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MET. REV

The Marine Observer



Volume XX No. 150

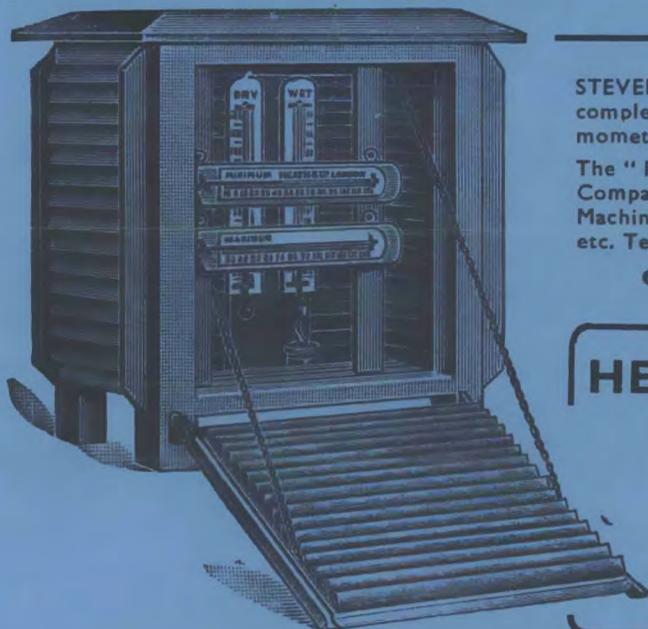
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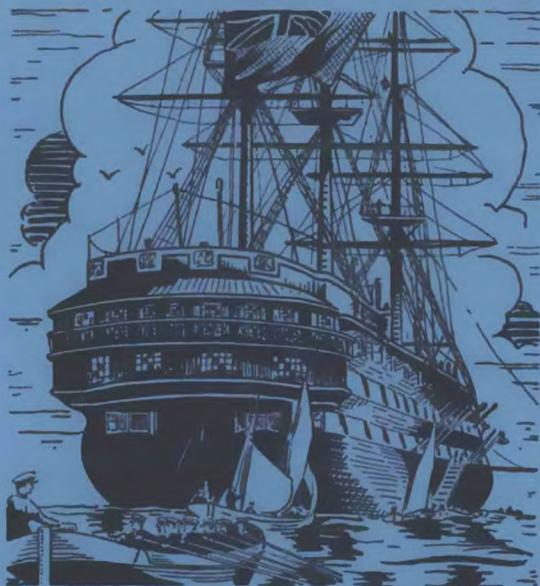
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THE MARINE OBSERVER

A Quarterly Journal of Maritime Meteorology

prepared by the

Marine Branch of the Meteorological Office

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No. 150

OCTOBER 1950

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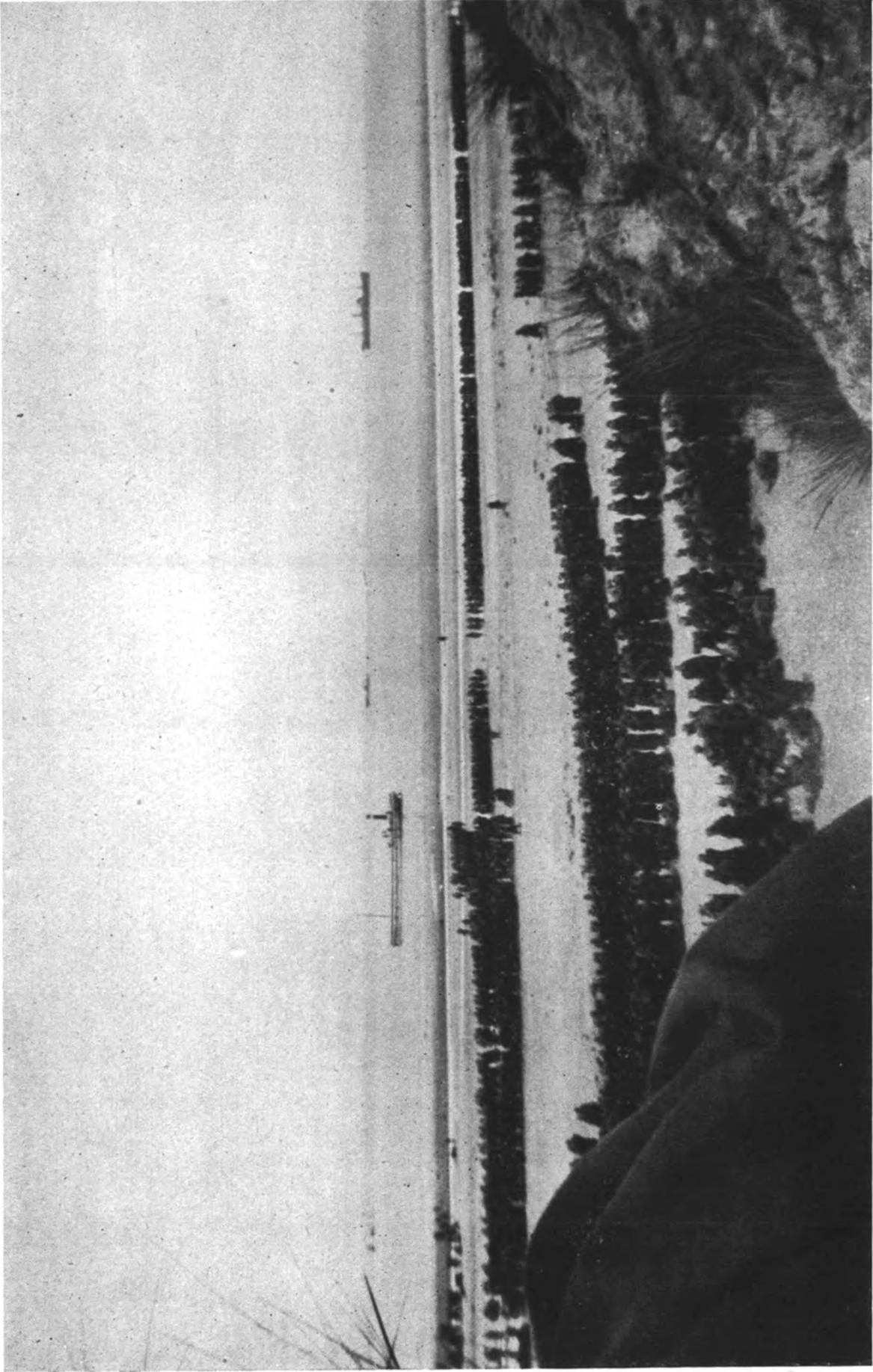
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The Times

EVACUATION OF DUNKIRK

British troops on a beach near Dunkirk forming into long queues ready to take their turn to board small boats which took them to larger vessels.

EDITORIAL

“ In all the long story of our seafaring race, there has never been an adventure of chivalry more stirring than that which the little ships undertook so willingly and so gallantly on that summer morning ten years ago.

“ So long as the English tongue is spoken, it should be commemorated with thankfulness and with pride, and those who brought it to so triumphant a conclusion should be held in honour by all those whose freedom they helped to preserve.”

Thus wrote His Majesty the King in a message to the organisers of a pilgrimage to Dunkirk in commemoration of the tenth anniversary of that memorable day when the British Expeditionary Force was successfully evacuated from the Dunkirk beaches in June, 1940.

The pilgrimage was first suggested by Captain W. H. Coombs, well known to all seafarers for his work on behalf of Merchant Navy officers generally, and indeed for his never-failing interest in all matters connected with ships and seamen. Captain Coombs became chairman of the organising committee, whose membership included Sir Frederick Bowhill (Master of the Honourable Company of Master Mariners), Admiral Sir Lionel Preston (who was largely responsible for organising the pool of small craft for the Dunkirk evacuation) and Admiral Sir William Tennant, who as S.N.O. at Dunkirk was one of the last officially to leave the perimeter with the rearguard of the B.E.F. A number of professional seamen and yachtsmen who assisted in the evacuation, together with several vessels which formed part of that gallant armada of little ships ten years earlier, took part in the pilgrimage. The whole fleet attending this reunion consisted of some sixty ships, including tugs, yachts, barges and railway steamers. The Royal Navy was represented by H.M. destroyer *Bleasdale*, an old friend of the Merchant Navy, being for some time employed as an escort of convoys in the Channel.

We may recall that the evacuation of the B.E.F. from those memorable beaches was not done in a day ; Operation Dynamo, as it was called, lasted from Sunday, 26th May, until Sunday, 2nd June, 1940. During that period, despite the bombing, shelling and mining, and attacks by E-boats, some 337,000 men of the B.E.F. came safely away from that pitifully small perimeter to their island fortress of England. And during most of this time the port of Dunkirk and its piers were virtually useless, so that much of the embarkation had to be from the beaches themselves. It was a job for little ships, and the world knows how well they did their job. During the whole operation no less than 123 vessels of all types, large and small, Royal Navy, Merchant Navy and privately owned, are known to have been lost, according to the Appendix of Mr. A. D. Divine's excellent book, *Dunkirk*.

For the pilgrimage ten years later the little ships mustered in Dunkirk Docks on Sunday, 4th June, 1950. A church parade, at which the Dean of Battle officiated, was held ashore and the little ships then steamed out of the docks and past the beaches, where ensigns were dipped and wreaths cast into the sea in memory of those who lost their lives in the evacuation. A fitting ceremony in commemoration of a gallant and successful operation.

Meteorologically, it seems that there is little doubt that the Fates were kind to the B.E.F. at Dunkirk. Embarking an army from open and gently shelving beaches with numerous sandbanks off the approaches, considerable rise and fall of tide and complicated currents, is no easy job, even if planned some time in advance and carried out in calm weather in peace-time. Operation Dynamo was suddenly thrust upon us and it was impossible for it to be properly planned; the additional hazards of minefields and continuous violent opposition by the enemy on sea, air and land are obvious. If the weather had been unfavourable, there is little doubt that the story would have been a very sad one.

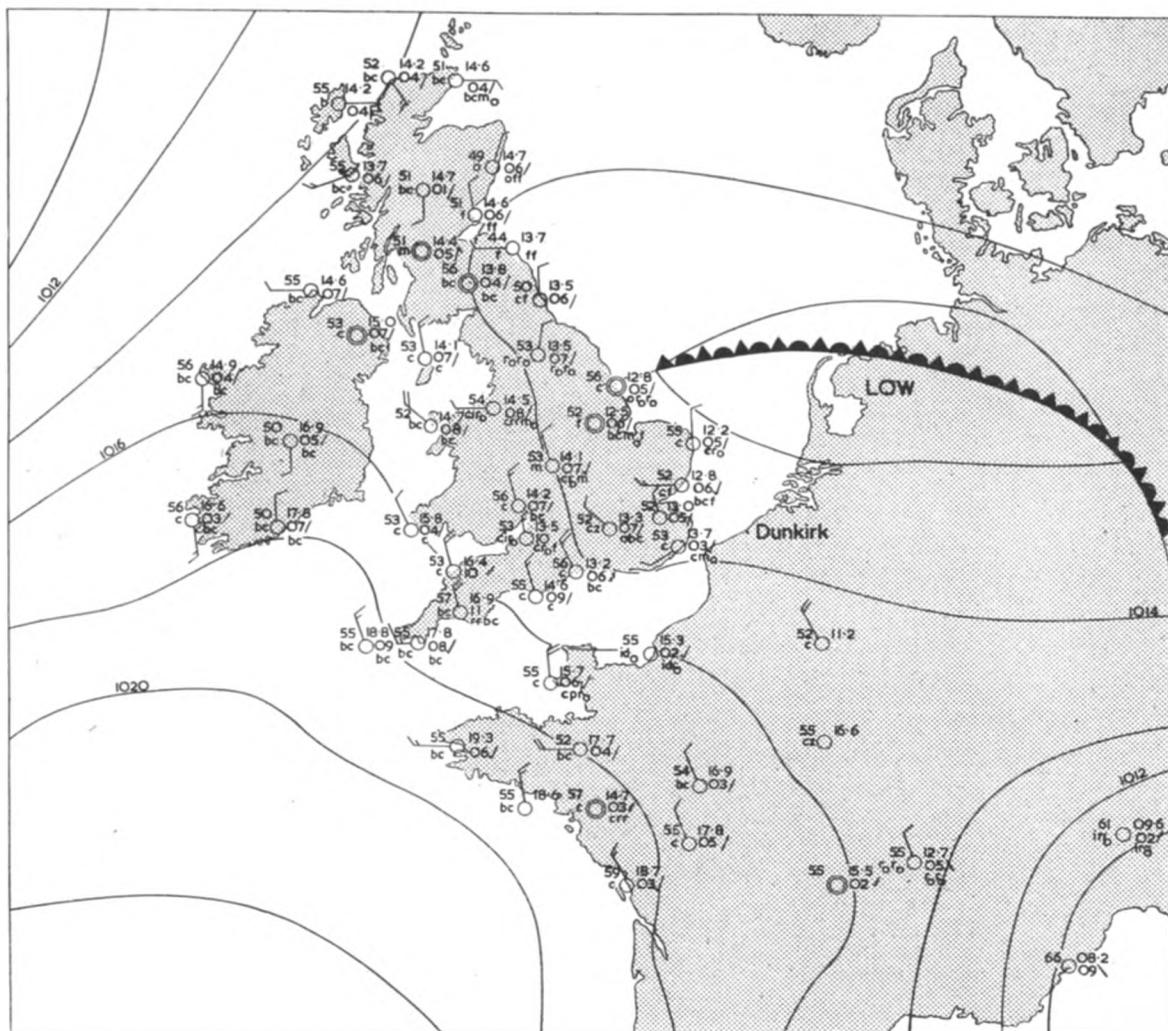


News Chronicle

The little ships steaming past Dunkirk breakwaters, June, 1950

Statistics show that the chances against getting winds of force 4 and above in the Dunkirk area, during May and June of any year, are slightly greater than 2 to 1, whereas the odds against a wind of force 5 and above occurring are about 19 to 1. Gales in that season are very rare. On beaches of that nature an on-shore wind of force 4 would be very unpleasant, owing to the surf it would raise, and if persistent might well have jeopardised the operation. As it happened, the maximum wind recorded was force 4, from the south-west on 27th May. On most of the days in question the wind varied between Beaufort force 1 and force 3, and was mostly from some easterly direction. An easterly wind had the advantage of causing less surf

on the beaches, and by blowing the smoke from the shell-fire and the burning town to seaward, provided some cover from attack at times for the craft off the beaches, but by reducing the visibility this added to the navigational hazards which were already considerable. Quite apart from the smoke, the visibility was poor from purely meteorological causes on more than one day. Even with the relatively light winds that were experienced there was frequently a rather heavy surf on the beaches, due partly to ground swell, and this combined with the rapid rise and fall of the tide made operations difficult enough, and accounted for the loss of many small craft.



Weather chart for morning of Wednesday, 29th May, 1940

A shallow depression over eastern England and the North Sea was moving east and the Azores anticyclone spreading east-north-east over France. Had that shallow low developed it might have kept enemy aircraft away from Dunkirk. On the other hand, winds might have been too strong and seas too rough for the small boats which crossed the Channel. The high developed and covered the British Isles by 2nd June.

The navigational hazards for the ships involved must have been enormous, combining as they did the complicated tides, lack of navigational marks, low visibility and so many craft of varying types and speeds under way in the area.

Reproduced above is a copy of an actual weather map drawn at Dunstable during the evacuation. It is rather a coincidence that during the pilgrimage ten years later similar fine weather was experienced ; on this occasion it

was combined with good visibility, as can be seen from the photograph on page 192.

The importance which weather played in the success of Operation Dynamo applies similarly to any other operation involving open beaches, as was shown on various occasions during the last war, and most particularly when the main invasion of Europe took place. Similar considerations apply on more peaceful occasions, such as discharging into lighters in open roadsteads, where a slight increase in sea or swell may compel all work to cease. The commercial importance of having reliable statistics about waves and, indeed, of being able to forecast their onset in this connection, and also with the planning of breakwaters and piers at harbours affected by swell, is considerable.

In considering the weather at Dunkirk, one is reminded of other occasions when weather has had enormous and far-reaching effects on the destinies of man. Perhaps the most famous and spectacular instance is that of Napoleon's retreat from Moscow. One wonders if the French Army would have carried out the campaign as they did if a modern Meteorological Service had been at their disposal: and yet it seems that the Germans made somewhat similar mistakes during their campaign in Russia in the last war.

Weather undoubtedly played a big part in the eventual destruction of the Spanish Armada—combined with the skill of the British seamen. One can think of many other instances of this kind, including, for example, the adverse effect of the heavy rain at Agincourt upon the French cavalry.

Other instances of less political importance but equally spectacular, and of terrible consequence to those concerned, include disastrous floodings, storms and famines—notably in the Far East—all directly due to weather. Equally far-reaching, but less spectacular, has been the slow but invincible march of the deserts of the world—in some cases assisted by man's greed and stupidity, but chiefly owing to climatic change.

The wonders of the universe are many, and Nature is in general bounteous if treated with the respect that is her due, and taking all things into consideration, in defiance of man's scientific achievement, it seems probable that the weather, free and unharnessed as it is, can do more to make or mar our plans, our comfort and our happiness than any other natural phenomenon we know of.

SPECIAL LONG-SERVICE AWARDS TO MARINE OBSERVERS

In recognition of their long and meritorious record of service for the Meteorological Office, the Director has been pleased to make a special award to the following voluntary marine observers.

CAPTAIN G. KINNEL, O.B.E. (New Zealand Shipping Co.). A voluntary observer over a period of thirty-one years, during which time his returns have been classified as "Excellent" on twenty-four occasions.

CAPTAIN J. A. MYLES (Cunard White-Star Line). First commenced to observe in 1921, his records have been classed as "Excellent" on sixty-nine occasions.

CAPTAIN R. A. PENSTON (Messrs. T. & J. Brocklebank Ltd.). Since 1926 this officer's returns have been classified as "Excellent" on twenty-four occasions.

CAPTAIN R. C. VIGURS (Steamship *Eros* Ltd.). A voluntary marine observer for twenty-seven years and a recipient of fifteen "Excellent Awards". The award will be in the form of a suitably inscribed barograph.

We warmly congratulate these captains upon this well-deserved recognition of their fine work. They will be personally notified about the award and of the arrangements which will be made for its presentation. EDITOR.

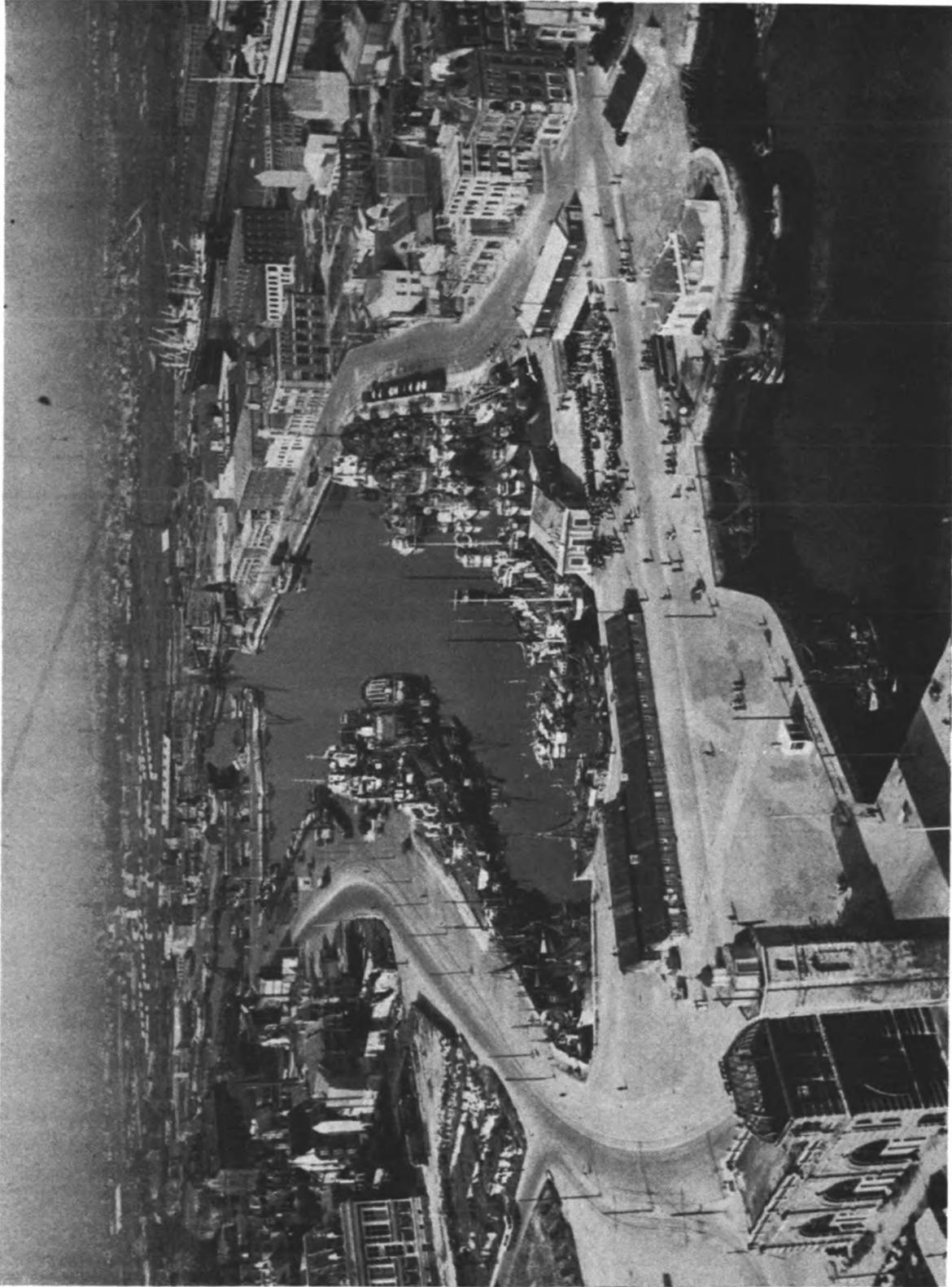
METEOROLOGICAL SERVICE OF CANADA "Excellent" Awards for Weather Observing at Sea

An award to officers in Canadian merchant ships who have carried out excellent meteorological observations on a voluntary basis during 1949 has been announced by Andrew Thomson, Controller of the Meteorological Division of the Department of Transport. The award is a book with an inscribed book plate.

Awards have been made for excellent observations to the following, who acted as principal observing officer in their ship during a considerable part of 1949.

G. Bourret	.. ..	M.V. <i>Canadian Constructor</i>
W. Burton	.. ..	M.V. <i>Canadian Challenger</i>
A. F. Carter	.. ..	S.S. <i>Fort Amherst</i>
R. P. Chouinard	.. ..	S.S. <i>Imperial Winnipeg</i>
William H. Crook	.. ..	S.S. <i>Lady Nelson</i>
S. G. Goodyear	.. ..	S.S. <i>Fort Townshend</i>
D. L. Heaney	.. ..	S.S. <i>Wairuna</i>
G. F. A. Hughes	.. ..	S.S. <i>Tantara</i>
C. D. Janes	.. ..	S.S. <i>Lake Minnewanka</i>
M. Jacques	.. ..	S.S. <i>Yamhill</i>
J. Kennedy	.. ..	S.S. <i>Waikawa</i>
C. D. Ketchum	.. ..	S.S. <i>Lake Manitou</i>
D. N. Lambton	.. ..	M.V. <i>Aorangi</i>
J. H. Langille	.. ..	M.V. <i>Canadian Challenger</i>
C. B. Lavoie	.. ..	M.V. <i>Canadian Constructor</i>
C. LeLievre	.. ..	S.S. <i>Tahsis</i>
A. E. Leonard	.. ..	S.S. <i>Pinnacles</i>
R. E. Morris	.. ..	S.S. <i>Imperial Alberta</i>
W. P. Murphy	.. ..	S.S. <i>Imperial Toronto</i>
W. Ridgley	.. ..	S.S. <i>Lady Nelson</i>
J. C. Robinson	.. ..	S.S. <i>Waihemo</i>
A. Shard	.. ..	S.S. <i>Pinnacles</i>
J. C. Smith	.. ..	S.S. <i>Imperial Winnipeg</i>
G. C. Vey	.. ..	S.S. <i>Waitomo</i>
E. Wagner	.. ..	S.S. <i>Imperial Quebec</i>
J. S. Watson	.. ..	S.S. <i>Imperial Toronto</i>
J. West	.. ..	M.V. <i>Aorangi</i>
R. G. Willkie	.. ..	S.S. <i>Lady Rodney</i>
E. M. Wilkie	.. ..	S.S. <i>Imperial Toronto</i>
Captain R. A. Wright	.. ..	S.S. <i>Ontario No. 1</i>

The principal observing officer is ordinarily the second officer. The master, assisting officers and the radio officer should be recognised as contributing equally, but the man who actually had charge of the observations has been selected to receive the token of appreciation.



News Chronicle

The little ships assembled in Dunkirk Docks, June, 1950, to commemorate the evacuation ten years earlier. The religious service is being held on the quay in the foreground.

THE MARINE OBSERVER

A Quarterly Journal of Maritime Meteorology
prepared by the Marine Branch of the
Meteorological Office

Vol. XX

1950



OCTOBER, NOVEMBER AND DECEMBER

The Marine Observer's Log is a quarterly record of the most unusual and significant observations made by mariners.

The observations are derived from the logbook of marine observers and from individual manuscripts. Photographs or sketches are particularly desirable.

Responsibility for each observation rests with the contributor.

CURRENT RIP

Australian Waters

M.V. *Waiwera*. Captain B. Forbes-Moffatt. Colombo to Fremantle. Observers, Captain B. Forbes-Moffatt and Mr. A. C. H. Childs, 3rd Officer.

6th October, 1949, 0330 G.M.T. A current rip was observed setting approximately 047° . It had a definite effect upon steering due to its velocity. A moderate swell was running but sea was only slight. Wind S'ly, force 2.

Position of Ship : Latitude $26^{\circ} 57'S.$, Longitude $110^{\circ} 12'E.$

DISCOLOURED WATER AND TIDE RIPS

Bay of Bengal

S.S. *Macharda*. Captain R. A. Penston. Madras to Calcutta. Observer, Mr. J. Kirkham, 3rd Officer.

5th November, 1949, 0745 G.M.T. An extensive area of discoloured water with tide rips at the edge was observed extending ENE to WSW. It was probably caused by the flooding of the Godavari River about 70 miles NW of ship. When the vessel entered the tide rips, two turns port helm had to be applied to maintain course. The wind was NNE, force 3. Course 042° (T). Speed $12\frac{3}{4}$ knots.

Position of Ship : Latitude $15^{\circ} 50'N.$, Longitude $83^{\circ} 10'E.$

DISCOLOURED WATER

South Atlantic Ocean

S.S. *Sneaton*. Captain J. S. Pinkney, O.B.E. Immingham to Buenos Aires. Observer, Mr. J. Lamb, 3rd Officer.

21st November, 1949, 1420 G.M.T. Steamed through discoloured water, which first appeared as deep brown streaks radiating from a circle of the same colour, about 20 ft. or 30 ft. in diameter, and spreading fanwise over an arc from 130° to 180° . When passing through the circle the echo sounder recorded a sudden drop from 44 to 70 fathoms. When churned up by the propeller the water appeared muddy, as seen in shallow areas of the North Sea. The discoloration covered about 15 miles in a SE'ly direction. Course 213° (T). Speed 9.6 knots.

Position of Ship: Latitude $19^{\circ} 37'S.$, Longitude $38^{\circ} 23'W.$

WATERSPOUTS

Caribbean Sea

M.V. *Pacific Exporter*. Captain W. F. Swann. Manchester to Vancouver. Observer, Mr. R. G. G. Bonney, 2nd Officer.

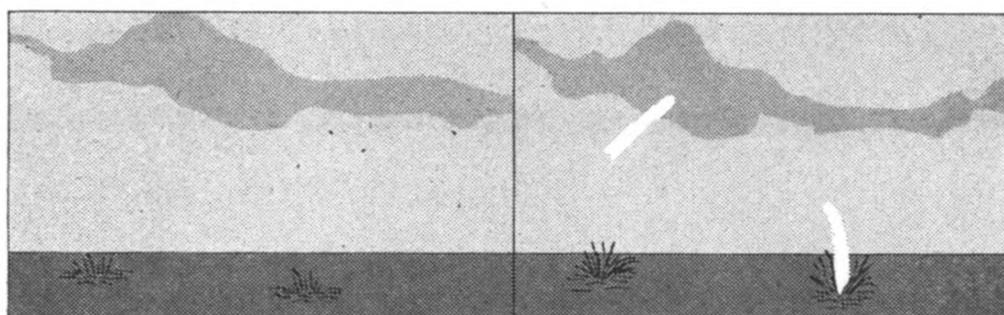


Fig 1

Fig 2

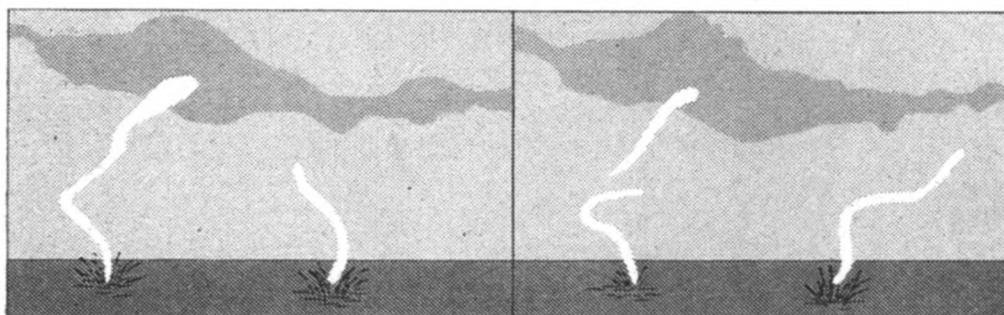


Fig 3

Fig 4

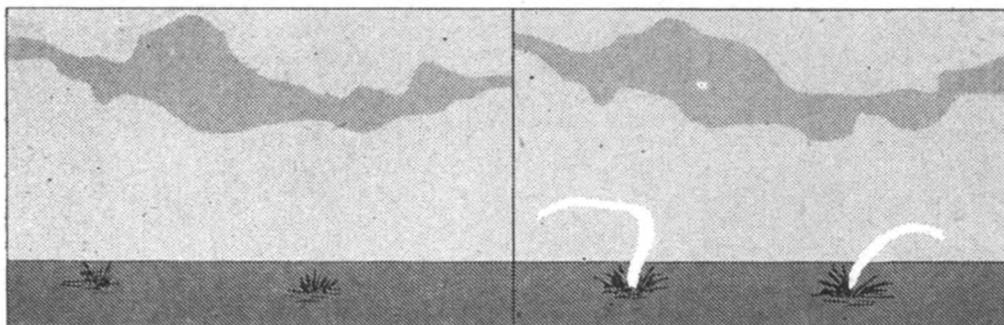


Fig 5

Fig 6

29th October, 1949, 1952 to 2010 G.M.T. The ship passed through a thunder shower of tropical intensity lasting for about eight minutes. By

2005 the shower had passed and was visible about half a mile away, bearing NW ; the wind then being SE × S, force 3. Air temperature 83°.

Between the ship and the shower, which showed up against the sea and sky as a dull, dark blue, two disturbances of the sea were observed about 200 yards apart (Fig. 1).

The sea round the disturbances had the appearance of boiling water and spray as fine as steam was being blown into the air ; above the left-hand disturbance there appeared the beginning of a waterspout suspended from the base of a Cb. (Fig. 2). From the centre of this disturbance a thin spout was observed to be forming and reaching upwards until it joined the end of the spout from the cloud (Fig. 3).

The complete spout lasted for about a minute and a half, then parted in the middle, the lower half falling back into the sea and the upper half forming into rain, until only the disturbance of the water remained (Figs. 4 and 5).

After a period of about two minutes the spout again appeared reaching upwards and then bending and running parallel to the sea (Fig. 6). The spout stayed in this position for about a minute until it again dropped back into the water. The disturbance in the water then died down until it disappeared.

The second, or right-hand disturbance, followed the same pattern, except that it never formed a complete waterspout.

Course 234° (T). Speed 12 knots.

Position of Ship : Latitude 18° 11' N., Longitude 67° 38' W.

Note. The visible column of a waterspout frequently builds up from the water surface and drops down from the cloud base simultaneously, eventually joining up as one column. This occurs since the relative humidity of the air is greatest at the base of the cloud and at the water surface than elsewhere in the rotating air column ; the fall of pressure within the rotating air column produces condensation of cloud at those levels first. Condensation subsequently spreads to the drier levels between the cloud base and the water surface as the rotation becomes more intense and the fall of pressure greater. When the waterspout column is decaying the reverse occurs ; the upper part of the spout is drawn into the cloud base while the lower part drops down to the water surface as the column dissipates.

Off Central America

M.V. *Derryclare*. Captain G. Smith. San Pedro to Panama. Observer, Mr. M. W. Drew, 2nd Officer.

16th December, 1949, 1800 G.M.T. Three waterspouts were observed during a period of about 15 minutes. The first occurred about $\frac{1}{4}$ mile distant on the vessel's starboard beam and travelled on a similar course and speed. The surface of the sea was lashed up into a cloud of spray 30 ft. high, rotating clockwise. The centre appeared as a thin black line reaching into the low cloud, but was broken in the middle. This spout lasted approximately 5 minutes and was soon followed by two others occurring simultaneously about 3 miles on the starboard quarter. These were similar to the first one, except that their centres were unbroken. The distance between them was $\frac{1}{2}$ mile. Weather conditions : barometer 1010.7 mb., falling slowly. Temperature : air 77°F., sea 80°. Wind WSW, force 3, overcast sky with Sc., light drizzle, slight sea and swell, moderate visibility. Course ESE. Speed 10 knots.

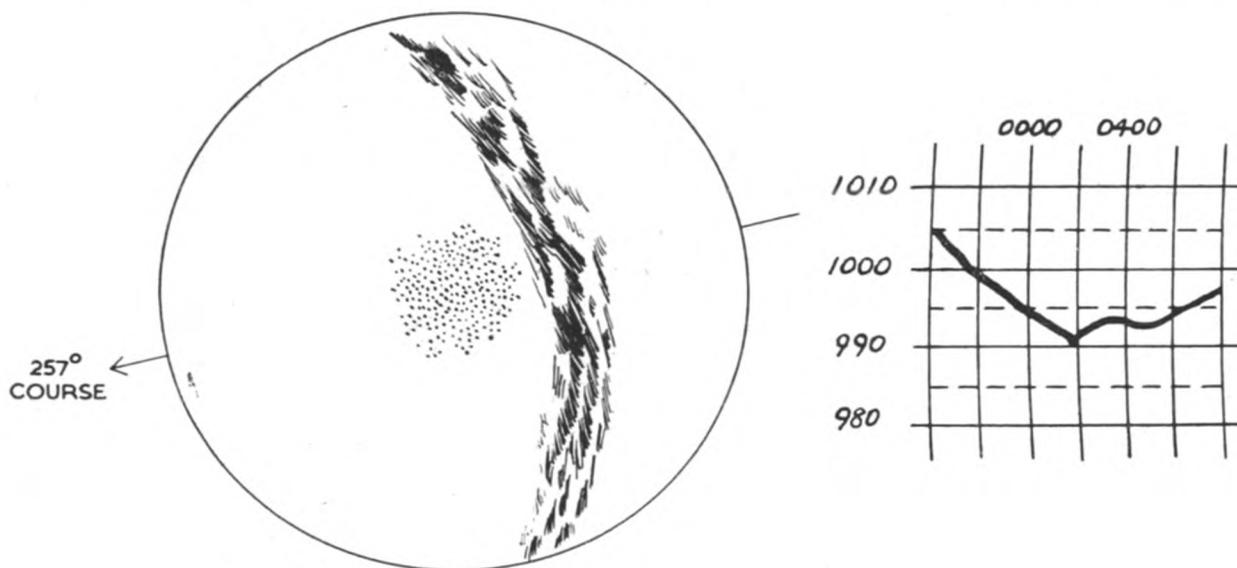
Position of Ship : Latitude 8° 40' N., Longitude 85° 10' W.

TROUGH OF LOW PRESSURE ON RADAR

North Atlantic Ocean

S.S. *Rialto*. Captain G. Hodgson. Hull to New York. Observer, Mr. F. H. Johnson, 3rd Officer.

6th to 7th December, 1949. At 1400 G.M.T. on 6th December, Washington reported a trough of low pressure extending from 48°N. , 64°W. , to 40°N. , 59°W. , moving E at 22 knots. The barometer began to fall steadily and the wind increased from 110° until force 8 was reached. At 2330 a period of continuous moderate rain began from 8/8 Ns. At 0150 the wind shifted to S'y, force 4, for about 3 minutes, accompanied by torrential rain which reduced visibility to zero. The wind then swung to 270° , force 7, the precipitation changing back to continuous moderate rain. The minimum pressure recorded was 992.3 mb. Air temperature 49°F. , wet bulb 48° . By 0250 the temperature had fallen to 45.5° and the wind veered to 290° , force 8.



