J. M. Smith ..	N. S. Reeve ..	Headlam & Son Ltd.
<i>Sneaton</i>	17.9.65	W. Gatenby ..	V. J. Williams, D. Hewitt, A. De La Haye, R. Sands	C. Lambe ..	Federal Line
<i>Somerses</i>	25.3.66	I. Y. Batley ..	H. A. Scott, S. R. Dyer, T. L. Pinder, K. Gowsell	A. S. Higginbottom	Shaw Savill Line
<i>Southern Cross</i>	1.3.66	L. J. Hopkins ..	W. T. Oliver, G. Mathews, R. Mimmack ..	J. B. Cane ..	Bibby Line
<i>Staffordshire</i>	1.11.65	N. F. Fitch, M.B.E.	P. G. Wright, B. J. Prince, G. Webber, D. Watt ..	D. Taylor ..	Shaw Savill Line
<i>Suevic</i>	20.12.65	G. S. Sheldon ..	V. R. Gibson, D. Chant, M. J. Roe	M. Moore ..	New Zealand Shipping Co. Ltd.
<i>Suffolk</i>	31.3.66	H. J. D. Sladen ..	T. M. B. Groves, C. MacLean, R. Eason, R. Waters	M. C. Newcombe	Sugar Line
<i>Sugar Carrier</i>	17.2.66	J. R. Cassidy ..	R. I. Waters, R. V. Martin, C. S. Dweight	T. O'Brian ..	Sugar Line
<i>Sugar Refiner</i>	11.10.65	J. R. Cassidy ..		D. H. Matthews	Sugar Line
<i>Sugar Transporter</i>	10.3.66	P. Sutcliffe ..			Sugar Line

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Sunda</i>	11.2.66	R. Bullock-Webster	D. C. W. Donaldson, R. G. C. Roberts, R. W. Espley	T. Canty	P. & O.-Orient Line
<i>Sunek</i>	11.3.65	H. Syversen	A. J. H. Milne, A. R. Taylor, D. E. Spencer,	K. D. Wilson	John Kilgour & Co. Ltd.
<i>Surrey</i>	18.1.66	J. F. Milner	R. G. J. Davis		Federal Line
<i>Sussex</i>	9.12.65	J. S. Laidlaw	C. H. J. Brownings, P. H. King, R. MacD. Mair,	R. W. Miller	Federal Line
<i>Sydney Star</i>	*	A. Ireland	P. Milner, P. Brecknell	T. Mandrell	Blue Star Line
<i>Sylvania</i>	22.9.65	H. J. Chaloner, R.D.	G. Ferguson, J. G. Parry, R. G. McClymont	J. F. Bryson	Cunard Line
<i>Tabaristan</i>	20.12.65	T. D. Dumont	A. C. McCulloch, R. J. Watkins, L. Lumley,		Strick Line
<i>Tactician</i>	3.1.66	L. J. Sharman	R. Taylor, P. Iveson, G. Stephens, B. Crook	P. Lawton	Harrison Line
<i>Tamele</i>	24.3.66	C. S. H. O'Sullivan	R. W. Brindley, N. G. Stewart	R. F. Seward	Elder Dempster Lines
<i>Tantallon Castle</i>	21.1.66	G. H. Matthews	D. I. Brunsell, R. R. Will, B. Batchelor	J. P. Hurley	Union Castle Line
<i>Tarkwa</i>	20.8.65	J. A. Cleator	D. Gill, J. J. Dawson, G. A. Burton	D. Greaves	Elder Dempster Lines
<i>Tasmania Star</i>	30.3.66	C. M. Watson	V. M. Vickers, D. Wadley, D. Lloyd	M. N. Clancy	Blue Star Line
<i>Tidcrest</i>	25.1.66	F. J. Anderson	R. J. L. Thorn, K. H. Thompson, P. W. Finnie	M. N. Blythe	Ivanovic & Co. Ltd.
<i>Torr Head</i>	10.3.66	E. G. Davey	J. D. McRitchie, B. M. Connor, J. A. Niblock	M. J. Hannon	Head Line
<i>Tower Bridge</i>	13.1.66	M. H. F. Smith	C. Harrison, J. R. Jenkins, J. H. Bates	J. Millar	Silver Line
<i>Trebartha</i>	5.1.66	M. R. Ryan	A. T. Elstob, D. W. Carsey, J. M. F. Barnett, J. Cotton	J. G. J. Duggan	Hain-Nourse Ltd.
<i>Trecarne</i>	30.9.65	H. Gravel	A. J. Ardley, J. Spall, A. G. Thomas	P. Keane	Hain-Nourse Ltd.
<i>Trecarrell</i>	22.11.65	E. F. Boyd	M. A. Cooper, J. Rhodehouse, J. Davies, D. R. Mitchell	T. Walker	Hain-Nourse Ltd.
<i>Trefusis</i>	29.11.65	L. Annett	I. Smith, J. Johnson, R. C. Hallow	W. A. Sowerby	Hain-Nourse Ltd.
<i>Tremayne</i>	15.12.65	J. R. Darby	G. B. Baxter, J. H. B. Armstrong, R. L. Mitchel,	J. Ryan	Hain-Nourse Ltd.
<i>Tremeadow</i>	15.11.65	J. Murray	T. E. Clark		Hain-Nourse Ltd.
<i>Tremorvah</i>	8.4.65	L. J. Lennox	M. J. Ball, J. J. Watson, R. J. Smith	J. P. McMahon	Hain-Nourse Ltd.
<i>Trenglos</i>	3.3.66	J. M. Downard	T. Raddings, J. O. Spence, J. A. Smeeton	P. Prestidge	Hain-Nourse Ltd.
<i>Treudagan</i>	28.2.66	G. Joslin	R. G. Whisker, B. J. Shawe, S. R. E. Pardon,	A. R. Watt	Hain-Nourse Ltd.
<i>Trevaylor</i>	7.10.65	R. B. Oliver	M. M. Marchant	M. Smart	Hain-Nourse Ltd.
<i>Trevidden</i>	3.2.66	D. Dodson	R. F. Morris, A. J. Smeeton, W. Gillespie	J. Dent	Hain-Nourse Ltd.
<i>Turakina</i>	25.11.65	R. B. Hood	A. T. Synott, J. C. Abbott, B. Stevenson, D. Field	J. A. O'Riordan	Hain-Nourse Ltd.
<i>Turkistan</i>	11.3.66	M. W. Ourwaite	D. S. MacDonald, M. J. Perfect, G. D. Goldsbrough	L. D. Lendrum	New Zealand Shipping Co. Ltd.
<i>Uganda</i>	17.1.66	J. D. Hamilton	W. I. S. Burr, M. H. Wilson, C. J. Sabine	L. I. Kidd	Strick Line
<i>Vellia</i>	13.1.66	J. Carmichael	K. W. V. Yeomans, R. Wilson, J. P. Caro,	H. H. Lyon	British India Line
<i>Venassa</i>	28.2.66	R. F. Garrud	J. M. Coolthard		Shell Tankers (U.K.) Ltd.
<i>Volvatella</i>	17.2.66	W. F. Thompson	E. Roberts, T. P. Cox, M. C. Batrick, L. J. Mawer	A. Forward	Shell Tankers (U.K.) Ltd.
<i>Watuera</i>	17.3.66	D. E. Aberdeen	C. T. Fellowes, W. A. Hemming, J. Paterson, I. Brown	F. Howell	Shell Tankers (U.K.) Ltd.
<i>Wanitu</i>	24.3.66	R. Kennett	L. Hubbard, I. Baird, B. Holroyd, R. Firth	N. Wilson	Shell Tankers (U.K.) Ltd.
<i>Warkworth</i>	20.5.65	B. Jewel	M. P. Alletson, E. Puddifer, J. Dudley, D. M. Cole	T. Tobin	Shaw Savill Line
<i>Waroonga</i>	14.2.66	P. H. Bidmead	M. P. Robinson, M. Tiede, B. Keeble	A. Lee	Watts, Watts & Co. Ltd.
<i>Welsh City</i>	9.12.65	C. E. Exton	—, McLean-Brown, T. R. Smith, J. Sabourne	S. Casey	R. S. Dalgliesh Ltd.
<i>Welsh Herald</i>	1.3.66	I. W. Jackson	R. H. Small, M. B. Smith, A. Gates	J. F. MacFarlane	British India Line
<i>Weybridge</i>	20.8.65	F. D. Lloyd	A. Hollidge, A. D. Lightfoot, P. Bloomfield	G. T. Walker	Sir Wm. Reardon Smith & Sons
<i>Wiltopool</i>	12.5.65	D. G. Martin	C. C. Davidson, W. Knight, M. O. Wilson	I. Watson	Welsh Ore Carriers Ltd.
<i>Windsor Castle</i>	15.3.66	A. J. Hort	R. E. Baker, J. G. Lewis, J. R. Timms	S. Buckley	Watts, Watts & Co. Ltd.
<i>Woozing</i>	3.12.64	T. G. Martin	C. J. Hunt, T. F. Jones, C. B. Tingle	W. K. H. H. Limpert	Sir R. Ropner & Son Ltd.
<i>Yorkshire</i>	31.12.65	D. Cooper, D.S.C.	L. Morris, A. J. Blackler	I. D. Muldowney	Union Castle Line
<i>Zaphon</i>	4.1.66	W. W. Gibb	R. E. Baker, D. H. Wells, M. J. Flanagan	R. S. Hough	Watts, Watts & Co. Ltd.
			C. R. Tiller, A. P. McCall, E. H. Jones, D. I. Jones	P. G. Crawford	Bibby Line
			C. B. Lukehurst, D. H. Rayfield	J. C. Haigh	Shell Tankers (U.K.) Ltd.