The accompanying sketches show the barogram for the period 2000 to 0800 and the appearance of the radar screen when the line of disturbance was 4 miles astern of the ship.

Position of ship at midnight on the 7th : Latitude $43^{\circ} 26'\text{N.}$, Longitude $51^{\circ} 29'\text{W.}$

UNUSUAL VISIBILITY

Indian Equatorial Waters

S.S. *Macharda*. Captain R. A. Penston. Calcutta to Colombo. Observer, Mr. J. Kirkham, 3rd Officer.

26th December, 1949, 1800 G.M.T. The loom of Dondra Head Light was observed at a distance of 55 miles. At 2015 a rising bearing of the same light was taken at a distance of 22 miles. The sky was $3/8$ covered with Cu. and Sc., $4/8$ with As.

Position of Ship : Latitude $6^{\circ} 06'\text{N.}$, Longitude $81^{\circ} 30'\text{E.}$

CLOUD COLORATION

Approaching Christobal

M.V. *Pacific Exporter*. Captain W. F. Swann. Manchester to Vancouver. Observer, Mr. R. G. G. Bonney, 2nd Officer.

1st November, 1949. Approaching Christobal from the eastward the sky was $\frac{7}{8}$ to $\frac{8}{8}$ covered with cloud. A thick sheet of Ac., through which the sun showed dimly, was overhead, while to the S and SW Cb. with large anvils towered over the high ground, estimated to be some 50 miles away. Beyond these clouds, seeming to emerge from the numerous large anvils, was a thick sheet of Cs. which showed an orange coloration over the greater part of its extent. This colouring of the SW'ly sky began at about 1400 A.T.S. and persisted until sunset.

Position of ship at 1800 G.M.T. : Latitude $10^{\circ} 03' N.$, Longitude $79^{\circ} 05' W.$

Note. The Cs. cloud on which the colouring was observed was probably derived from the anvils. The observation is interesting and unusual since the approximate time of sunset was 1735 A.T.S. The orange coloration therefore began about $3\frac{1}{2}$ hours before sunset.

AURORA AND EXCEPTIONAL VISIBILITY

Atlantic Equatorial Waters

S.S. *Balantia*. Captain F. A. C. Thacker. London to Brazilian ports. Observer, Mr. W. H. Squair, 3rd Officer.

16th October, 1949, 0001 G.M.T. White Aurora Australis lights were observed at about altitude 30° which continued for some time. At 0047 Porto de Pedras Light was picked up at a distance of $29\frac{1}{2}$ miles. The listed maximum distance for this lighthouse is 22 miles.

Position of Ship : Latitude $8^{\circ} 45' S.$, Longitude $34^{\circ} 50' W.$

AURORA AND LUNAR ECLIPSE

St. Lawrence River

S.S. *Ascania*. Captain J. Chapman, R.D., R.N.R. Liverpool to Montreal. Observer, Mr. G. H. Griffiths, Junior 1st Officer.

8th October, 1949. In the evening, when about 5 miles off the south coast of the St. Lawrence River, a very prolonged and bright exhibition of aurora was seen.

An eclipse of the moon was beginning when diffuse aurora was observed in the form of large dim clouds in many parts of the sky. At 0205 G.M.T. a straight unbroken band was observed 4° in breadth, extending from 5° above the westerly horizon to 5° above the easterly horizon through the north. It was extremely bright, about two or three times as bright as the Milky Way on a dark clear night.

This band elevated itself slowly as the eclipse advanced until at 0230 it was at the zenith and at its brightest. At 0300 it was still unbroken, but was now south of the zenith and much dimmer. It did not move again but gradually dimmed until it disappeared.

At 0309 a patch was seen bearing 010° to 090° , between 10° and 25° in altitude, and very bright moving curtains were associated with it.

At 0312 a patch in the shape of a large starfish with a dark centre was seen bearing 300° to 330° . Narrow bands, coloured red and green, constantly flickered from it.

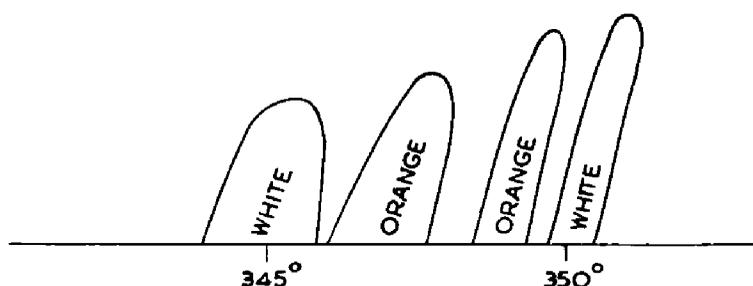
During this time the vessel was steaming along the south coast of the St. Lawrence River, arriving at Father Point at about 0400.

AURORAE

North Atlantic Ocean

M.V. *Port Wyndham*. Captain E. E. Roswell. Curaçao to New York. Observer, Mr. P. R. Lewis, 2nd Officer.

15th October, 1949, 2350 G.M.T. Display as shown in sketch was seen.



It was faint and lasted about 10 minutes, its intensity was slightly greater than that of the Milky Way.

Position of Ship : Latitude $28^{\circ} 42' N.$, Longitude $70^{\circ} 14' W.$

M.V. *John Biscoe*. Commander H. Kirkwood, D.S.C., R.N. Southampton to Antarctic. Observer, Lieut. F. R. Brooke, R.N.

15th October, 1949. The sky was clear except for a narrow band of cloud on the NW horizon. At about 2000 G.M.T., as darkness was falling, the sky to the NW above this bank of cloud became pink and gradually deepened in colour until reminiscent of the glow from a large and distant fire. This glow was streaked with vertical lines of silvery light, the two most prominent having their upper limit at β and γ Ursae Majoris. This band of colour, bearing 320° to 355° , vertical height above horizon 12° , moved slowly S and gradually faded out after a horizontal movement of 10° , having been visible about 15 minutes. As it faded a vertical shaft of light appeared bearing 348° , vertical height 12° , then moved slowly southward and faded bearing 338° , having been visible for about 8 minutes.

Position of Ship : Latitude $39^{\circ} 08' N.$, Longitude $13^{\circ} 08' W.$

Australian Waters

M.V. *Waiwera*. Captain B. Forbes-Moffatt. Fremantle to Adelaide. Observers, Captain B. Forbes-Moffatt, Mr. A. C. H. Childs, 3rd Officer, and Mr. K. Drabble, Cadet.

15th October, 1949, 1320 G.M.T. A display of auroral lights was observed which lasted for about half an hour, disappearing completely at about 1355. The extreme edges bore approximately 130° and 250° (T). Bright green-white light spread steadily along the horizon making a band about 15° wide ; this spread into a bright red hue behind cloud until about 30° above horizon and then became a deeper red in a slightly cloudy sky. This deeper red extended to an average height of 45° . Occasional rays of red and white projected to about 60° . Sky was $3/8$ to $4/8$ covered with Sc. and Cb.

Position of Ship : Latitude $35^{\circ} 21' S.$, Longitude $128^{\circ} 20' E.$

Other ships reported aurora on 15th October, 1949 :

S.S. *Empress of Canada*. " Brilliant auroral curtains and draperies " at midnight in Latitude $55^{\circ} 05' N.$, Longitude $40^{\circ} 11' W.$

S.S. *Eros*. " 1953 to 2030 G.M.T., brilliant Aurora Borealis observed " in approximate Latitude $49^{\circ} 23' N.$, Longitude $12^{\circ} 06' W.$

M.V. *Pacific Exporter*. " Northern Lights plainly seen—red and white bands " at midnight in Latitude $49^{\circ} 33' N.$, Longitude $11^{\circ} 55' W.$

S.S. *Marengo*. " Exceptional aurora covering $\frac{5}{8}$ of sky at times " at midnight in Latitude $57^{\circ} 53' N.$, Longitude $15^{\circ} 22' W.$

M.V. *Hopecrown*. " 1320 G.M.T. Aurora Australis observed bearing 175° . At first dull red, it gradually spread out until it covered from 135° to 225° and became brighter with numerous white streaks like searchlights. The phenomena was brightest at 1335 and ended at 1345." Position : Latitude $31^{\circ} 45' S.$, Longitude $115^{\circ} 00' E.$

O.W.S. *Weather Recorder*. " Aurora flashing " at midnight in Latitude $53^{\circ} 51' N.$, Longitude $18^{\circ} 17' W.$

North Atlantic Ocean

O.W.S. *Weather Watcher*. Captain F. A. Elston. On Station " Item ".

20th October, 1949, 2200 G.M.T. Aurora was first observed at 070° . A very bright arc then moved across the sky from E to W. The lower edge was clearly defined and slight veiling appeared in the most brilliant section to the E. The arc had an elevation of 25° at the apex and stretched from 070° to 310° . At 2205 the arc appeared to shimmer in the W with the effect moving rapidly eastwards. Curtains of brilliant colour now appeared and the entire northern sky to the zenith showed some activity. At the time of greatest activity the section of the sky which had contained the original arc was clear. By 2215 the appearance returned to that of a single arc at a slightly lower elevation of 15° , which was not generally so bright, although at times brilliant curtains appeared. The aurora then faded until at 2330 only a glow was still apparent.

Position of Ship : Latitude $60^{\circ} 02' N.$, Longitude $19^{\circ} 58' W.$

Icelandic Waters

M.V. *Amastra*. Captain R. Ashby Todd. Hvalfjorden to Curaçao. Observer, Mr. C. Close, 2nd Officer.

4th to 5th December, 1949. At 2200 G.M.T. (2130 A.T.S.) on the 4th, abundant Aurora Borealis was observed lasting 10 minutes. Originating in the SW and passing the zenith it spread to the NE in varying intensity, and at one time appeared like fast-moving cirrus cloud, changing form very rapidly. Vertical streaks were also seen in the NW, but of lesser intensity. Aurora was observed again at 2330 A.T.S., but not so intense and of shorter duration. On the 5th at 0200 A.T.S. a display was observed which lasted about 35 minutes from SW to W. At first it was in the form of draperies in rapid motion and later took the shape of two separate fan-shaped bundles of rays, greenish-yellow and very bright despite nearly full moon.

Position of ship on the 4th at 2200 G.M.T. : Latitude $61^{\circ} 20' N.$, Longitude $26^{\circ} 55' W.$

METEORS

North Atlantic Ocean

S.S. *Brazil Star*. Captain G. M. Duff. Rio de Janeiro to London. Observer, Mr. D. M. McPhail, 3rd Officer.

15th October, 1949, 0330 G.M.T. The SW sector of the sky was lit up by a brilliant blue flash lasting about 2 seconds. The meteor appeared close to Fomalhaut, bearing 238° (T), altitude 30° , dropped vertically for 3 seconds before it burst and emitted bright blue flashes. No trail was visible.

Position of Ship : Latitude $16^{\circ} 55'N.$, Longitude $22^{\circ} 00'W.$

S.S. *Delilian*. Captain R. McNie. Avonmouth to Montreal. Observer, Mr. J. S. Rodger, 2nd Officer.

7th October, 1949, 0230 G.M.T. A very bright meteor was observed bearing 245° , altitude 50° . It travelled on a course of approximately 360° , remaining at the same altitude until it disappeared bearing 320° , leaving a distinct trail which was visible after the body had disappeared. The meteor was in sight for about 4 seconds and was bright green.

Position of Ship : Latitude $53^{\circ} 00'N.$, Longitude $18^{\circ} 44'W.$

Off Coast of Morocco

S.S. *Millais*. Captain A. R. Bibby, O.B.E. Buenos Aires to Las Palmas. Observer, Mr. J. M. Edgar, Chief Officer.

2nd October, 1949, 2015 G.M.T. A brilliant meteor was observed travelling in a W'y direction and leaving a trail of sparks. It was first seen near the star Altair and disappeared near Venus, which was low in the W. Duration of flight approximately 15 seconds, magnitude brighter than Venus and colour purple.

Position of Ship : Latitude $21^{\circ} 00'N.$, Longitude $18^{\circ} 30'W.$

Red Sea

S.S. *Bennevis*. Captain T. M. Blaikie, Jidda to Suez. Observer, Mr. D. S. McPherson, 2nd Officer.

8th December, 1949, 2343 G.M.T. Observed a very large meteor bearing 045° , approximate altitude 15° . It disappeared behind a small Cu. cloud at an approximate altitude of 10° . It was brilliant blue with a trail of red sparks.

Position of Ship : Latitude $23^{\circ} 17'N.$, Longitude $37^{\circ} 16'E.$

Caribbean Sea

S.S. *Mataroa*. Captain R. James, R.D., R.N.R. Panama to Curaçao. Observer, Mr. R. Munro, 4th Officer.

13th November, 1949, 0018 G.M.T. A brilliant green meteor of magnitude -6 was observed bearing 045° altitude 10° . It disappeared bearing 060° altitude 7° , having been visible for 8 seconds. No trail was seen.

Position of Ship : Latitude $11^{\circ} 50'N.$, Longitude $74^{\circ} 15'W.$

Gulf of Aden

S.S. *Mahout*. Captain H. F. Scoins. Aden to Colombo. Observer, Mr. D. L. Campbell, Chief Officer.

21st October, 1949, 1840 G.M.T. Meteor sighted, brilliant white light, magnitude -2, altitude 8° to 10° , bearing from 105° to 110° , rising slightly while travelling N to S.

Position of Ship : Latitude $12^{\circ} 04'N.$, Longitude $51^{\circ} 10'E.$

South Pacific Ocean

S.S. *Vasconia*. Captain G. S. Evans. Sydney to Panama. Observer, Mr. M. V. Meardon, 2nd Officer.

17th October, 1949, 1300 G.M.T. A meteor of magnitude 2.2 appeared bearing 340° , altitude 30° . After a flight of approximately 4 seconds it disappeared bearing 350° , altitude 5° . Length of tail 2° , visible throughout.

Position of Ship : Latitude $32^{\circ} 00'S.$, Longitude $153^{\circ} 05'W.$

S.S. *Fordsdale*. Captain T. T. Oliver. Sydney to Balbao. Observer, Mr. P. H. Carden, 3rd Officer.

29th October, 1949, 0409 G.M.T. Sighted a brilliant object bearing approximately 340° , altitude approximately 30° . At first it was thought to be a flare, but consequently believed to be a meteor. It was of great light intensity and slightly greenish-white. During its period of visibility (about 12 seconds), the bearing changed slightly to E and the altitude became slightly less. About $1/5$ of the sky was considerably illuminated as on a bright moonlight night.

Position of Ship : Latitude $13^{\circ} 13'S.$, Longitude $107^{\circ} 30'W.$

North Pacific Ocean

M.V. *Pacific Exporter*. Captain W. F. Swann. Manchester to Vancouver. Observer, Mr. R. G. G. Bonney, 2nd Officer.

11th November, 1949, 2200 G.M.T. A very bright meteor, magnitude -5, green in colour, appeared from behind Sc. bearing 260° and vanished at an altitude of 6° , no trail being visible. As the cloud base was at an altitude of about $6\frac{1}{2}^{\circ}$ the meteor was only observed momentarily. A glow was, however, seen behind the clouds immediately prior to its appearance, indicating a vertical fall toward the horizon.

Position of Ship : Latitude $25^{\circ} 18'N.$, Longitude $112^{\circ} 51'W.$

SHIP REPORTS AND THE FORECASTER

By J. ROBINSON, B.Sc.

(Assistant Forecaster, Central Forecasting Office, Dunstable)

Forecasting the weather depends primarily on a regular supply of surface and upper-air observations from a sufficiently large number of reporting stations both on land and at sea. So far as land areas are concerned, the forecaster knows that by international agreements he is assured of the receipt of routine observations from many specially selected reporting stations. For sea areas it is a completely different story.

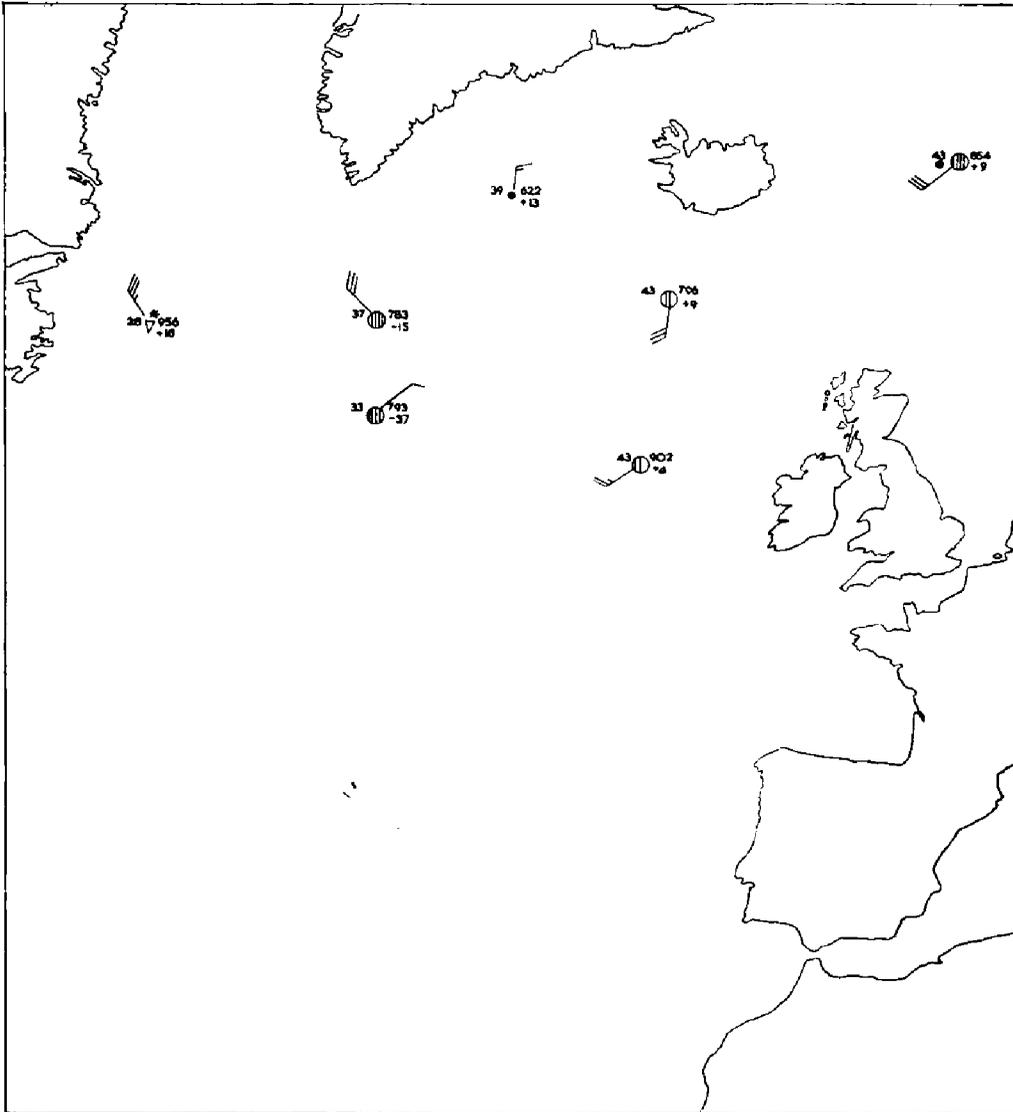


Fig. 1

4th February, 1950. 1800 G.M.T. Only Weather Ships plotted.

Since 1947 stationary "weather ships" have been operating in the North Atlantic, making regular reports of both surface and upper-air observations. Why, then, it may be asked, since these regular reports are available, is it still deemed necessary to have reports from other ships sailing the seas? A glance at Fig. 1, which shows the observations received from these stationary weather ships for 1800 G.M.T. on the 4th February, 1950, will indicate how very few of them there are. It would be difficult, if not often impossible, for the forecaster to analyse large areas of the Atlantic with any

degree of accuracy with only these observations to help him. Fig. 2 shows the synoptic chart for the same hour as Fig. 1, but with the addition of all the ships' reports that were received. The difference it makes is quite startling, and these two maps demonstrate vividly the vast expanses of the Atlantic Ocean from which we rely upon voluntary observations made by seamen.

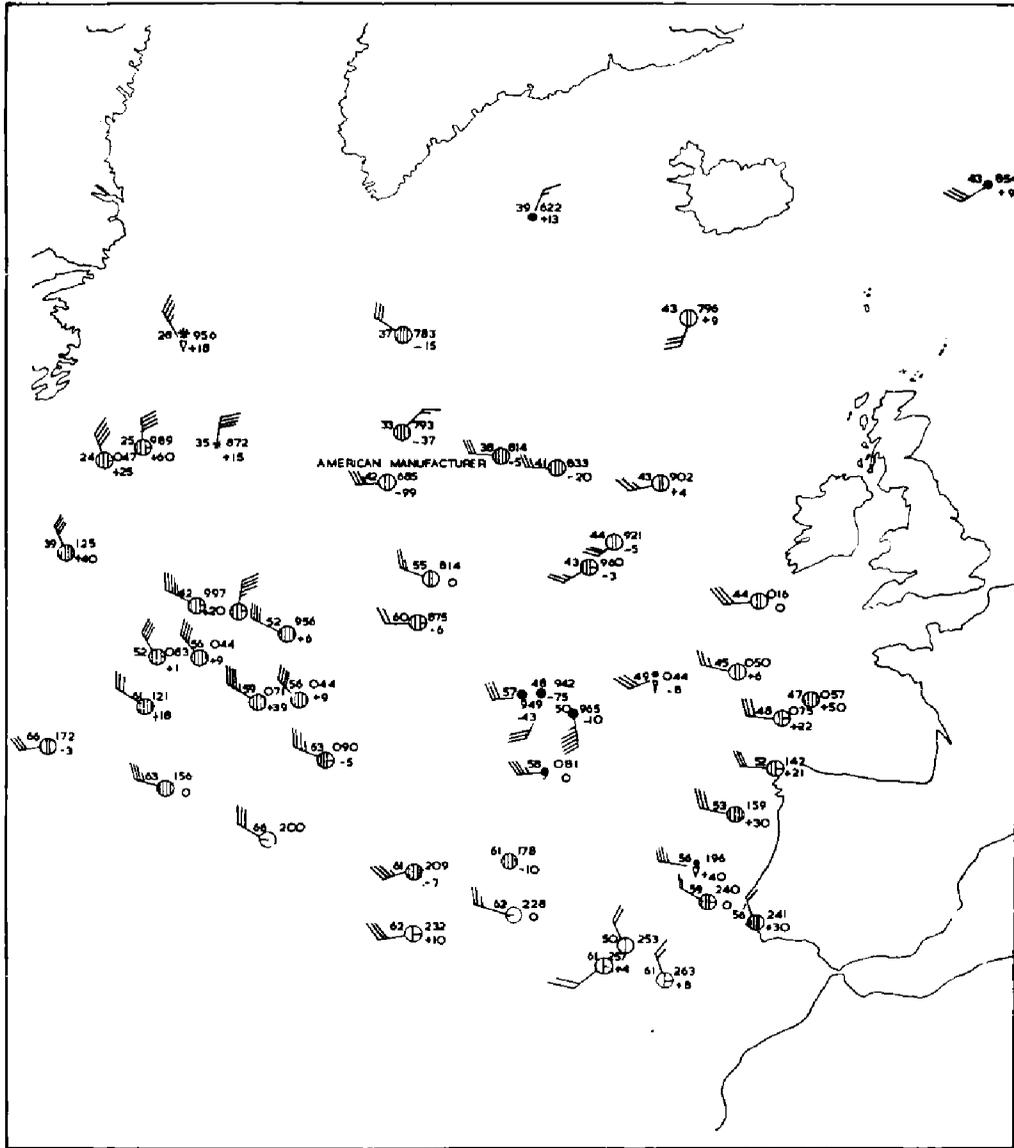


Fig. 2
4th February, 1950, 1800 G.M.T. All ships plotted.

At this stage we may consider in a little greater detail the special function of the stationary weather ship. Ships do not sail at random over the ocean but mostly along well-defined sea-lanes, and along these routes there is usually no shortage of observations from merchant ships, thanks to the voluntary marine observers. To supply the forecaster with regular observations from the less frequented parts of the Atlantic, stationary weather ships were established in 1947 at carefully selected positions. In addition to the supply of surface weather reports at the standard observing hours, these ocean weather ships have another job to do. They are responsible for taking

upper-air observations, and it is upon these observations that the forecaster relies for regular information about conditions in the upper atmosphere over the Atlantic. Thus the weather ships exist to provide information additional to that supplied by the voluntary observing merchant ships or "selected ships", whose reports, therefore, continue to be as important as they ever were.

In return for the very valuable observations supplied by the merchant fleet, the Meteorological Office is able to provide a comprehensive service of weather forecasts and gale warnings for shipping in the North Atlantic and in coastal waters. As many readers will probably be aware, this service consists of a regular supply of weather bulletins, including forecasts and gale warnings, broadcast by the B.B.C. and by coastal radio telegraphy and radio-telephone stations of the G.P.O. for shipping using coastal waters, the gale warnings also being sent to coastguard stations around our coasts for necessary action. Farther west, over the North Atlantic, shipping is catered for by the regular issue of forecasts, analyses and selected ship and land reports broadcast by Portishead Radio Station. Storm warnings for the North Atlantic are also broadcast with these forecasts when appropriate, and at other times as considered necessary by the forecaster.

In addition to these services the Meteorological Office provides a wide range of forecasts for the general public and for aviation, the reliability of which depends to a great extent upon observations which are received from merchant ships. Regular forecasting services for the general public are maintained through the medium of the press and the B.B.C. (including television), whilst in addition special forecasts and warnings are supplied to meet the particular requirements of farmers, fruit-growers, film companies, electricity and gas undertakings, the railways, road transport, pigeon races, industrial concerns and various other interests. All the forecasts required by the Royal Air Force and by civil aviation are provided by the Meteorological Office, which also undertakes the meteorological briefing of air-crews at Royal Air Force stations and at civil airports. A feature of major importance is the supply of forecasts for transatlantic flights, in the preparation of which ship reports are of primary importance. In addition all airfields throughout the country are kept informed of impending gales so that the necessary precautions can be taken to avoid damage to aircraft.

It is true to say that, so far as the British Isles are concerned, the North Atlantic is broadly the birthplace of most of our weather, and as such it receives a great deal of attention and respect from the forecasters. The weather in these areas very frequently travels approximately from west to east, and thus often occurs over the Atlantic long before it reaches our western seaboard. Hence the forecaster wants to know the latest information with regard to Atlantic weather so that he can give adequate warning of impending weather changes there and elsewhere. But this is not the whole story. If the weather only travelled in certain directions then the forecaster's problem would indeed be greatly simplified. A complication arises from the fact that it is over the Atlantic itself that changes in the situation often occur, where fronts and depressions begin to form and where the associated weather develops. The forecaster must therefore always be on the lookout for these changes or developments, and to do this effectively he must watch carefully for every symptom shown by the reports supplied to him. It is therefore apparent that a high degree of accuracy in these reports is a most important

requirement. Over land a suspected faulty observation can usually be checked against neighbouring stations or against previous reports from the same station. This is not so easy in regard to merchant ship reports, for the ship is in motion, and two successive observations do not refer to the same point and, further, there are usually no other ships in the immediate locality against which the reports may be checked.

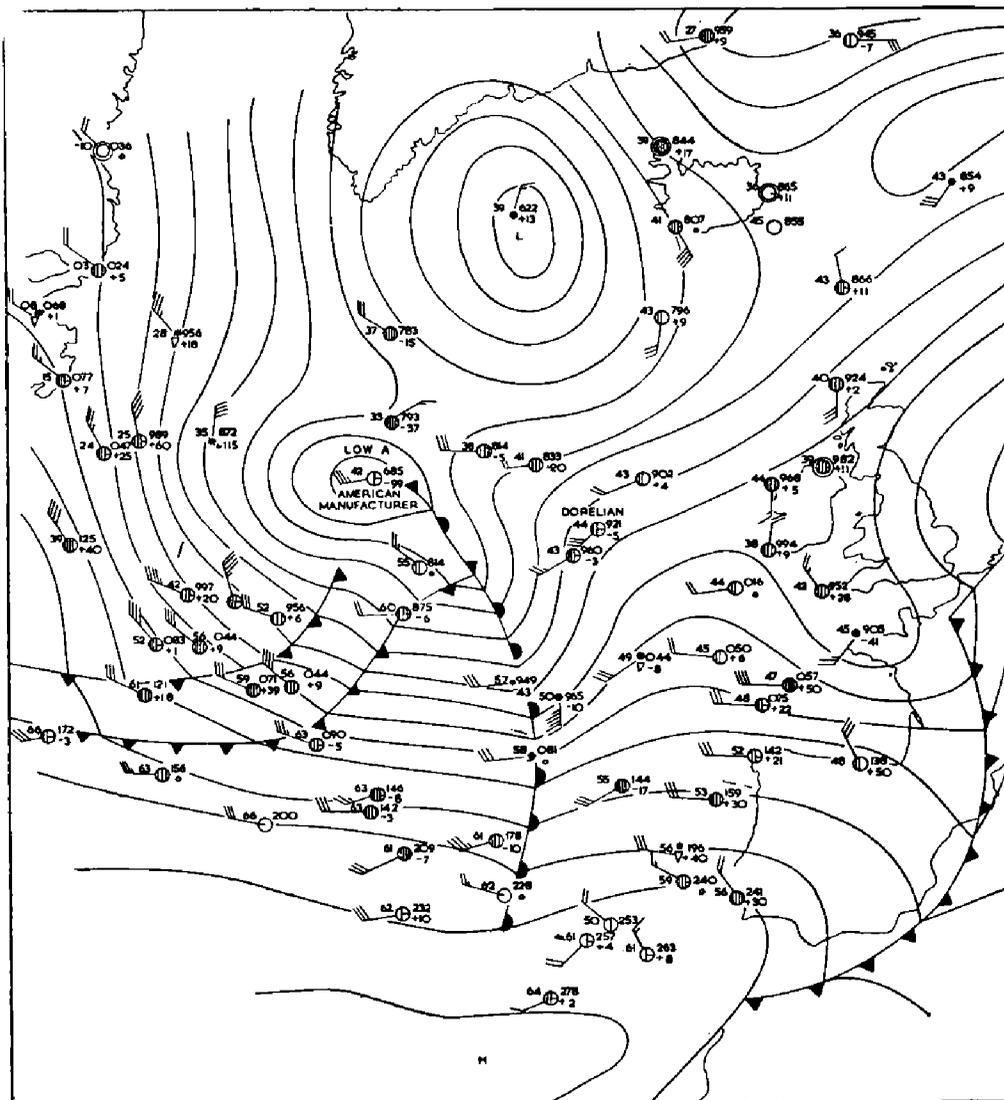


Fig. 3
Weather chart for 4th February, 1950, 1800 G.M.T.

A necessary preliminary to any forecast is the accurate analysis of the latest synoptic chart, with all the available weather observations plotted. In making his analysis the forecaster attempts to draw on the chart as accurately as possible all the significant features of the meteorological situation, such as depressions and anticyclones and the air-mass boundaries or "fronts", taking care that the completed chart shows a consistent development from previous charts. Over the greater part of the ocean the number of ships' observations is still inadequate to enable this to be done satisfactorily on all occasions and the forecaster may often need to place very great reliance on one particular ship report, which then becomes of critical importance. An

inaccurate report may thus lead to an inaccurate analysis and hence, possibly, to an erroneous forecast. In Figs. 3, 4 and 5 the synoptic situation which existed at twelve-hour intervals from 1800 G.M.T. on the 4th February to 1800 G.M.T. on the 5th February, 1950, is reproduced. The important feature of this situation was the depression, Low A, which was approaching the British Isles from the Atlantic and which was giving a very wide area of gales to the south of it. On each of these charts the forecaster was faced with the problem of fixing the centre of the depression, Low A, and its associated warm and cold fronts, as accurately as possible and of tracking the movement of this depression from chart to chart. Referring to Fig. 1 we

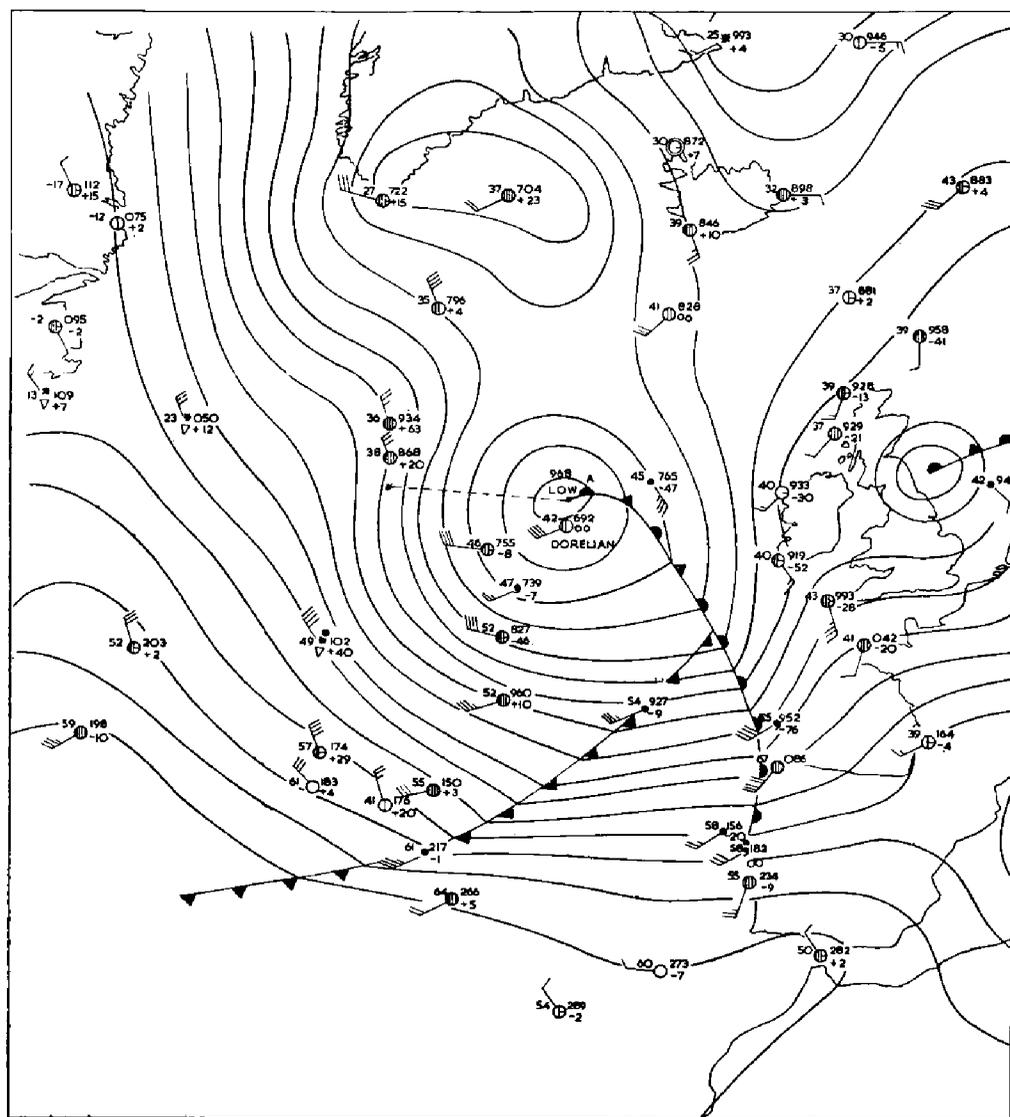


Fig. 4
Weather chart for 5th February, 1950, 0600 G.M.T.

see the chart as it would have appeared to the forecaster if he had observations only from the stationary weather ships. His task of preparing the analysis in this case would have been very difficult indeed. Fig. 2 shows the chart as it was finally presented to him for his analysis, and at once it is seen that the ship *American Manufacturer* becomes of supreme importance, enabling him to fix the position of the centre of the depression and also the depth of the centre, another very important feature. The other ships' reports available

at the time helped very considerably in drawing the fronts and the isobars of the depression, and also indicated the extent of the gales resulting from the depression. The forecaster now had a good start, for he had before him a reasonably complete picture of the meteorological situation as it existed at 1800 G.M.T. on the 4th February, and he was able to assess the eastward spread of rain and gales with a good degree of accuracy. During the 4th and 5th February gale warnings were issued a long time in advance for many coastal sea areas and land areas. The vital problem that was now to be solved was the future track of Low A. The forecaster knew that its motion

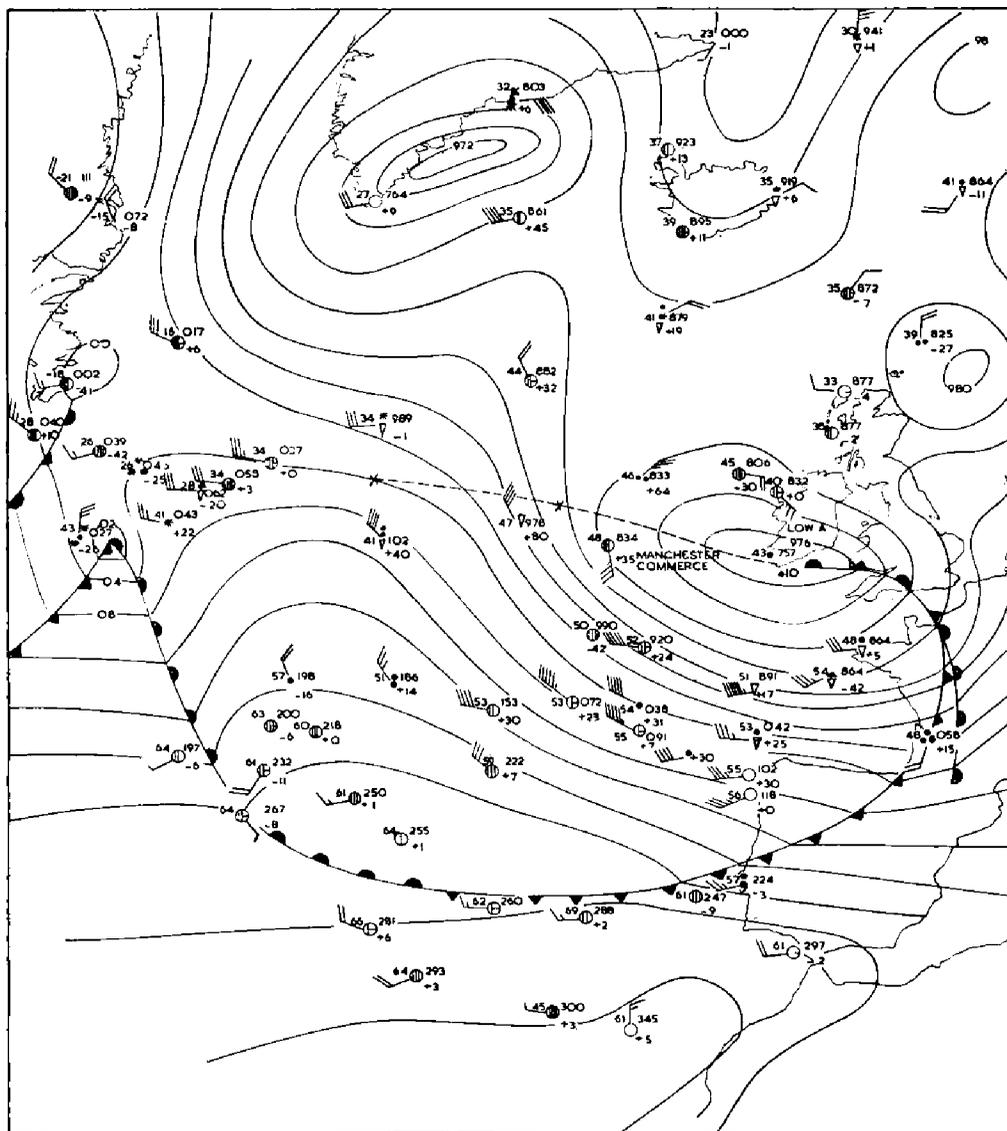


Fig. 5
Weather chart for 5th February, 1950, 1800 G.M.T.

would be roughly from west to east, but a few degrees variation could prove to be very important for particular areas of the British Isles. Let us suppose for a moment that the depression would move north-eastwards toward Northern Ireland; then it was to be expected that the winds in Northern Ireland would become south-west and reach gale force on its passage. If, on the other hand, the low were to move in a more southerly direction toward

Southern Ireland the winds over Northern Ireland would become easterly and would not reach gale force. In Fig. 4 the ship *Dorelian* was of critical importance and helped to fix the centre, and once this had been done the track of the depression from 1500 G.M.T. on the 4th to 0600 G.M.T. on the 5th February showed that it had been moving not toward Northern Ireland but toward the centre of Ireland. In Fig. 5 we see the situation that existed at 1800 G.M.T. on the 5th February, with the centre of Low A over Southern Ireland and with easterly winds over Northern Ireland. The track of the depression for the period showed that the centre had turned somewhat

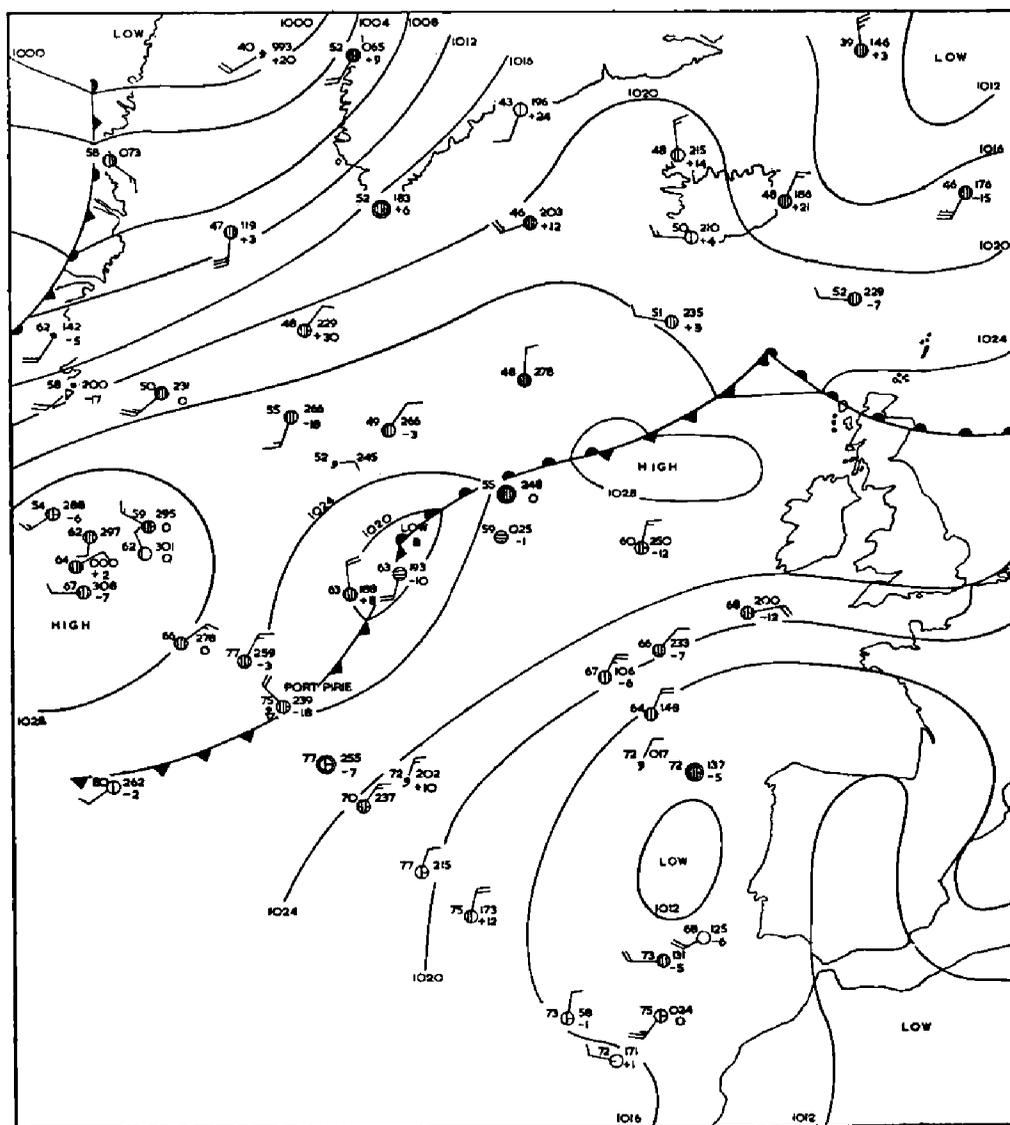


Fig. 6
Weather chart for 11th July, 1949, 1800 G.M.T.

to the right, or southwards, and this possibility had been strengthened earlier by deductions from the upper-air charts, for which the reports from the stationary weather ships were very important. A further point of interest arises in Fig. 5. The report from the *Manchester Commerce* as received by the forecaster was obviously faulty, and it seemed almost certain that the wind direction report was in error by 180° . This may have been due to an

inaccuracy in the observation, the coding, or the transmission of the report.* Fortunately, in this case the wind direction error was obvious, but it might quite easily have happened that the erroneous wind direction could have caused the forecaster to have placed the centre of the depression too far to the west.

Another situation that is worth a brief reference, as it demonstrates the great value of accurate observation, is that reproduced in Figs. 6, 7 and 8. These maps show the meteorological situation that existed at 1800 G.M.T. on the 11th, 12th and 13 July, 1949. In this series of charts the *Port Pirie*

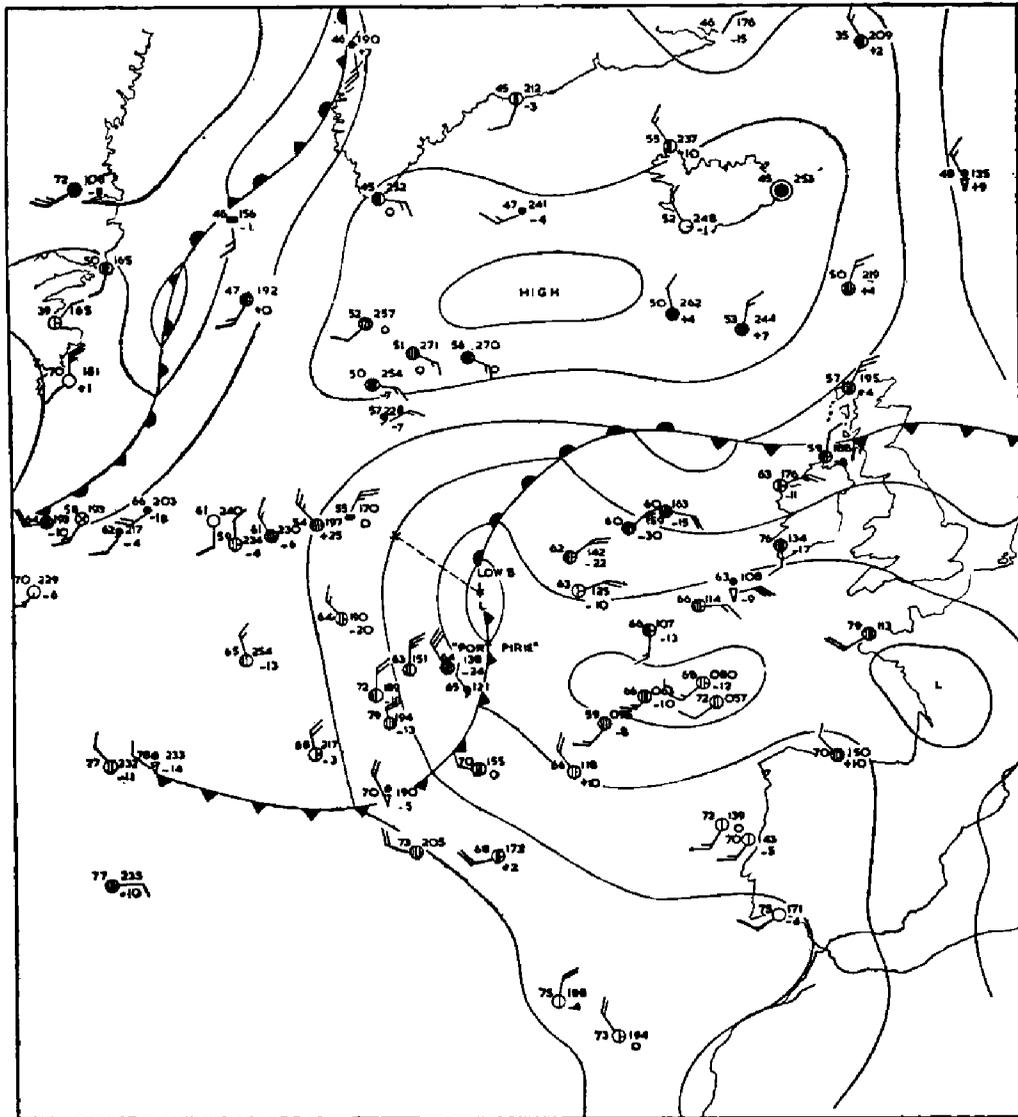


Fig. 7
Weather chart for 12th July, 1950, 1800 G.M.T.

was in a critical or near critical position with regard to the depression, Low B, and the very reliable reports received from this vessel were of great value to the forecaster in positioning the centre, in tracking its past motion and in forecasting its future position.

*EDITOR'S NOTE. It has been verified that this was an observational error caused by logging the wind on its reciprocal bearing.

In Figs. 1 to 8 only certain items from each report have been plotted, but on the forecaster's charts all the information contained in the coded reports from each and every ship is plotted in full according to a standard symbolism, and whenever a late report is received it too is plotted on the appropriate chart. It may sometimes happen that a late ship report contains vital information which may necessitate the redrawing not only of that particular chart but also some earlier and later ones. The prompt receipt of ships' observations, therefore, contributes substantially to the efficient preparation of reliable analyses and forecasts.

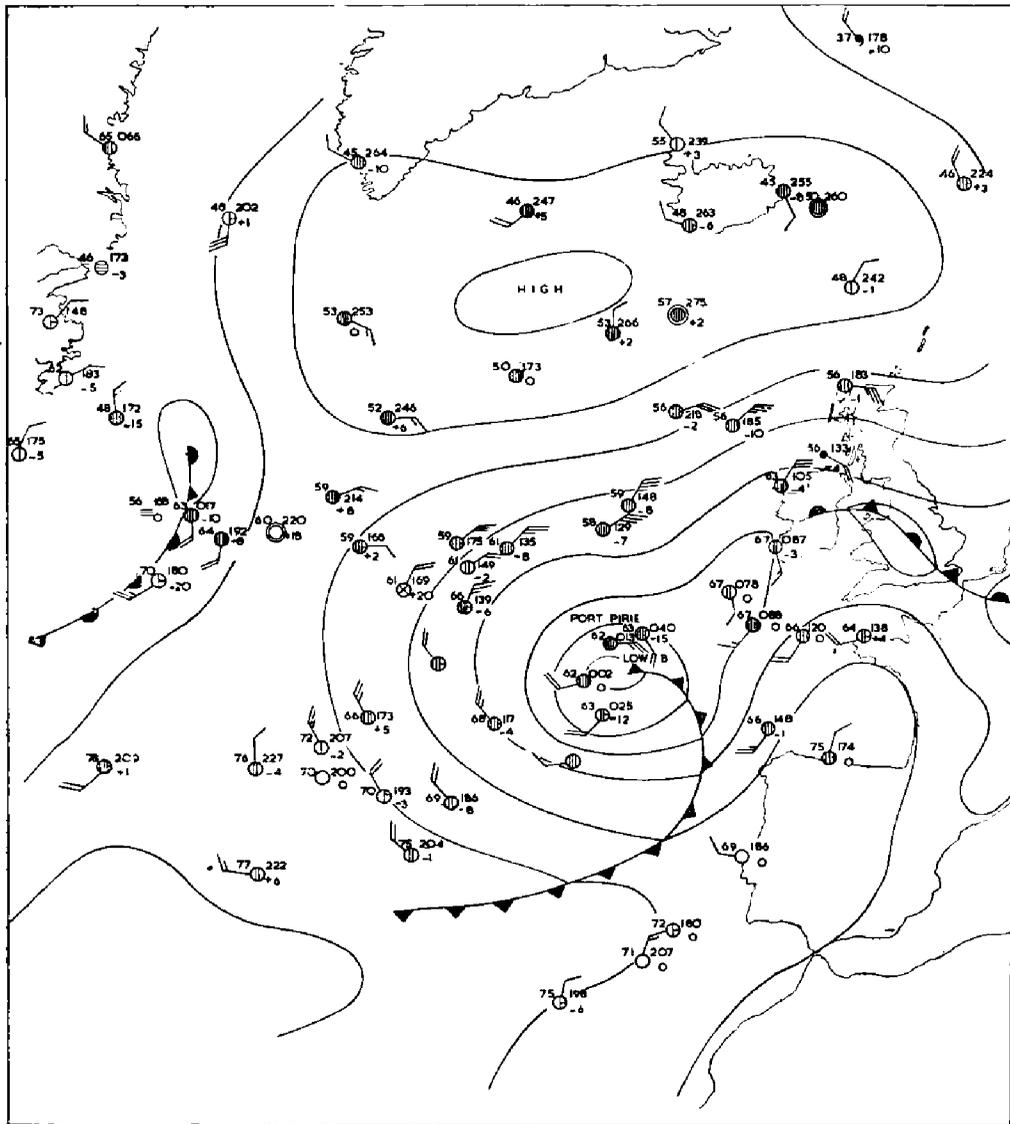


Fig. 8
Weather chart for 13th July, 1950, 1800 G.M.T.

In this article an attempt has been made to indicate the fundamental importance of ship observations from the North Atlantic and, as a forecaster who is daily in contact with the problems of analysing the synoptic charts over this area, the writer can speak with appreciation of the great value of accurate observations from this area. So far as forecasts for twenty-four to forty-eight hours for the British Isles are concerned the North Atlantic is

of the greatest importance. However, in problems of forecasting for several days ahead the whole of the Northern Hemisphere has to be considered in great detail, and consequently ship observations from sea areas other than the North Atlantic become important even to forecasters in Great Britain, although they are at the time more directly valuable to other Meteorological Services. The weather map of the Northern Hemisphere for 1200 G.M.T. on 4th February, 1950, is reproduced as Fig. 9. In the Southern Hemisphere the wide expanses of ocean make ship observations even more vital to the Meteorological Services concerned.

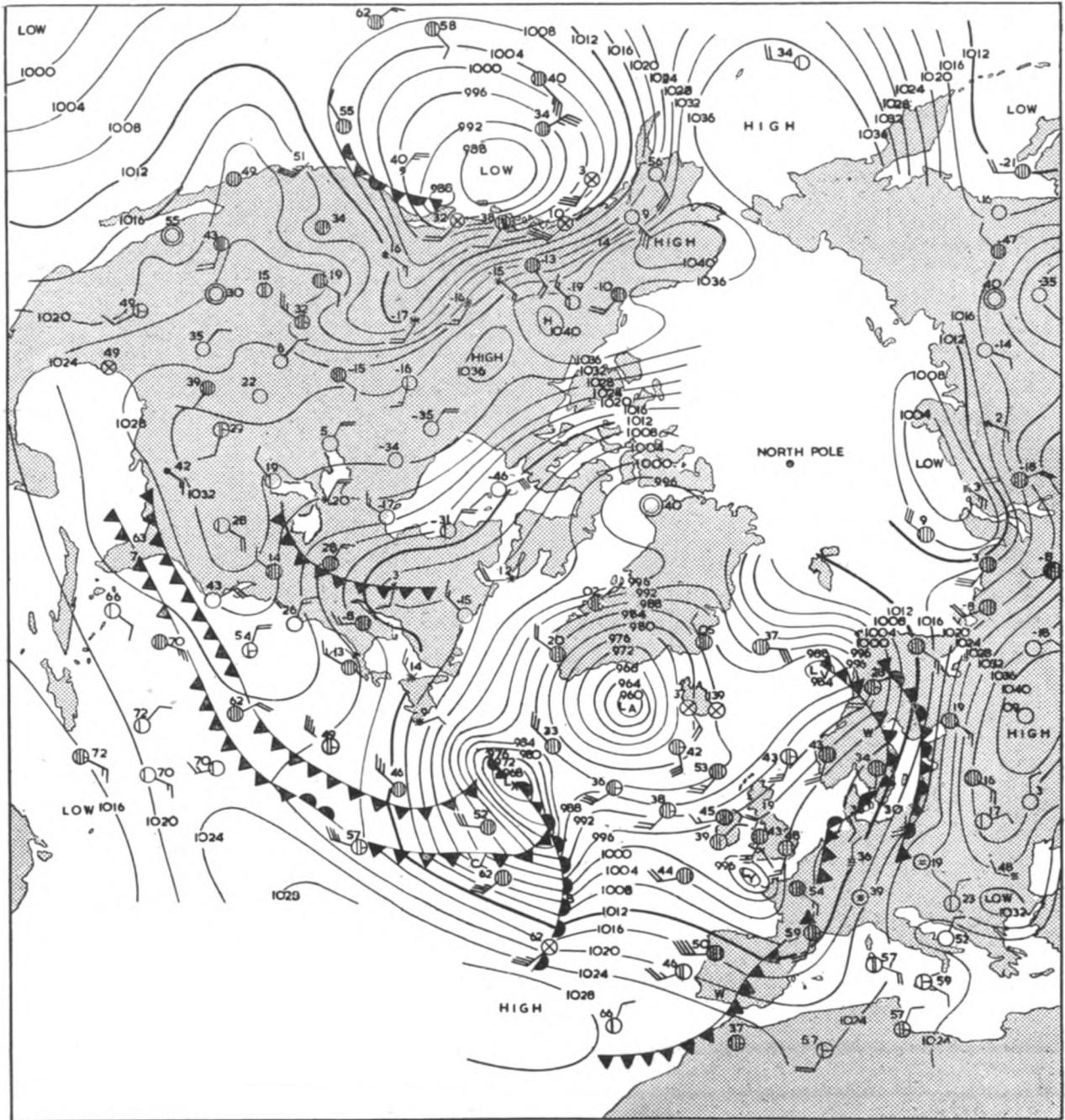
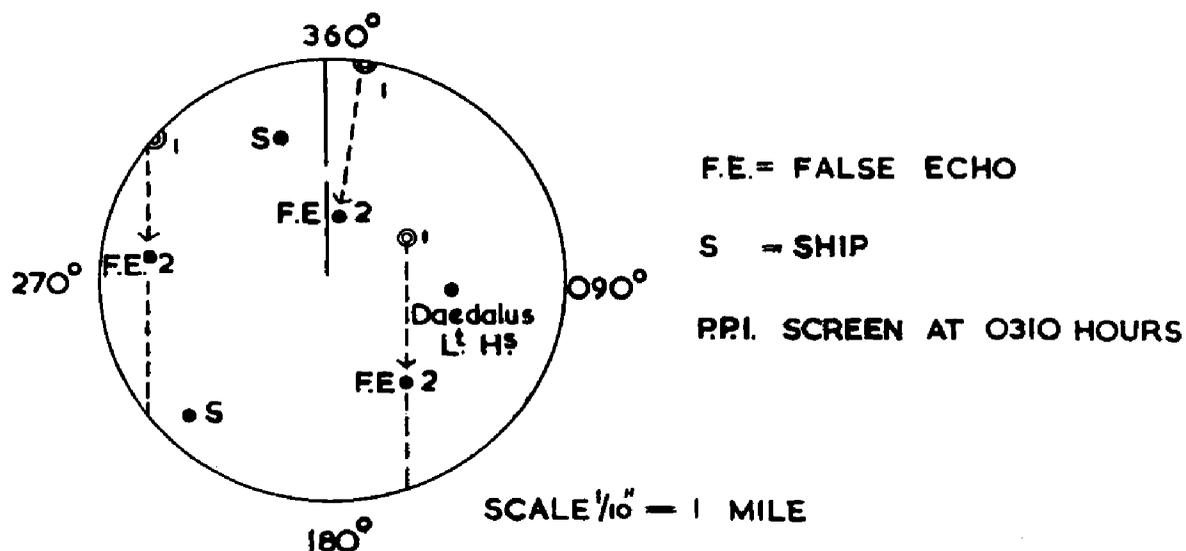


Fig. 9
Weather chart for 4th February, 1950, 1200 G.M.T.

UNUSUAL REPORT ON RADAR PERFORMANCE FROM THE T.S.S. CLAN DAVIDSON ON A VOYAGE FROM SUEZ TO ADEN

8th May, 1949, 0200 to 0400 hours ship's time. Speed 15 knots. Course 146° until 0310 hours, when course was altered to 151°.

At approximately 0200 hours the radar was switched on. With the "Heading Marker" checked echoes were recorded of all ships in the vicinity, but additional echoes were also observed. The false echoes were clear, firm and constant. One such echo was picked up 10° on the starboard bow at a distance of 10 miles. This echo remained on the same bearing as the distance decreased, though the size of the echo became smaller until at a distance of 3 miles it finally disappeared altogether. Although a strict visual watch was maintained no object could be seen on this bearing. Other false echoes were also apparent at the time and all proper objects, such as ships and eventually the lighthouse, were seen in their correct relative positions. As implied from the paragraph below, the visibility was good and even a darkened native sailing craft would have easily been seen.



Later, on nearing the beam bearing of Daedalus Reef Lighthouse, an echo was again picked up 10 miles distant and 10° on the starboard bow. The bearing of this echo also remained constant but its size gradually diminished until at approximately 3 miles distant it too disappeared. The accompanying sketch gives an indication of the relative positions at this moment. All echoes, false and true, changed their bearing and distance on the screen as might be anticipated. Bearings and distances of Daedalus Reef Lighthouse agreed with those obtained by normal navigational methods.

Temperatures : dry bulb 75.5°, wet bulb 75.5°, dew point 75.5°, sea 77°. Corrected barometer reading, 1008.1 mb. Weather : cloudless, no wind, calm sea. Very heavy dew which formed a slight mist above the surface of the water to a height of approximately 150 ft. Visibility good. Daedalus Reef Light, which should have been sighted at a distance of 19½ miles, was observed 14 miles distant.

During the previous twenty-four hours on the passage from Suez the radar had given excellent results, average-sized vessels being picked up at a distance of 15 to 18 miles on the 30-mile range, but the previous two watches had also reported observing false, but nevertheless distinct, echoes. All the false echoes observed had these points in common, namely : (a) at a distance of 10 miles they appeared on the screen larger than the normal echoes obtained from a vessel or similar target ; (b) they diminished in size with a decrease of distance ; (c) no such echoes were observed at a distance of less than 3 miles (even when the PPI range scale was altered to 3 miles), and any such echoes which " approached " and reached that range then disappeared.

With regard to (a) it may be noted that the 10-mile range is used as the normal " working " range, and that this distance marks approximately the usual visual range of most surface objects from the bridge. It is of interest, too, that though false echoes had been observed during all three watches they only took place between the hours of sunset on the 7th and sunrise on the 8th May. These false echoes were observed by the master and radio officer, as well as the navigating officers. No similar occurrence has taken place to the knowledge of those on board and one cannot help but speculate whether the atmospheric conditions were responsible. The radio officer, who maintains the equipment, is unable to give an explanation.

During the remainder of the passage to Aden the radar gave satisfactory results whenever used.

*The following comments upon this report were received from
Dr. Hopkins, Radio Research Station, Slough*

I do not think with the facts provided that there is any obvious explanation, but this hardly justifies the conclusion that the causes are meteorological. There are two points which would have to be cleared up before such an hypothesis could be safely advanced—and there may be others.

(1) What about birds ? Flocks of birds might give echoes at the ranges quoted, but it is curious that the birds showed up, at any rate in two cases, at the same bearing and distance. This hypothesis might explain the " large " nature of the echo and the disappearance might perhaps be connected with the birds flying over the beam. But marine radar sets have broad vertical beams, and for this to happen the birds would have to be at a few thousand feet for disappearance at 3 miles. It is also curious that, in two cases, the echo stayed on the same relative bearing as distance decreased, i.e. the echo " steered " a collision course at some unspecified speed. Would birds come along to have a look at a ship ? Talking of birds, what about aircraft ? Some idea of apparent speed of echo would either rule out or lend support to this possibility.

(2) What about indirect echoes, due to reflection from largish structures on the ship ? These are often troublesome on board ship and are caused, for example, by reflections from the large metal crosstrees of cargo ships. On this type of effect a spurious echo is produced whenever an actual target exists at some appropriate azimuth relative to the line joining radar scanner to the structure. The spurious echo has the same range as that of the wanted target, but its apparent bearing is roughly along the scanner-reflecting structure line. It is impossible to say with certainty from the data whether

any or all of the echoes might be due to indirect effects from one or more reflecting structures. But it is perhaps significant that in two cases the echo always stayed at 10° starboard. On the ship concerned is there a reflecting structure on this bearing? The disappearance at 3 miles might be connected with vertical directivity of the structure. The fact that these peculiar echoes had not been noted before might have been due to (a) fortuitous arrangement of ships, (b) rearrangement of derricks or cargo at, e.g. Suez.

Mr. Le Page, of the Marine (Navigational Aids) Division, Ministry of Transport, comments upon this report as follows

This case, of which a good and detailed account is given, is of unusual interest. Before advancing any explanation for those echoes observed but unaccounted for, it should be noted that the set in use, an early Marconi Radiolocator, possesses two design features which have been taken into account in assisting explanations. These features are a pulse repetition frequency rather higher than usual (1,500 p.p.s.) and a pre-set swept-gain or anti-clutter circuit. It should also be noted that in the Red Sea in summer conditions favourable to super-refraction are common, and in this case almost certainly existed, so that the occurrence of anomalous propagation could be expected.

In attempting to account for the echoes, three possibilities should be considered. The echoes might be :

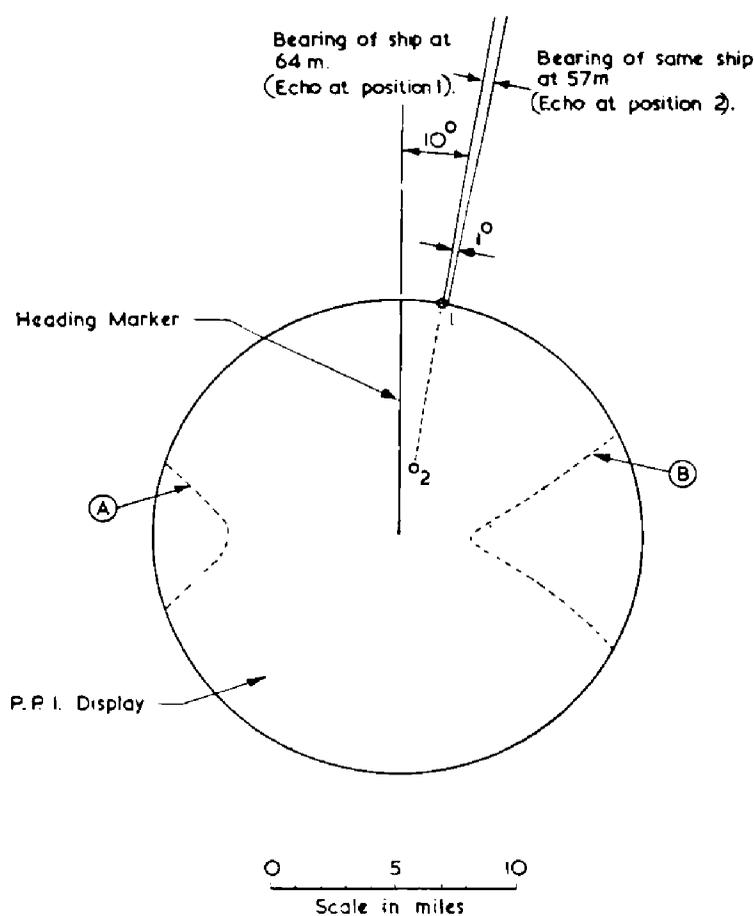
- (1) true echoes reflected in the ship's superstructure ;
- (2) " second-trace " echoes occurring under conditions of anomalous propagation ;
- (3) echoes from targets unseen by the observers, though present at the ranges and bearings quoted.

Consider first the possibility of reflections from the ship's superstructure. A false echo formed in this manner is invariably at the same range as a true echo, but on a different bearing. This bearing, which will be that of a fixed obstruction such as a mast, samson post or funnel, will evidently remain nearly constant, though range will alter. In the instances quoted, however, there is no reference to any ship echoes maintaining the same ranges from the ship as the " false " echoes. Nor, apart from the Daedalus Reef, is any charted land within 50 miles which could give rise to such echoes. It is practically certain, therefore, that this cause can be discounted.

" Second-trace " echoes can occur if the time taken for the reflection to be returned to the radar receiver is greater than that between one pulse and the next. On this set the time interval between pulses corresponds to a distance of only 54 miles, because of the high pulse repetition rate. Echoes from this or greater ranges might be received in conditions of anomalous propagation, such as were believed to have existed at the time. It should also be noted that because of their distance the rate of change of bearing of echoes at these ranges, and due to their own movement, will be low. Assuming the existence of anomalous propagation, it is possible that the echo shown at 10° to starboard in the diagram in the report, was that of a ship on a reciprocal course well over the radar horizon. When first detected, the echo appearing at 10 miles, the ship would in fact be at a range of 64 miles.

Were the ship on an approximately reciprocal course, then when last seen, the echo being at 3 miles, the bearing of the ship, and consequently of the echo, would have changed by about 1° only, i.e. sufficiently close to the reading accuracy to have been regarded as constant as was reported.

To account for the disappearance of the echo at 3 miles, some other explanation must be sought than the collapse of super-refraction conditions, since the phenomenon repeated itself. Because of the pre-set swept-gain previously referred to as being fitted to this type of set, the sensitivity will fall off toward the centre of the screen, so as to keep the screen clear of sea clutter. Normally a ship echo will increase in strength very rapidly as the ship closes in, more than enough to overcome this fall in sensitivity, and so maintain its echo on the screen. But for the ship closing in 7 miles from



(A) (B) Theoretical Paths of second-trace echoes from fixed targets, or targets moving on a parallel course, (A) at 61m on beam (B) at 57m on beam.

64 miles the magnitude of the returned signal would not be increased much in intensity, since the range altered by only 11 per cent approximately. Hence, with gain automatically controlled as described, the echo size would decrease as the echo approached the centre of the P.P.I., probably disappearing altogether at short range.

The above explanation seems to fit the observed facts in most respects. The repetition of the phenomenon can only be explained by the occurrence of more ships following approximately the same course, which would presumably be quite possible in this area.

The other two echoes, one to port and one to starboard, cannot be explained by the above theory, since they apparently followed straight tracks parallel to that of the ship. A "second-trace" echo on the beam, originating from an object whose movement relative to that of the ship is in a straight line, may be shown by simple geometry to trace out a curved path on the display, approaching the centre while forward of the beam, and receding from the centre when aft of the beam (see diagram). To make the second-trace echo

describe a straight path the target would have to move in a particular geometrical curve, which seems unlikely. It would seem therefore, that if these echoes did, in fact, follow a straight track, they must have been due to targets at the measured ranges ; if not on the sea surface such targets might have been airborne, e.g. aircraft or flocks of birds. Were they aircraft, one would expect them to have been observed. A knowledge of the time taken for the echoes to move from one position to another on the P.P.I. would have materially helped in the search for an explanation.

On the information available in the report it seems, therefore, that although echoes on the bow may be accounted for by assuming anomalous propagation, the only reasonable explanation for those on the beam is that they were from targets unseen by the observers though present at the ranges and bearings reported.

Ships' officers are invited to take particular note of any similar occurrences they may experience. In doing so it would be of great help to note the apparent speeds of the targets. Full details of weather conditions, as in the *Clan Davidson* report, are needless to say of the greatest value in establishing the likelihood of anomalous propagation.

(The Meteorological Office confirms that at the time and place referred to in the *Clan Davidson's* report, conditions of super-refraction probably existed.)

Since the above comments were made, a number of reports of unusual echoes seen in the English Channel, Red Sea and Persian Gulf areas have been received at the Marine (Navigational Aids) Division of the Ministry of Transport. The radar sets used were those with a 1500 p.p.s. recurrence frequency. Some of these are clearly second-trace echoes from a distant coastline, the echoes corresponding in shape to the coastline, assuming each point of it to be brought about fifty-four miles radially inwards toward the ship.

INTERNATIONAL CONFERENCE OF SALVAGE EXPERTS

The shipping press reports a meeting of the International Salvage Union at Paris, early in July, at which delegates of many maritime countries were present.

It is interesting to note that the Conference expressed concern at the decreasing number of times they are called upon to render assistance to ships in distress. The delegates appear to have attributed this to better construction of ships in general, improved navigational aids, and better meteorological service, as well as the fact that the average age of ships afloat is lower than in pre-war years.

This reference to improved meteorological service, and its impact on shipping casualties, will no doubt be of interest to readers of this magazine, for it is certain that voluntary observers in ships at sea contribute in a very marked degree to the meteorological service which is provided for shipping all over the world. When one bears in mind the present high cost, not only of building ships but of repairing them, it is from a general economic viewpoint gratifying to note that the frequency of need to call upon salvage vessels has decreased so much.

C. E. N. F.

REPORTS FROM SHIPS ON RADAR PERFORMANCE

It is well known that radar, which is only a few years old, is by no means fully developed, and that there are still many problems to be faced in most fields where it is being applied. This is no less true of the marine uses of radar than of other applications of this invention. Although more and more ships of the British merchant fleet are fitting radar, no one would say that all is known about the use of radar in ships that there is to know.