Supplementary Ships

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Aaro</i>	14.10.65	A. T. Jardine	P. Bishop		Ellerman's Wilson Line
<i>Apollo</i>	19.10.65	G. V. Barnes	W. G. Somerfield, J. S. Earl, B. Welch, P. N. North	R. Price	Bristol S.N. Co. Ltd.
<i>Arctic Freebooter</i>	*	R. S. Bryant		P. Body	Boyd Line Ltd.
<i>Aristo</i>	21.12.64	N. O. Cook		I. Keyser	Ellerman's Wilson Line
<i>Athelbeach</i>	*	T. Gorst	Bolton, M. Quirk, M. E. Hughes	W. Meade	Athel Line Ltd.
<i>Baltic Importer</i>	10.2.66	J. Cringle	K. Camp, P. Wearing, W. Matthew	W. Meade	United Baltic Co. Ltd.
<i>Bendoran</i>	28.7.65	K. Wilson	E. P. Anderson, J. L. Davidson, F. G. Marriot	A. Gordon	Ben Line
<i>Bemvorlich</i>	*	E. L. Lloyd	N. Duncan, D. Brown, R. Staker		Ben Line
<i>Border Shepherd</i>	21.10.64	A. T. Jardine	G. Mitchell, R. A. Blencoe, B. Taylor	A. D. Sinclair	Lowland Tanker Co. Ltd.
<i>Borodino</i>	15.6.65	N. W. C. Rutherford			Ellerman's Wilson Line
<i>British Chivalry</i>	31.12.65	A. Lawson	R. F. Shaw, T. J. Stringer, D. Roberts, C. E. Hayward	M. J. P. Reddin	B.P. Tanker Co. Ltd.
<i>British Destiny</i>	3.9.65	H. J. Sadler	J. Dwight	W. Stewart	B.P. Tanker Co. Ltd.
<i>British Energy</i>	20.1.66	W. V. Frost	D. Lewry, E. Coates, D. A. White	B. Cameron	B.P. Tanker Co. Ltd.
<i>British Oak</i>	*	J. A. R. Robinson	R. Richman, C. Jarvis, J. H. Young	M. Callaghan	B.P. Tanker Co. Ltd.
<i>British Patriot</i>	21.1.65	W. H. K. Hillman	K. C. Newcombe, D. McCallum, G. B. Sinclair	I. R. Urtley	B.P. Tanker Co. Ltd.
<i>British Reliance</i>	6.12.65	S. J. Robinson	J. Walwark	W. Hurley	B.P. Tanker Co. Ltd.
<i>British Robin</i>	28.9.65	T. W. Westerdale	C. E. Jones, N. Macinnes, J. Bell	J. Hunter	British Tankers Ltd
<i>British Workman</i>	12.5.64	G. W. Mortimer	G. Calm, F. Cooper, A. Stockdale	J. H. Hewetson	Associated Humber Lines Ltd.
<i>Byland Abbey</i>	27.7.65	F. A. Firth	G. O. Cox	P. Brennan	J. Robinson & Son
<i>Camellia</i>	17.3.66	E. Clarke, M.B.E.	L. Gibson, P. Blud	M. Prior	Ellerman's Wilson Line
<i>Carlo</i>	7.4.65	E. Tyler	R. W. Barrett, J. D. Edwards	W. E. L. Gittins	South Eastern Gas Board
<i>Catford</i>	10.1.66	H. G. N. D'Evelin	M. J. Hogan	A. W. Dixon	Ellerman's Wilson Line
<i>Cicero</i>	24.1.66	N. J. Llewellyn	R. L. Few, M. R. B. Childs, B. A. Darling, J. Wisden	M. K. Wilmot	South Eastern Gas Board
<i>Croydon</i>	2.2.66	C. N. Wightman	M. R. G. Worner, H. H. Grant	P. O'Callaghan	Bristol S.N. Co. Ltd.
<i>Dido</i>	3.3.66	J. L. Jenkins	S. N. Pugsley, W. McCormick, R. Hyam		Royal Mail Lines
<i>Ebro</i>	10.3.66	F. Lord			Bristol S.N. Co. Ltd
<i>Echo</i>	21.10.64	G. Walterson	C. Begg, G. Massie, K. M. MacRae	J. B. McIntosh	Esso Petroleum Co. Ltd.
<i>Esso Lancashire</i>	28.3.66	W. Shaw	V. Y. Bradley, J. Forbes, R. Hoare, M. D. Staniforth	G. R. Smith	Esso Petroleum Co. Ltd.
<i>Esso Westminster</i>	1.3.66	W. Kays	A. S. Phillips, R. Roberts	T. O. Bradley	Chr. Salvesen & Co. Ltd.
<i>Glitra</i>	17.6.64	F. Wickman	B. Tong	G. R. Smith	Stag Line Ltd.
<i>Gloxinia</i>	18.11.65	C. Townsend	N. McLean, J. Reid, J. Kelly		Bristol S.N. Co. Ltd.
<i>Hero</i>	13.12.65	F. W. Wooler	A. Kamdron, J. King, J. Whitney		Hudson S.S. Co. Ltd.
<i>Hudson Deep</i>	26.10.65	H. G. Mackay			J. Marr & Sons Ltd.
<i>Junella</i>	6.12.63	R. Hanson			Ellerman's Wilson Line
<i>Kirkham Abbey</i>	25.3.66	N. E. Longthorp	G. W. Taylor		Chr. Salvesen & Co. Ltd.
<i>Lagna</i>	30.6.65	J. P. Brand	G. G. Beaton, A. P. Briggs, C. D. Croall, D. Tracey		Ship Finance & Management Co. Ltd.
<i>Lord Codrington</i>	18.3.66	D. A. Keller	B. H. Bennion, P. Richardson, D. Moore		Hellyer Bros. Ltd.
<i>Esso</i>	1.12.65	J. P. Jackson	J. C. Harper, L. P. Jones, A. Simpson		Brocklebank Line
<i>Esso</i>	14.3.66	J. S. Munday	A. P. Wallbank, L. P. Jones, A. Simpson		Brocklebank Line
<i>Esso</i>	22.3.66	H. Grant	J. C. Beaumont, M. D. Coles		Brocklebank Line
<i>Esso</i>	9.3.66	J. H. E. George	E. Foley, B. A. Codd		Shell Tankers (U.K.) Ltd.
<i>Esso</i>	20.12.65	J. A. Miller	K. Tree, D. F. B. Wright, K. J. Webb		Bristol S.N. Co. Ltd.
<i>Esso</i>	*	C. Billett	J. C. Harper, L. P. Jones, A. Simpson		Mobil Shipping Co. Ltd.
<i>Esso</i>	1.2.66	M. G. Pirie	A. P. Wallbank, L. P. Jones, A. Simpson		Mobil Shipping Co. Ltd.
<i>Esso</i>	23.2.66	J. Pawlowicz	J. L. Hussey, C. J. C. Harker, D. Penny		Mobil Shipping Co. Ltd.
<i>Esso</i>	25.2.66	D. Luff	W. M. Davies		Mobil Shipping Co. Ltd.
<i>Esso</i>			J. Morgan		J. Marr & Sons Ltd.
<i>Esso</i>					Houlder Bros. Ltd.