One aspect which is of particular interest to readers of this magazine, is the effect of meteorological conditions generally on the performance of radar. Much careful scientific work has already been done on the propagation of centimetric radio waves in varying atmospheric conditions and on the effects of precipitation, etc. But there is still a lack of knowledge as to how meteorological factors affect the use of radar. For example, there is much yet to learn about the reliability with which radar can detect ice in its various forms, and this is clearly a matter of direct concern to those navigating in ice areas. The practical effects of attenuation of radio waves by heavy precipitation are also not yet fully known.

The Operational Research Group of the Ministry of Transport, studying various problems of the application of radar to marine use, collects and analyses data on these weather effects. Some of the information is collected by the group's own members, but most is sent in by users of radar. May we ask officers of ships of the Voluntary Observing Fleet to assist this work by making observations on the effects of meteorological conditions on the performance of their radar equipments, and thus provide the much needed data necessary to learn more about this subject ?

As with ordinary meteorological observations full and careful records, up to the high standard associated with reports appearing in *The Marine Observer*, are necessary. The detection of ice by radar has already been mentioned, and to guide observers in collecting the required information we have designed an experimental record form on this subject. A copy of this has been reproduced on page 218. This is an example of the detail required in making these observations. Masters may obtain copies of these forms from Port Meteorological Officers and Merchant Navy Agents, or by application to the Marine Branch.

Not only do solid objects such as ice produce radar echoes, but certain natural phenomenon such as squalls, tide rips, overfalls, etc., produce a characteristic radar picture. Photographs of such P.P.I. displays would be particularly welcome.

The Ministry of Transport will be very pleased to hear from any mariner who would care to assist in these investigations, or has any suggestions to offer regarding them.

Voluntary observers are therefore requested to send in to the Director of the Meteorological Office (M.O.1) any reports upon radar performance which they may make. These reports, after examination for points of purely meteorological importance, will be forwarded to the Ministry of Transport for their investigation and comments. Extracts of reports received in this manner, together with the comments received from the interested authorities, will be published in *The Marine Observer* from time to time.

The above note has been prepared by the Operational Research Group of the Ministry of Transport in conjunction with the Marine Branch of the Meteorological Office.—EDITOR.

Special Investigation into the Detectability of Icebergs by Radar (1949)

This experimental log has been drawn up by the Operational Research Group of the Ministry of Transport in an endeavour to collect some accurate scientific information on the detectability of icebergs by radar. If you are willing to co-operate with us in this experiment will you please do the following two things :

- (a) make entries in this log on the next occasion when you meet ice ;
- (b) let us know whether there are any other factors that ought to be included in the log or any other comment you have about it.

Note. An isolated berg is the best kind of target for the experiment and you can make such a berg act as two targets :

- (i) by logging it when you *first detect it ahead* ;
- (ii) again as you *lose it astern* on the radar.

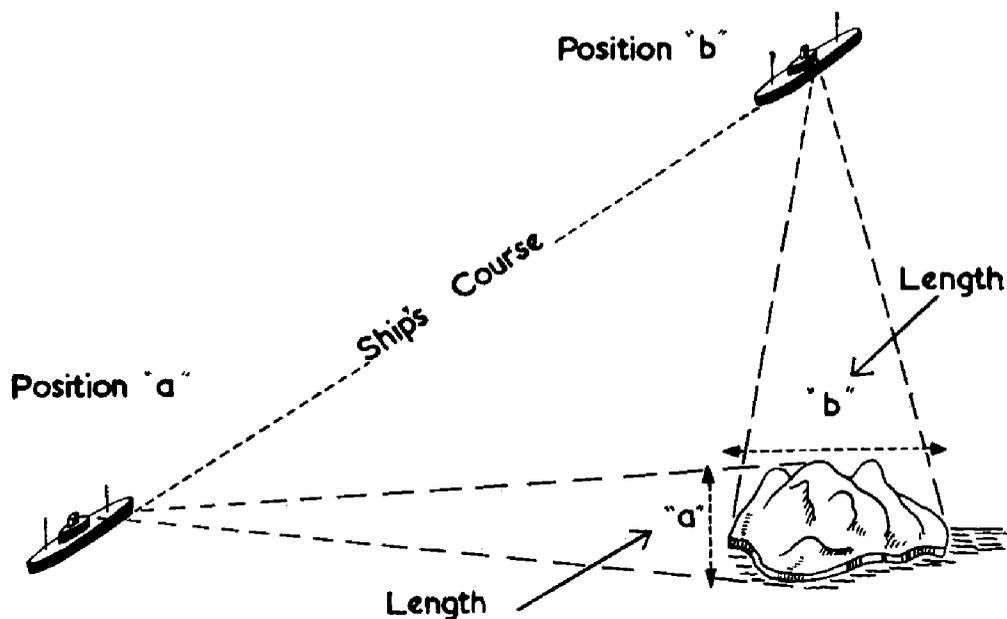
It is important to log it as two completely separate targets, since the faces it presents to you will almost certainly differ in the two cases.

This double log of each berg may provide most valuable scientific information.

Explanation of types of berg :

Type	Height of berg above waterline	
Large bergs	More than 100 ft.	} Give height in ft. as accurately as possible e.g. large/140 ft.
Medium bergs	More than 30 ft.	
Small bergs	More than 15 ft.	
Bergy bits	6 to 15 ft.	
Growlers	Less than 6 ft.	
Heavy floes	More than 2 ft. above water	
Light floes	Less than 2 ft. above water	

Length of berg (see sketch).



Date	Time	Position	Type of berg (see note)	Approx. length (see sketch)	Approx. slope of wall facing you (degrees)	Nature of face, smooth, jagged, snow-covered, etc.	Any other features likely to affect detectability	Weather and sea state and humidity	Maximum radar detection range (approaching)	Range at which target was lost (receding)	Remarks (observations on navigation through ice floes, etc.) General ice conditions

S.S. Sailing from Date Arrival at Date Type of Radar

THE INSTITUTE OF NAVIGATION

In May and June, 1950, some interesting and varied papers were read and discussed during meetings of the Institute of Navigation at the Royal Geographical Society's Lecture Hall.

The most significant meeting, from the maritime viewpoint, was that of 19th May, when a symposium of four papers on Marine Radio Position-Fixing Systems was read. The content of these papers is briefly discussed below.

A SURVEY OF SYSTEMS IN USE TODAY, by Mr. H. E. Hogben. This paper, as its name implies, gave a general picture of the various systems, Decca, Consol, Loran and D/F, in use today, and briefly discussed their advantages and disadvantages and their application to particular purposes and users.

THE USE OF D/F AT SEA, by Mr. F. P. Best, gave a clear exposition of the history and progress of D/F from the maritime viewpoint, and of the practical value to the mariner of modern D/F facilities, both aboard a ship and ashore. He discussed possible errors and precautions which are necessary in interpreting D/F bearings, and the respective merits of bearings taken with the ship's own apparatus and those given to the ship by a shore installation.

DECCA AS AN AID TO NAVIGATION AT SEA, by Group-Captain E. Fennessy, O.B.E. The almost uncanny accuracy which can be obtained with the Decca system was discussed, and one felt it was rather a pity the system had only so far been adopted in somewhat limited areas. It is comforting to think that the North Sea, notorious for swift and uncertain tides and currents, shallow water, low-lying coastline and poor visibility, is already included in the Decca coverage.

THE USE OF CONSOL IN THE FISHING FLEET, by Commander D. H. Harper. The particular needs of the deep-sea trawler, his desire for a navigational aid which was simple to use and interpret for the dual purpose of helping him to locate a favourable fishing bank (with the additional aid of echo-sounding) and of guiding him home to his market, without mishap, were well described in a racy way in this paper. The author had a lot of sea experience in the Royal Navy, and in his present job at Hull comes into very close contact with the fishing fraternity and knows their problems intimately.

Captain Elvish, of the Clan Line, in opening the discussion on the papers, hoped that all electronic aids to navigation would be treated in their proper perspective, and that the masters and officers of the Merchant Navy would not tend to become "push-button sailors". They should realise that these were only *aids* to navigation, and his skill as a seaman and a navigator was the most important attribute of the officer at sea—combined with an intelligent appreciation as to how best to use and apply the aids to navigation which science placed at his disposal.

The general trend of this discussion was to agree that these electronic aids were of enormous benefit to the shipping industry generally, but that seamanlike caution was needed in using all of them. The varied effects of meteorological conditions upon radio impulses of all types was mentioned, both during the papers and the discussion.

On 16th June two aeronautical papers which are not without interest to the mariner were read and discussed.

The first of these was by Squadron-Leader B. Walford, R.A.F., and described the work of the aircraft carried by the Anglo-Scandinavian Expedition to Queen Maude Land in Antarctica. The aircraft was an

R.A.F. Auster, and was carried on the deck of the sealing vessel *Norsel* (165 ft. long), which transported the expedition to Antarctica (see *The Marine Observer*, Vol. XX, No. 148, April, 1950, page 103). The stowage and carriage and successful launching of even a light aircraft of this type from the deck of such a small ship was no mean feat and needed considerable ingenuity. The lecturer, who piloted the aircraft, described the launching of the aircraft when the vessel reached the ice edge, the meteorological and control organisation between ship and aircraft, and the various reconnaissance flights which the aircraft made over the ice and into the Antarctic continent.

The chief object of the flights was to locate leads and weaknesses in the ice so that the ship could approach the continent as close as possible, to find a suitable place for discharging the cargo on the ice near to the shore and to make a general reconnaissance both over the ice itself and over the continent. This important reconnaissance work was done efficiently and without mishap, and as a result the expedition found an admirable place at which to disembark from the *Norsel* and set up their camp. The lecturer mentioned that the meteorological charts which were plotted aboard the *Norsel* were surprisingly comprehensive in character, and included observations received from whaling vessels. He illustrated his talk with some delightful colour photographs. The *Norsel*, having disembarked the expedition, brought the aircraft and her pilot back to Europe.

The second paper, entitled LIGHT AIRCRAFT NAVIGATION, was by Mr. M. Townsend, navigator of the aircraft in which Mrs. Morrow Tait did her trip round the world in 1949 in a Percival Proctor. It will be remembered that that aircraft was wrecked in the U.S.A., the trip being finished in a Vultee Valiant. It was a fascinating account, from the navigational viewpoint, of the difficulties, hazards and adventures that can attend a light aircraft on a flight of this nature, and how they can be overcome with courage and resourcefulness. The mariner will no doubt sympathise with the air navigator in such an aircraft who, having passed the point of "non-return" on a night passage between Japan and an island in the north-east Pacific, has all his lights fused, and with no electronic aids at his disposal has to depend on a torch for light for all purposes during the remainder of the passage. Some ingenious and quick methods of utilising position-line fixing were illustrated, and the vital necessity of accurate meteorological information for both the planning and the operation of such a flight was stressed. C. E. N. F.

MEETING OF THE CHALLENGER SOCIETY

At the 167th scientific meeting of the Challenger Society, held in London on 19th April, a paper of considerable interest, not only to oceanographers but to mariners and to meteorologists, PROBLEMS AND NEW TECHNIQUES FOR THE PRESENT-DAY OCEANOGRAPHER, was read by Mr. C. O'D. Iselin, Director of the Woods Hole Oceanographical Institution, Massachusetts, United States. The Woods Hole Institution, which is situated on the Cape Cod Peninsula (famed for "sea food"), has excellent laboratories and the research schooner *Atlantis* at its disposal, and the paper aptly illustrates the wide range of activities upon which these American oceanographers are engaged.

Mr. Iselin's paper was solely concerned with the North Atlantic, and discussed such matters as the distribution in depth of the 10°C. isotherm in

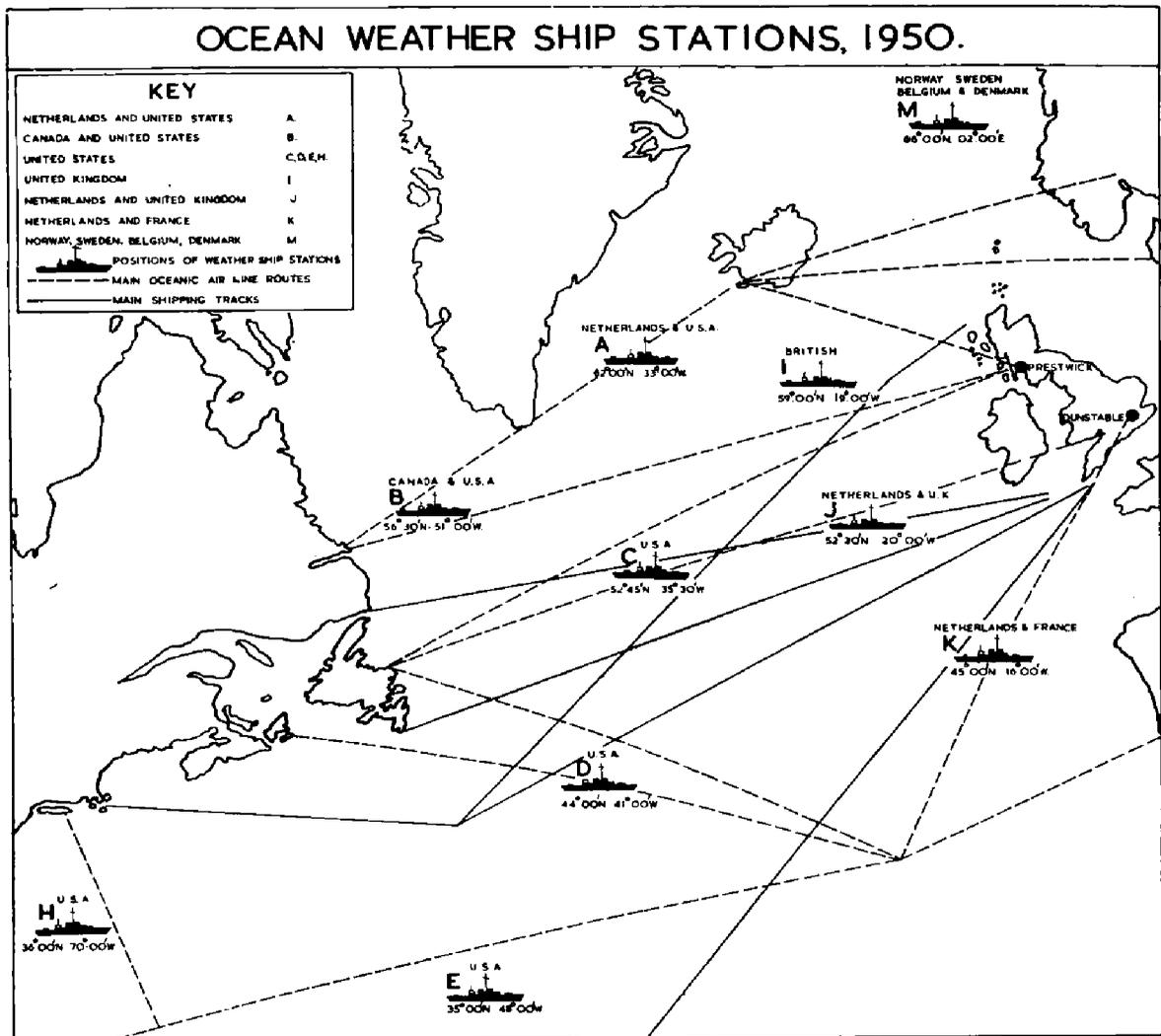
that ocean ; the vagaries of the Gulf Stream, in temperature and density, both at the surface and in depth ; and a section through its temperature profile ; the practical use of the bathythermograph* ; the practical value of "Loran" to the oceanographer, particularly when obtaining details of surface-current movement ; an ingenious electro-magnetic method of obtaining ocean-current observations from a moving ship ; and experiments with sonic waves of various frequencies to determine the nature of "layer" echoes at varying depths in the water of the oceans.

Although he did not mention meteorology as such, Mr. Iselin's paper did much to emphasise the intimate and inescapable relationship between meteorology and oceanography, and, indeed, of the necessity of those engaged upon these two sciences getting together and generally co-operating. The contours of the 10°C. isotherm, for example, followed in a remarkable way the track of the Gulf Stream and North Atlantic current at the surface—thus showing that the warming effect of the Gulf Stream is effectual at considerable depths, and suggesting that there is, perhaps, also a sub-surface drift effect across the ocean similar to that which is found at the surface. This fact is undoubtedly of great meteorological importance. Another striking feature was the curious waves or swirls which have been shown to occur in the southern extremity of the Gulf Stream. These swirls have been investigated by the Woods Hole Institution in considerable detail, and it seems that they are, to some extent, analogous to the waves which occur at frontal "meeting places" in the atmosphere near the earth's surface. The whole thermal structure of the oceans, and particularly its intricate pattern at the edge of the Gulf Stream, was vividly described with slides, and this also seems to be of considerable meteorological interest, for it is certain that the vagaries in the ocean temperature have very great effect upon the overlying atmosphere.

There seems little doubt that the use of electronic aids to navigation ("Loran" in this case) is an enormous boon to the oceanographer, who can thus obtain regular "fixes" quite irrespective of atmospheric conditions and enable very accurate ocean-current observations to be made merely by letting the ship steam a steady course at slow speed. It is not so much that "Loran" can fix the ship geographically with greater accuracy than any other method, but that by frequent fixes, irrespective of weather, the relative movement of the current can be studied. Similar arguments would apply with the use of Decca, for example. The electro-magnetic apparatus which Mr. Iselin referred to is towed astern of the ship, and depends broadly for its action upon the magnetic force of the earth and the currents induced in sea water flowing across or along the magnetic field ; if there is no ocean current present, then there is no electrical disturbance on the instrument. To operate the instrument a ship needs to steer various courses so as to steam across the current in order to get its maximum effect. The sonic-sounding experiments showed that many of the false echoes which appeared on the trace are due to living organisms of some kind or other in the water—plankton, fish, etc.—and that by varying the frequency of the transmission one can get echoes from different sizes of organisms.

*An instrument which automatically records temperature against depth.

C. E. N. F.



Map showing positions of North Atlantic Ocean Weather Stations as agreed at the I.C.A.O. Conference, London, 1949. Photographs of some of the vessels operating these stations are shown on pages 224 and 225.

Sea-Dogs

On 6th May, 1950, a rather unusual type of message was received by C.F.O. Dunstable for retransmission to the authorities concerned which emanated from the Ocean Weather Ship *Weather Observer* at sea.

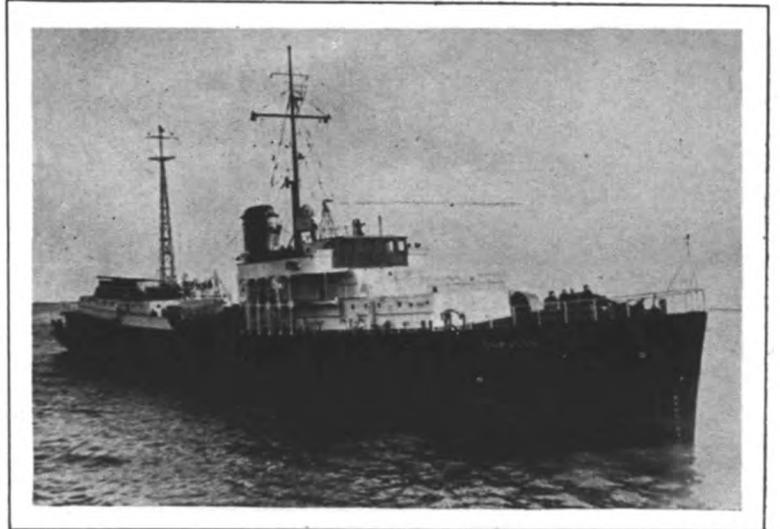
A copy of the message and the reply sent to the ship were as follows :
 061032. From *Weather Observer* to C.F.O. for Luton and Dunstable Hospital.

“Have bitch on board recently given birth to a litter. She is now restless and having occasional fits. Request advice please.”

061105. From Wilson, Veterinary Surgeon, Luton, to O.W.S. *Weather Observer*.

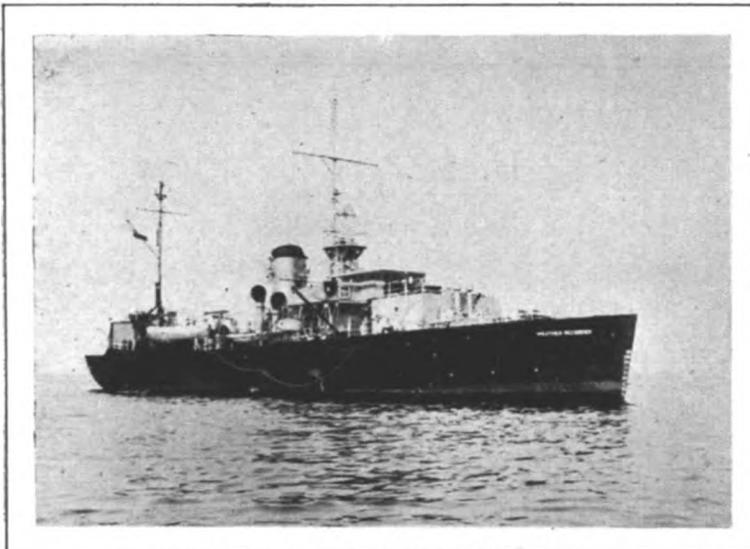
“Condition is eclampha. Inject in neck dextro-magnesium about 20/30 ccs. under the skin. Alternate any form of calcium. Follow with calcium tablets by mouth 3/4 per day. Give sedative potassium bromide.”

NETHERLANDS



O W S CUMULUS
Length 287 ft.. Dispt 2300 tons.

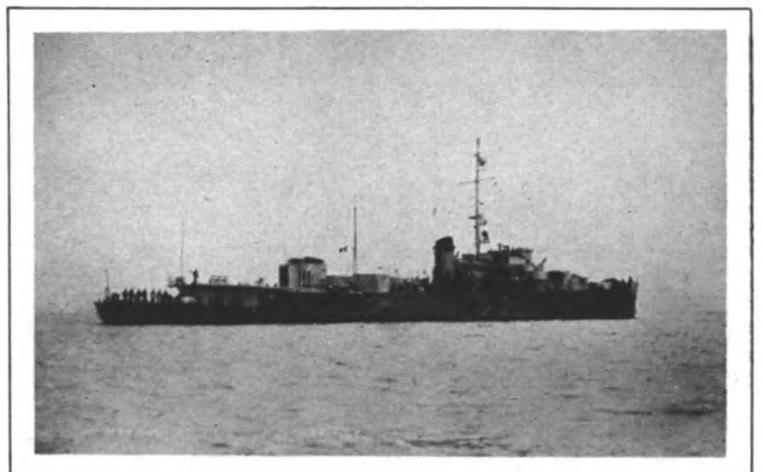
GREAT BRITAIN



O W S WEATHER RECORDER
Length 205 ft.. Dispt 1340 tons.

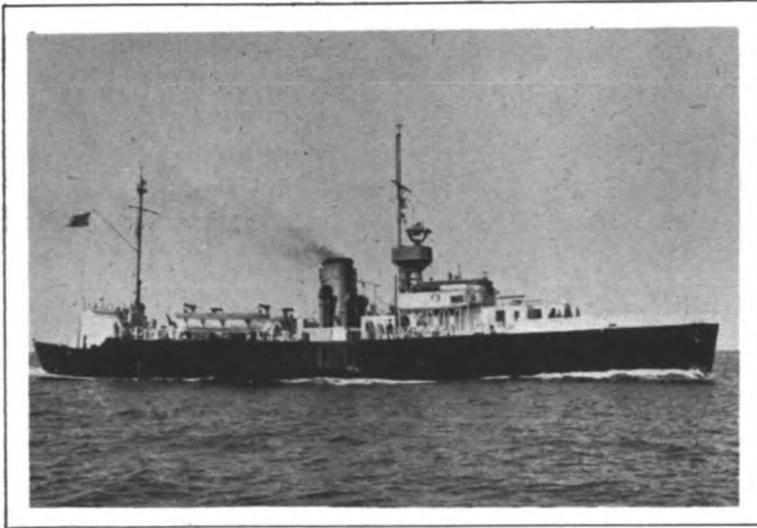
**NORTH
OCEAN WEATHER
TYPES OF VESSELS
OPERATING**

FRANCE



O W S MERMOZ
Length 278 ft Dispt 2200 tons

NORWAY



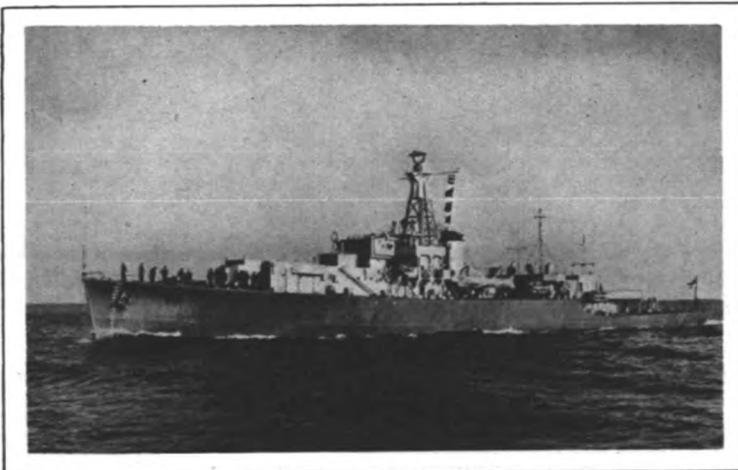
O W S. POLAR FRONT
Length 205 ft.. Dispt. 1340 tons.

U. S. A.



U S C. G. C. MINNETONKA
Length 255 ft.. Dispt. 1910 tons

CANADA



H M C S ST STEPHEN
Length 301 ft Dispt 1445 tons.

**ATLANTIC
ICE
STATIONS
EMPLOYED BY THE
COUNTRIES**

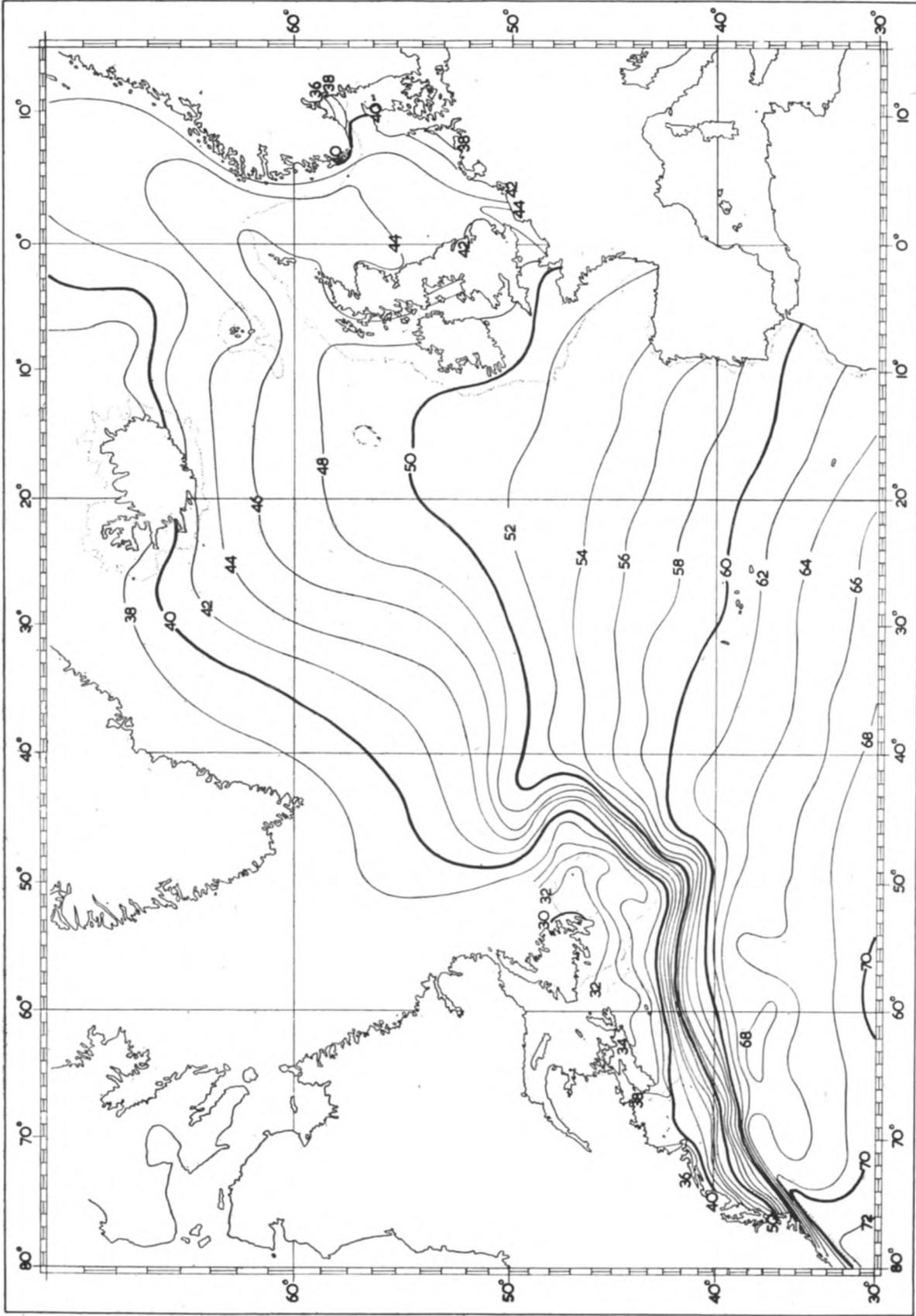


Fig. 1
 Map showing average sea-surface temperatures in December
 (Taken from *Atlas of Monthly Sea-Surface Temperatures of North Atlantic Ocean, M.O. 527*)

NO DEPRESSION IN ICELAND

BY A. H. GORDON, M.Sc.

A very amusing little book entitled *No Depression in Iceland* was published during the war. It contained a humorous account of the exploits of the British Army in Iceland, and was written by one of the officers who partook in the occupation of that country during the early years of the war. The title of this book was no doubt intended to convey a psychological rather than a meteorological meaning, but the phrase "depression over Iceland" has been heard so frequently in the B.B.C. weather forecasts that it has come to represent to the general public an almost perpetual meteorological condition from which springs all the bad weather that reaches the British Isles.

This concept is a fallacy. Although many vigorous and deep depressions do strike the Icelandic coast they seldom form there, and unless the pressure distribution is favourable do not subsequently approach the British Isles. On the other hand, many anticyclones do build up over Iceland and persist there for many days, perhaps even a week or more, giving clear, bright weather, very cold in winter but remarkably warm at times in summer, particularly in inland sheltered valleys. It is, in fact, the persistence of an anticyclone over Iceland that often forces the Atlantic depressions to take a more southerly track than normal and thus pass straight over the British Isles!

The most severe depressions which strike Iceland probably originate off the Florida coast over the warm waters of the Gulf Stream. Such depressions develop slowly at first and move rather sluggishly in the sub-tropical seas where they form, but as soon as cold continental air from the North American continent is drawn into their circulation they receive new energy, deepen and move very rapidly up the eastern coasts of the United States and Nova Scotia. The centres normally pass slightly east of Newfoundland and south of Cape Farewell, Greenland, before reaching the southern coast of Iceland. If the centre of such a depression should move north toward the Davis Straits after passing Newfoundland a vigorous new centre frequently forms off Cape Farewell, and this moves north-east toward Iceland while the old centre drifts up the Davis Straits and gradually fills up. After leaving Cape Farewell the centre of a depression generally takes one of two courses. It either passes up the Denmark Straits or else moves eastwards to the south of Iceland. Occasionally the centre becomes stationary off the south-west coast of Iceland.

The depressions which form in the sub-tropical waters of the Gulf Stream and move north-eastwards over the western Atlantic, drawing icy continental air from the Polar wastes of Canada and Greenland, are probably the most severe type of winter Atlantic storm. By the time they affect Iceland they have often reached the peak of their intensity and produce winds of hurricane force. During these storms winds of force 11 or 12 are not infrequent. A gust of 133 m.p.h. was estimated at Reykjavik in the early days of the war.

Depressions tend to be steered along the mean isotherms of the atmospheric column such that higher temperature is to the right and lower temperature to the left of the path of motion. Depressions usually take the general tracks described in the preceding paragraphs because of this principle of thermal steering. It will be seen from Fig. 1 that there is a concentration of the isotherms of sea-surface temperature running from SW to NE over the

North Atlantic Ocean east of the coasts of the American continent, and along which the depressions usually move.

In spite of its northerly latitude the climate of Iceland is not exceptionally rigorous. Mild weather can occur at any time throughout the winter and frequently lasts for long spells. This mildness is responsible for unpleasant conditions at times. The temperature may fluctuate above and below freezing point several times from one day to the next, causing freshly fallen snow on the ground to become a mire of dirty slush, which then freezes into a hard, icy surface, over which it becomes dangerous to move. The ice then thaws again or forms a glazed ice surface as rain falls over the frozen snow. If such a dangerous surface is accompanied by gale force winds, walking becomes a hazardous venture. Yet even this winter mixture of unpleasantness may often be preferable to the thick clouds of lava dust which are raised in summer by traffic along all the roads in the country outside the city of Reykjavik. The volcanic soil does not hold rainfall. A pool of rain soon runs off or dries up in summer and does not lay the dust for long.

The greatest extremes of temperature occur on the north coast of Iceland near Akureyri. There in winter the cold north winds blow direct from the Arctic ice pack. There in summer the Föhn effect of the mountains of central Iceland causes the warmest temperatures with southerly winds; temperatures in the seventies are not uncommon under these conditions. The Föhn can produce some quite unusual effects. Some years ago a temperature of 62°F was reached on the east coast of Iceland at midnight in mid-November. During clear summer days a sea breeze usually prevents the temperature from exceeding 60°F. along the coast.

Radiation fog is rare, but sea fog and very low cloud are quite common on the coast in spring and summer when the wind circulation is onshore. During calm anticyclonic conditions and when the wind is offshore exceptionally good visibilities may occur.

The main impressions gained by a visitor from more southerly climes after a long sojourn in Iceland are the abnormally long winter nights, illuminated much of the time by the Northern Lights, the abnormally long summer days, when real darkness is unknown for nearly four months, and the barren nature of the terrain, which, partly due to the climate and partly to the volcanic nature of the country, prohibits the growth of any trees or thick vegetation.

LETTERS TO THE EDITOR

MIRAGE ?

Sir,

With regard to Dr. Goldie's letter on page 181 of *The Marine Observer*, I think the two sets of phenomena referred to are different.

The *Stirling Castle* observation is probably a mirage which often produces elongation (see *Marine Observer*, page 63, figure). Had it been in daylight the masts might have been seen elongated. In Pernter and Exner *Meteorologische Optik*, page 193, there is quoted an observation by Drago of the transformation of a distant light into " a small column of fire " which split into two images, one red and the other green.

The pillars which Dr. Goldie observed seem to be similar to those which appear over lights in continental winters, and which are probably due to reflection in some way from tabular ice-crystals floating in the atmosphere and perhaps rotating about a horizontal axis.

2 Park Road,
Tunbridge Wells

C. M. BOTLEY.

PHOSPHORESCENT WHEELS

Sir,

Referring to the note below an article about the phosphorescent wheel, observed on board the S.S. *Laomedon* on the 25th February, 1949, between Sumatra and Colombo (*The Marine Observer*, Vol. XX, No. 147, page 6), I should like to draw the attention of your readers to an explanation of this phenomenon given by a Dutch naval officer as early as 1911.

This explanation is, I think, quite to the point, and in the Dutch *Marine Observer's Guide* we refer to it as being fully satisfactory.

A member of my staff made a summary of the literature upon this subject, which appeared in the Dutch nautical journal *De Zee (The Sea)* in 1911 and 1921. The translation of this summary is enclosed herewith.

J. W. TERMIJTELEN

De Bilt, 29th March, 1950

(Director, Section for Oceanography
and Maritime Meteorology)

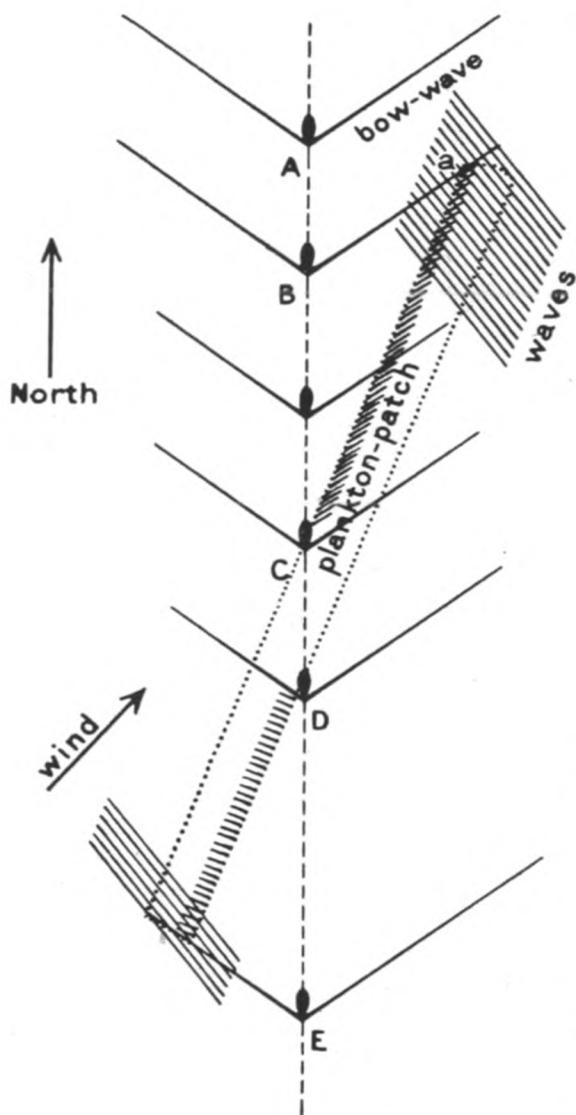
Koninklijk Nederlands Meteorologisch Instituut.