Supplementary Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
Ross Leonis ..	13.1.66	R. Waller ..	R. R. N. Laing ..	R. R. N. Laing ..	Ross Trawlers Ltd.
Ross Intrepid ..	*	K. Neilson ..	J. Renfrew ..	J. Renfrew ..	Ross Trawlers Ltd.
Ross Orion ..	1.3.66	G. Whur ..	A. Ramsay ..	A. Ramsay ..	Ross Trawlers Ltd.
St. Finbarr ..	15.3.66	T. Sawyers ..	D. Redshaw ..	D. Redshaw ..	Thos. Hamling & Co. Ltd.
St. Giles ..	20.1.66	J. Humphrey ..	K. C. Stone ..	K. C. Stone ..	Thos. Hamling & Co. Ltd.
Sea Captain ..	*	R. E. Huggins ..	P. J. Teham, W. L. Morrison, J. Harvey ..	P. J. F. Skelton ..	Vergocean S.S. Co. Ltd.
Soutra ..	23.2.66	W. H. Spence ..	A. Sinclair ..		Chr. Salvesen & Co. Ltd.
Streambank ..	20.12.65	P. Smith ..			Bank Line
Syloan Arrow ..	22.12.65	E. A. K. Brewer ..	D. M. Bell ..	M. A. Place ..	Mobil Shipping Co. Ltd.
Tolsta ..	25.11.65	W. P. Watt ..	A. B. Gibson ..	C. Begg ..	Chr. Salvesen & Co. Ltd.
Truro ..	29.4.65	J. K. Marrow, M.B.E. ..	J. M. Jarratt, B. A. Gash, C. Kaiser ..	M. J. Doyle ..	Ellerman's Wilson Line
Tudor Prince ..	17.9.65	A. H. Kent ..	L. Gibson, R. Jones ..	J. Strong ..	Prince Line
Volo ..	18.10.63	W. K. Tadman ..	A. Macintyre ..	W. C. Doyle ..	Ellerman's Wilson Line
Winga ..	30.12.64	R. J. McNinch ..	D. Peacham, B. Tong, B. D. Lee, R. Shaw ..		Glen & Co. Ltd.
York ..	17.2.65	J. Wm. Laverack ..			Associated Humber Lines Ltd.

Trawlers

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

SKIPPER	RADIO OPERATOR	TRAWLER OWNER/MANAGER
B. A. Ashcroft ..	C. Hodder ..	Hellyer Bros. Ltd.
D. Cawood ..	B. Robinson ..	Newington Steam Fishing Co.
P. Craven ..	L. Hough ..	St. Andrews Steam Fishing Co. Ltd.
J. O. Ermons ..	L. Bacon ..	Ross Trawlers Ltd.
W. Fry ..	W. J. Teare ..	Hellyer Bros. Ltd.
H. Hall ..	G. V. Lane ..	Thos. Hamling & Co. Ltd.
W. Hastie ..	J. D. Lester ..	Ross Trawlers Ltd.
W. Hodson ..	L. Bacon ..	Ross Trawlers Ltd.
C. Ives ..	S. F. Roe ..	Ross Trawlers Ltd.
S. Milne ..	J. D. Lester ..	Ross Trawlers Ltd.
A. Osler ..	J. K. Fenwick ..	Hellyer Bros. Ltd.
G. Phillips ..	A. J. Nettleship ..	Hellyer Bros. Ltd.
D. Ward ..	S. F. Roe ..	Ross Trawlers Ltd.

‘Marid’ Ships

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

NAME OF VESSEL	CAPTAIN	OWNER/MANAGER
<i>Adriatic Coast</i> ..	R. E. Holt ..	Coast Lines Ltd.
* <i>Alderney Coast</i> ..	C. Baines ..	British & Channel Islands Shipping Co. Ltd.
<i>Allen Commodore</i> ..	C. Bott ..	Commodore Shipping Co. Ltd.
* <i>Amsterdam</i> ..	H. Jennings ..	British Railways Board
<i>Angularity</i> ..	D. O’Leary ..	F. T. Everard & Sons Ltd.
* <i>Arnhem</i> ..	C. Witchell ..	British Railways Board
<i>Avalon</i> ..	F. Atkinson ..	British Railways Board
<i>Ballylagan</i> ..	A. Barrow ..	John Kelly Ltd.
<i>Barbic Ferry</i> ..	R. Hockings ..	Atlantic S.N. Co. Ltd.
* <i>Brenda</i> ..	I. MacRae ..	Dept. of Agriculture & Fisheries for Scotland
<i>B.P. Manager</i> ..	F. Cain ..	Shell-Mex & B.P. Ltd.
<i>Caesarea</i> ..	V. Newton ..	British Railways Board
<i>Caledonian Coast</i> ..	F. Mara ..	Coast Lines Ltd.
<i>Cambria</i> ..	W. J. Roberts ..	British Railways Board
<i>Cardiffbrook</i> ..	B. S. Lock ..	Comben, Longstaff & Co. Ltd.
* <i>Cerdic Ferry</i> ..	C. E. Turner ..	Atlantic S.N. Co. Ltd.
<i>Cheshire Coast</i> ..	C. A. Hopkins ..	Coast Lines Ltd.
<i>Clarebrook</i> ..	W. H. N. Anderson ..	Comben, Longstaff & Co. Ltd.
<i>Claymore</i> ..	D. Gunn ..	David MacBrayne Ltd.
* <i>Clupea</i> ..	J. Jappy ..	Dept. of Agriculture & Fisheries for Scotland
<i>Darlington</i> ..	W. Brown ..	Associated Humber Lines Ltd.
* <i>Doric Ferry</i> ..	D. Burgess ..	Atlantic S.N. Co. Ltd.
<i>Dorset Coast</i> ..	R. K. Jones ..	British Railways Board
* <i>Dryburgh</i> ..	F. Pitulko ..	G. Gibson & Co. Ltd.
<i>Duke of Argyll</i> ..	D. A. Ponting ..	British Railways Board
<i>Duke of Lancaster</i> ..	— Greenwood ..	British Railways Board
<i>Duke of Rothesay</i> ..	J. B. Williams ..	British Railways Board
<i>Elk</i> ..	B. Picot ..	British Railways Board
<i>Elwick Bay</i> ..	W. G. Dennison ..	Elwick Shipping Co.
<i>Etrick</i> ..	J. Murray ..	G. Gibson & Co. Ltd.
<i>Fernhurst</i> ..	P. McCullough ..	Stephenson, Clarke Ltd.
<i>Ferryhill</i> ..	J. Innes ..	Aberdeen Coal & Shipping Co. Ltd.
<i>Fingal</i> ..	R. McEachern ..	Northern Lighthouse Board
* <i>Fulham X</i> ..	D. Battle ..	Stephenson, Clarke Ltd.
<i>Gaelic Ferry</i> ..	J. W. Cowie ..	Atlantic S.N. Co. Ltd.
<i>Hadrian Coast</i> ..	J. MacKinnon ..	Coast Lines Ltd.
<i>Hamble</i> ..	H. Jack ..	Shell-Mex & B.P. Ltd.
<i>Harrogate</i> ..	C. R. Jones ..	British Railways Board
<i>Hebrides</i> ..	J. Hodgson ..	David MacBrayne Ltd.
* <i>Helmsdale</i> ..	A. F. Ross ..	Northern Trading Co. Ltd.
* <i>Heron</i> ..	G. C. Longfield ..	General S.N. Co. Ltd.
* <i>Hesperus</i> ..	D. McCorkingdale ..	Northern Lighthouse Board
<i>Hibernia</i> ..	R. Roberts ..	British Railways Board
<i>Hibernian Coast</i> ..	G. H. Mearns ..	Coast Lines Ltd.
* <i>Iberian Coast</i> ..	D. Collins ..	Tyne, Tees Shipping Co. Ltd.
<i>Innisfallen</i> ..	T. McVeigh ..	City of Cork Steam Packet Co.
<i>Ionic Ferry</i> ..	W. Close ..	Atlantic S.N. Co. Ltd.
<i>Irish Coast</i> ..	A. Nicholson ..	Coast Lines Ltd.
<i>Jade</i> ..	A. G. Smith ..	Wm. Robertson Ltd.
<i>Jersey Coast</i> ..	J. G. Casey ..	Coast Lines Ltd.
<i>Kelvin</i> ..	H. A. Mathesen ..	Wm. Sloan & Co. Ltd.
* <i>Killingholme</i> ..	W. Mair ..	Shell-Mex & B.P. Ltd.
<i>Lairds Crest</i> ..	A. Palmer ..	Burns & Laird Line Ltd.
<i>Lairds Glen</i> ..	D. Campbell ..	Burns & Laird Line Ltd.
* <i>Lairds Loch</i> ..	H. Davidson ..	Burns & Laird Line Ltd.
<i>Lancashire Coast</i> ..	P. A. Johnson ..	Belfast S.S. Co. Ltd.
* <i>Leinster</i> ..	G. Barry ..	Coast Lines Ltd.
<i>Loch Ard</i> ..	R. Campbell ..	David MacBrayne Ltd.
<i>Loch Carron</i> ..	A. Mathieson ..	David MacBrayne Ltd.
* <i>Loch Seaforth</i> ..	A. McQueen ..	David MacBrayne Ltd.
<i>Lord Tedder</i> ..	J. Russel ..	Lord Line Ltd.
<i>Melrose</i> ..	J. Wyne ..	G. Gibson & Co. Ltd.
<i>Moose</i> ..	B. A. Caws, D.S.C., R.D. ..	British Railways Board
<i>Mountstewart</i> ..	C. A. Hopkins ..	Coast Lines Ltd.
* <i>Munster</i> ..	J. Williams ..	Coast Lines Ltd.
<i>Mytongate</i> ..	F. Williams ..	Hull Gates Shipping Co.
<i>Netherlands Coast</i> ..	E. Fisher ..	Tyne, Tees Shipping Co. Ltd.
<i>Olivian Coast</i> ..	T. S. Stewart ..	Tyne, Tees Shipping Co. Ltd.
<i>Oriole</i> ..	L. A. Buntyne ..	General S.N. Co. Ltd.
<i>Orselina</i> ..	T. M. Jarvis ..	Continental Cargoes Ltd.
* <i>Pearl</i> ..	W. Campbell ..	Gem Line
* <i>Pharos</i> ..	C. Campbell ..	Northern Lighthouse Board
<i>Pluto</i> ..	E. H. Jones ..	Bristol S.N. Co. Ltd.
<i>Pole Star</i> ..	A. W. Walker ..	Northern Lighthouse Board
<i>St. Andrew St. David</i> ..	D. O. Griffiths ..	British Railways Board
* <i>St. Clair</i> ..	T. Gifford ..	North of Scotland Shipping Co. Ltd.
<i>St. Magnus</i> ..	J. Harvey ..	North of Scotland Shipping Co. Ltd.
<i>St. Patrick</i> ..	C. E. Hatchley ..	British Railways Board
* <i>Sappho</i> ..	R. Mudway ..	Bristol S.N. Co. Ltd.
<i>Sark Coast</i> ..	P. Meras ..	British Channel Islands Shipping Co. Ltd.
<i>Sarmia</i> ..	G. Cartwright ..	British Railways Board
* <i>Scotia</i> ..	A. M. Finlayson ..	Dept. of Agriculture & Fisheries for Scotland

* These ships report wind and weather.

'Marid' Ships (contd.)

NAME OF VESSEL	CAPTAIN	OWNER/MANAGER
<i>Scottish Coast</i>	A. S. Nicholson	Coast Lines Ltd.
<i>Selby</i>	J. O. Griffiths	British Railways Board
<i>Shell Director</i>	G. Sayers	Shell-Mex & B.P. Ltd.
<i>Silvio</i>	F. Firth	Ellerman's Wilson Line
<i>Slieve Bawn</i>	L. R. Evans	British Railways Board
<i>Slieve Bearnagh</i>	J. D. Nash	British Railways Board
<i>Slieve Donard</i>	L. R. Evans	British Railways Board
<i>Slieve League</i>	H. Hughes	British Railways Board
* <i>Southern Coast</i>	H. G. Keilit	Coast Lines Ltd.
<i>Spray</i>	J. Andrews	Ellis & McHardy Ltd.
<i>Stormont</i>	P. A. Johnson	Coast Lines Ltd.
<i>Stella Antares</i>	J. Kearsey	Charleson Smith Trawlers Ltd.
* <i>Superiority</i>	J. Thompson	F. T. Everard & Sons Ltd.
* <i>Talisker</i>	D. MacDonald	Sloan & Co. Ltd.
<i>Tay</i>	D. MacDonald	Sloan & Co. Ltd.
* <i>Teano</i>	A. Gillis	Ellerman's Wilson Line
<i>The President</i>	A. Turner	J. Hay & Sons
<i>Torquay</i>	G. Youngson	J. & A. Davidson Ltd.
<i>Treviscoe</i>	H. S. Shugar	Channel Shipping Ltd.
* <i>Warwickbrook</i>	D. J. Moyes	Comben, Longstaff & Co. Ltd.
<i>Winchester</i>	B. Caws, D.S.C., R.D.	British Railways Board
* <i>Whitby Abbey</i>	J. Collier	Associated Humber Lines Ltd.
<i>Woodlark</i>	A. E. Guest	General S.N. Co. Ltd.
<i>Yarvic</i>	F. Williams	East Anglian Shipping Co. Ltd.

* These ships report wind and weather.

Light-vessels

NAME OF VESSEL	MASTERS
<i>Bar</i>	N. S. Burns, H. Houton
<i>Dowsing</i>	H. Frost, B. Holmes
<i>East Goodwin</i>	G. F. Bailey, S. R. Woolnough
<i>Galloper</i>	W. G. Burroughs, W. C. Green
<i>Humber</i>	D. A. Bacon, D. W. Bird
<i>Longstone (Lt. Ho.)</i>	R. D. Ewens, G. H. Jones
<i>Newarp</i>	W. E. Fenn, G. A. Harris
<i>Royal Sovereign</i>	B. J. G. Key, G. Davies
<i>St. Gowan</i>	R. J. Owen, D. J. Harries
<i>Seven Stones</i>	S. R. Woolnough, H. Edwards
<i>Shambles</i>	E. Davis, H. Price
<i>Shipwash</i>	S. Goose, J. Goldsmith
<i>Skulmartin</i>	D. Hawkins, H. Master
<i>Smith's Knoll</i>	B. E. Cunham, F. Harrison

Training Establishments

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

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

BRITISH COMMONWEALTH

The following lists 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.

INDIA (Information dated 11.3.66)

NAME OF VESSEL	OWNER
Selected Ships:	
<i>Andamans</i>	Great Eastern Shipping Co. Ltd.
<i>Bahadur</i>	Asiatic S.N. Co. Ltd.
<i>Bharatmitra</i>	Bharat Line Ltd.
<i>Bharatratna</i>	Bharat Line Ltd.
<i>Dumra</i>	British India Line
<i>Dwarka</i>	British India Line
<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 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 Renown</i>	India S.S. Co. Ltd.
<i>Indian Trader</i>	India S.S. Co. Ltd.
<i>Islami</i>	Mogul Line Ltd.
<i>Jaladhan</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>Jalamudra</i>	Scindia S.N. Co. Ltd.
<i>Jalaprakash</i>	Scindia S.N. Co. Ltd.
<i>Jalaputra</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 Line
<i>Karanja</i>	British India Line
<i>Mohammedi</i>	Mogul Line Ltd.
<i>Mozaffari</i>	Mogul Line Ltd.
<i>Nicobar</i>	Great Eastern Shipping Co. Ltd.
<i>Pradeep</i>	Dept. of Lighthouses and Lightships, Govt. of India
<i>Rajula</i>	British India Line
<i>Santhia</i>	British India Line
<i>Saudi</i>	Mogul Line Ltd.
<i>Sirdhana</i>	British India Line
<i>State of Assam</i>	Shipping Corporation of India Ltd.
<i>State of Bombay</i>	Shipping Corporation of India Ltd.
<i>State of Bihar</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 Tr. 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.
Supplementary Ships:	
<i>Akash</i>	A. P. J. Shipping Co. Ltd.
<i>Ashok Jayanti</i>	Jayanti Shipping Co. Ltd.
<i>Bharatbhusan</i>	Bharat Line Ltd.
<i>Bharatkesari</i>	Bharat Line Ltd.
<i>Desh Bandhu</i>	Shipping Corporation of India Ltd.
<i>Gandhi Jayanti</i>	Jayanti Shipping Co. Ltd.
<i>Indian Endeavour</i>	India S.S. Co. Ltd.
<i>Indian Industry</i>	India S.S. Co. Ltd.
<i>Indian Resource</i>	India S.S. Co. Ltd.
<i>Indian Resolve</i>	India S.S. Co. Ltd.
<i>Indian Splendour</i>	India S.S. Co. Ltd.
<i>Indian Strength</i>	India S.S. Co. Ltd.
<i>Indian Tradition</i>	India S.S. Co. Ltd.
<i>Indian Triumph</i>	India S.S. Co. Ltd.
<i>Indian Trust</i>	India S.S. Co. Ltd.
<i>Jag Doot</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Ganga</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Jamna</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Jiwan</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Kranti</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Ketu</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 Mitra</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Rahat</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Ratna</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Shanti</i>	Great Eastern Shipping Co. Ltd.
<i>Jag Vijay</i>	Great Eastern Shipping Co. Ltd.
<i>Jaladhanya</i>	Scindia S.N. Co. Ltd.