Phosphorescent wheel

An explanation of this remarkable phenomenon was given by Vice-Admiral G. F. Tydeman, R. Neth. N., in an article in the Dutch nautical journal *De Zee* (Vol. XXXIII, 1911, page 14). Attention was drawn to the " phosphorescent wheel " in an earlier article in the same journal (December, 1910), when a description was given of a rotating light-beam in the sea, observed on board the Dutch ship *Valentijn* in lat. $3^{\circ} 33' N.$, long. $107^{\circ} 58' E.$, in the China Sea on the 12th August, 1910, some time after midnight. The course of the ship was south (magn.), speed 8 knots, when the sea commenced to show regularly flashing spots in a direction approximately abreast of the port bow. Soon the flashes changed into the " spokes of a wheel " rotating anti-clockwise with the centre behind the horizon, one spoke passing every

half second. The intensity of the spokes increased and the beams got narrower as the phenomenon went on. When it reached its maximum and the spokes more or less touched the ship the wheel disappeared, and the ship sailed for some minutes in the type of phosphorescence known as "white water".

This situation lasted for about five minutes. Then the spokes appeared again, turning anti-clockwise, but with their centre of rotation this time approximately abreast of the starboard bow. The intensity of the spokes was now gradually decreasing and at the same time the spokes became broader and less sharp. About forty minutes after the first flashing in the east occurred the phenomenon disappeared, the last glow being seen on a bearing NW \times W.



Other data on this occasion were :

- (a) dark night (moon set two hours before the commencement of the phenomenon);
- (b) wind SW, Beaufort 3 ;
- (c) barometer steady ;
- (d) cloudiness 7/10, Ns. and Cb.
- (e) air temperature 84°F. ;
- (f) light swell ;
- (g) visibility very good (no haze) ;
- (h) no change in the magnetic compass ;
- (i) the only change in conditions was a gust of wind (Beaufort 5) and a rain shower approaching from the SW at the end of the observation.

Tydeman gives the following explanation (see fig.). It is supposed that there was a plankton patch in a SSW-NNE direction containing phosphorescent organisms, indicated by the dotted line in the figure. At A the ship was sufficiently near the patch to see a glimmer in an eastern direction (distance Aa about 1 mile). The strong equable flashing was probably caused by differences in the intensity and movement of the phosphorescent organisms.

When the ship was at B the bow-wave of the ship started to cross the patch, and as the ship (and the bow-wave) moved on, the nearest point of contact of the bow-wave and the patch came nearer to the ship. In this way the bow-wave and the existing waves in the patch (the direction of these existing waves was SW-NE) formed breaking points at the tops of the latter and so these tops flashed up in a NW-SE direction. In this way the

flash was regularly repeated, every flash starting at the borderline of the patch and crossing the patch in the same direction as its predecessor. In this way it is clear that the flashes became brighter and sharper as the phenomenon proceeded, for the distance to the ship shortened and the bow-wave causing the effect was sharper near the ship than at a greater distance. The whole phenomenon moved from left to right in parallel lines, and as the spokes were seen in perspective it seemed to the observers as if they converged to a point somewhere behind the patch. From a centre beyond the horizon the spokes therefore appeared to move anti-clockwise, giving the impression of a rotating phosphorescent wheel. At C the ship itself entered the patch and the phenomenon of the wheel was obscured by the strong light of the immediate phosphorescent surroundings of the ship. When the ship at D left the patch the rotation of the wheel would start again, but now off the starboard bow. Gradually the intensity of the spokes decreased, and finally when the ship was at E the phenomenon faded out on the bearing NW × W.

This explanation has been made on the basis of an oblong patch of plankton ; in reality the patch may have any form and may be very irregular. The ship may pass a patch and not cross it, or the ship may sail between two separate patches, etc. The impressions of the observers on board will thus differ in the various cases.

After Tydeman's article had appeared in *De Zee* some notes were sent to the Editor and a discussion was opened, but eventually the explanation given was generally accepted.

Now in the above case of the phosphorescent wheel, and probably in most cases, the radiating spokes were observed in the top layer of the water itself, and we think that as long as the wheel remains on or just below the sea surface, all cases can be explained by Tydeman's theory. However, in the issue of Vol. XLIII (March, 1921) an article appeared in *De Zee* from Mr. G. J. A. van Munster, third officer in the Dutch ship *Van Waerwijck*, stating that on 14th November, 1920, during a dark night in lat. $4^{\circ} 55' N.$, long. $106^{\circ} 27' E.$, between China and Singapore, a phosphorescent wheel was observed in the air above the sea, in a stratum more or less parallel to the sea surface. The nautical and meteorological observations were : course SW × S $\frac{1}{2}$ S (magn.), speed 11 knots. Wind NE, fair ; light swell from NNE. Moon set about four hours before the phenomenon started. Visibility very good. Air temperature $80^{\circ} F.$, sea temperature $82^{\circ} F.$

Broadly speaking the phenomenon was identical with the phosphorescent wheel observed on board the *Valentijn*, but the spokes appeared to rotate at a level of about 30 ft. above the sea surface. It was observed, when the wheel appeared, that the water was covered with a haze, and as soon as the wheel disappeared the haze was no longer there. It was also observed that the wheel did not only turn anti-clockwise, but occasionally changed its movement into a clockwise direction. During the whole phenomenon the water was but slightly phosphorescent.

Two months later, in the No. 5 issue of the same volume of *De Zee* (May, 1921), Admiral Tydeman gave an explanation of the new phenomenon.

He argued that on the first occasion (S.S. *Valentijn*, 1910) the sea, which had been brought into motion by the bow-wave, was phosphorescent itself, the organisms being in the top surface of the water. In the second case (S.S. *Van Waerwijck*, 1920) the surface water, of course, was brought into

motion as well ; the phosphorescent organisms, however, were at a lower level in the sea and were not moved by the waves or the swell above them, or only slightly so. Now the waves acted as oblong cylindrical lenses. As soon as the haze was at focus distance from the lens a sharp light was seen at that level, and because the lenses changed their form continuously, and as the observer saw the flashes in perspective, a " wheel " was seen. It now depended on the height of the spokes in the haze and of the height of the observer's eyes respectively if the wheel would turn clockwise or anti-clockwise. It would be possible for an observer who moved from a lower deck to the upper deck to see that the direction of turning had changed.

No refracted image will be visible at the focus-distance of the lens when there is no haze, consequently no spokes will be observed.

Considering the fact that the height and expanse of the haze, the direction and form of waves and swell, and of the expanse, intensity and depth of the phosphorescent organisms may vary very much, it will be clear that phenomena observed in connection with phosphorescent organisms may differ from those described above. Many surprising characteristics, which cannot be explained off-hand, may therefore be observed.

(A previous letter from Vice-Admiral G. F. Tydeman, quoting the same ships' observations and giving a similar explanation of them, was published in *The Marine Observer*, Vol. IX, 1932, page 32.)

THE ASSOCIATION OF NAVIGATION SCHOOLS

In the years before 1851 the masters and mates of British ships knew not the terrors of the examination room ; the awe-inspiring title of Examiner of Masters and Mates was not invented and neither examinations nor navigation schools existed. Shortly before this date a Parliamentary Committee had reported that the masters and officers of British ships were suffering from illiteracy and insobriety and that they were, in fact, bringing discredit to the name of Britain in ports abroad. As a result of this Committee's findings, the examinations of masters and mates were introduced and the job of conducting these ordeals was entrusted to the Board of Trade. The resulting introduction of the Examiner of Masters and Mates necessitated the foundation of navigation schools. The first navigation schools were rather in the nature of " cramming " establishments run by private individuals, the syllabus being narrow and restricted in its outlook and application. Gradually, however, as the standard of the examinations and of the examiners improved and became more human, so the standard of the schools and the quality of the teachers improved. We soon saw the emergence of certain schools of a more enlightened and educational nature which eventually, in the numbers of their pupils and of their successes, towered high above the others.

In the early days there was little contact between the schools, examiners and ship-owners, and it is probable that the first two of these mutually disliked and distrusted each other.

In 1917 a big step forward in the education of the Merchant Navy officer was made when the first conference of the schools was held at Liverpool, and though other meetings were held it was not until 1935 that in its present form the Association of Navigation Schools came into being. The aims of this Association are, broadly, to exchange views between the various schools

and the Ministry of Education and the examiners, to see that the standard of education of ships' officers is kept at a reasonable level and, indeed, to do all that is possible in this direction.

The Association numbers among its members practically all the navigation schools of the country, situated as they are in ports big and small, varying from the great Port of London to Lerwick in the Shetlands. The Association has frequent consultations with the Principal Examiner of Masters and Mates and with representatives of the Ministry of Education and other interested bodies. The Annual General Meeting, to the public session of which the Principal Examiner of Masters and Mates, Ministry of Education, Meteorological Office, Honourable Company of Master Mariners and representatives of other bodies are invited, is held at a different port each year and provides an excellent forum for the interchange of ideas about all aspects of the technical education of the Merchant Navy officer. There is no doubt that the Association performs an admirable service on behalf of those who sail the seven seas.

In May, 1950, the Annual Conference was held, at the invitation of the Master and the Court, aboard the headquarters ship *Wellington*—the home of the Honourable Company of Master Mariners—whose berth is situated quite close to the ancient Pool of London and almost under the shadow of Westminster. There are few Master Mariners who do not owe a debt of gratitude to the patient staff of some navigation school for having drummed into them the knowledge needed to obtain that much-coveted certificate. It seemed very appropriate, therefore, that this Conference should be held in the attractive courtroom of this Honourable Company. One of the aims of the Company is the advancement of learning, both technical and academic, among those who go down to the sea in ships. The Company has always taken a keen interest in the work of the schools and in the examinations; it has a Technical Committee which deals with the subject of training and education of ships' officers generally, and has its own cadet scheme and system of scholarships.

The Conference was presided over by Dr. A. Harvey, of the Cardiff Technical College, and in addition to the navigation school delegates those present included representatives of the Ministry of Transport, Shipping Federation, Officer's Federation, Merchant Navy Training Board, Ministry of Education and Meteorological Office. The delegates and visitors were welcomed to the *Wellington* by Sir Frederick Bowhill, Master of the Honourable Company, himself an Extra Master and Marshal of the Royal Air Force.

Bearing in mind the national importance of a thorough training of our Merchant Navy officers, and being so near to Westminster, it was fitting that the Conference should be opened by a Minister of the Crown, in the person of the Home Secretary, the Right Hon. J. Chuter Ede. Mr. Ede, in paying tribute to the Merchant Navy, pointed out that the shipmaster needed to blend the qualities of technician and leader of men. He praised the work of the Merchant Navy Board and the spirit of co-operation which now existed between navigation schools, shipowners and the Ministries of Transport and Education in providing training facilities for young officers.

The morning's discussions were chiefly concerned with the revision of the Merchant Navy Training Board syllabus and correspondence courses

provided by navigation schools, whereby apprentices are guided in the right path while studying for their certificates at sea.

During the afternoon Captain Quick, Principal Examiner of Masters and Mates, reported upon the examination results during the past year. While the results were generally fairly satisfactory (an average of about 75 per cent success for all candidates, compared with 69 per cent the previous year), his general criticism was that weakness lay in what the candidate should have learned at sea, and the greatest proficiency was shown in work learned at school or from books. Boat work, chart work, ship construction and general seamanship seemed to be weak subjects. He particularly urged ships' officers to take every opportunity of practising boat work. Referring to meteorology, he said that the work of first mates was good—rather better than that of masters.

Discussing the new examination syllabus, he stressed that the object was not a general stiffening of the examinations but a rearrangement in order to bring it more up to date and include material necessary for modern navigational practice. In the discussion following Captain Quick's address most speakers stressed the need for young officers to be observant and to take a practical interest in the construction and general work of their own ship, and thereby have a better chance of becoming practical seamen.

The Association and its guests had the honour of being entertained to luncheon at the Mansion House by the Lord Mayor, Sir Frederick Rowland, and the Lady Mayoress. In proposing the toast of the Association, the Lord Mayor pointed out that as most of its members were themselves merchant seamen he felt that he was, in fact, that day entertaining representatives of all the Merchant Navy. The remainder of his address was as follows :

. . . Great Britain, and in particular this great City of London, as the premier port, owes its rise in power in large measure to the intrepidity of its navigators, and yet, prior to the first world war, little was heard of the Merchant Service—it was just "accepted", and the nation gave little or no thought to the men who brought its food to these shores and carried its goods to all parts of the world. It was, in fact, more silent than the "Silent Service", but during the 1914-18 war, with the heavy sinkings and the possibility of starvation, it was only natural that the whole country became aware of what it owed to the Mercantile Marine.

Up to this point, recruiting for the officer personnel was quite haphazard. Apart from those of seafaring stock who really felt the call of the sea, and the limited number who entered through the training ship establishments, it was in some cases the lad of little education, who could fit into no other profession, who finally either ran away to sea or entered through the normal channels of apprenticeship.

The disappearance of the sailing ship, the increase in the number and size of steamers, the impact of science and invention upon the equipment and appliances with which the vessels were fitted, and finally the requirements of more exacting navigational methods, called for some proper system of training and better education attainments. It is true that the then Board of Trade took care of "safety of life at sea" by a system of examinations for certificates which, in common parlance, were degraded to "tickets".

The navigation schools, much against their will, existed in competition with dozens of private crammers, for the purpose of cramming for these examinations. The schools had no standing, and it is not surprising that as a result the status of the Merchant Navy officer also suffered.

This is a gloomy picture, but as a background it serves well to show how great has been the progress since those days.

In 1917 the schools got together and held a "conference", which, I understand, was the real beginning of your Association. In 1918 they were recognised by the Board of Trade and the Board of Education and accepted by the industry, that your Association now has a voice in all matters concerning the training, education and examinations for the officer personnel.

In 1921 a standard uniform was granted, and in 1928 His Majesty King George V conferred on the Merchant Navy a signal honour by creating the office of "Master of the Merchant Navy and Fishing Fleets". Today His Majesty King George VI graciously occupies that office.

In 1926 the Company of Master Mariners was founded, with the object of raising the prestige of the officers of the Merchant Navy. The Company received the title of Honourable in 1928 and was granted livery by the Court of Aldermen in 1932. This was a great step forward, and it is today one of my privileges, by virtue of my office, to be an Honorary Member of that Company.

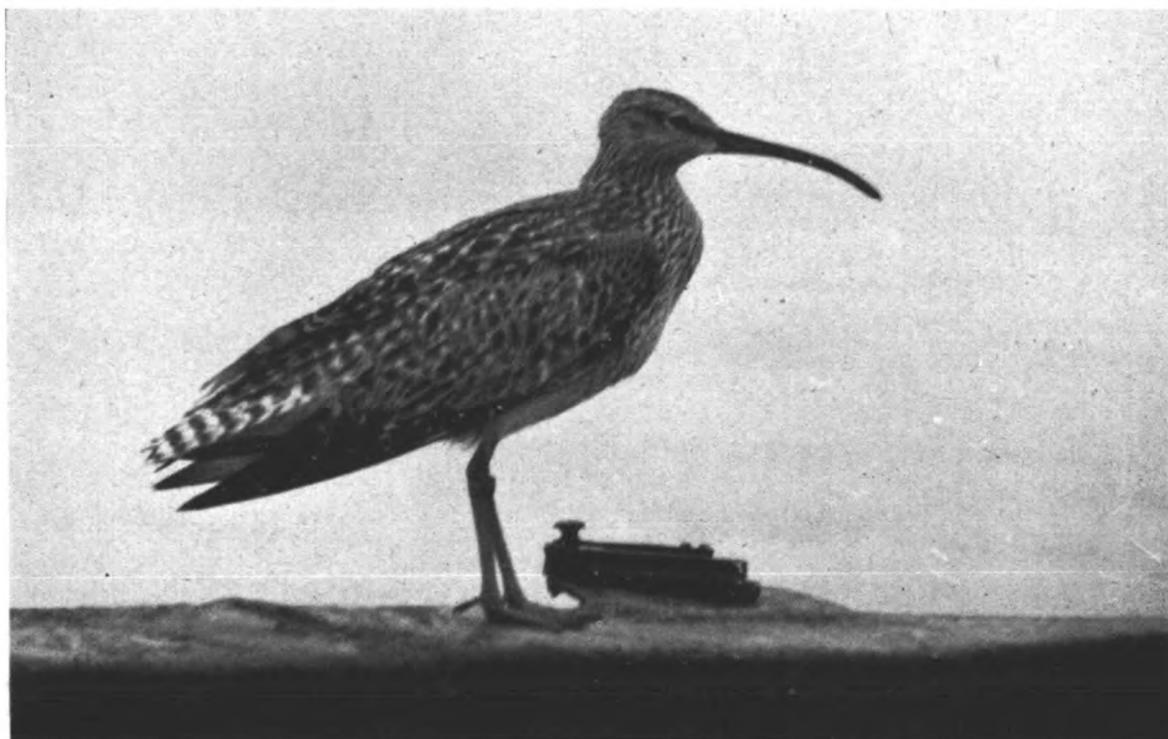
In these years also, there was apparent a spirit of co-operation between the interested parties, including the present Ministry of Transport, Ministry of Education, the shipping industry, the Officers Merchant Navy Federation and the Association, and as a result the Merchant Navy Training Board came into being.

Plans were drawn up for the control of entry, for the education and pre-entry training, and though all of these have not yet matured, today the status of the Merchant Navy stands higher than ever before. It offers an attractive career which compares very favourably with that of its sister Service, the Royal Navy.

If we are to survive, an efficient Merchant Navy is more than ever a necessity, and I want to pay tribute to all of you for the parts you have played in seeing that we have a supply of officer personnel qualified to carry on our great tradition as a seafaring nation.

Dr. Harvey, Chairman of the Association, in responding, said that the Association and the Merchant Navy had been highly honoured at the invitation to luncheon at the Mansion House.

C. E. N. F.



W. N. Burton

The bird is a whimbrel which alighted on O.W.S. *Weather Recorder* at Station "Item" (59° 00'N., 19° 00'W.) and remained for twenty-four hours, May, 1950. The bird is a wader which breeds in Iceland, and was probably heading there from Spain.

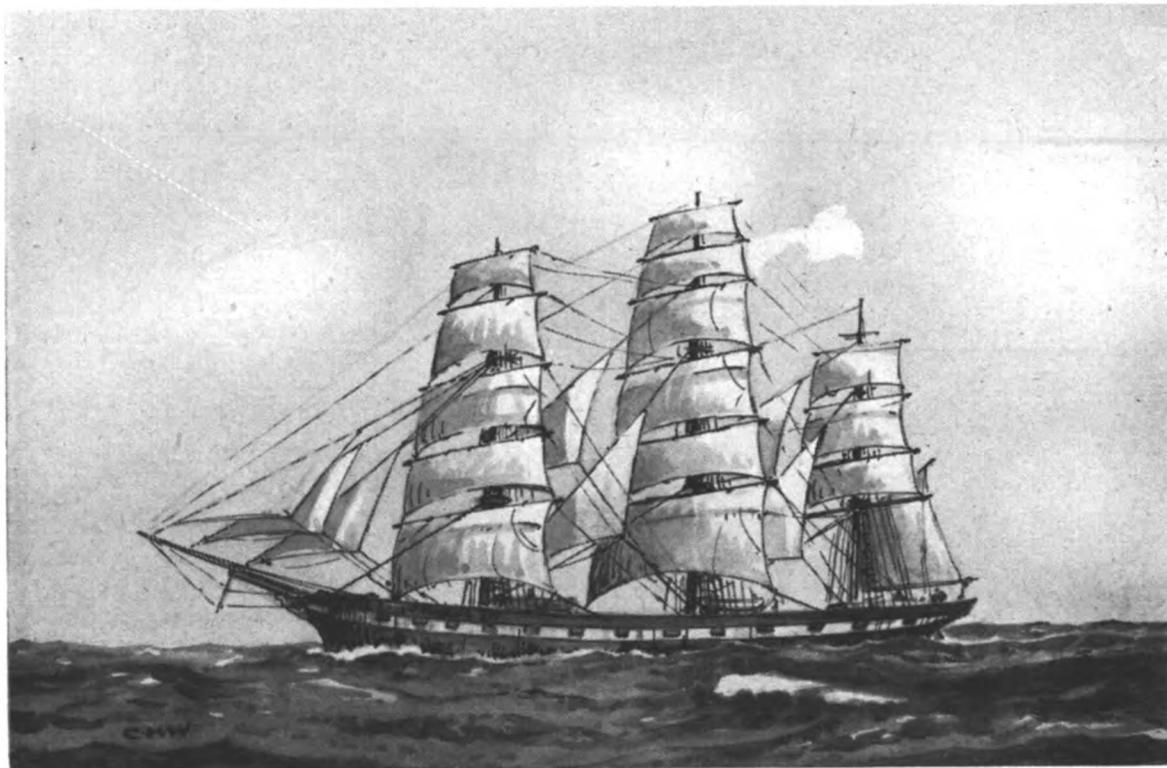
AN OLD METEOROLOGICAL LOG

BY CDR. C. H. WILLIAMS, R.D., R.N.R.

Modern marine weather observers may find the following notes of some interest. They are suggested by a perusal of an old "Weather Book Register" still in the Marine Branch of the Meteorological Office. This log was kept by the New Zealand Shipping Company's full-rigged ship *Waitara*, Captain W. F. Caborne, on a passage from New Zealand to London by way of Cape Horn in 1876.

The ship *Waitara*, of 833 tons register, was built of iron in 1863 as the *Hindustan*. She was bought by the New Zealand Shipping Company in 1873 and renamed.

On the passage referred to the ship sailed from Bluff, New Zealand, on Thursday, 23rd March, 1876, rounded the Horn on the 25th April, and arrived off the Lizard on Thursday, 29th June, making a passage of ninety-nine days; not a particularly smart one.



An impression of the ship *Waitara*, N.Z.S. Co., 1876

(Drawing made from a photograph of a ship of the same date, rig and tonnage owned by the N.Z.S. Co.)

The fair copy of the log appears to have been written up by the captain. It is carefully and neatly written, and contains many notes in the "remarks" column. Observations were entered every four hours. The general layout of the meteorological register of those days was similar to the modern log, the main differences being: (a) the observations were in Civil Time (Apparent Time Ship) and were made every four hours, at the end of the watch; (b) specific gravity of the sea was recorded, as well as the sea-surface temperature; and (c) there was a column for magnetic variation. Only lower and upper types of cloud were logged, and the direction from which the latter were moving. At the beginning of the book there were four large

pages ruled up for plotting the daily barometer and air thermometer range during each month. This had been very neatly done in red and black inks. Then there were six large pages ruled up for compass notes, tables of deviations, etc.

In the *Waitara* the mercurial barometer was read in inches, to three places of decimals (30.118, etc.) and the thermometers were read to decimals of a degree F. as: 49.8°, 47.2°, 58.5°, etc. The specific gravity of the sea was usually recorded twice daily.

The clouds appear to have been carefully observed, and extra notes on them entered in the "remarks" column, such as: "The wind is from the Northward, but the clouds (ST-CU 10/10) are coming from the Westward." (This remark was in lat. 57° 36'S., long. 65° 39'W., that is, south of Cape Horn.)

The ship's head and the wind direction were logged as true bearings, but in a rather unusual manner: in the columns at each observation there is a cross representing the cardinal points, with a figure in each angle indicating the number of points of the compass from north to south.

$\frac{2}{+}$ for NNE	$\frac{4}{+}$ for N × W	$\frac{5}{+}$ for NE × E
$\frac{1}{+}$ for E	$\frac{4}{+}$ for SW	$\frac{7}{+}$ for E½S, and so on

Calm is represented by \oplus .

In the "remarks" column Captain Cabourne made many notes of various birds seen, and of whales, sharks and other fish; noted when birds or fish were caught; kelp seen; the colour of the sea; and any ships spoken or sighted.

Some of these entries may be of interest to modern marine observers.

27th March, 1876. Latitude 49° 15'S., Longitude 179° 43'W. (Note in red ink): "So numerous were the albatrosses about the ship that twenty-five fine birds were captured within less than four hours."

8th May. Latitude 36° 09'S., Longitude 32° 37'W. "Spoke Messrs. Green's ship *Superb*, from Melbourne to London forty-five days out. She had not seen any ice and rounded the Horn on the same day as ourselves, viz. April 25th."

18th May. Latitude 7° 50'S., 29° 19'W. "Signalled the British brig *P.L.H.F.*, Glasgow to Melbourne, fifty-four days out. She looked like a steamer without a funnel, and said she had been dismasted." (Two other vessels, a barque and a ship, both Dutch, were also signalled that day.)

2nd June. Latitude 22° 29'N., Longitude 42° 56'W. "A very blue sea. Sea surface like glass. A boatswain bird about the ship. Saw some small pieces of Gulf weed. Saw a Portuguese man-o-war. Observed a large halo round the moon."

9th June. Latitude 36° 21'N., Longitude 42° 14'W. "British ship *Conference* of Bristol in company. Some "Mother Carey's chickens" about. The sea of a dark green hue and full of a long straw-like substance, also some creatures much resembling jellyfish."

26th June. Latitude 48° 34'N., Longitude 11° 05'W. "A large number of fish (jelly) floating about in the water, in colour and general appearance much resembling toadstools. 10 p.m. : latitude by Pole Star 48° 45'N."
"Thurs 29th June, 1876. 7 a.m. : off the Lizard."

(Log ends)

She arrived in London on the 1st July.

AN EPIC OF THE COASTGUARDS

From time to time H.M. coastguards are called upon to save life from a stranded ship around the coasts of the British Isles by the use of the rocket life-saving appliance. Such an occurrence was the morning of 31st January, 1950, when the Norwegian motorship *Rask* (631 tons) went ashore off Scremerston, three miles south of Berwick, at about 7 a.m. It was blowing a south-easterly gale at the time with frequent snow squalls, and there was a big sea and heavy swell. The vessel was about 400 yards from high-water mark when she went ashore and sounded the S O S on her siren, but conditions were so bad that the Berwick lifeboat was unable to get close enough to the wreck to render assistance but could only stand by.

The coastguard life-saving company were summoned, but owing to the distance of the vessel from the shore, combined with the heavy surf and the cross wind, it was a difficult task to get a rocket-line across to her. In spite of this, the second rocket which was fired made contact with the ship and the breeches buoy was eventually set up, but owing to the distance they could not use the hawser but could only employ the whip. They rescued some of the men during the forenoon, but at high water it was found impossible to carry on with the rescue work as the crew of the ship had to shelter in the wheelhouse to avoid being washed overboard.

During the afternoon, as the tide ebbed, they managed to get contact with another rocket at a range of about 300 yards and all the crew were landed by 6 p.m.

As a result of this successful rescue work the Berwick, Goswick and Beadnell Companies of the Coast Life-Saving Corps received the Ministry of Transport shield for the best wreck service performed during the year ended 31st March.

This episode tends to emphasise the fact that heavy weather can be, and still is, an enemy to the mariner, despite modern ships, equipment and navigational aids, and that the mariner still has to use constant vigilance and skill to avoid getting his ship into danger. It also illustrates the importance of providing vessels, particularly the smaller type of vessel, with adequate information about impending bad weather, so that those aboard the ship can take timely steps, as far as possible, to avoid getting into danger. There is little doubt, however, that whatever meteorological information is provided, one cannot avoid ships occasionally breaking down, or finding themselves quite unavoidably in a position whereby danger and perhaps disaster cannot be avoided. In such cases, the admirable work of the coastguards and Lifeboat Service comes into play, and many a mariner has cause to be grateful for the excellent work done by the men in these Services.

C. E. N. F.

BOOKS RECEIVED

The Kon-Tiki Expedition. By Thor Heyerdahl. 8vo. 8¾ in. × 9½ in. pp. 235. *Illus.* George Allen & Unwin Ltd. 1950.

Here is a book which admirably succeeds in combining scientific investigation, travel, adventure, danger and a lot about the sea, leavened with humour and human understanding, which should certainly be read by everybody interested in ocean travel. Thor Heyerdahl, the author and leader of the expedition, is a Norwegian scientist who has a theory that the inhabitants of certain Polynesian islands originally came there from across the Pacific by raft from Peru centuries ago.

As nobody seemed to believe his theory he decided to prove it by doing the voyage, with a few companions, on a raft himself. At Callao, he built a raft of balsa wood, with a little bamboo cabin amidships, and erected a mast on which a rectangular sail could be set, the only method of steering being by steering oar. He first of all had to go into the Peruvian jungle, in the midst of the rainy season, to fell the balsa trees. The raft was an exact copy of the old Indian rafts of centuries ago—before the Iron Age—and there were no metal fastenings whatever in its construction, everything being bound together with hempen rope.

Having taken on board provisions and water, Thor Heyerdahl, with five Scandinavian companions, set sail from Callao on his great adventure on 28th April.

Their only modern acquisitions were in the form of tinned provisions and a small battery-operated radio transmitter and receiver, whereby they were able to get in sporadic touch with the outer world (chiefly with amateur radio enthusiasts) and transmit weather reports to the U.S. Weather Bureau.

The general idea was to drift north in the Humboldt Current until it meets the South Equatorial Current, and then to be carried westward across the Pacific with the set of the latter, assisted by the trade winds, until they should reach one of the islands of the Marquesas or Tuamotu Archipelagoes. The six intrepid adventurers—none of them professional seamen—were aboard their raft for 101 days, and during that time they sighted no shipping whatever. On August 7th, 1947, the raft stranded on Raroia reef and their great adventure was over.

The raft stood up to the voyage in a remarkable manner, although strong winds and gales were experienced on several occasions, when sail had to be taken in, and although their only method of steering was with an oar.* The craft was, from her nature, very stable, and although seas came aboard quite frequently they readily drained away. The fact that the balsa logs were merely lashed together with hempen ropes prevented their being chafed through.

The currents and the trade winds behaved exactly as they should have done, and broadly in accordance with the information given in meteorological and current atlases. The raft averaged about forty-two nautical miles per day on her 4,300 mile voyage.

Living so closely to the sea, and moving so slowly through the water, the

*The steering was to some extent assisted by the use of a crude form of centre-board, which merely consisted of short planks pushed down vertically into the water between the balsa logs forming the "deck" of the raft.

voyagers had unique opportunities of observing marine life. Catching sharks and other more attractive fish became commonplace; their larder was never lacking in fresh fish throughout the voyage. They regularly made their meteorological observations, which they broadcast by radio whenever possible, and they even had a hand anemometer aboard. The results of the voyage are best summarised in the words of the author himself:

“ My migration theory as such was not proved by the successful outcome of the Kon-Tiki expedition. What we did prove was that the South American balsa raft possesses qualities not previously known to scientists of our time, and that the Pacific islands are located well inside the range of prehistoric craft from Peru. Primitive people are capable of undertaking immense voyages over the open ocean. The distance is not the determining factor in the case of oceanic migrations, but whether the wind and the current have the same general course, day and night, all the year round. The trade winds and the Equatorial currents are turned westward by the rotation of the earth, and this rotation has never changed in the history of mankind.”

C. E. N. F.

WEATHER INFORMATION FROM BRITISH WHALERS IN THE ANTARCTIC

Merchant shipping has once more played a considerable part in aiding Antarctic exploration. The whaling fleets of several nations have supplied valuable weather information from the unfrequented Antarctic Ocean to the joint Norwegian-British-Swedish Expedition in Queen Maud Land. Numbered among these fleets were ten vessels owned by two British whaling companies, six of them by Messrs. Chr. Salvesen & Co. Ltd. and four by the United Whalers Ltd. Recruited by the Marine Branch of the Meteorological Office, these vessels have, in co-operation with the Meteorological Bureau of South Africa, rendered assistance to the expedition by voluntarily taking synoptic weather observations, and transmitting their reports to “ Met Pretoria ” for relay to the expedition’s base on the Antarctic mainland during the 1949–50 whaling season.

Whaling is carried out on a highly competitive basis, and individual companies do not care to give their position of operation away to their competitors. Their wishes in this respect had therefore to be considered. Accordingly Norsk Polarinstittutt evolved a separate position cypher for each company, to be used in conjunction with the International Weather Code F.M.21. The cypher is “ unbreakable ” and is used instead of the tens, units and decimals of degrees of latitude and longitude in the first and second groups of code F.M.21., the other symbols of the code remaining unaltered. The Meteorological Bureau of South Africa and the expedition in the Antarctic were each in possession of all cyphers. Thus the ships were enabled to broadcast their positions to the expedition for meteorological purposes, yet these remained unknown to each other.

An event of historic meteorological interest resulted from this widespread scheme. Sufficient weather information was received to issue a special daily Antarctic inference for the benefit of the whalers during the whaling season. This inference was prepared and issued by the Naval Weather Service at Cape Town at the request of the South African Meteorological Bureau.

R. R.

SOUTHERN ICE REPORTS
During the year 1948
DECEMBER
 Reported by S.S. *Southern Venturer*

DATE	POSITION		DESCRIPTION	REMARKS
	LATITUDE	LONGITUDE		
1	56 31S	26 22W	Bergs, and growlers, Pack-ice.	Many bergs and growlers, scattered pack-ice.
2	57 03S	23 56W	Bergs.	Some icebergs.
20	59 38S	21 37W	Pack-ice.	Inside edge of pack-ice.
23	59 10S	22 37W	Pack-ice.	Some shelter from ice pack. Wind W-S, 6.
24	57 52S	24 17W	Pack-ice.	Some shelter from ice pack. Wind W-N, 4. Distribution of ice making estimation of sea and swell difficult.

During the year 1949
NOVEMBER
 Reported by S.V. *John Biscoe*

DATE	POSITION		DESCRIPTION	REMARKS
	LATITUDE	LONGITUDE		
30	62 23S	61 52W	Bergs.	Six small bergs to the N of Boyd Strait.
30	62 40S	62 05W	Pack.	Close pack-ice, probably only a few months old, composed of brash and small floes of comparatively soft, crumbly nature, but closely packed together. The surface of the sea was freezing. This pack-ice, whose north edge ran W from north coast of Snow Island to N of Smith Island, extended S down Boyd Strait for at least 15 miles.

DECEMBER
 Reported by S.V. *John Biscoe*

DATE	POSITION		DESCRIPTION	REMARKS
	LATITUDE	LONGITUDE		
1	61 57S 62 31S	58 50W 59 30W	Bergs. Pack.	Numerous bergs north of Nelson Strait. Open pack-ice of soft, crumbly nature. North-east edge running 120° from Robert Point. North-west edge running 210° from 3 miles west of Castle Rock.
2-8	62 57S	60 35W	Fast ice.	Fast ice in Port Foster was unbroken from Penfold Point North on arrival. During stay ice edge receded approximately 1 cable northwards.
8	62 31S	59 30W	Pack.	Open pack-ice similar to that encountered on 1st December lying up to 5 miles off the South Shetlands. North-east limit, Robert Island.
9-13	62 05S	58 24W	Fast ice.	Fast ice lay unbroken in Visca Anchorage, north of a line joining Ullmann Point and the shore ½ mile NE of La Plaza Point.
13	61 50S	57 12W	Bergs.	Six bergs and bergy bits at northern end of Bransfield Strait.
16	56 43S	51 35W	Berg.	One small irregular berg.
18	54 25S	42 16W	Bergy bits.	Several bergy bits.
18	54 15S	41 30W	Bergs.	Three small tabular bergs.
27	53 51S	38 21W	Bergs.	Five small bergs.
27	54 43S	39 26W	Bergs.	Numerous bergs, probably aground.
27	55 30S	40 38W	Bergs.	Seven medium tabular bergs.
28	56 20S	41 45W	Bergs.	Twenty medium bergs.
28	57 05S	43 00W	Bergs.	Two bergs.
28	57 53S	44 06W	Bergs and bergy bits.	Five bergs and several bergy bits.
28	58 53S	45 48W	Bergs.	Twelve bergs, mainly tabular.
29	60 05S	47 00W	Bergs and pack.	Close pack-ice composed of large, heavy, weathered floes extending S at least 18 miles. Signy Island reported heavy pack visible S of Inaccessible Island. Numerous bergs and bergy bits N of pack.
29	59 22S	47 15W	Bergs and bergy bits.	Numerous bergs and bergy bits.
29	58 28S	48 37W	Bergs and bergy bits.	One berg and a few bergy bits.
29	57 36S	50 12W	Bergs.	Eleven bergs.
30	56 40S	51 03W	Bergs.	Numerous bergs visible to SW.