INDIA (cont.)

NAME OF VESSEL	OWNER
<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>Jalagomati</i>	Scindia S.N. Co. Ltd.
<i>Jaladuta</i>	Scindia S.N. Co. Ltd.
<i>Jalagouri</i>	Scindia S.N. Co. Ltd.
<i>Jalagovind</i>	Scindia S.N. Co. Ltd.
<i>Jalagopal</i>	Scindia S.N. Co. Ltd.
<i>Jalakendra</i>	Scindia S.N. Co. Ltd.
<i>Jalakirti</i>	Scindia S.N. Co. Ltd.
<i>Jalakrishna</i>	Scindia S.N. Co. Ltd.
<i>Jalamaya</i>	Scindia S.N. Co. Ltd.
<i>Jalamani</i>	Scindia S.N. Co. Ltd.
<i>Jalamayur</i>	Scindia S.N. Co. Ltd.
<i>Jalapushpa</i>	Scindia S.N. Co. Ltd.
<i>Jalarajendra</i>	Scindia S.N. Co. Ltd.
<i>Jalavijaya</i>	Scindia S.N. Co. Ltd.
<i>Jalapalak</i>	Scindia S.N. Co. Ltd.
<i>Jalapankhi</i>	Scindia S.N. Co. Ltd.
<i>Jalavikram</i>	Scindia S.N. Co. Ltd.
<i>Jalaveera</i>	Scindia S.N. Co. Ltd.
<i>Jalavishnu</i>	Scindia S.N. Co. Ltd.
<i>Jalvallah</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 Tara</i>	South East Asia Shipping Co. Ltd.
<i>Maha Rajah</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 Usha</i>	Ratnakar Shipping Co. Ltd.
<i>State of Andhra</i>	Shipping Corporation of India Ltd.
<i>State of Gujarat</i>	Shipping Corporation of India Ltd.
<i>State of Kerala</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>Vishva Jyoti</i>	Shipping Corporation of India Ltd.
<i>Vishva Kanti</i>	Shipping Corporation of India Ltd.
<i>Vishva Kirti</i>	Shipping Corporation of India Ltd.
<i>Vishva Mangal</i>	Shipping Corporation of India Ltd.
<i>Vishva Maya</i>	Shipping Corporation of India Ltd.
<i>Vishva Nidhi</i>	Shipping Corporation of India Ltd.
<i>Vishva Prem</i>	Shipping Corporation of India Ltd.
<i>Vishva Shanti</i>	Shipping Corporation of India Ltd.
<i>Vishva Sudha</i>	Shipping Corporation of India Ltd.
<i>Vishva Usha</i>	Shipping Corporation of India Ltd.

NEW ZEALAND (Information dated 23.2.66)

NAME OF VESSEL	OWNER
Selected Ships:	
<i>Kaimanawa</i>	Union S.S. Co. of New Zealand Ltd.
<i>Kaimiro</i>	Union S.S. Co. of New Zealand Ltd.
<i>Kaitoa</i>	Union S.S. Co. of New Zealand Ltd.
<i>Kaitoke</i>	Union S.S. Co. of New Zealand Ltd.
<i>Kaituna</i>	Union S.S. Co. of New Zealand Ltd.
<i>Karamu</i>	Union S.S. Co. of New Zealand Ltd.
<i>Karetu</i>	Union S.S. Co. of New Zealand Ltd.
<i>Karepo</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>Komata</i>	Union S.S. Co. of New Zealand Ltd.
<i>Koraki</i>	Union S.S. Co. of New Zealand Ltd.
<i>Koranui</i>	Union S.S. Co. of New Zealand Ltd.
<i>Koromiko</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>Matua</i>	Union S.S. Co. of New Zealand Ltd.
<i>Moana Roa</i>	New Zealand Government
<i>Ngakuta</i>	Union S.S. Co. of New Zealand Ltd.
<i>Ngatoro</i>	Union S.S. Co. of New Zealand Ltd.
<i>Port Montreal</i>	Port Line
<i>Saracen</i>	Crusader Shipping Co. Ltd.
<i>Tarawera</i>	Union S.S. Co. of New Zealand Ltd.
<i>Tofua</i>	Union S.S. Co. of New Zealand Ltd.
<i>Waikare</i>	Union S.S. Co. of New Zealand Ltd.
<i>Waimate</i>	Union S.S. Co. of New Zealand Ltd.
<i>Waiamea</i>	Union S.S. Co. of New Zealand Ltd.
<i>Wairata</i>	Union S.S. Co. of New Zealand Ltd.
<i>Waitemata</i>	Union S.S. Co. of New Zealand Ltd.
Supplementary Ships:	
<i>Aramoana</i>	New Zealand Railways
<i>City of Auckland</i>	Ellerman & Bucknall S.S. Co. Ltd.
<i>Holmburn</i>	Holm & Co.
<i>Knight Templar</i>	Crusader Shipping Co. Ltd.
<i>Taranui</i>	South Pacific Shipping Co. (Suva)
Auxiliary Ships:	
<i>Coromel</i>	Jurie Shipping Co.
<i>Holmlea</i>	Holm & Co.
<i>Kaiapoi</i>	Union S.S. Co. of New Zealand Ltd.
<i>Kaimai</i>	Union S.S. Co. of New Zealand Ltd.
<i>Kaitangata</i>	Union S.S. Co. of New Zealand Ltd.
<i>Kaitawa</i>	Union S.S. Co. of New Zealand Ltd.
<i>Konui</i>	Union S.S. Co. of New Zealand Ltd.
<i>Navua</i>	Union S.S. Co. of New Zealand Ltd.
<i>Picton</i>	Picton Fishing Co. Ltd.
<i>Waiana</i>	Union S.S. Co. of New Zealand Ltd.

HONG KONG (Information dated 15.3.66)

NAME OF VESSEL	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Anking</i> ..	B. McLennan ..	J. Lough, R. V. McKay, K. M. Tsoi ..	Ma Edmund ..	China Navigation Co. Ltd.
<i>Arshun</i> ..	R. Kennett ..	J. R. C. Hanman, T. W. Allsop, D. A. Roche, L. R. Jones ..	Li San Kau ..	China Navigation Co. Ltd.
<i>Cape St Mary</i> ..	V. Jarvis Wan ..	W. J. Stuart, D. H. Drvett, Chan Chau Po ..	Tsang Chiu Leong ..	Kiu Lee Co. Ltd.
<i>Changsha</i> ..	Fu Chiu Wan ..	Chan Hok Min, Kwok Yung Sing ..	Wong Kam Tim ..	Fisheries Department, Hong Kong Government
<i>Chefoo</i> ..	I. F. O'Connor ..	W. F. Jeffrey, B. D. White, M. J. Carolin ..	Lum A. Gwan Ying ..	China Navigation Co. Ltd.
<i>Chekiang</i> ..	K. D. Johnson ..	M. R. Coyne, A. M. Allcott, R. E. Herman ..	Yue Shiu Ming ..	China Navigation Co. Ltd.
<i>Chengtu</i> ..	V. R. Woolfe ..	R. B. Evans, N. R. Masterson, D. R. Parkinson ..	Wai Pun Un ..	China Navigation Co. Ltd.
<i>Chungking</i> ..	M. R. M. Seale ..	W. B. Jones, J. M. Pemberton, K. G. C. Troughton ..	Kwok Man Wai ..	China Navigation Co. Ltd.
<i>Dana</i> ..	N. C. Pearson ..	J. A. Derrick, J. B. Wells, M. J. Pellegrini ..	Tsang Kau ..	China Navigation Co. (H.K.) Ltd.
<i>Eastern Argosy</i> ..	I. Johnson ..	R. Rasmussen, H. Bjordal, S. Dionne ..	A. Gundersen ..	Karsten Larsen Co. (H.K.) Ltd.
<i>Eastern Maid</i> ..	M. I. Groundwater ..	K. Millar, P. M. Wheeler, J. Downie ..	M. F. Stevens ..	Indo-China S.N. Co. Ltd.
<i>Eastern Moon</i> ..	T. H. Nichols ..	J. Hawthorne, N. Whyte-Macpherson, Lam Kang Yuen ..	F. J. Bateman ..	Indo-China S.N. Co. Ltd.
<i>Eastern Muse</i> ..	W. G. White ..	G. T. Colbeck, M. J. Kearney, I. J. H. Alexander ..	F. A. Dunford ..	Indo-China S.N. Co. Ltd.
<i>Eastern Queen</i> ..	P. J. Sullivan ..	D. M. Cauvin, K. A. Ashworth, P. E. H. Piriou ..	F. McGuckin ..	Indo-China S.N. Co. Ltd.
<i>Eastern Ranger</i> ..	J. M. Marshall ..	J. D. McNeill, N. J. Porteous, A. P. Brazil ..	H. D. Bray ..	Indo-China S.N. Co. Ltd.
<i>Eastern Rover</i> ..	G. C. Taylor ..	B. O. Jensen, R. C. Porteous, T. J. Frawley ..	R. Sadler ..	Indo-China S.N. Co. Ltd.
<i>Eastern Sage</i> ..	G. Kinley ..	R. G. MacDonald, P. R. Hammond, L. J. Burne ..	M. Hewitt ..	Indo-China S.N. Co. Ltd.
<i>Eastern Star</i> ..	M. I. K. Crichton ..	J. G. Boyle, J. R. Denney, G. F. Hammonds ..	M. I. O'Brien ..	Indo-China S.N. Co. Ltd.
	W. E. Reeve ..	G. W. S. Ison, T. M. Muir, B. L. Ballantyne, M. D. Pickard ..	W. D. O'Keefe ..	Indo-China S.N. Co. Ltd.
<i>Eastern Trader</i> ..	C. Preston ..	R. M. F. Bertram, J. Wroughton, N. A. H. Funston ..	D. J. Warth ..	Indo-China S.N. Co. Ltd.
<i>Elsbeth</i> ..	C. W. S. Ellis ..	J. Keates, Chan H. H. ..	Wong T. Y. ..	Shun Cheong S.N. Co. Ltd.
<i>Francis Drake</i> ..	P. D. Carlson ..	R. Cromb, J. S. Hill, S. Dobson, M. I. May ..	J. Heggie ..	Shun Cheong S.N. Co. Ltd.
<i>Galle</i> ..	D. W. R. Gash ..	Tai Lin Yung, Foo Kok Young ..	F. C. Renshaw ..	Shun Cheong Enterprises (H.K.) Ltd.
<i>George Anson</i> ..	A. R. Dyason ..	B. M. Curtis, D. A. James, M. Bolderson, P. Suckling ..	D. W. Murphy ..	Shun Cheong Enterprises (H.K.) Ltd.
<i>Hai Hing</i> ..	O. Schibsted ..	Niels Kaaber, Kåre Melbø, J. Honningsuag ..	Chung Yeuk ..	Thoresen & Co. Ltd.
<i>Hai Lee</i> ..	H. Yndestad ..	H. Iversen, Jan Roland, Inge O. Evjen ..	Kwong Shek Hee ..	Thoresen & Co. Ltd.
<i>Hai Meng</i> ..	N. O. Wilhelmssen ..	Stein Olsen, O. Lauvli, Knut Erik Frederiksen ..	Chan Kam Tsun ..	Thoresen & Co. Ltd.
<i>Haldis</i> ..	I. Eide ..	Leif Moen, A. Øyen, Nils Jan Isaksen ..	Leung Lit-Chuen ..	Thoresen & Co. Ltd.
<i>Halldar</i> ..	N. Soelberg ..	I. Buer, R. Frydenlund, Aage Iversen ..	Lau Kam Pui ..	Thoresen & Co. Ltd.
<i>Haltvard</i> ..	Halvor Andersen ..	R. Farstad, A. H. Saterøy, Arne Hansen ..	Lai Kwong Yin ..	Thoresen & Co. Ltd.
<i>Hang Sang</i> ..	D. Wilson ..	G. G. Taylor, Hsu Chien Szu, Clinton To F. H. ..	A. M. Bailey ..	Indo-China S.N. Co. Ltd.
<i>Helios</i> ..	O. Holm Andersen ..	J. Riverud, Knut Olsen, A. K. Sandnes ..	Ip Yuk Fai ..	Thoresen & Co. Ltd.
<i>Hermod</i> ..	O. J. Apolo ..	Arne Johnsen, T. Moensen, A. Myklebust ..	Poon Chee Pooi ..	Thoresen & Co. Ltd.
<i>Hero</i> ..	T. Thorkildsen ..	A. Solbak, H. Tioftot, Jan Erik Hermansen ..	Tam Chung Mo ..	Thoresen & Co. Ltd.
<i>Hosang</i> ..	L. C. Cox ..	D. N. Greenhalgh, D. A. C. Allardice, Yuen Chok Ying ..	J. F. Stewart ..	Indo-China S.N. Co. Ltd.
<i>Hoi Kung</i> ..	J. Ekrene ..	B. Vold, D. Ingesund, B. Nilsen ..	E. Moller ..	Karsten Larsen Co. (H.K.) Ltd.
<i>Hoi Wong</i> ..	J. B. Jerkenes ..	O. Espeseth, M. Stana, G. Emberland ..	A. Back ..	Karsten Larsen Co. (H.K.) Ltd.
<i>Jacob Jepsen</i> ..	G. J. Andersen ..	N. L. Thomsen, J. I. Toennesen, M. L. Thyssen ..	W. G. McLaren ..	China Navigation Co. Ltd.
<i>Kuala Lumpur</i> ..	R. C. W. Gorman ..	D. W. Boys, J. Milward, R. A. Drakes, R. B. Crick ..	Wong Wood Man ..	China Navigation Co. Ltd.
<i>Kwangsai</i> ..	A. Harper ..	H. J. Stagg, J. L. Simpson, R. J. Mullin ..	Shiu Ping Fan ..	China Navigation Co. Ltd.
<i>Kweichow</i> ..	R. E. Brooks ..	G. M. Adams, W. B. J. Hibberdine, P. R. Ringe ..	Chan Wing Tsung ..	China Navigation Co. Ltd.
<i>Kwelin</i> ..	J. R. Kidd ..	C. J. R. Metcalf, D. C. Ramsey, R. L. Staker ..	Choi Pong Cheung ..	China Navigation Co. Ltd.
<i>Michael Jepsen</i> ..	R. A. D. Nielsen ..	F. Nissen, P. Hedlund, C. W. Aggergren ..	Lai Cho Hoi ..	China Navigation Co. Ltd.
<i>Michung</i> ..	I. Andresen ..	M. A. Fares, A. Jorgensen, L. Hjervikrem ..	Ma Yau Sun ..	China Navigation Co. Ltd.
<i>Ning Hai</i> ..	G. E. Bennett ..	J. H. Gomersall, A. J. Gregg, W. F. Elton ..	R. C. Garrard ..	Sveen Shipping Co. Ltd.
<i>Norman</i> ..	C. D. Nisbet ..	N. J. Alexander, E. Lysons, J. W. Simpson ..	Tsang Pui Leung ..	China Navigation Co. Ltd.

<i>Sinkiang</i> ..	R. J. Shipp ..	T. S. Payne, J. D. Arbuthnot, D. J. Taylor ..	Lam Hoi Yuen ..	China Navigation Co. Ltd.
<i>Star Alcyone</i> ..	E. M. H. Bodensjo ..	S. A. Bengtsson, S. O. Berg, I. R. Johansson ..	B. O. Johnsson ..	Everett S.S. Corporation S/A
<i>Star Antares</i> ..	P. A. Perswalld ..	R. Vabasatu, P. Ramberg, B. Ronn ..	R. Reslow ..	Everett S.S. Corporation S/A
<i>Star Betelgeuse</i> ..	C. G. Warfvinge ..	H. O. Hansson, R. J. Nyblom, P. A. Gustafsson ..	B. S. Zetterman ..	Everett S.S. Corporation S/A
<i>Szechuen</i> ..	R. D. F. Pook ..	A. L. Carter, A. J. Mill Irving, R. F. D. Davies ..	Tsui See Man ..	China Navigation Co. Ltd.
<i>Tai Lung Shan</i> ..	Tai A. C. ..	G. T. Henshaw, Wong C. Y., Ip P. C. ..	So H. L. ..	Shun Cheong S.N. Co. Ltd.
<i>Tai Foo Loy</i> ..	A. H. Bathurst ..	Tin W. K., Hui S. C., Lo Y. M. ..	Chan K. C. ..	Shun Cheong S.N. Co. Ltd.
<i>Tai Wah Shan</i> ..	E. L. Merrett ..	Yu C. T., Wan C. K., Li Y. W. ..	Chau C. F. ..	Shun Cheong S.N. Co. Ltd.
<i>Taiyuan</i> ..	J. M. Parker ..	T. J. Wilson, P. I. Isherwood, R. S. Newman, R. B. Morris ..	Leung Man Hin ..	China Navigation Co. Ltd.
<i>Wenchow</i> ..	F. Cunningham ..	C. J. N. Darch, J. N. Edwards, J. R. Haines ..	Leung Hon Kui ..	China Navigation Co. Ltd.
<i>Yochow</i> ..	R. A. Taylor ..	R. J. Smith, A. K. MacDonald, R. M. Mitchell ..	Lo Kin Chek ..	China Navigation Co. Ltd.
<i>Yunnan</i> ..	B. A. Owen ..	P. Ellis, I. D. Fletcher, O. E. Johnson ..	U In San ..	China Navigation Co. Ltd.