December, 1949]

Reported by S.S. *Southern Opal*

DATE	POSITION		DESCRIPTION	REMARKS
	LATITUDE	LONGITUDE		
28	57 46S	2 33E	Bergs and growlers.	Numerous bergs and growlers.
31	59 04S	5 58E	Bergs and growlers.	Numerous bergs and growlers.
31	59 08S	2 42W	Bergs and growlers.	Passed four bergs and six growlers.
31	59 08S	1 20E	Bergs and growlers.	Passed five bergs and several growlers.

Reported by S.S. *Southern Harvester*

DATE	POSITION		DESCRIPTION	REMARKS
	LATITUDE	LONGITUDE		
14	54 31S	34 02W	Bergs.	Several icebergs.
16	56 01S	24 06W	Berg.	One berg.
16	56 27S	21 42W	Bergs.	Several small bergs.
16	56 20S	19 48W	Bergs.	Three bergs.
17	56 41S	17 02W	Berg.	One berg.
17	56 54S	16 23W	Pack-ice.	
17	57 09S	14 40W	Pack-ice and bergs.	Five bergs.
17	57 02S	12 39W	Bergs.	Several bergs.
18	56 56S	10 52W	Bergs and drift-ice.	Twelve bergs sighted between midnight and 1200.
18	56 44S	10 48W	Bergs and drift-ice.	Nine bergs.
19	56 42S	10 44W	Bergs and pack-ice.	Pack-ice to S. Many bergs.
19	56 32S	09 06W	Bergs and pack-ice.	Pack-ice to S. Three bergs.
19	56 30S	07 24W	Bergs and drift-ice.	Many bergs.
20	56 36S	06 11W	Bergs.	A few bergs.
20	56 34S	06 15W	Bergs.	Eleven bergs.
20	56 45S	06 00W	Bergs and drift-ice.	Seventeen bergs. Drift-ice from SE to S and SW.
20	57 00S	05 46W	Bergs and drift-ice.	Fifteen bergs. Drift-ice from SE to S and SW.
21	57 03S	05 40W	Bergs and drift-ice.	Drift-ice from E to SE, fourteen bergs.
21	57 04S	05 50W	Bergs and drift-ice.	Twenty-four bergs, drift-ice from SE to SW.
21	56 20S	05 06W	Bergs and drift-ice.	Seven bergs. Loose drift-ice.
21	57 14S	05 00W	Bergs and drift-ice.	Two bergs. Loose drift-ice.
22	57 20S	05 20W	Drift-ice.	
22	57 25S	05 17W	Drift-ice.	
22	57 32S	05 24W	Drift-ice.	
23	57 35S	05 24W	Drift-ice.	
23	57 40S	05 27W	Drift-ice.	
23	57 40S	05 30W	Drift-ice.	
23	58 00S	05 30W	Drift-ice and bergs.	Several bergs.
24	58 05S	05 42W	Bergs and drift-ice.	Three bergs.
24	58 08S	05 45W	Bergs and drift-ice.	Three bergs.
24	58 10S	06 00W	Bergs and drift-ice.	Thirty bergs sighted in six hours.
25	58 12S	06 10W	Bergs.	Three bergs.
25	58 15S	06 14W	Bergs and growlers.	Many bergs and growlers.
25	58 15S	06 20W	Bergs, growlers and drift-ice.	
25	58 15S	05 09W	Bergs.	Three bergs.
26	58 10S	05 01W	Bergs and drift-ice.	Three bergs. Scattered heavy drift-ice.
26	58 22S	04 35W	Bergs and drift-ice.	Six bergs. Scattered drift-ice.
26	58 24S	04 00W	Bergs.	Eighteen bergs.
26	58 50S	03 00W	Bergs.	Six bergs.
31	59 07S	06 01W	Bergs.	Twelve bergs.

December, 1949]

Reported by S.S. *Southern Venturer*

DATE	POSITION		DESCRIPTION	REMARKS
	LATITUDE	LONGITUDE		
11	58 31S	22 25W	Bergs.	Six bergs in sight.
12	56 12S	19 05W	Bergs.	Three bergs in sight.
12	56 09S	18 55W	Bergs.	Two bergs in sight.
12	56 40S	18 10W	Bergs.	Two bergs in sight.
13	56 43S	18 00W	Pack-ice.	Pack-ice seen in SW, stretching E-W.
13-14	57 30S	18 37W	Bergs and pack-ice.	Twenty-four bergs. Pack-ice running approximately NW-NE on either side.
	57 10S	18 10W		
15	57 00S	19 23W	Bergs and pack-ice.	A few scattered bergs.
15	56 54S	19 43W		Clear of all ice.
	56 49S	19 52W		
16	56 09S	19 36W	Bergs.	Four bergs.
18	56 22S	17 52W	Bergs.	Four bergs.
18	56 31S	18 24W	Bergs.	Four bergs.
19	57 23S	18 35W	Pack-ice.	Loose pack round vessel with main pack to SWS.
20	57 38S	17 56W	Pack-ice.	Loose pack to S stretching E-W.
21	57 53S	17 35W	Pack-ice.	Vessel lying off loose pack stretching E-W. Apparent end bearing SSW.
22	57 25S	17 29W		Clear of all ice.
26	55 56S	16 13W	Growler.	

Reported by S.S. *Bransfield*

DATE	POSITION		DESCRIPTION	REMARKS
	LATITUDE	LONGITUDE		
21	57 00S	82 15E	Bergs.	Number of icebergs.
21	57 22S	84 18E	Bergs.	
23	59 20S	99 00E	Bergs.	Many icebergs.

Reported by S.S. *Struan*

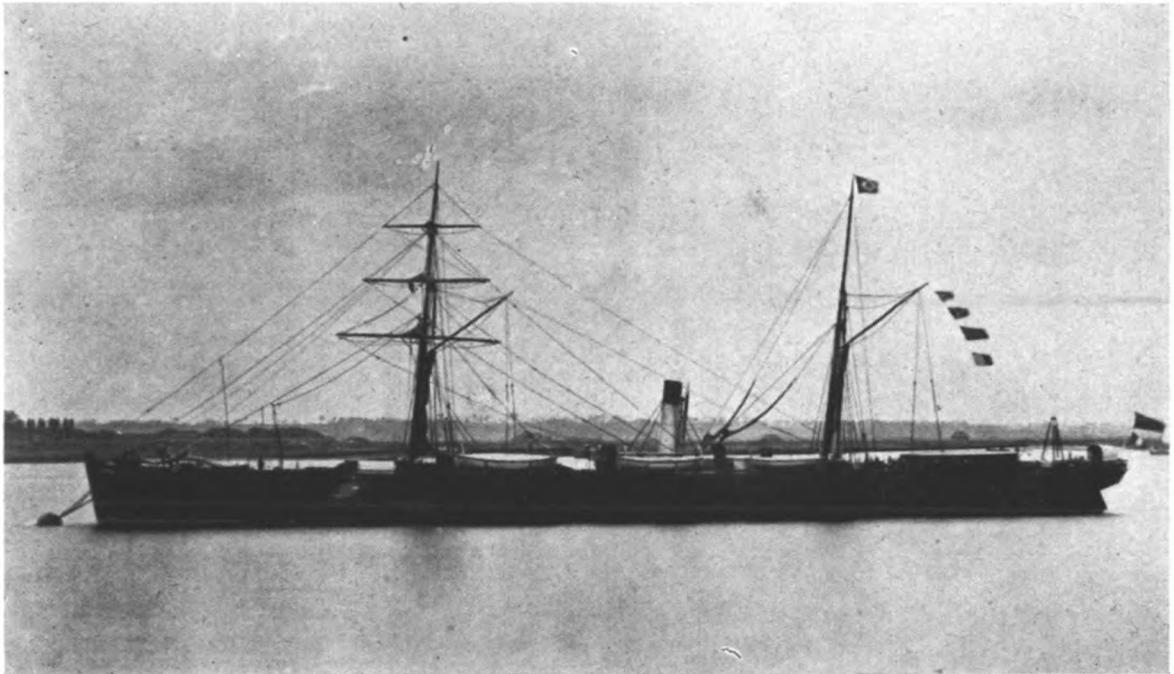
DATE	POSITION		DESCRIPTION	REMARKS
	LATITUDE	LONGITUDE		
17	53 00S	36 24W	Bergs.	Unable to measure owing to fog and distance

Additional reports of ice for October, November and December, 1948, will be found in *The Marine Observer*, Vol. XIX, No. 146, page 238.

S.S. NESTOR

The news that the Blue Funnel liner *Nestor** (14,629 tons) has completed her last voyage and is to be broken up after thirty-seven years service is noted with considerable regret.

This brings to mind the fact that ships bearing this name have been in the forefront of the work of observing and reporting weather information at sea for the Meteorological Office and, indeed, for the Meteorological Services of many other countries for over seventy years. The very first meteorological logbook received from an S.S. *Nestor* covered the period 27th June to 27th October, 1877, on a voyage to and from China via Suez. She was an iron vessel with brigantine rig of 1,869 tons, and possessed an engine capable of 150 h.p. driving a screw propeller.

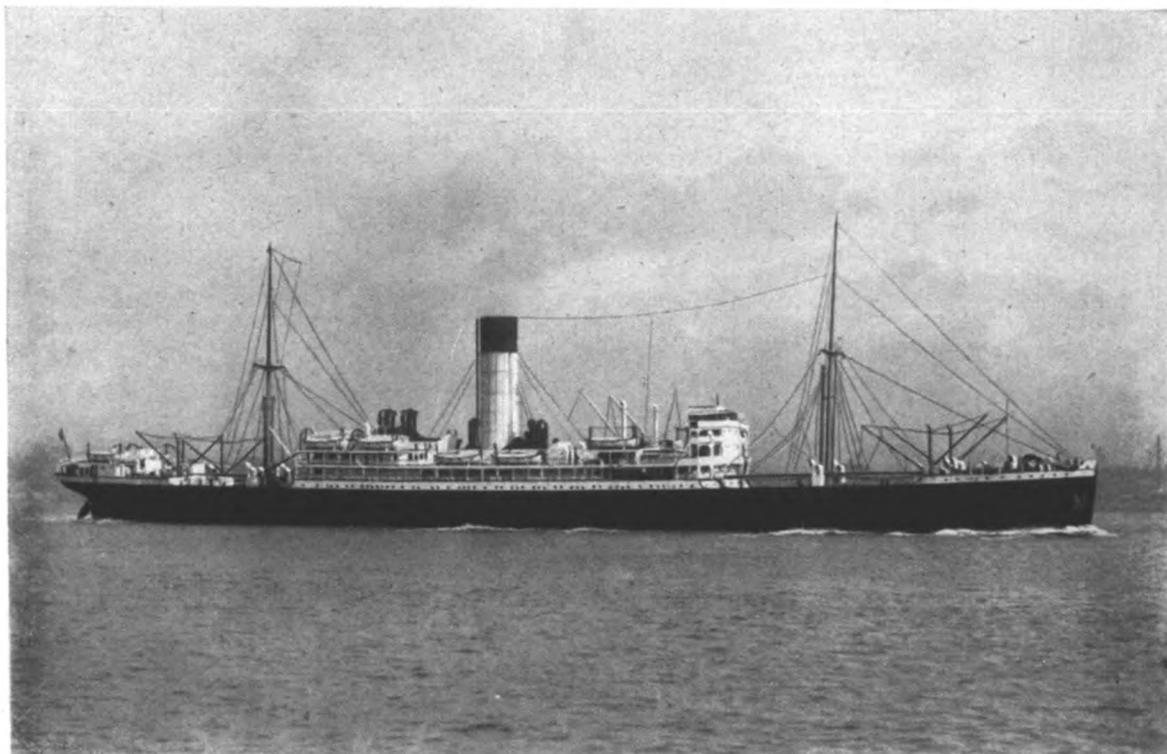


S.S. *Nestor* (1868-1894)

The master of this early *Nestor* was Captain T. W. Freeman. He maintained the logs himself, and inspection shows that he was apparently a very keen observer, not only of the meteorological elements but also of the fish, bird and marine life which he found around him. An entry in his log on 12th May, 1879, when in lat. $22^{\circ} 34' N.$, long. $37^{\circ} 14' E.$, states: "Passed through streaks of yellow fibres. Under the microscope they appeared as 12 or 14 fibres joined together and of unequal lengths, with minute purple globules attached."

The present *Nestor*, launched in 1913, has been a member of the Voluntary Observing Fleet since 1925, having contributed eighteen logbooks in that period, nine of which have been assessed as "excellent" and nine as "very good". In all a total of no fewer than thirty-eight meteorological logbooks have been received from ships bearing this name, and it is sincerely hoped

*EDITOR'S NOTE. According to the *Encyclopædia Britannica*, Nestor was the old warrior of the "Iliad" and the wise counsellor of the Greeks before Troy. In his earlier years he took part in the battle of the Centaurs and Lapithae, the Calydonian boar hunt and the Argonautic expedition. The name is used in modern times for any old man of ripe experience or the oldest member of a class or corporation.



S.S. *Nestor* (1913-1950)

that it will not be long before we can welcome once again a *Nestor* to carry on the sterling work of her predecessors. N. E.

PERSONNEL

OBITUARY.—It is with regret that we record the death of CAPTAIN H. W. HAZLEWOOD, of the Port Line, Ltd. Horace William Hazlewood joined the Port Line in June, 1912, as an apprentice. Both as officer and as master he was associated with the Meteorological Office as a voluntary observer in a number of the Company's ships.

His first command was the *Port Saint John* in October, 1938, and he was subsequently master of the *Port Caroline*, *Port Fairy*, *Port Dunedin*, *Port Fremantle*, *Port Wyndham*, and on his last two voyages in the *Port Chalmers*.

He died suddenly shortly after his ship's arrival in London, early in July, 1950.

C. H. W.

RETIREMENT.—COMMODORE C. M. FORD, C.B.E., R.D., R.N.R., completed his last voyage in command and retired from the sea after 47 years, with the arrival of the *Queen Elizabeth* at Southampton on 6th June last.

Commodore Ford joined the Cunard Steamship Company in 1912 as fourth officer of the first *Caronia*. As an R.N.R. officer during the 1914-18 war he commanded "Q" boats, and again from 1939 to 1942 being recalled to serve as Commodore of Convoys, for which services he was created a C.B.E. in 1946. Commodore Ford was appointed Royal Naval Reserve A.D.C. to the King in 1942 and in 1944 was confirmed in the rank of Commodore, R.N.R. (ret.).

During his service with the Cunard Line Commodore Ford passed through the various grades of officer, serving in the *Berengaria*, *Aquitania*, *Franconia*, *Andania*, *Ausonia* and *Aurania*, and in 1939 was given his first command, the *Antonia*. On returning to the Cunard-White Star Line in 1942 he commanded the *Mauretania*, *Aquitania*, *Queen Mary* and *Queen Elizabeth*, in which ship he has sailed as Commodore of the fleet since January, 1949, in succession to Captain Sir Gordon Illingsworth.

Commodore Ford has been a voluntary marine observer in all the ships he has commanded since 1945.

We wish him health and happiness in his retirement.

J. R. R.

THE MARINE OBSERVER

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FLEET LIST (Great Britain)

VOLUNTARY OBSERVING SHIPS

The following is a list of British ships voluntarily co-operating 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 last column.

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

The Port Meteorological Officers and Merchant Navy Agents at the ports will make personal calls on the Captains and Observing Officers as opportunity offers, or on notification from the ship at any time when their services are desired. (See under Notices to Marine Observers.)

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 in a special list in *The Marine Observer*.

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

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

NAME OF VESSEL	CALL SIGN	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS	LAST RETURN RECEIVED
<i>Accra</i>	GJSW	A. G. Baptiste	J. R. Smith, L. Austin, C. Morrison, T. A. Holson	J. A. Stuart	Elder Dempster Lines, Ltd.	18.1.49
<i>Afghanistan</i>	GNYB	W. A. Chappell	G. L. Andrews, R. A. Pennell, R. B. Arthur	J. Isherwood	F. C. Strick & Co., Ltd.	8.5.50
<i>Ajax</i>	GJXM	P. Cross	E. B. Bertelsen, S. Barbour, N. Robertson, H. Bowers, D. S. Moreby	W. Akhurst	A. Holt & Co.	18.3.50
<i>Akaroa</i>	GMLP	J. Steele	H. P. Last, A. R. Stephenson, G. K. Lewis	J. W. Soulsby	Shaw Savill & Albion Co., Ltd.	1.5.50
<i>Alcantara</i>	GLQR	G. A. Bannister	A. N. Brook, N. Larrive, F. Williams	R. E. Hammond	Royal Mail Lines, Ltd.	1.5.50
<i>Alcyone Fortune</i>	MAQC	T. Bowen-Rees	J. A. Leech		Alcyone Shipping Finance Co., Ltd.	
<i>Amakura</i>	MCPN	A. J. Carter	K. Leadbetter		Booker Bros., McConnell & Co., Ltd.	
<i>Amasra</i>	GYDD	R. Ashby Todd	R. Hedley, C. Close, J. Bizzey	R. Dunne	Anglo-Saxon Petroleum Co., Ltd.	23.1.50
<i>Amersham</i>	GNTQ	A. Spence	J. Halliday, E. T. Ward, D. Bond	C. Medley	Thompson S.S. Co., Ltd.	15.5.50
<i>Andes</i>	GQCV	B. K. Berry, R.D., Cmdr., R.N.R.	R. D. Jones, F. M. Dickenson, W. Wheatley, P. Anthony	W. Smith	Royal Mail Lines, Ltd.	30.9.49
<i>Apapa</i>	MACE	J. J. Smith	R. G. Williams, C. A. Smith, J. Wright, S. S. Jenkins, T. A. Nicholson	R. F. Barrett	Elder Dempster Lines, Ltd.	16.12.49
<i>Arabia</i>	GLKF	W. T. Fitzgerald	J. Robinson, K. T. Jones, T. A. Bell, F. W. Diggle	B. A. Long	Cunard Steamship Co., Ltd.	19.1.50
<i>Arabistan</i>	GCKK	J. E. Cook	A. K. Linton, P. Hewitt, J. C. Purdy	W. Davies	F. C. Strick & Co., Ltd.	21.3.50
<i>Araby</i>	GMZL	T. W. Bolland	K. M. Cutler, P. J. Robinson, J. M. Cree, M. G. Boyd	K. J. Roberts	Royal Mail Lines, Ltd.	19.12.49
<i>Arakaka</i>	GDEV	R. Harrison	D. Douglas-Kerr, C. Nolan, H. Adler	J. A. Davis	Booker Bros., McConnell & Co., Ltd.	5.8.49
<i>Argentina Star</i>	GTKF	D. R. Macfarlane, O.B.E., D.S.O.	K. White, D. G. Hastie, T. Ripley	J. Eastwood	Blue Star Line, Ltd.	14.3.50
<i>Argyll</i>	GBWB	J. Dodds	A. W. Fielding, J. W. Millbank, G. Galloway	J. J. Smith	B. J. Sutherland & Co., Ltd.	16.1.50
<i>Arigami</i>	GMBL	G. S. Gracie	R. D. Philipotts, G. Wallis, D. Mackinnon	A. N. Taylor	Elders & Fyffes, Ltd.	4.1.49
<i>Armadae</i>	GMCR	E. J. Ridout			Trinder, Anderson & Co.	

NAME OF VESSEL	CALL SIGN	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS	LAST RETURN RECEIVED
<i>Ascamia</i>	GKNJ	J. V. Locke, R.D., R.N.R.	G. L. Mitchell, N. R. Haddon, D. R. Button	M. O'Donnell	Cunard Steamship Co., Ltd.	28.11.49
<i>Asburton</i>	GNJN	F. W. Mould	C. F. Woodcock, D. A. Keats, L. Browne	J. S. Buchanan	Trinder Anderson & Co.	14.11.49
<i>Asia</i>	GLJV	B. Harrison	M. T. Dodds, D. J. Steff, P. King, R. Parry	W. J. Rainey	Cunard Steamship Co., Ltd.	23.1.50
<i>Asturias</i>	GLQS	H. G. Whittle, O.B.E.	— Lawson, — Morganti, — Edwards, C. Hartley	— Hunt	Royal Mail Lines, Ltd.	13.2.50
<i>Athelchief</i>	GCRG	J. H. Flockhart	R. V. Parkiss, N. Jones, A. Green	W. Bradbury	Tankers, Ltd.	16.1.50
<i>Athelregent</i>	GQWL	J. A. Russell	R. Nicholson, R. McGregor, W. H. Buckle	A. Williams	Athel Line, Ltd.	4.1.50
<i>Athletic</i>	GBLS	B. Forbes-Moffatt	A. E. Warren, W. A. Hutchinson, P. G. Clifford, C. A. Brodie, R. Reid	D. Haggart	Shaw Savill & Albion Co., Ltd.	22.2.50
<i>Athlone Castle</i>	GYTK	J. McReynolds, D.S.C.	— Beaumont, — McNeil, — Evans	J. H. Summers	Union Castle Mail S.S. Co., Ltd.	30.12.49
<i>Atlantis</i>	GLTM	A. R. Osburn	J. F. Anderson, M. Bialowski, J. Upton, C. Wightman	H. Mathews	Royal Mail Lines, Ltd.	14.3.50
<i>Auricula</i>	GKPV	H. Sangster	H. Young, C. Eastwood, M. Lee	R. Davies	Anglo-Saxon Petroleum Co., Ltd.	2.6.50
<i>Australia Star</i>	GYCS	G. M. Duff, G.M.	K. C. Crompton, S. Davies, M. R. Harry	L. Cooper	Blue Star Line, Ltd.	19.6.50
<i>Australind</i>	GJKF	I. F. Wood	D. Ewan, J. H. Looker, R. Mattingley	K. F. Kipping	Trinder Anderson & Co.	2.6.50
<i>Avondene</i>	MAWG	G. Doyle	J. R. Dixon, R. L. Jones	J. Smallwood	Dene Shipping Co., Ltd.	14.6.50
<i>Balantia</i>	GBNM	C. C. Dingle	G. A. Dando, W. C. L. Sturrock, G. L. Fraser, R.D., R.N.R., R. L. Collins	J. J. Mytton	Royal Mail Lines, Ltd.	16.1.50
<i>Baltara</i>	GTXM	G. E. Thomas	— Davies	C. James	United Baltic Corporation, Ltd.	4.1.49
<i>Baron Elphinstone</i>	GCCD	S. Williams	I. S. Cameron, J. W. Cameron, W. O'Neill	J. Hopkins	H. Hogarth & Sons	5.6.50
<i>Baron MacLay</i>	GKXW	J. Reid	D. Harlock, R. Cameron, A. J. Hutcheson	J. Dowdall	H. Hogarth & Sons	28.9.49
<i>Baron Yarborough</i>	GNJD	A. Irvine	F. Smith, J. Peck, J. B. Harbord	G. Shilson	Ellerman's Wilson Line, Ltd.	30.11.49
<i>Bassano</i>	GNXK	D. B. Ramsbottom, D.S.C.	A. J. Cox, A. Ferguson, M. G. King	A. D. Garden	Watts, Watts & Co., Ltd.	20.3.50
<i>Beaconsfield</i>	GNNQ	J. W. Gardiner	T. F. Hercus, W. C. Halliday, P. A. LePatourel	T. Ainsworth	Canadian Pacific S.S., Ltd.	20.12.49
<i>Beaverburn</i>	MAGB	J. B. Smith, O.B.E.	D. P. Blois, R. D. P. Gillett, A. H. R. Peace, R. R. Rawlings	J. A. McAskill	Canadian Pacific S.S., Ltd.	31.1.50
<i>Beavercove</i>	GNLX	D. Parsons, R.D., R.N.R.	R. W. Savage, W. Williams, — Bateman	L. Norton	Canadian Pacific S.S., Ltd.	11.1.49
<i>Beaverdell</i>	GBBS	N. C. H. Scallon, R.D., R.N.R.	E. R. Conneron, E. R. Shaw, D. Wallace	W. Poingdestre	Canadian Pacific S.S., Ltd.	6.2.50
<i>Beaverford</i>	MQJG	R. A. Leicester, O.B.E.	L. Kinns, B. Dunham, J. Mackay, P. Ainsworth, R. A. Jones	R. Burch	Canadian Pacific S.S., Ltd.	14.3.50
<i>Beaverglen</i>	GBCP	J. Soame	R. Savage, B. Snell, J. Waling, T. Sargent	W. Chick	Canadian Pacific S.S., Ltd.	18.1.50
<i>Beaverlake</i>	GBCQ	C. L. de H. Bell, D.S.C., R.D., Capt., R.N.R.	G. T. Sharpe, W. Gibson, M. G. King	A. W. T. Camp	W. Thomson & Co.	14.3.50
<i>Beckenham</i>	GCGK	D. Cameron	M. J. Peyton-Bruhl, A. King, J. Bain, G. M. Gall	R. Dixon	W. Thomson & Co.	22.5.50
<i>Benarly</i>	GCZZ	D. S. Sinclair	R. Winn, K. Parker	J. E. Kemp	W. Thomson & Co.	13.4.50
<i>Bendoran</i>	MYSF	H. F. Masson	J. B. Butterworth, C. K. Hoffman, P. Shields	P. V. Richmond	W. Thomson & Co.	13.4.50
<i>Bennhor</i>	GDDV	J. P. Robertson	L. C. Finn, R. M. Snowie, N. Mackie	I. M. Fraser	W. Thomson & Co.	26.1.49
<i>Bentreoch</i>	GDJT	I. B. Hastie	J. Clements, I. M. Bruce, T. Lindsay	J. L. Wells	W. Thomson & Co.	2.6.50
<i>Benrachie</i>	GBTZ	W. O. Atkinson	E. N. Stone, G. Speirs, G. K. Harrison	J. Whyman	Houlder Bros. & Co., Ltd.	..
<i>Benwyvis</i>	MYPW	K. Hardie	F. E. Barley, D. S. Craven, R. B. Leach	R. Biss	Hector Tankers, Ltd.	..
<i>Bibury</i>	GIFC	W. E. Brett	..	..	..	..
<i>Biscoe</i>	GDCW	D. Cornwell	..	..	..	..

NAME OF VESSEL	CALL SIGN	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS	LAST RETURN RECEIVED
<i>Chitral</i> ..	GLKN	G. C. Forrest, R.D., Cdr., R.N.R. ..	J. A. P. Crichton, E. Snowden, J. A. Lefevre ..	A. R. Porter ..	P. & O. Steam Navigation Co.	25.11.49
<i>Cilicia</i> ..	GDGL	R. Blake ..	D. McDiarmid, R. Ballantyne, A. Mackendrick ..	J. Malcolm ..	Anchor Line, Ltd.	10.10.49
<i>City of Barcelona</i> ..	GTKR	E. M. Jenkins ..	A. M. Bowman, P. Appleton, R. E. Greenwood ..	W. Dobbie ..	Ellerman Lines, Ltd.	10.1.50
<i>City of Bristol</i> ..	GCPN	G. Vickers ..	T. Irvine, A. J. Bickerton, P. G. C. Simpson ..	K. P. Grocock ..	Ellerman Lines, Ltd.	2.6.50
<i>City of Calcutta</i> ..	GLYX	H. Johnson ..	D. Wardlaw, D. Campbell, D. McKinnon ..	H. Elder ..	Ellerman Lines, Ltd.	6.2.50
<i>City of Capetown</i> ..	GBBQ	W. R. Pinchbeck ..	W. S. Fletcher, P. Redhead, F. Smith ..	D. S. Crombie ..	Ellerman Lines, Ltd.	21.4.50
<i>City of Carlisle</i> ..	GBJK	W. A. Hannah ..	J. G. Stott, B. H. Pickering, R. H. Halcrow ..	— Vernal ..	Ellerman & Bucknall S.S. Co., Ltd.	17.3.50
<i>City of Chester</i> ..	MAHN	E. M. Robertson ..	B. Williams, E. Cumming, R. E. Garisch ..	J. Ellis ..	Ellerman Lines, Ltd.	30.12.49
<i>City of Delhi</i> ..	GLBW	I. W. Wotherspoon ..	J. P. Mason Price, I. Irvine, W. Smith ..	A. Dennis ..	Ellerman Lines, Ltd.	8.11.49
<i>City of Derby</i> ..	GFWC	W. A. Hannah ..	R. Tyrrel, J. Twomey, R. Huntingdon ..	R. Macdonald ..	Ellerman Lines, Ltd.	30.8.49
<i>City of Dieppe</i> ..	GSVQ	E. G. Chapman ..	J. Thompson, M. Graham, D. Roe ..	R. M. Jones ..	Ellerman Lines, Ltd.	30.12.49
<i>City of Dundee</i> ..	GDPY	F. M. Womersley ..	R. Jones, J. A. Whieldon, L. G. Powell ..	H. M. O'Gorman ..	Ellerman Lines, Ltd.	26.1.49
<i>City of Durham</i> ..	GBJM	H. G. Williams, O.B.E. ..	D. S. Taylor ..	W. B. Noonan ..	Ellerman Lines, Ltd.	21.3.49
<i>City of Evansville</i> ..	GJNF	D. C. Hamilton ..	A. Fry, J. S. Schofield, J. Checkley ..	J. Oultram ..	Ellerman Lines, Ltd.	14.11.49
<i>City of Johannesburg</i> ..	GBKW	A. G. Freeman ..	C. H. Routledge, H. Lewis, T. Gorny, R. A. Vaughan ..	A. R. Henderson ..	Ellerman Lines, Ltd.	25.4.50
<i>City of Khartoum</i> ..	GBZC	J. A. Benyon ..	C. P. Bradbury, C. T. Heywood, J. B. Lister, R. F. Moon ..	R. Greenhalgh ..	Ellerman Lines, Ltd.	14.6.50
<i>City of Lille</i> ..	GSLN	W. A. Owen ..	R. B. May, H. M. Steele, G. S. Garner ..	A. Julius ..	Ellerman Lines, Ltd.	14.11.49
<i>City of Lyons</i> ..	GMCN	F. Barnard ..	A. R. Horan, R. Clark, J. Morrison ..	W. Anderson ..	Ellerman Lines, Ltd.	20.3.49
<i>City of Paris</i> ..	GFQM	H. Percival, O.B.E., R.D., Cdr., R.N.R. ..	P. S. Morrison, M. A. Perry, R. N. Caldwell, J. Wharry ..	B. Holyoake ..	Ellerman Lines, Ltd.	14.11.49
<i>City of Pretoria</i> ..	GBLN	R. Longstaff, D.S.C. ..	D. Salt, F. Braddick, W. Taggart ..	J. Booth ..	Ellerman & Bucknall S.S. Co., Ltd.	29.3.50
<i>City of Swansea</i> ..	GBZI	M. L. Hernan, M.B.E. ..	E. G. O'Driscoll, J. A. Whieldon, E. N. Williams ..	W. Bateman ..	Ellerman Lines, Ltd.	17.3.50
<i>City of Sydney</i> ..	GSEFM	H. Johnson ..	B. Walker, J. Blanch, E. E. Cooper ..	H. D. Smythe ..	Ellerman Lines, Ltd.	24.8.49
<i>City of Tokyo</i> ..	GFMW	R. L. Stewart ..	E. Bonfield, R. H. Bellhouse, E. Redshaw ..	— McFigue ..	Ellerman Lines, Ltd.	..
<i>City of Windsor</i> ..	GJYR	W. S. Doidge ..	A. Brocklebank, W. Singleton, T. H. Peirce ..	A. C. Macaulay ..	Ellerman & Bucknall S.S. Co., Ltd.	17.3.50
<i>Clan Brodie</i> ..	GKPD	B. Vernon-Browne ..	J. Jones, S. F. Nicholson, E. J. E. Owen, I. Williamson ..	W. M. Morrison ..	Cayzer Irvine & Co., Ltd.	28.3.50
<i>Clan Buchanan</i> ..	GKNM	J. Browne ..	J. H. Wright, F. King, J. P. McMasters ..	J. H. Wright ..	Cayzer Irvine & Co., Ltd.	1.7.50
<i>Clan Campbell</i> ..	GDZK	J. A. Forster ..	D. S. Tosh, E. M. Crawley, J. Beynon, J. Hay ..	R. F. Cole ..	Cayzer Irvine & Co., Ltd.	4.1.50
<i>Clan Chattan</i> ..	GFBX	H. C. Simpson, O.B.E. ..	F. T. Turton, J. W. Ward, J. Campbell ..	E. Shillabeer ..	Cayzer Irvine & Co., Ltd.	3.4.50
<i>Clan Chisholm</i> ..	GFBY	J. McCrone ..	R. D. Helm, D. W. Pannel, A. G. Allison, J. A. Lionnet ..	J. A. Gray ..	Cayzer Irvine & Co., Ltd.	27.2.50
<i>Clan Davidson</i> ..	MAWU	H. J. Anchor, O.B.E., R.D., R.N.R. ..	A. M. Kennedy, E. R. Smith, D. R. Godfrey, P. Ingram, M. J. Skillington ..	J. E. Appleton ..	Cayzer Irvine & Co., Ltd.	19.1.50
<i>Clan Forbes</i> ..	GPGB	W. R. Woodruffe ..	A. S. Palethorpe-May, R. H. Field, J. L. Easton ..	W. Saville ..	Cayzer Irvine & Co., Ltd.	3.4.50
<i>Clan Macaulay</i> ..	GZCS	A. G. Storkey ..	T. R. Halliday, M. P. R. Turner, D. S. Clark ..	J. Ormerod ..	Cayzer Irvine & Co., Ltd.	12.7.49
<i>Clan Macdonald</i> ..	GCPG	H. Cater ..	J. P. Dunphy, F. Lionnet, D. Milner ..	G. Martyn ..	Cayzer Irvine & Co., Ltd.	7.12.48

<i>Clan Macdougall</i>	..	GFBQ	P. McMillan	..	S. R. J. Woods, D.S.C., R.D., Cdr., R.N.R., J. A. Molyneux, D. E. Milner	..	Cayzer Irvine & Co., Ltd.	..	16.12.49
<i>Clan Maclaren</i>	..	GSSC	E. H. O. Stone	..	T. O. Marr, Lt.-Cdr., R.N.R., J. A. Baxter, D. Richardson	..	Cayzer Irvine & Co., Ltd.	..	11.10.49
<i>Clan Macnair</i>	..	GFNK	J. Dumphy	..	A. Mair, A. Graham, J. Brackenridge	..	Cayzer Irvine & Co., Ltd.	..	16.1.50
<i>Clan Macneil</i>	..	GFWP	J. West	..	G. Rowland, K. M. Thomson, A. P. Sweeney	..	Cayzer Irvine & Co., Ltd.	..	18.4.50
<i>Clan Macrae</i>	..	MAHP	E. Coulthart	..	J. D. W. Chapple, R. E. Heywood, J. Nichols	..	Cayzer Irvine & Co., Ltd.	..	17.3.49
<i>Clan Maclatish</i>	..	GUBB	H. S. Pengelly	..	G. Owen, G. S. Russell, G. Dubery	..	Cayzer Irvine & Co., Ltd.	..	17.4.50
<i>Clan Shaw</i>	..	GBYW	R. P. Galer	C.B.E., R.D., Capt., R.N.R.	..	..	Cayzer Irvine & Co., Ltd.	..	14.6.50
<i>Clan Urquhart</i>	..	GFBK	T. W. Inman	..	W. Graham, M. N. Ure, A. D. Rumble	..	Cayzer Irvine & Co., Ltd.	..	22.5.50
<i>Clearpool</i>	..	MAHQ	J. Whamond	..	G. Ratcliffe, I. H. Isaac, A. Pringle	..	Sir R. Ropner & Co., Ltd.	..	28.7.49
<i>Clydebank</i>	..	GKLM	J. W. Greig	..	B. H. Smith, A. R. Howson, E. A. D. Vargas	..	Andrew Weir & Co., Ltd.	..	13.4.50
<i>Clydefield</i>	..	GSNK	A. S. Reid	..	P. B. Goudie, J. C. Wheeler	..	Hunting & Son, Ltd.	..	20.4.50
<i>Columbia Star</i>	..	GQGT	D. J. Stratta	..	F. C. T. Wood, D. E. Ortner, D. B. Wright, B. W. Bailie	..	Blue Star Line, Ltd.	..	6.6.50
<i>Comanche</i>	..	GYRX	O. H. Shepheard	..	A. Lindall, J. Marks, I. Mackintosh	..	Eso Transportation Co., Ltd.	..	1.6.49
<i>Comedian</i>	..	GPTJ	H. T. Wells	..	D. English, D. A. Bloom	..	T. & J. Harrison	..	19.6.50
<i>Comitbank</i>	..	GKLJ	I. Townsley	..	A. J. Whiston, A. Brown, E. J. Stoddart	..	Andrew Weir & Co., Ltd.	..	..
<i>Condosa</i>	..	MAHU	H. Heal	..	R. Timmouth, S. J. Edgington, M. Jenkins	..	Furness-Houlder Argentine Lines, Ltd.	..	..
<i>Corfu</i>	..	GRNW	C. S. Parker	..	K. H. S. Renshaw, D. M. Johnstone,	..	P. & O. Steam Navigation Co.	..	..
<i>Corinthic</i>	..	GZYL	G. M. Robertson	D.S.C.	C. C. Vickers, N. R. Lewis	..	Shaw Savill & Albion Co., Ltd.	..	..
<i>Corrientes</i>	..	GFPT	W. Anderson	..	R. Frisby, J. W. Woodbridge, D. S. Upton, H. F. Singleton	..	Donaldson Bros. & Black, Ltd.	..	..
<i>Couligorn</i>	..	MAHZ	G. Robison	..	R. Allan, R. Aitken, J. H. Stark	..	Lambert Bros., Ltd.	..	..
<i>Craftsman</i>	..	GPZT	W. F. O'Neill	..	W. Birnie, P. McKellar, I. Cloherly	..	T. & J. Harrison	..	..
<i>Cumberland</i>	..	GPY	H. E. Reilly	D.S.C., R.D., R.N.R.	W. E. Williams, I. M. Ritchie, J. Macaulay	..	Federal Steam Nav. Co., Ltd.	..	..
<i>Dallas City</i>	..	GCLS	C. E. Exton	..	P. M. N. Busby, N. Etherton, R. G. Ford	..	Sir William Reardon Smith & Sons, Ltd.	..	..
<i>Debrett</i>	..	GRPR	H. W. Underhill	..	T. W. D. John, N. C. Pascoe, A. M. Robson	..	Lampport & Holt Line, Ltd.	..	..
<i>Deebank</i>	..	GTDB	B. Rivett	..	D. S. Sapp	..	Andrew Weir & Co., Ltd.	..	..
<i>Defoe</i>	..	GNWF	W. C. Blake	..	G. T. Clarke, R. Clarke, J. A. North	..	Lampport & Holt Line, Ltd.	..	..
<i>Delane</i>	..	MMNW	H. Pratt	..	K. Maguire, M. C. Roberts, D. Simpson	..	Lampport & Holt Line, Ltd.	..	..
<i>Delilian</i>	..	GJSQ	R. McNie	..	B. M. Metcalfe, L. J. Roberts, C. T. Skrastrin, D. Simpson	..	Lampport & Holt Line, Ltd.	..	..
<i>Delius</i>	..	GZSY	A. W. Mitchell	..	A. S. Kerr, J. H. Small, S. C. Macdonald	..	Donaldson Bros. & Black, Ltd.	..	..
<i>Denbigshire</i>	..	GQGW	D. Hey	..	W. Jones, A. Bennett, B. Walker, R. H. Baldwin	..	Lampport & Holt Line, Ltd.	..	..
<i>Derryclare</i>	..	GCKN	N. Bellwood	..	P. Wilks, L. Henshall, G. Bower	..	Glen Line, Ltd.	..	..
<i>Derryheen</i>	..	MAIF	R. Storm	..	M. Drew, D. Kingsland	..	McCowan & Gross, Ltd.	..	..
<i>Desado</i>	..	MAIH	S. J. G. Hill	..	N. J. Oliver, R. D. Jones, P. C. T. Davies	..	McCowan & Gross, Ltd.	..	..
<i>Devis</i>	..	GFKT	T. J. Sweeny	..	P. Casey, J. Bicknell, G. Trickey	..	Royal Mail Lines, Ltd.	..	..
<i>Devon</i>	..	GDRF	A. Hocken	..	R. Stewart-Scott, J. D. Cubitt, R. D. Baillie, J. D. Hellings	..	Lampport & Holt Line, Ltd.	..	..
<i>Devonshire</i>	..	GTTV	A. Beharrel	..	R. Phillips, T. Sheldrake, J. F. W. Farrow	..	Federal Steam Nav. Co., Ltd.	..	..
<i>Discovery II</i>	..	GWVM	J. F. Blackburn	D.S.O., Cdr., R.N. (retd.)	..	..	Bibby Bros. & Co.	..	..
	..						National Institute of Oceanography	..	..