SINGAPORE (Information dated 21.3.66)

NAME OF VESSEL	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Bidor</i> ..	I. B. Hunter ..	A. Chan Eng Lock ..	Sunny Fernandez ..	Straits S.S. & Co. Ltd.
<i>Cable Enterprise</i> ..	G. H. C. Reynolds ..	Peter R. Shaw, James M. Watson ..	George O'Brien ..	Cable & Wireless Ltd.
<i>Hoi Houw</i> ..	O. Utseth ..	L. Overaa, A. Stralesen ..	Pieter Joubert ..	Cable & Wireless Ltd.
<i>Kah Poh</i> ..	S. J. Harvey ..	Salleh bin Sahid ..	L. S. Fernandez ..	Ho Chiang Shipping Co. Ltd.
<i>Kario formerly Kim Hock</i> ..	Lam Tit Man ..	W. C. Coules, Ng Chuan Ming ..	Hoon Chia Loui ..	Guan Guan Ltd.
<i>Katong</i> ..	J. M. MacNaughton ..	C. R. Rankine ..	Loh Yok Kwai ..	Straits S.S. & Co. Ltd.
<i>Keningau</i> ..	E. E. Fenwick ..	H. P. Davies ..	K. A. Menon ..	Straits S.S. & Co. Ltd.
<i>Kimanis</i> ..	W. G. Bradshaw ..	E. G. L. Small ..	Sheri R. Bharucha ..	Straits S.S. & Co. Ltd.
<i>Kinabalu</i> ..	H. W. Wilkinson ..	Chua Ngiap Foo ..	Lee Yeun Fatt ..	Straits S.S. & Co. Ltd.
<i>Kuda Mas</i> ..	A. B. Durrant ..	E. P. R. McCarthy, Khalib bin Ismail ..	Wong Lang Kuan ..	Guan Guan Ltd.
<i>Kunak</i> ..	R. E. Davies ..	Peter Ho Kia Tuang ..	Tan Chong Huan ..	Straits S.S. & Co. Ltd.
<i>Letong</i> ..	A. Apituley ..	Zakaria bin Ahmad, Abdul Wahab bin Mohd. Derus ..	Tan Wan Hin ..	K.P.M. (Far East) Ltd.
<i>Perak</i> ..	B. W. Reeve ..	M. F. James ..	Ismail Bin Haji Manat ..	Straits S.S. & Co. Ltd.
<i>Perlis</i> ..	K. L. Edwards ..	C. F. Thezeira ..	K. Kumaran ..	Straits S.S. & Co. Ltd.

CANADA (Information dated 12.5.66)

NAME OF VESSEL	OWNER
Selected Ships:	
<i>Acadia</i>	Government of Canada
<i>Arcadia</i>	P. & O.-Orient Line
<i>A. T. Cameron</i>	Government of Canada
<i>Baffin</i>	Government of Canada
<i>Beaverfir</i>	Canadian Pacific Steamships
<i>Bluenose</i>	Government of Canada
<i>Bridgepool</i>	Pacific Export Lines Ltd.
<i>Camsell</i>	Government of Canada
<i>Canberra</i>	P. & O.-Orient Line
<i>C. D. Howe</i>	Government of Canada
<i>d'Iberville</i>	Government of Canada
<i>Droxford</i>	Ridson Beazley Ltd., Southampton
<i>Edward Cornwallis</i>	Government of Canada
<i>G. B. Reed</i>	Government of Canada
<i>Hudson</i>	Government of Canada
<i>Imperial St. Lawrence</i>	Imperial Oil Ltd.
<i>Irving Glen</i>	Kent Lines Ltd.
<i>John A. Macdonald</i>	Government of Canada
<i>John Cabot</i>	Government of Canada
<i>Kapuskasing</i>	Government of Canada
<i>Kristin Bakke</i>	Knutsen Line, Norway
<i>Labrador</i>	Government of Canada
<i>Lakemba</i>	Pacific Shipowners Ltd., Singapore
<i>Letitia</i>	Donaldson Line, Glasgow
<i>Montcalm</i>	Government of Canada
<i>Narwhal</i>	Government of Canada
<i>N. B. McLean</i>	Government of Canada
<i>Northern Shell</i>	Shell Canada Ltd.
<i>Oriana</i>	P. & O.-Orient Line
<i>Porte Dauphine</i>	Government of Canada
<i>Rally</i>	Government of Canada
<i>Rapid</i>	Government of Canada
<i>R. B. Angus</i>	Anglo Canadian Shipping Co. Ltd.
<i>Saldura</i>	Chr. Salvesen & Co. Ltd., Leith
<i>Silvia</i>	Saguenay Shipping Ltd.
<i>Simon Fraser</i>	Government of Canada
<i>Sir Humphrey Gilbert</i>	Government of Canada
<i>Sir William Alexander</i>	Government of Canada
<i>Thor I</i>	A. S. Thor Dahl, Sandefjord, Norway
<i>Thorshope</i>	A. S. Thor Dahl, Sandefjord, Norway
<i>Thorsriuer</i>	A. S. Thor Dahl, Sandefjord, Norway
<i>Thorstream</i>	A. S. Thor Dahl, Sandefjord, Norway
<i>Waihemo</i>	Union S.S. Co. of New Zealand
<i>Wolfe</i>	Government of Canada
Supplementary Ships:	
<i>Abegweit</i>	Government of Canada
<i>Alaska</i>	Courtney Agencies Ltd., Vancouver
<i>Anna Bakke</i>	Knutsen Line, Norway
<i>Astrid Bakke</i>	Knutsen Line, Norway
<i>Bonneville</i>	A. F. Klaveness & Co., Oslo
<i>Bougainville</i>	A. F. Klaveness & Co., Oslo
<i>Bronxville</i>	A. F. Klaveness & Co., Oslo
<i>Emerillon</i>	Shell Canada Ltd.
<i>Gosforth</i>	Federal Commerce & Navigation Co. Ltd.
<i>Imperial Halifax</i>	Imperial Oil Ltd.
<i>Imperial Quebec</i>	Imperial Oil Ltd.
<i>Lloyd Bakke</i>	Knutsen Line, Norway
<i>Maxwell</i>	Government of Canada
<i>M. J. Boylen</i>	Kent Line Ltd.
<i>Princess of Acadia</i>	Canadian Pacific Steamships
<i>Sunnyville</i>	A. F. Klaveness & Co., Oslo
<i>Sunprincess</i>	Princess Shipping Co., Monrovia
<i>Thorscarrier</i>	A. F. Thor Dahl, Sandefjord, Norway
<i>William Carson</i>	Government of Canada

Auxiliary Ships:

Canada has 26 ocean-going Auxiliary Ships and 36 Auxiliary Ships operating on the Great Lakes.

Notice to Mariners

ECHO COMPOSITE BROADCAST

On 1st June 1966, Londonderry NST began the Echo Composite Broadcast and will now transmit the High Seas Warnings that have hitherto been transmitted by the Kilo Composite Broadcast at Rota. Rota has discontinued this broadcast. Frequencies and times of transmissions of weather information are as follows:

Frequency 13110, 6487, 5167, 9318 kc/s.
Times of transmission are 0000-0045
0530-0600
1200-1245
1730-1800

CANADIAN EXCELLENT AWARDS

(The following statement has been received from the Director of the Canadian Meteorological Branch)

The winners of the 18th annual Canadian Excellent Awards for marine weather observing in 1965 have been announced, and are listed on page 166.

This year, 50 awards, in the form of suitably inscribed books, will be presented to the Captains, Principal Observing Officers and Radio Officers of certain ocean-going observing vessels reporting for Canada.

A 'Ship Award' is presented to the captains of the 20 ships which have returned the best logbooks, in regard to both quantity and quality of observations, in 1965. The book chosen for this award was *The Wondrous World of Fishes*, published by The National Geographic Society.

This award is usually placed in the ship's library for the benefit of all officers.