NAME OF VESSEL	CALL SIGN	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS	LAST RETURN RECEIVED
<i>Dominion Monarch</i>	GRGG	Sir Henry Gordon, K.B., D.S.C.	A. D. Enlighs, J. Hunt, C. C. D. Gough A. J. Dougal, D. Brown, D. B. Langwell	J. A. McAskill	Shaw Savill & Albion Co., Ltd.	1.5.50
<i>Dorelian</i>	GJTL	D. MacQueen	J. B. Whyte, K. M. Hamilton, — Eeloo	B. Kimble	Donaldson Bros. & Black, Ltd.	5.12.49
<i>Doris Clunies</i>	MSLB	A. MacVicar	C. A. Miller, M. Mortimer, P. C. T. Davies	H. A. Reynolds	Clunies Shipping Co.	1.7.50
<i>Drina</i>	MAIL	D. R. Miller	J. McCool, S. N. Coe, D. Beighton	A. Allen	Royal Mail Lines, Ltd.	20.9.49
<i>Dromore</i>	GDSF	J. R. Moreby	K. Quirk, M. Fair, W. Overhill	R. H. Heard	Furness Withy & Co., Ltd.	20.9.49
<i>Dryden</i>	MQFT	F. A. Griffiths	T. Walton, L. Labistour, J. G. Perrin, N. Beattie	J. Gerrity	Lampport & Holt Line, Ltd.	28.9.49
<i>Duke of Athens</i>	GMYS	J. G. Lomas, A.I.N.A.	J. D. B. Wylie, A. J. Hawkes, D. W. Hobday	D. R. Uglow	Trent Maritime Co., Ltd.	13.2.50
<i>Dunkerv Beacon</i>	GUFS	L. E. Thomas	H. R. Neal, E. C. Turner, T. C. Mullings	A. B. Ewart	Phs. Van Ommeren (London), Ltd.	14.11.49
<i>Dunster Grange</i>	GCSD	R. S. Grigg, O.B.E.	T. Buckney, J. Postill, R. Sly, J. Gunns	T. Jones	Houlder Bros. & Co., Ltd.	15.5.50
<i>Durango</i>	MAIM	P. M. Burrell	W. Reilly, — Cutcliffe, D. A. Bird	W. Wilson	Royal Mail Lines, Ltd.	8.5.50
<i>Durban Castle</i>	GPGP	C. G. Gorringe	H. R. Smith, G. Whitlam, — Hargreaves	H. A. Liggins	Union Castle Mail S.S. Co., Ltd.	1.5.50
<i>Durenda</i>	GFSL	R. Stone	J. K. Thomas, J. Batley, D. E. Moran	— Wigglesworth	British India Steam Nav. Co., Ltd.	18.3.50
<i>Durham</i>	GWVK	R. J. Dunning	D. Simon, D. Elkington, D. Grant	C. Robinson	Federal Steam Nav. Co., Ltd.	8.5.50
<i>Eastern</i>	GFTV	H. G. Stratford	R. W. Mitten, I. C. McPherson, — Gray	E. C. Bouel	Eastern & Australian S.S. Co., Ltd.	28.3.49
<i>Edinburgh Castle</i>	GOHN	T. W. McAllen	W. B. Sawyers, W. Hallum, R. Watt, H. Keenan	J. Hodgson	Union Castle Mail S.S. Co., Ltd.	17.4.50
<i>Edward East</i>	GYXZ	J. A. Whittleton	T. Pearson, E. J. Morgan, J. Channing-Pearce	R. Hartley	H. Croft Baker & Sons, Ltd.	..
<i>Egdia</i>	GJZD	J. L. Gibson, O.B.E.	J. T. Donald, A. McKendrick, N. Fletcher	..	Anchor Line, Ltd.	..
<i>El Gallo</i>	MAIP	F. H. Simpson	H. Tomson, N. Dalziel, S. P. Ewing	A. G. Pews	C. T. Bowring & Co., Ltd.	24.4.50
<i>Elysia</i>	GJZK	D. Barclay	G. Ramage, W. G. Creelman, W. Marshall	W. H. Hier	Anchor Line, Ltd.	8.7.50
<i>Empire Brent</i>	GLBX	E. Laidlaw	W. Mottram, S. McGillivray, J. Lewis	L. Hooper	Donaldson Bros. & Black, Ltd.	..
<i>Empire Fowey</i>	GMFW	D. G. Bailey	P. J. C. Cockburn, J. R. English, P. Byers	D. Robson	P. & O. Steam Nav. Co.	..
<i>Empire Halladale</i>	GPVQ	J. McGill Brown	R. D. Fielder, R. Hammond, A. Cameron	R. Charlton	Anchor Line, Ltd.	6.3.50
<i>Empire Martaban</i>	GBSV	E. Pleasance	T. Hender, M. R. Bremberg, J. Edwards, P. Ellett	..	Bolton S.S. Co., Ltd.	1.7.50
<i>Empire Orwell</i>	GRCB	A. C. G. Hawker, C.B.E., R.D., R.N.R.	H. Urinsky	..	..	..
<i>Empire Pride</i>	MAJB	N. F. Fitch, M.B.E.	— Brockwell, — Brydges, — Crossley	A. C. Shippam	Orient Steam Nav. Co., Ltd.	5.8.49
<i>Empire Star</i>	GCDP	G. E. Barnard	W. J. P. Roberts, R.D., R.N.R., A. G. Ingram, J. E. Potter	A. Mallett	Bibby Bros. & Co.	..
<i>Empire Towy</i>	GDKL	C. L. Thomas	A. H. R. Peace, R. Walgate, J. H. Fraser, B. Snell	H. Smith	Blue Star Line, Ltd.	28.10.49
<i>Empire Viceroy</i>	MAJN	J. B. S. Bland	J. M. Brackenridge, R. G. Roberts, M. H. Scott, J. C. Moffat	G. R. Stuart	Fenton S.S. Co., Ltd.	5.8.49
<i>Empress of Australia</i>	GFBS	C. E. Duggan, R.D., R.N.R.	B. Ford, J. Martin	— Hagon	Pandelis Shipping Co., Ltd.	8.7.50
<i>Empress of Canada</i>	GSVR	J. P. Dobson, D.S.C., R.D., R.N.R.	V. Irving, C. P. Turguand, H. Beyer, W. King	W. Campbell	Canadian Pacific S.S., Ltd.	15.12.48
<i>Empress of France</i>	GNTV	B. B. Grant, R.D., R.N.R.	G. S. Sheldon, G. Main, J. D. Randle, J. K. Wyles	J. M. Butterworth	Canadian Pacific S.S., Ltd.	28.11.49
<i>Empress of Scotland</i>	GMLV	E. A. Shergold	D. Owen, F. Stamps, D. Harris	D. Murphy	Canadian Pacific S.S., Ltd.	7.12.49
<i>Eradona</i>	GZLQ	J. E. Gill	R. J. Davies, J. C. Young, D. J. Harrison	..	Anglo-Saxon Petroleum Co., Ltd.	..
<i>Eros</i>	GYSB	R. C. Vigurs	..	P. McEwan	Elders & Fyffes, Ltd.	2.6.50
<i>Esperance Bay</i>	GSMP	T. V. Roberts, R.D., Capt., R.N.R.	..	..	..	..
<i>Essex Trader</i>	GCMS	D. G. Evans	..	M. J. Sheehan	Shaw Savill & Albion Co., Ltd.	1.7.50
<i>Esso Glasgow</i>	GTXC	C. G. Broughton	..	G. Moore	Trader Navigation Co., Ltd.	29.11.49
				P. J. Everett	Esso Transportation Co., Ltd.	14.11.49

NAME OF VESSEL	CALL SIGN	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS	LAST RETURN RECEIVED
<i>Jersey City</i> ..	GIGA	I. Williams	D. L. Beynon, D. Baker, H. M. Keevil..	D. R. Davies	Sir Wm. Reardon Smith & Sons, Ltd.	30.9.49
<i>Jessmore</i> ..	MAOF	G. Killick	P. V. McCullough, R. Martin, R. W. Liley	F. Matthews	Furness Withey & Co., Ltd.	5.6.50
<i>John Biscoe</i> ..	GFLF	Cdr. H. Kirkwood, D.S.C., R.N.	P. Bathurst, W. L. Harrison, R. J. Griffiths	P. A. Senior	Government of the Falkland Islands	27.7.50
<i>John Holt</i> ..	GNFD	J. Shaw	G. S. Gunn	A. Leeder	John Holt Line, Ltd.	12.10.49
<i>Kaikoura</i> ..	GZPZ	N. Fraser	J. Farnell, J. B. Ricketts, F. Le Messurier	R. M. Evans	Trinder, Anderson & Co.	24.4.50
<i>Kaipaki</i> ..	GOGJ	T. M. Fenwick	D. M. Steven, N. Strizaker, A. E. Carter	A. Clegg	Trinder, Anderson & Co.	16.12.49
<i>Kaipara</i> ..	GZPY	G. P. Parkin, O.B.E.	T. G. Wilson, J. Jackson, G. Charleson	A. Robbins	Trinder, Anderson & Co.	20.6.50
<i>Kaituna</i> ..	GOGG	R. F. Hellings	W. Watson, F. J. Callanan	A. Robbins	United Africa Co., Ltd.	10.3.50
<i>Kano Palm</i> ..	GGRM	H. Coffey, R.D., R.N.R.	D. B. Ross, J. H. Drummond, I. Bigham	C. Robinson	Union Castle Mail S.S. Co., Ltd.	24.2.49
<i>Kenilworth Castle</i> ..	MQLP	L. H. Farrow	J. Collins, R. Kinloch, M. Blake	R. Heath	Federal Steam Nav. Co., Ltd.	18.7.50
<i>Kent</i> ..	GPDC	N. A. Thomas	W. Keith, G. Griffiths, P. Kidd	W. Fielding	Dodd, Thomson & Co., Ltd.	10.10.47
<i>King Robert</i> ..	MAON	G. Craze	J. C. Davies, P. M. Flower, D. Evans	A. McInnes	Dodd, Thomson & Co., Ltd.	18.7.50
<i>King Robert</i> ..	GNVF	A. B. Drever	W. G. Smith, A. L. Rigden, J. Dixon	D. Chapman	F. C. Strick & Co., Ltd.	29.6.50
<i>King William</i> ..	GSFZ	A. N. Henderson	R. H. Scaiff, W. Johnston, L. J. Nurse	K. W. Baddeley	Pacific Steam Nav. Co.	20.9.49
<i>Kohistan</i> ..	GJKC	R. D. S. Eckford	J. Orr, R. G. C. Gibson	J. J. Brenann	Galbraith Pembroke & Co., Ltd.	4.4.50
<i>Laguna</i> ..	MAOS	H. F. McInnes	A. Mair, A. Elston, W. W. S. Arnott	J. B. Allan	Turnbull Martin & Co., Ltd.	12.7.49
<i>Lambrook</i> ..	GCTC	A. R. Cossor	W. H. Malley, M. Treasurer, O. Ashcroft	A. Jones	Bibby Bros. & Co.	15.5.50
<i>Lanarkshire</i> ..	GLZC	E. W. Jeffries	S. Dickenson, J. Bicknell, P. V. des Landes	N. Moore	Lampert & Holt Line, Ltd.	1.6.49
<i>Lancashire</i> ..	GFND	A. McKellar	A. P. S. Jackson, N. Morganti, R. J. Stanley	J. Brownlee	Anglo-Saxon Petroleum Co., Ltd.	12.10.49
<i>Lassell</i> ..	GLCF	J. B. Ritchie	H. Owen, J. Sutherland, C. Single, T. Rowland	E. Howarth	Federal Steam Nav. Co., Ltd.	8.11.49
<i>Leicester</i> ..	GBTG	S. W. Andrews	G. Cheyne, R. Lidstone, D. Moore	A. P. J. Brooke	Andrew Weir & Co., Ltd.	8.7.50
<i>Leverbank</i> ..	GILPZ	D. Gillies	F. Methan, J. Williams, J. Beer	K. W. Baddeley	T. & J. Harrison	1.6.48
<i>Linguist</i> ..	GQBC	A. H. Frew	D. Leitch	J. Eager	Ellerman's Wilson Line, Ltd.	16.11.49
<i>Livorno</i> ..	GPWF	E. S. Green	C. Lines, D. W. Verniers, A. H. Benson	M. Riley	Union Castle Mail S.S. Co., Ltd.	25.2.49
<i>Llangibby Castle</i> ..	GPLY	B. W. B. Lloyd	J. H. Allenby, F. Hutchings, R. Pass	E. Fisher	Crest Shipping Co., Ltd.	8.7.50
<i>Lloydcrest</i> ..	MAOY	L. Barwell	G. E. Leech, D. R. Bryden, I. Jamieson	M. R. Littlejohn	Pacific Steam Nav. Co.	17.11.49
<i>Lobos</i> ..	GDXL	P. Ray	E. A. E. Littlewood, J. N. Kavanagh, A. Hanily, M. Dean	D. Morgan	Royal Mail Lines, Ltd.	22.11.49
<i>Loch Avon</i> ..	GMZT	A. N. Anderson	T. Evans, R. C. H. Hunnisett, H. Nixon	J. F. G. Thomas	Royal Mail Lines, Ltd.	4.3.49
<i>Loch Garth</i> ..	GMZY	J. Smith, R.D., R.N.R.	A. H. Treikelder, J. Janezak, J. S. Armstrong	J. Sandler	Ships Finance & Management Co., Ltd.	21.12.49
<i>Loch Ryan</i> ..	MAOZ	R. N. Fletcher	A. F. James, C. O. Connor, S. Thompson	J. J. Sheridan	G. Heyn & Sons, Ltd.	1.3.50
<i>Lord Gladstone</i> ..	MAPA	P. S. Kenning	R. M. Hall, R. Harper, J. Blaney, E. L. Harper	C. A. Murphy	G. Heyn & Sons, Ltd.	4.3.50
<i>Lord Glenlochan</i> ..	GRMK	W. J. Leinster	A. S. Maclean, R. Dootson, C. Pringle	J. Murray	Pacific Steam Nav. Co.	20.7.49
<i>Lord O'Neill</i> ..	GRLZ	R. A. Ferguson	F. J. Leicester, W. Jenkins, J. G. Gaislon	E. O'Neill	Pacific Steam Nav. Co.	20.6.49
<i>Loriga</i> ..	GCLM	S. E. Aylard	A. W. Banks, R. M. Chalmers	D. Whitling	H. E. Moss & Co.	19.6.50
<i>Losada</i> ..	GDXM	P. L. Hockey	Dobson, L. J. E. Saxty, J. Robertson	I. Caddy	T. & J. Brocklebank, Ltd.	6.2.50
<i>Lumina</i> ..	MAPB	R. A. Weatherston	H. Ackerley, L. Burn, G. Kay	H. Halton	T. & J. Brocklebank, Ltd.	4.1.49
<i>Macharda</i> ..	GKKF	R. A. Penston	J. Brand, J. C. Long, P. Greenall, G. P. Hurms	T. Williams	T. & J. Brocklebank, Ltd.	1.3.50
<i>Magdapor</i> ..	GBJX	A. Hill, O.B.E.	R. F. Hamilton, N. E. Wood, D. M. Heynes	F. Jones	Shaw Savill & Albion Co., Ltd.	1.3.50
<i>Mahanada</i> ..	GOFM	J. W. B. Robertson, R.D., R.N.R.				
<i>Mahia</i> ..	GNZV	G. Campbell				

<i>Mahout</i>	..	GDZN	H. F. Scoins	..	D. L. Campbell, E. G. Anderson, H. L. Burn	C. W. Jacobs	..	T. & J. Brocklebank, Ltd.	22.5.50
<i>Maiseer</i>	..	GZSV	L. T. Owen, O.B.E.	..	D. Carter, F. Mitchell, A. Halcrow	B. Pinn	..	T. & J. Brocklebank, Ltd.	5.6.50
<i>Malsud</i>	..	GSCP	L. E. Jeans	..	J. W. Ross, J. H. Moore, E. McAully	F. C. Bailey	..	T. & J. Brocklebank, Ltd.	6.9.49
<i>Maithar</i>	..	GSCL	W. Gibson	..	O. Pritchard, F. Mitchell, P. A. Gunson	G. Caddy	..	T. & J. Brocklebank, Ltd.	13.4.50
<i>Makalla</i>	..	GOFN	T. C. Eddy	..	D. H. Morris, E. Watkins, J. K. Cooper	A. E. Weston	..	T. & J. Brocklebank, Ltd.	14.6.50
<i>Malakand</i>	..	GOPF	J. Owen	..	J. P. Jackson, A. B. Davies, K. R. Hughes	R. J. Smith, M.B.E.	..	T. & J. Brocklebank, Ltd.	29.7.50
<i>Malancha</i>	..	GZRD	S. Broughton	..	J. Clarke, J. R. Kemp, D. J. Evans	R. Higson	..	Furness Withy & Co., Ltd.	9.9.49
<i>Malayan Prince</i>	..	GZVW	J. D. Fraser	..	G. Roberts, I. J. Sladen, K. Slapp	D. Flood	..	Houlder Bros. & Co., Ltd.	8.5.50
<i>Malmesbury</i>	..	MAQE	R. Ross	..	W. P. Russell, H. E. Barratt, E. Cole	A. Macbeth	..	P. & O. Steam Nav. Co.	29.6.50
<i>Maloja</i>	..	GFBD	F. Ferraby	..	R. M. Sinclair, R. N. Firth, — Game	..	..	..	16.1.50
<i>Manchester City</i>	..	GBBP	H. Hancock	..	W. Hine, J. A. McCarran, R. O. White, J. S. Ellis	..	..	..	..
<i>Manchester Commerce</i>	..	GKMY	E. W. Espley	..	W. E. Quirk, J. E. Askew, L. Pound	A. S. J. Broadbent	..	Manchester Liners, Ltd.	6.4.50
<i>Manchester Division</i>	..	GBYR	W. Hine, R.D., Cdr., R.N.R.	..	M. F. Robinson, D. Millard, W. A. Washington	M. Doran	..	Manchester Liners, Ltd.	20.2.50
<i>Manchester Port</i>	..	GYNF	F. Downing	..	J. E. Jones, J. S. Dalgarns, T. Field, A. H. Swan	R. S. Pogson	..	Manchester Liners, Ltd.	2.6.50
<i>Manchester Progress</i>	..	GPGD	W. H. Downing	..	F. Lewis, T. W. Field, N. W. Cockshoot	P. B. McNab	..	Manchester Liners, Ltd.	10.1.50
<i>Manchester Regiment</i>	..	GERD	F. D. Struss, O.B.E., D.S.C.	..	W. R. McLaren, J. E. Askew, A. Cookson	W. C. Critchley	..	Manchester Liners, Ltd.	20.2.50
<i>Manchester Shipper</i>	..	MAPC	M. E. Bewley	..	F. Lewis, D. Heaton, T. H. Lynn	A. Reid	..	Manchester Liners, Ltd.	19.10.49
<i>Manchester Trader</i>	..	GMWG	M. E. Bewley	..	W. E. Oliver, P. N. Fielding, A. C. Caird, N. Cockshoot	E. Ambler	..	Manchester Liners, Ltd.	14.1.47
<i>Mandator</i>	..	GBNY	R. Humble	..	D. A. Keller, A. W. Wiltshire, J. D. Guthrie	A. C. Gavin	..	Manchester Liners, Ltd.	12.1.49
<i>Marengo</i>	..	GLFW	F. Bernard, M.B.E.	..	H. Edwards, C. R. Tutty, C. Main	G. W. Hazel	..	T. & J. Brocklebank, Ltd.	8.11.49
<i>Margay</i>	..	GFYQ	E. A. Prentice	..	A. J. Thompson, B. S. Kenn, K. Cooper	G. Carun	..	Eilerman's Wilson Line, Ltd.	3.3.50
<i>Markhor</i>	..	GTFZ	I. B. Newman	..	I. A. MacLaren, J. Ritchie, — Woodward	L. L. Lithgow	..	Kaye, Son & Co., Ltd.	22.5.50
<i>Marna</i>	..	MLPK	R. J. Sinclair	..	J. C. Macdonald, A. Petrie	L. L. Owen	..	T. & J. Brocklebank, Ltd.	7.2.49
<i>Marquita</i>	..	GQVY	F. C. Jennings	..	J. Cush, F. Liddle, D. Parker	R. J. Sinclair	..	Chr. Salvesen & Co.	14.6.50
<i>Marsdale</i>	..	GBKB	N. Ferguson	..	H. Jones, J. Tere, L. Marsell	K. C. Wright	..	Kaye, Son & Co., Ltd.	4.1.49
<i>Martand</i>	..	GTCG	J. Fox-Lloyd	..	E. L. Jones, P. A. Litherland, I. Robertson	D. H. Butterworth	..	Kaye, Son & Co., Ltd.	31.1.50
<i>Martitia</i>	..	GNQT	H. Bunn	..	M. G. Stevens, H. R. Watson, D. Johnston	D. Diver	..	T. & J. Brocklebank, Ltd.	21.12.49
<i>Mataroa</i>	..	GCSV	R. G. James, R.D., Capt., R.N.R.	..	J. Williams, P. Carden, R. Ryding	L. Boyce	..	Kaye, Son & Co., Ltd.	15.5.50
<i>Matheran</i>	..	GOFQ	A. B. Bannatyne, O.B.E.	..	H. Simpson, J. A. Miller, R. M. Lucas, R. F. Holland	P. Neeson	..	Shaw Savill & Albion Co., Ltd.	2.11.49
<i>Matina</i>	..	GSZX	H. T. Robinson	..	J. C. Crane, B. Hodges, H. G. Cresswell	H. C. Knight	..	Elders & Fyffes, Ltd.	29.6.50
<i>Mauritania</i>	..	GTTM	C. Ivan Thompson	..	S. Dexter, — Jolliffe, J. Ward	F. Clarke	..	Cunard Steamship Co., Ltd.	12.12.49
<i>Medva</i>	..	GSWR	D. M. MacLean, D.S.C., R.D., R.N.R.	..	P. Jackson, J. O. Springall, R. Hardman	J. MacArdle, M.B.E.	..	Cunard Steamship Co., Ltd.	20.7.50
<i>Melbourne Star</i>	..	GDFZ	F. N. Riley, D.S.O.	..	R. G. Taylor, D. S. Gilmour, D. A. R. James	J. Clarke	..	Blue Star Line, Ltd.	6.2.50
<i>Millais</i>	..	MAPH	A. R. Bibby, O.B.E.	..	J. Edgar, D. S. Leicester, A. B. Baines	J. Williams	..	Lampport & Holt Line, Ltd.	14.10.49
<i>Mirror</i>	..	GDFL	S. P. Sheldon	..	P. A. J. Edwards, G. W. Heron, J. Willmer	J. Crouch	..	Cable & Wireless, Ltd.	8.7.50
<i>Monarch</i>	..	GBDF	J. P. F. Betson	..	R. M. Tuckwell, R. H. Hardy, E. J. Evans	D. Rendall	..	H.M. Postmaster-General	5.12.49
<i>Mooltan</i>	..	GFBC	C. E. Pollit	..	J. W. Owen, L. H. Kellelt, E. M. Phelps	J. Ormiston	..	P. & O. Steam Nav. Co.	2.6.50
<i>Moveria</i>	..	GKYW	J. Jack	..	G. Waddle, A. T. Johnston, W. McKean	H. D. Robinson	..	Donaldson Bros. & Black, Ltd.	12.2.49
<i>Mulbera</i>	..	GFTM	D. J. B. Barling	..	P. A. Logan, A. Cockburn, I. S. Currie	N. Kehoe	..	British India Steam Nav. Co., Ltd.	1.3.50
<i>Myrtlebank</i>	..	GLQB	F. Hale	..	P. Kendall, M. Goddard, L. Stephens	J. E. Conway	..	Andrew Weir & Co., Ltd.	4.1.49
<i>Naticina</i>	..	GIGH	F. Mansfield	..	V. Graham	..	..	Anglo-Saxon Petroleum Co., Ltd.	..
<i>Neaera</i>	..	MQTG	R. G. Green	..	R. Stewart, L. Berridge, P. Brecknell	C. J. Carter	..	Anglo-Saxon Petroleum Co., Ltd.	26.11.49
<i>New Zealand Star</i>	..	GYCR	G. Owen, O.B.E., Cdr., R.N.R.	..	R. B. Stewart, J. T. Sheffield, D. Beighton, R. B. Douglas	T. Cahill	..	Blue Star Line, Ltd.	19.1.50
<i>Newfoundland</i>	..	GNMC	C. H. Kenyon	..	..	..	..	Furness Withy & Co., Ltd.	..

NAME OF VESSEL	CALL SIGN	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS	LAST RETURN RECEIVED
Norfolk	GJLV	B. Evans	R. Harding, E. Worster, J. Witchell, J. Gardyne	—, Wilman	Federal Steam Nav. Co., Ltd.	20.8.49
Northumberland	GBSJ	L. W. Fulcher	J. M. James, P. N. Jeanes, T. G. Fuller	R. N. MacDonald	Federal Steam Nav. Co., Ltd.	13.4.50
Norwegian	GDMC	C. S. Low	D. K. Dickson, J. Hunter, G. Clarke	H. Harner	Donaldson Bros. & Black, Ltd.	24.3.50
Nottingham	GCNC	H. D. Horwood, R.D., Cdr., R.N.R.				
Nova Scotia	GNNK	J. E. Wilson, O.B.E.	J. D. P. Williamson, R. Heys, J. Williams	W. C. Brock	Federal Steam Nav. Co., Ltd.	22.5.50
Novelist	GMLG	T. E. Steel	D. O. Percy, G. B. Roberts, G. K. Watson, T. Maddox	J. Timmons	Furness Withy & Co., Ltd.	10.1.50
Orari	GJKX	F. Loughheed	E. White, A. A. Faulkner, W. Dawes	J. K. Brindlewood	T. & J. Harrison	25.4.50
Orbita	GLTQ	J. Sutherland	E. G. Shephard, G. E. Mitchell, P. Whelbourn	J. Stone	New Zealand Shipping Co., Ltd.	1.3.50
Orcades	MABA	C. Fox, C.B.E.	—, Hardy, —, Kingswood, —, Finch, J. L. Radcliffe	N. A. Boon	Pacific Steam Nav. Co.	24.9.49
Orduna	GLTS	J. Williams	T. Wilcockson, A. L. Dixon, J. Owen	J. Clarke	Orient Steam Nav. Co. Ltd.	12.12.49
Orion	GYKL	N. A. Whimfield	M. R. Wilmshurst, P. Leighton, D. P. Blois	T. H. Shannon	Pacific Steam Nav. Co.	15.5.50
Ormonde	GLYC	C. K. Blake, O.B.E.	T. Thornton, E. V. Harris, J. S. Gregson	R. Oakley	Orient Steam Nav. Co., Ltd.	19.6.50
Orontes	GBXM	I. G. Goldsworthy, R.D., R.N.R.	R. F. Underwood, F. W. Woolley, D. Hays	F. Murphy	Orient Steam Nav. Co., Ltd.	3.8.50
Otranto	GFKV	R. J. Galpin, R.D., R.N.R.	J. W. Terry, C. S. Thomas, —, Francis, R. L. Clark	C. J. Seaton	Orient Steam Nav. Co., Ltd.	16.1.50
Pacific Exporter	GBJC	E. A. Kemp	R. E. G. Simmons, R. G. G. Bonney, D. C. Aitchison	A. Cory	Orient Steam Nav. Co., Ltd.	14.6.50
Pacific Fortune	GBFM	E. O. Evans	—, Whitby, —, Sturt, —, Willoughby	—, Thomas	Furness Withy & Co., Ltd.	17.3.50
Pacific Importer	GDKV	B. M. Collard	G. Cook, A. H. Linden, E. H. Gregson	J. A. Butcher	Furness Withy & Co., Ltd.	10.1.50
Pacific Liberty	GDFQ	W. Swann	J. Ferris, N. Land, C. Stiff	R. Faulkner	Furness Withy & Co., Ltd.	27.7.50
Pacific Nomad	GCRZ	W. Hutchinson	J. I. Meacham, L. M. Morgan, E. B. Pratt	A. Adamson	Furness Withy & Co., Ltd.	1.8.50
Pacific Stronghold	GNSQ	F. H. Perry	I. H. Clarke, D. R. Gibson, R. W. Keene, R. Hughes	S. A. Vincent	Furness Withy & Co., Ltd.	8.7.50
Pacific Unity	GUAN	H. S. Reavley, O.B.E.	M. Head, J. Purnier, E. McG. Hall	P. Allison	Furness Withy & Co., Ltd.	20.2.50
Palacio	GNJW	J. P. Harris	J. Sheppard, T. D. I. Platt, D.S.O. Lt.-Cdr., R.N.R., E. Pepper, A. E. Smith	T. A. Robinson	MacAndrews & Co., Ltd.	22.3.50
Palomares	GJGN	D. J. Thomas, M.B.E.	R. D. Cookman, W. T. Munday	M. F. Conroy	MacAndrews & Co., Ltd.	19.1.50
Pampas	GCDL	R. C. S. Woolley, R.D., R.N.R.				
Papamui	GDJW	H. N. Lawson, R.D., R.N.R.	J. Allason-Jones, S. D. Gibson, B. Sugden	J. Tuck	Royal Mail Lines, Ltd.	22.3.50
Paparaoa	GECZ	D. H. Chadwick	B. Applegate, P. J. Field, T. A. Bennett	L. J. Roberts	New Zealand Shipping Co., Ltd.	1.2.50
Paraguay	MAQS	H. V. Todd, R.D., R.N.R.	T. Train, R. Kinloch, M. Byrd	H. Hare	New Zealand Shipping Co., Ltd.	10.1.50
Pardo	GMNZ	T. Powell	G. A. Gibbons, D. Davies, J. T. Jones	P. Goulden	Royal Mail Lines, Ltd.	31.1.50
Parina	GCLQ	H. E. Sang	C. G. M. Smith, G. Dudley, J. M. Barber	H. J. Coates, P. J. Middleton, R. H. Turner	Royal Mail Lines, Ltd.	20.4.49
Paringa	MMBD	H. P. Mallet	J. T. Jones, R. C. Hunnisett, J. M. Barber	N. H. Crocker	Royal Mail Lines, Ltd.	21.3.49
Paritha	GSWQ	J. Chapman, R.D., R.N.R.	P. C. Reed, R. Elenor, C. B. Thompson	B. S. Magennis	P. & O. Steam Nav. Co.	12.2.49
Perim	GCGB	J. M. Peter	R. Arnott, R. J. Oglivie, J. K. Finlay	A. O'Sullivan	Cunard Steamship Co., Ltd.	16.11.49
Perthshire	GYWK	A. J. Hogg	P. J. Jackson, P. Hewitt, C. W. Lyon	F. Groves	P. & O. Steam Nav. Co.	7.10.49
			G. Black, M. P. R. Turner, G. Sharp	F. Rayner	Turnbull Martin & Co., Ltd.	4.4.50