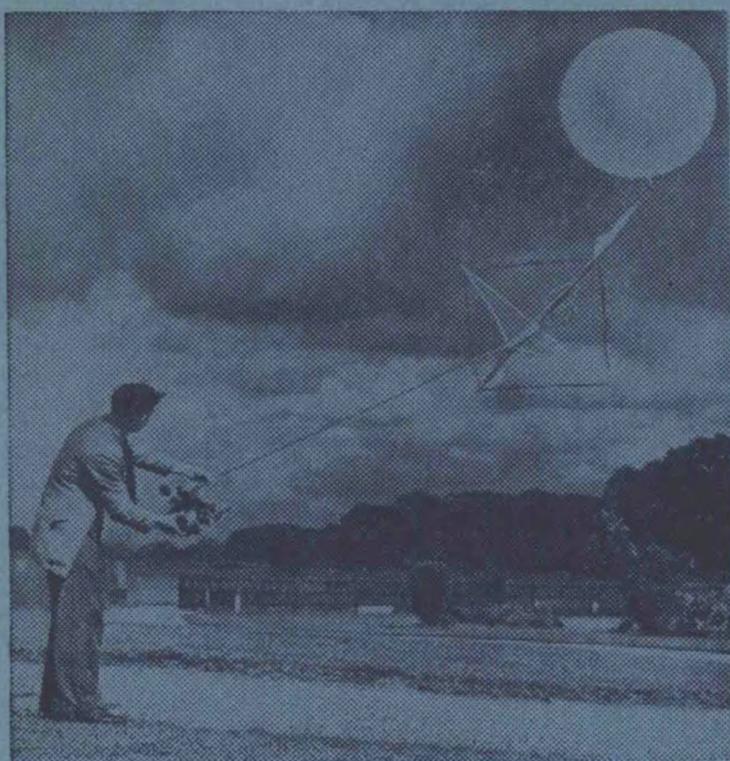
The 15 Principal Observing Officers, whose records were considered to be the best during the year, will receive a copy of *The Churchill Years, 1874-1965* by the editors of The Viking Press, text by *The Times* of London.

Awards were presented to the 15 Radio Officers who made the greatest number of transmissions. The book chosen was *Procession* by John Gunther.

The Canadian Meteorological Branch congratulates all award-winning captains and officers, and extend their thanks for the splendid work done by all the officers of the marine weather observing vessels. We are sure that their reports were greatly appreciated by all the nations which received them.

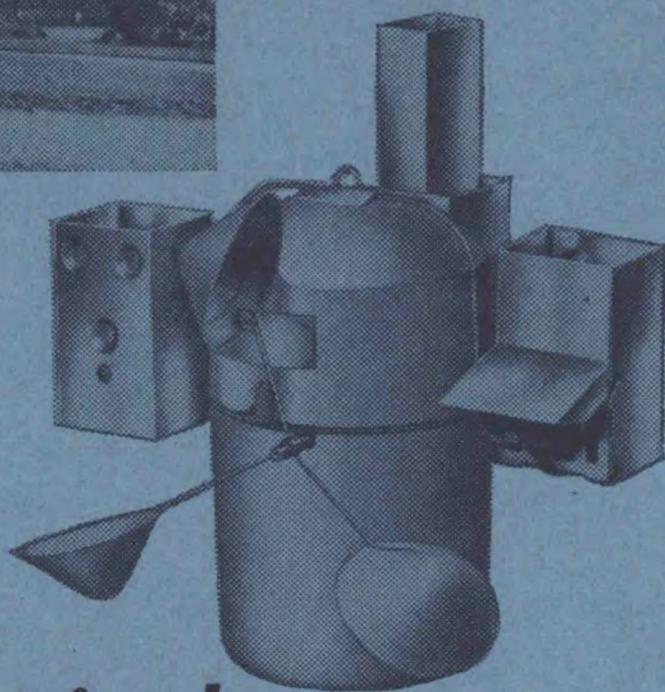
Recipients of Canadian Excellent Awards—1964

NAME OF VESSEL	CAPTAIN(S)	PRINCIPAL OBSERVING OFFICERS	RADIO OFFICER	OWNER/AGENT
<i>Acadia</i>	J. W. C. Taylor	F. W. Sheppard	F. M. Rowe	Government of Canada
<i>Bluenose</i>	—	D. Vail, H. Whitehead	—	Government of Canada
<i>Bridgepool</i>	T. W. Cameron	T. Cary	—	Pacific Export Lines Ltd.
<i>Cyrus Field</i>	—	P. Petrovitch	—	British Western Union Ltd.
<i>d'Iberville</i>	W. A. Ross	—	B. A. Laxson	Government of Canada
<i>Droxford</i>	R. B. Bowers, G. J. Williams	R. V. Martin	H. R. Bates	Risdon Beazley Ltd.
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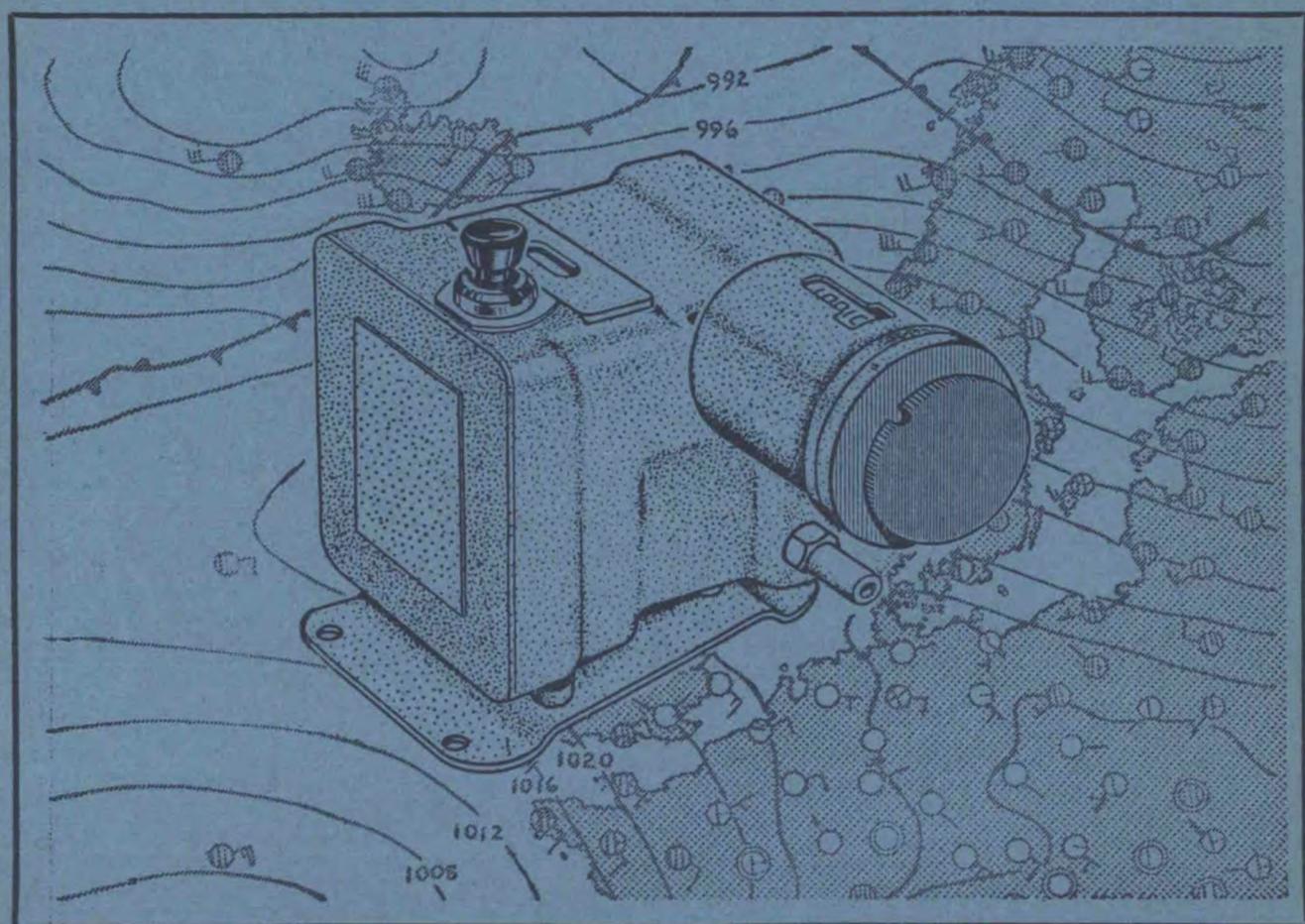
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