<i>Philomel</i> ..	..	..	H. M. Selmer ..	D. C. Diggins, J. Mordin, W. Davies, P. Beech ..	A. Laurie ..	..	General Steam Nav. Co., Ltd. T. & J. Harrison ..	14. 11. 49
<i>Philosopher</i> ..	..	..	S. H. Coates ..	W. Kennedy, J. C. Egan, K. Harper ..	E. Jones ..	..	Royal Mail Lines, Ltd. ..	15. 5. 50
<i>Pilcomayo</i> ..	..	..	F. A. C. Thacker ..	R. W. Merry, D. G. Seward, C. A. Miller ..	L. P. Sayer ..	..	New Zealand Shipping Co., Ltd. Chr. Salvesen & Co. ..	29. 6. 50
<i>Pipiriki</i> ..	..	..	H. R. M. Smith ..	E. D. Smith, T. Gilmour, R. Marshall ..	W. Tulloch ..	..	..	14. 6. 50
<i>Polar Maid</i> ..	..	..	I. T. Leask ..	..	..	..	..	..
<i>Port Auckland</i> ..	..	..	W. G. Enright, O.B.E., Cdr., R.N.R. ..	..	..	..	..	..
<i>Port Brisbane</i> ..	..	..	H. Steele ..	G. K. Morris, P. Smith, W. M. Crossman ..	J. Griffiths ..	..	Port Line, Ltd. ..	18. 8. 49
<i>Port Chalmers</i> ..	..	..	H. W. Hazlewood ..	A. W. Kensett, D. J. A. Pritchard, C. Milne ..	E. G. Gunner ..	..	Port Line, Ltd. ..	14. 6. 50
<i>Port Jackson</i> ..	..	..	P. S. Ball ..	W. J. Williams, K. H. Henneker, D. Sinclair ..	R. C. Crompton ..	..	Port Line, Ltd. ..	19. 6. 50
<i>Port Lincoln</i> ..	..	..	L. Copeland ..	H. Thompson, — Webster, A. J. Wardell ..	P. J. McKeon ..	..	Port Line, Ltd. ..	1. 7. 50
<i>Port Macquarie</i> ..	..	..	E. E. Roswell ..	R. M. Liley, F. Lascelles, H. A. Sproul-Cran ..	R. Robertson ..	..	Port Line, Ltd. ..	23. 2. 49
<i>Port Napier</i> ..	..	..	G. W. Hazlewood ..	S. D. A. Pritchard ..	..	..	Port Line, Ltd. ..	..
<i>Port Phillip</i> ..	..	..	J. G. Lewis, O.B.E. ..	T. G. Ward, R. A. Holmes ..	B. McGovern ..	..	Port Line, Ltd. ..	2. 6. 50
<i>Port Pirie</i> ..	..	..	F. W. Bailey, M.B.E. ..	E. R. Cliffe, W. Wakefield, J. T. Martyn ..	W. Miller ..	..	Port Line, Ltd. ..	8. 3. 50
<i>Port Wellington</i> ..	..	..	E. J. Syvret ..	C. A. Rhodes, W. E. Bell, G. A. Blundell ..	J. S. McPherson ..	..	Port Line, Ltd. ..	14. 3. 50
<i>Port Wymndham</i> ..	..	..	E. E. Roswell ..	P. R. Lewis, M. E. Field, W. M. G. Lloyd ..	J. N. Courts ..	..	Port Line, Ltd. ..	2. 6. 50
<i>Potaro</i> ..	..	..	G. H. Taggart ..	M. Mortimer, R. R. Thompson, J. T. Price ..	T. J. Berry ..	..	Royal Mail Lines, Ltd. ..	16. 11. 49
<i>Pretoria Castle</i> ..	..	..	R. Wren, D.S.O. ..	J. Kerr, — Wetts, — Trayner ..	H. Oliver, M.B.E. ..	..	Union Castle Mail S.S. Co., Ltd. ..	23. 1. 50
<i>Radley</i> ..	..	..	C. J. Forster ..	H. G. Strickland, D. A. Barfoot, J. D. Todd ..	P. Probert ..	..	..	2. 5. 50
<i>Rakaia</i> ..	..	..	A. I. Robertson, R.D., R.N.R. ..	J. Bury, T. Wadie, J. Wright ..	F. Rathy ..	..	..	30. 9. 49
<i>Ramore Head</i> ..	..	..	E. W. Black ..	I. M. Piggott ..	..	..	New Zealand Shipping Co., Ltd. G. Heyn & Sons, Ltd. ..	..
<i>Ranchi</i> ..	..	..	A. G. Jenkins ..	E. R. Rose, J. Clayton, P. W. Holmes, D. Lightly ..	R. V. Gregory ..	..	..	18. 1. 49
<i>Rangitane</i> ..	..	..	T. L. Maltby ..	J. F. Milner ..	C. Lambe ..	..	P. & O. Steam Nav. Co. ..	..
<i>Rangitata</i> ..	..	..	G. Kinnell, O.B.E. ..	T. A. Bennett, G. Risley, G. Pool ..	S. Peeling ..	..	New Zealand Shipping Co., Ltd. ..	29. 6. 50
<i>Rangitiki</i> ..	..	..	P. B. Clarke, M.V.O., O.B.E., D.S.C. ..	M. J. Blake, R. E. Baker, W. M. Bell ..	S. Peeling ..	..	..	28. 10. 49
<i>Rangitoto</i> ..	..	..	A. E. Lettington, O.B.E., D.F.C. ..	G. Bevis, E. B. Mallett, J. Mason, A. Finch ..	E. R. Saunders ..	..	New Zealand Shipping Co., Ltd. ..	8. 5. 50
<i>Regent Hawk</i> ..	..	..	J. Ward ..	T. Moncrieff, A. R. Cardno, M. D. Keogh ..	R. W. Jones ..	..	Regent Petroleum Tankship Co., Ltd. ..	13. 2. 50
<i>Reina del Pacifico</i> ..	..	..	J. Whitehouse ..	J. A. Greenwood, J. B. Olsson, W. J. Campbell ..	J. Butler ..	..	..	29. 6. 50
<i>Repton</i> ..	..	..	D. Cowrie ..	D. M. Muir, W. Jones, O. N. Selwood ..	A. Lloyd ..	..	Pacific Steam Nav. Co. ..	27. 3. 50
<i>Rhodesia Star</i> ..	..	..	G. L. Evans ..	G. A. Horner, T. W. Jones, R. B. Escreet ..	A. R. Roe ..	..	Galbraith, Pembroke & Co., Ltd. ..	24. 2. 50
<i>Rialto</i> ..	..	..	H. Tyler ..	J. Etches, H. Riley, B. A. Gash ..	J. Sanderson ..	..	Lampart & Holt Line, Ltd. ..	21. 4. 50
<i>Richmond Castle</i> ..	..	..	A. C. M. Black ..	C. J. Willis, G. D. Atwood, A. Rossouw ..	F. Shea ..	..	Ellerman's Wilson Line, Ltd. ..	8. 7. 50
<i>Richmond Hill</i> ..	..	..	S. Sloan ..	— Huggins, D. Goodwin, — Heppingstone ..	— Longton ..	..	Union Castle Mail S.S. Co., Ltd. Counties Ship Management Co., Ltd. ..	20. 4. 50
<i>Ripplingham Grange</i> ..	..	..	R. Owen, O.B.E. ..	H. Butler, A. J. Builey, J. Taylor, H. H. Fawcett ..	R. G. J. Alton ..	..	..	1. 7. 50
<i>Rochester Castle</i> ..	..	..	T. Whatley ..	G. D. Fowler, R.D., Lt.-Cdr., R.N.R., J. V. H. Drummond, D. Kerr ..	G. Mein ..	..	..	25. 4. 49
<i>Roslin Castle</i> ..	..	..	F. R. Pope ..	R. J. Miller, G. E. Smith ..	J. Tuck ..	..	..	25. 7. 50
<i>Rowallan Castle</i> ..	..	..	R. A. D. Cambridge, D.S.C., R.D., Cdr., R.N.R. ..	T. Allan, M. W. Williams, M. N. R. Knowles ..	T. M. K. Knowles ..	..	..	9. 11. 49
<i>Roxburgh Castle</i>	I. D. B. Fisher ..	P. Eckford, M. Kenshole ..	L. W. Bettinson	25. 1. 50
<i>Rubystone</i>	E. J. Griffiths	Navigation & Coal Trade Co., Ltd.

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NAME OF VESSEL	CALL SIGN	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS	LAST RETURN RECEIVED
<i>Rutland</i>	GTCB	W. Thom	J. A. Williamson, C. S. Angus	J. Macfarlane	Currie Line, Ltd.	8.1.47
<i>Ruysdael</i>	MAQP	J. Burns	F. Howgego, J. T. Hibbert, P. Yorke	W. Vaughan	Bolton S.S. Co., Ltd.	14.3.50
<i>Sacramento</i>	GKCN	J. E. Robinson, M.B.E.	W. White, W. Walker, J. A. Ryley	J. P. Carter	Ellerman's Wilson Line, Ltd.	20.2.50
<i>St. Apollo</i>	GBBZ	J. H. Ellis, D.S.C.	J. H. Ellis, D.S.C., E. E. White, L. A. Abbey	E. E. White	T. Hamling & Co., Ltd.	24.2.50
<i>St. Crispin</i>	MBSW	A. E. Hall	D. L. Verity	D. L. Verity	B. A. Parkes	10.12.47
<i>Salacia</i>	GZRN	T. S. Graham	G. M. Clark, J. Hunter, I. MacGregor	W. Docherty	Donaldson Bros. & Black, Ltd.	16.1.50
<i>Salamanca</i>	GLSG	D. W. Hutchison	P. D. O'Driscoll, J. Peters, R. Riley, K. Williams, G. A. Duffey	F. Fitzgerald	Pacific Steam Nav. Co.	13.4.50
<i>Salaverry</i>	GBLQ	G. B. Wardale	A. Powell, K. Eastwood, W. R. Holmes	J. Slater	Pacific Steam Nav. Co.	11.1.50
<i>Salinas</i>	GLLK	A. G. Litherland	D. I. Jones, W. B. Holmes, T. Lewis	J. Cummins	Pacific Steam Nav. Co.	22.5.50
<i>Samanco</i>	MARQ	A. Lyall	A. D. Hunt, N. Crook, R. G. Mossop, D. Calvert	A. Hatfield	Pacific Steam Nav. Co.	20.4.49
<i>Samaria</i>	GJCF	J. Chapman, R.D., R.N.R.	T. Magee, D. P. Carroll, D. Frazer	E. P. Bishop	Cunard Steamship Co., Ltd.	19.12.49
<i>San Adolfo</i>	GZMK	L. Mays	R. Auric, D. A. Ward, D. N. Richards	B. A. Palin	Eagle Oil & Shipping Co., Ltd.	16.11.49
<i>San Cirilo</i>	GZMR	T. L. Pearson	J. Whyborn, R. Wilkinson, E. V. Mace	G. Minihane	Eagle Oil & Shipping Co., Ltd.	20.2.50
<i>San Felix</i>	GFJZ	C. Summers	J. T. Greener, A. T. Cross, A. G. Stephenson	W. L. Radcliffe	Eagle Oil & Shipping Co., Ltd.	29.7.50
<i>San Velino</i>	GCNY	M. A. Connell, O.B.E.	W. W. Gibb, J. Hunter, R. Atkinson	H. B. Hurst	Eagle Oil & Shipping Co., Ltd.	13.2.50
<i>San Veronica</i>	MASQ	W. Lamb	W. F. Hunt, J. D. Nash, P. Johnson	R. G. Morris	Eagle Oil & Shipping Co., Ltd.	22.5.50
<i>San Vulfrano</i>	MASR	F. R. H. Atkinson	K. Thomas, O. A. Baker, J. T. Bruce	B. Kimble	Eagle Oil & Shipping Co., Ltd.	28.11.49
<i>Santander</i>	GBNR	T. I. Naylor	T. Hiatt, F. Nurtall, I. A. Ireland	C. Murray	Pacific Steam Nav. Co.	3.5.49
<i>Sarmento</i>	MARW	G. H. Rice	H. Tomsett, D. Gaffrey, G. Irving	N. Roberts	Pacific Steam Nav. Co.	5.3.49
<i>Saxton Star</i>	MARX	J. D. W. Davies	D. Sims, R. E. Harvey, R. Williams	A. Reece	Blue Star Line, Ltd.	24.7.50
<i>Scholar</i>	GDCC	D. Wolstenholme	J. Bennett	A. Hudson	T. & J. Harrison	30.12.49
<i>Scottish Prince</i>	GDSK	J. L. Edwards	W. McInnes, W. Owens, O. T. Jones, P. A. Leighton	J. Clerk	Furness Withy & Co., Ltd.	3.3.49
<i>Selecter</i>	MARZ	W. H. Slaughter	W. Baker, W. D. Aitken, R. H. Rowlands	—, McKenzie	Andrew Weir & Co., Ltd.	28.2.50
<i>Settler</i>	GTTX	R. T. Phillips	J. H. Tomlinson, D. Lamont, A. N. Cockcroft	J. A. Wickens	Silver Line, Ltd.	15.5.50
<i>Shielbank</i>	GDPZ	C. S. Holbrook	V. Stafford, D. M. Lamont, A. Kirkby, G. A. Hubbard	P. Garvey	Silver Line, Ltd.	15.5.50
<i>Silverbriar</i>	GDWM	W. N. Tulloch	J. McK. Batchen, J. M. Donaldson, P. R. Miller	H. Mellington	Silver Line, Ltd.	2.6.50
<i>Silverguava</i>	GMVK	T. T. Morgan	P. C. Palmer, K. Allen, G. Stobo	—, Arthurs	Silver Line, Ltd.	19.8.49
<i>Silveroak</i>	GCQR	E. Stark	E. E. Reed, M. J. S. Beaumont, M. A. A. Oldakoski	P. Killen	Silver Line, Ltd.	2.6.50
<i>Silverplane</i>	MABL	R. H. Woodrow	K. Allen, H. Rose, M. Bingham	J. Thomas	Silver Line, Ltd.	30.12.49
<i>Silversandal</i>	GSFQ	J. Thompson	W. J. Ross, J. B. de Wet, F. E. West	J. Hands	Silver Line, Ltd.	21.4.50
<i>Silverteak</i>	GSFR	E. Palmer	E. Wilson, W. Locker, F. Newton, F. T. Lamb	C. Fletcher	Headlam & Son	29.3.50
<i>Silvervalnut</i>	GSFT	G. A. Reay	D. A. Hansing, J. L. Dunkley, —, Blyth, —, Rimmer	H. J. Camp	P. & O. Steam Nav. Co.	14.6.50
<i>Sneaton</i>	GDBS	W. Armstrong	N. I. Collett, W. F. Dan, M. J. Ruffhead	P. Broome	Federal Steam Nav. Co., Ltd.	8.7.50
<i>Socotra</i>	MASC	J. C. Last, O.B.E., Cdr., R.N.R.	A. Anderson	J. MacKinnon	Chr. Salvesen & Co.	20.4.50
<i>Somerset</i>	GJMN	D. C. Chadwick	D. Moar, G. Reid	G. R. Campbell	Chr. Salvesen & Co.	1.5.50
<i>South Africa Star</i>	GUAU	R. White, D.S.C.	W. Scott, N. McLean, D. A. Watt			
<i>Southern Atlantic</i>	GBLY	M. G. Oliver				
<i>Southern Collins</i>	MASE	L. Robertson				
<i>Southern Garden</i>	MASF	W. J. Swanson				

NAME OF VESSEL	CALL SIGN	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS	LAST RETURN RECEIVED
<i>Valacia</i> ..	MATR	J. G. Bradley, R.D., Cdr., R.N.R.	J. B. Mort, A. R. M. Graham, L. R. W. Porter	J. Patterson ..	Cunard Steamship Co., Ltd.	10.3.50
<i>Vancouver City</i> ..	GIGT	M. D. Louttit ..	J. Armstrong, J. B. Cuckow, E. Thompson	R. Butche ..	Sir Wm. Reardon Smith & Sons, Ltd.	8.5.50
<i>Vardulia</i> ..	GCFW	A. Sargent ..	J. M. Hughes, A. Crook, P. Watton	F. Berry ..	Cunard Steamship Co., Ltd.	14.10.48
<i>Vasconia</i> ..	MQJY	C. S. Evans ..	J. H. W. Locke, M. V. Meardon, E. Hall	R. Burns ..	Cunard Steamship Co., Ltd.	10.1.50
<i>Vestra</i> ..	MNNB	D. S. Archibald ..	D. C. White, H. M. Third ..	G. Williams ..	J. T. Salvesen & Co.	23.1.50
<i>Volo</i> ..	GPCJ	F. Ellison ..	T. Briggs, T. A. Firth, T. Johnson	J. Robinson ..	Ellerman's Wilson Line, Ltd.	22.4.48
<i>Waimana</i> ..	MATW	L. J. Hopkins ..	A. S. D. Masters, J. W. Webster, J. B. Cousins, R. H. Dennison	J. Murphy ..	Shaw Savill & Albion Co., Ltd.	1.2.50
<i>Waipawa</i> ..	GWXQ	F. A. Smith ..	J. Carroll, B. Hammond, H. M. Hignett, P. Atrowsmith	E. W. Robson ..	Shaw Savill & Albion Co., Ltd.	3.4.50
<i>Wairangi</i> ..	MATX	W. G. West ..	B. H. Clarke-Lens, K. C. Davis ..	J. Downie ..	Shaw Savill & Albion Co., Ltd.	14.3.50
<i>Waivera</i> ..	GBJB	G. P. McGraith ..	F. Charnley, J. Gunning, J. B. Cousins ..	G. Shaw ..	Watts, Watts & Co., Ltd.	25.1.50
<i>Wanstead</i> ..	GFLS	A. E. Woodcock ..	N. E. Upham, —, Taylor, —, Eckford ..	D. I. J. Townsend ..	Union Castle Mail S.S. Co., Ltd.	13.2.50
<i>Warwick Castle</i> ..	GRRJ	J. Trayner ..	E. Peirce ..	R. Brew ..	National Institute of Oceanography	12.11.48
<i>Wendover</i> ..	GFML	W. Donald ..	T. Morgan, —, Sayles, E. C. Bennett ..	W. Allen ..	Union Castle Mail S.S. Co., Ltd.	14.11.49
<i>William Scoreby</i> ..	GFNM	A. F. Macfie, Lt.-Cdr., R.N.R.	R. B. Williams	A. McLennan ..	Watts, Watts & Co., Ltd.	29.6.50
<i>Winchester Castle</i> ..	GTPZ	H. A. Deller ..	J. Whitehead, D. Wilson, T. F. Fields ..		Elders & Fyffes, Ltd.	28.1.48
<i>Woodford</i> ..	GFMM	F. W. Grist ..	P. T. Brentnall, I. Saunders, B. Ditchburn			
<i>Worcestershire</i> ..	GZFM	E. C. Brooks ..				
<i>Yoma</i> ..	GLPN	S. Thompson ..				
<i>Zealandic</i> ..	MAGI	P. F. Owens ..				
<i>Zent</i> ..	GRDW	F. P. Inch ..				
<i>*Queen of Bermuda</i> ..	GZKF	L. F. Banyard, O.B.E. ..	N. E. James ..	H. Stennett ..	Furness, Withy & Co., Ltd.	
<i>Conway, H.M.S.</i> ..	—	E. Hewitt, R.D., Capt., R.N.R.	The Senior Cadets	—	—	15.5.50
<i>Pangbourne Nautical College</i> ..	—	H. C. Skinner, O.B.E., Cdr., R.N.	The Senior Cadets	—	—	3.4.48
<i>Worcester, H.M.S.</i> ..	—	G. C. Steele, V.C., Cdr., R.N. (Retd.)	The Senior Cadets	—	—	3.4.50

* This ship has been recruited by the Bermuda Meteorological Service.

FLEET LIST (Australia) VOLUNTARY OBSERVING SHIPS

The following is a list of observing ships voluntarily co-operating with the Meteorological Service of Australia

NAME OF VESSEL	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/AGENTS
Selected Ships:				
<i>Canara</i>	W. Bird, O.B.E.	T. Woodward, J. D. Campbell, C. C. Springall	P. A. Stuart	British India Steam Nav. Co.
<i>Chupra</i>	J. D. Woods	C. Allerton, H. S. Strawbridge, W. L. Hillcoat	R. C. Whiting	British India Steam Nav. Co.
<i>Idomeneus</i>	J. L. Johnston	W. A. Clark, G. D. F. Cruickshank, P. S. Lombard, G. Moncks	A. N. Williams	A. Holt & Co.
<i>Koolinda</i>	J. S. Airey	J. Paulsen, J. Palfreyman, R. Seaward	H. White	Western Australian State Steamships
<i>Koomilya</i>	F. W. Roberts	C. Stewart, R. Sicklin, G. Steinbeck	F. Mackie	McIlwraith, McEacharn, Ltd.
<i>Koorunga</i>	F. McLean	A. D. Hanson, V. Bovell, J. A. Grey	R. M. Rees	McIlwraith, McEacharn, Ltd.
<i>Lowana</i>	L. Fry	C. A. Blow, T. H. Millidge, J. K. Saint	J. Bell	Melbourne Steamship Co., Ltd.
<i>Nellore</i>	T. Mills	A. Johnston, G. Champion, G. Cleveland, K. Skinner	J. Dennison	Eastern & Australian S.S. Co., Ltd.
<i>Orestes</i>	F. J. Cockburn	A. Surtees, G. Kitching, R. Denning, R. P. Beckett	J. E. Audsley	A. Holt & Co.
<i>River Burnett</i>	L. G. Ramsay	R. Campbell, H. W. Robinson, T. Beckinsale	G. Harper	Australian Shipping Board
<i>River Clarence</i>	W. W. Fish	A. T. Lake, I. K. S. Adam, S. F. Dockwell	M. Pearson	Australian Shipping Board
<i>River Mitta</i>	A. Knight	G. Davies, K. Clarence, W. Wiggins	M. Hayter	British Phosphate Commission
<i>Triadic</i>	A. Rhoades	J. P. Milton, W. L. Harboard, W. B. Jeavons	J. Ward	British Phosphate Commission
<i>Trienza</i>	P. Richardson	D. Neilson, D. Robb, K. Oliver	R. G. Neale	British Phosphate Commission
<i>Triona</i>	C. L. Evans	P. W. Thompson, S. E. B. Harris, B. J. Robertson	C. Palmer	A. Holt & Co.
Supplementary Ships:				
<i>Diomed</i>	A. M. Caird	H. A. Jeffrey, K. W. Dunlop, E. Webb		Australian Shipping Board
<i>Derrigo</i>				Western Australian State Steamship
<i>Kybra</i>				

FLEET LIST (Hong Kong) VOLUNTARY OBSERVING SHIPS

The following is a list of observing ships voluntarily co-operating with the Royal Observatory, Hong Kong

NAME OF SHIP	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	SHIPPING COMPANY OR OPERATORS
<i>Anhui</i>	A. Naismith	H. Pilling, F. W. Ridley, G. Young	Leung Shu Fun	China Navigation Co., Ltd.
<i>Anking</i>	E. H. Histed	W. Davidson, J. G. de Veale, G. Baxter	G. W. Moore	China Navigation Co., Ltd.
<i>Caroline Moller</i>	W. J. Lang	L. Klæboe, H. L. Whitlock, N. F. Andrade	P. N. Bhatt	Mollers (Hong Kong), Ltd.
<i>Chang Sha</i>	C. P. Muller	W. J. Bunney, S. Fergusson, R. Tasker, P. Baxter	R. Gooseman	China Navigation Co., Ltd. Burma Navigation Corporation, Ltd.
<i>Chit Setn</i>	K. D. Lam	W. J. Bartlett, P. D. Coles, Yeung Koh Ching	Lai Choi Hoi	Indo-China Steam Navigation Co., Ltd.
<i>Choy Sang</i>	R. G. Stanton	E. M. Norman, D.S.C., E. Jones, Yuan Tso Ying	E. A. West	Indo-China Steam Navigation Co., Ltd.
<i>Chun Sang</i>	D. G. R. Kinnear	T. J. Ashcroft, E. A. Ladbroke, R. Grievie, R. W. E. Little	C. D. Evans	Australia China Line, Ltd.
<i>Eastern Glory</i>	L. McRae	M. I. Groundwater, M. J. K. Crichton, J. D. Markland	R. E. Stewart	Australia China Line, Ltd.
<i>Eastern Saga</i>	S. Schofield	R. A. P. Foxley, Fong Chao Hong, Cheung Siu Tung	F. Delage	Hong Kong Eastern Shipping Co., Ltd. Indo-China Steam Navigation Co., Ltd.
<i>Eastern Trader</i>	J. L. Baines	L. C. Cox, N. B. Hall, A. D. Lamb	T. R. Crockett	Hong Kong Eastern Shipping Co., Ltd. Indo-China Steam Navigation Co., Ltd.
<i>E. Sang</i>	G. Owens	D. J. Mander, J. F. O'Connor, T. R. Young	Tsang Pui Leung	China Navigation Co., Ltd.
<i>Fengtien</i>	F. Gibbs	A. V. Harrison, J. R. Brett, A. P. Sokoloff	Leung Man Hin	China Navigation Co., Ltd.
<i>Foochow</i>	F. Kelly	G. D. Pentney, F. J. Owen, P. P. Garbutt	G. H. Parker	Royal Fleet Auxiliary
<i>Fort Charlotte</i>	F. P. Hennin, O.B.E.	W. J. Young, D. Harper	Chan Sin Mang	Mollers' (Hong Kong), Ltd.
<i>Frosty Moller</i>	P. R. Dixon	G. A. Abbs, R. Perry, A. Roddis	Leung Tjeuk Shing	China Navigation Co., Ltd.
<i>Fukien</i>	E. G. Thomas	B. V. Dobbie, B. Kinnmond, J. Purdy	A. M. A. Champney	Royal Fleet Auxiliary
<i>Green Ranger</i>	E. Payne	F. Kelly, J. C. E. Crowden, R. N. Frappell	D. G. Sims	Mollers' (Hong Kong), Ltd.
<i>Greystoke Castle</i>	L. Rowe			
<i>Hai Lee</i>	J. Hansen			
<i>Hai Meng</i>				
<i>Hang Sang</i>	L. W. Harrison	K. P. Wilkinson, A. Moyse, A. Nelson	Young Shang	China Siam Line
<i>Han Yang</i>	G. P. Cope	L. Walker, A. C. Ingles, Lu Ping Hai	Lo Kin Chek	Indo-China Steam Navigation Co., Ltd. China Navigation Co., Ltd.
<i>Hertrich Jessen</i>	G. R. Hansen			Jebsen Steamship Co., Ltd.
<i>Hermelin</i>	B. Eliassen			China Siam Line
<i>Hew Sang</i>	D. G. Burleigh	B. D. Hoatson, I. Rowland-Jones, H. Wood	Ho Hung Ki	Indo-China Steam Navigation Co., Ltd.
<i>Hin Sang</i>	W. T. Rochester	E. P. Ladbroke, L. Manser, D. D. Battell	Tang Kwong Ho	Indo-China Steam Navigation Co., Ltd.
<i>Hiram</i>	O. Olsen			China Siam Line
<i>Hoi Houto</i>	O. M. Klette	K. Munkejord, O. Ofteidal, H. Kiristofersen		China Siam Line
<i>Hoi Wong</i>	M. Bierkenes	M. Fiasaen, B. Macland, O. Lindanger	A. J. Takvam	Jebooshun Shipping Co.
<i>Hunan</i>	A. H. Finnie	D. P. Manthorpe, P. Flory, J. R. Durup	H. Bru	Jebooshun Shipping Co.
<i>Hupoh</i>	J. W. E. Warrior	W. Pollock, J. R. Suffren, R. J. Porter	Choi Pong Cheung	China Navigation Co., Ltd.
<i>Kut Sang</i>	C. R. Harris	J. M. McFarlane, B. D. Johnson, J. G. Perrin	Tsang Kan	China Navigation Co., Ltd.
			G. McDonald	Indo-China Steam Navigation Co., Ltd.

<i>Kwei Yang</i>	..	W. B. B. Paul ..	..	H. M. Stanfield, V. Walker, J. C. Anderson	..	Liu Yuk Kong	..	China Navigation Co., Ltd.
<i>Lok Sang</i> ..	..	R. I. Groundwater ..	..	F. W. Cross, J. McK. Marshall, Keng Jen Ko	..	J. E. Chew ..	..	Indo-China Steam Navigation Co., Ltd.
<i>Mau Sang</i>	..	R. G. Gillespie ..	..	D. R. McFadzien, C. Przybylinski, A. O. Jakobsen	..	Ma Ping Leung	..	Indo-China Steam Navigation Co., Ltd.
<i>Mui Ann</i> ..	..	A. Bj. Justad ..	..	H. Pettersen, T. Johnsen, H. Asheim ..	..	A. Ovlund ..	..	Chin Seng Hong Shipping Co.
<i>Mui Heng</i> ..	..	A. G. Gorham ..	..	W. A. Findlay, L. L. Watson, P. Pott, D. J. Evans	..	V. B. Ritson ..	..	Mollers' (Hong Kong), Ltd.
<i>Muncaster Castle</i> ..	..	D. Needham ..	..	K. McLeod, E. W. Woodcock, P. Bulatoff	..	T'ang Chung Fui	..	China Navigation Co., Ltd.
<i>Pakhoi</i> ..	..	D. McG. Holmes ..	..	P. T. Yeandle, M. D. B. Sweeny, Li Che Lim	..	Li San Kau ..	..	China Navigation Co., Ltd.
<i>Poyang</i> ..	..	J. B. Cooke ..	..	L. O. Harborow, J. R. Snelgrove, D. Raine, W. G. White	..	R. O. Smith ..	..	British India Steam Navigation Co., Ltd.
<i>Sangola</i> ..	..	J. W. Evans ..	..	W. J. Coburn, S. E. B. Harris, R. D. A. Owen	..	Pun Kwong Yee	..	China Navigation Co., Ltd.
<i>Shansi</i> ..	..	J. G. Smart ..	..	R. E. Selwyn-Jones, D. I. Robertson, V. A. Boutskoi	..	Chau Wing ..	..	China Navigation Co., Ltd.
<i>Shengking</i> ..	..	A. Taylor ..	..	A. Watson, J. Hunter, P. H. Ward	..	Chin Fook On	..	China Navigation Co., Ltd.
<i>Sinkiang</i> ..	..	W. Brawn, M.B.E.	..	D. S. Hutton, H. W. Bolles, P. R. Daniels	..	J. E. Ward ..	..	British India Steam Navigation Co., Ltd.
<i>Sirdhana</i> ..	..	E. Bruce ..	..	V. R. Woolfe, J. C. Christal, Laigen Kwong	..	F. Gelatly ..	..	China Navigation Co., Ltd.
<i>Soochow</i> ..	..	O. Fox ..	..	G. D. O. Rennie, D. S. Southey, T. M. J. Davies	..	Leung Cheuk Shing	..	China Navigation Co., Ltd.
<i>Szechuen</i> ..	..	A. H. Bathurst ..	..	A. E. Lovgreen, Chan Sai Chung	..	Pong Shiu Lun	..	Shun Cheong Steam Navigation Co.
<i>Tai Chung Shan</i> ..	..	Y. N. Campbell	..	B. McLennan, A. O. Atkinson, H. A. Ledeboer	..	D. F. MacDonald	..	China Navigation Co., Ltd.
<i>Tai Yuan</i> ..	..	E. J. Thomson ..	..	J. R. G. Findlay, W. Graham, J. R. Burston	..	Im Ki ..	..	Indo-China Steam Navigation Co., Ltd.
<i>Tak Sang</i> ..	..	J. McKinlay ..	..	C. A. N. Baker, G. A. Rankin, W. T. Masters	..	Wai Pun Un ..	..	China Navigation Co., Ltd.
<i>Tsinan</i> ..	..	H. G. Goddard ..	..	H. A. Greenwood, C. M. Wilson, A. A. Watson	..	A. G. Lum ..	..	Indo-China Steam Navigation Co., Ltd.
<i>Wing Sang</i>	..	N. H. King ..	..	L. I. Ovsianikoff, R. P. Farquar, K. Y. Feng	..	A. W. J. Leveck	..	Indo-China Steam Navigation Co., Ltd.
<i>Wo Sang</i> ..	..	F. Hindle	..	S. Davidson, A. Harper, Wu Kwei Wen	..	Cheung Shing Cheung	..	China Navigation Co., Ltd.
<i>Yochow</i> ..	..	W. E. Hargrave	..	J. R. Keddie, C. Stark, D. J. Coombes ..	..	U In San ..	..	China Navigation Co., Ltd.

FLEET LIST (New Zealand) VOLUNTARY OBSERVING SHIPS

The following is a list of observing ships, voluntarily co-operating with the Meteorological Service of New Zealand.

NAME OF VESSEL	CAPTAIN	OBSERVING OFFICER	RADIO OFFICER	OWNERS
Selected Ships :				
<i>Kaitoke</i> ..	A. F. Inman ..	G. R. Inkster ..	L. M. Harvey ..	Union S.S. Co., Ltd.
<i>Karitane</i> ..	C. W. Dovey ..	W. Weatherup ..	A. E. Whalley ..	Union S.S. Co., Ltd.
<i>Kauri</i> ..	J. Billingham ..	R. E. P. Williams ..	R. B. Blake ..	Union S.S. Co., Ltd.
<i>Komata</i> ..	W. J. Hill ..	P. Nash ..	G. H. Willis ..	Union S.S. Co., Ltd.
<i>Kopua</i> ..	F. T. Chapman ..	I. G. Sykes ..	W. L. Lambie ..	Union S.S. Co., Ltd.
<i>Korowai</i> ..	R. Blampied, M.B.E. ..	L. J. Lynch ..	T. Roberts ..	Union S.S. Co., Ltd.
<i>Koromiko</i> ..	H. S. Collier ..	H. G. Harwood ..	W. Hawkins ..	Union S.S. Co., Ltd.
<i>Kurouo</i> ..	F. W. Gibson ..	A. W. Hannam ..	B. G. Hart ..	Union S.S. Co., Ltd.
<i>Matua</i> ..	A. R. Russell ..	R. D. Bennett ..	H. A. Shields ..	Union S.S. Co., Ltd.
<i>Monowai</i> ..	L. C. Boulton ..	I. Hare ..	W. A. Taylor ..	Government of New Zealand
<i>Monowai</i> ..	G. B. Morgan, D.S.O. ..	K. D. Mitchell ..	J. G. Rea ..	Union S.S. Co., Ltd.
<i>Port Waikato</i> ..	M. W. Monaghan ..	J. Drummond ..	I.C.L., Ltd. ..	Union S.S. Co., Ltd.
<i>Waipori</i> ..	C. Keith ..	J. Flette ..	Holm & Co. ..	Union S.S. Co., Ltd.
<i>Wairata</i> ..	S. C. Angus ..	R. K. Brown ..	J. Anderson ..	Union S.S. Co., Ltd.
<i>Wairimu</i> ..	W. E. Jones ..	P. W. Callender ..	A. A. Lindsay ..	Union S.S. Co., Ltd.
<i>Waitaki</i> ..	C. Burgess ..	I. G. Waites ..	C. Ward ..	Union S.S. Co., Ltd.
<i>Waitemata</i> ..	E. F. Rainbow ..	R. G. Anderson ..	B. Sword ..	Union S.S. Co., Ltd.
<i>Waitemata</i> ..	D. M. Keith ..	J. A. Barbour ..		Union S.S. Co., Ltd.
Supplementary Ships :				
<i>James Cook</i> ..	A. Deed ..	E. G. Rapley ..	A. J. Jeans ..	H. C. S. Coasters
<i>Kaimiro</i> ..	D. C. Champion ..	H. A. Hodgkinson ..		Union S.S. Co., Ltd.
<i>Kakapo</i> ..	R. Ainsworth ..	E. G. Trousdale ..	E. A. Miller ..	Union S.S. Co., Ltd.
<i>Kamo</i> ..	A. W. Pert ..	S. Peterson ..		Union S.S. Co., Ltd.
<i>Karepo</i> ..	W. Kehoe ..	E. M. Bienenman ..		Union S.S. Co., Ltd.
<i>Karigi</i> ..				Union S.S. Co., Ltd.
<i>Kiritika</i> ..	G. M. Schofield ..	A. B. MacDonald ..	R. N. Dennis ..	Union S.S. Co., Ltd.
<i>Manuka</i> ..	E. J. Johnston ..	H. J. Southworth ..	H. T. Fernandes ..	Chatham Fishing Co.
<i>Omana</i> ..	H. L. P. Brown ..	L. Lindsay ..		Union S.S. Co., Ltd.
<i>Viti</i> ..	F. A. Barrett ..			Tasman S.S. Co., Ltd.

FLEET LIST (South Africa)

The following is a list of observing ships voluntarily co-operating with the Meteorological Service of South Africa

NAME OF SHIP	CAPTAIN	OBSERVING OFFICER	SENIOR RADIO OFFICER	SHIPPING COMPANY OR OPERATOR
<i>Africana II</i>	R. L. V. Shannon, O.B.E.	A. Thomas, D.S.C.	E. Grover	Department of Fisheries, Cape Town
<i>Aguilhas</i>	T. Y. Thompson	A. Harvey	R. Parker	South African Railways Ships, Cape Town
<i>Aloe</i>	R. Lewis	K. M. Botha	R. E. Star	South African Railways Ships, Cape Town
<i>Baltic Coast</i>	H. H. Coor	L. W. Coltham	F. P. Garnett	Thesen's Steamship Co., Cape Town
<i>Bokkeveld</i>	A. W. Lewis	I. A. Clark	I. D. Flood	Arden Hall Steamship Co., Pretoria
<i>Constantia</i>	A. M. Barlow	P. A. T. Gordon	J. Stamp	South African Marine Corporation, Cape Town
<i>Damaraland</i>	N. Waiter	M. A. Hoffman		South African Lines, Ltd., Cape Town
<i>Empire Victory</i>				Union Whaling Co., Ltd.
<i>Gita</i>	J. Lundberg		M. Hutchons	Irvin & Johnston, Ltd., Cape Town
<i>Kaapland</i>	C. B. Adkins	P. D. Aldworth	G. Adey	South African Lines, Cape Town
<i>Morgenster</i>	F. D. Wilkinson	H. M. Stephens	P. Goggin	South African Marine Corporation, Cape Town
<i>Namaqualand</i>	B. Parnaby	C. B. O'Connor		South African Lines, Cape Town
<i>Pequeña</i>		M. T. Scott		Tristan Exploration Co., Cape Town
<i>Vergelegen</i>	D. W. Thorpe	N. T. Casley	P. Boyd	South African Marine Corporation, Cape Town

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FLEET LIST (India)

The following is a list of observing ships, voluntarily co-operating with the India Meteorological Department.

NAME OF VESSEL	OWNERS
Selected Ships :	
<i>Alavi</i>	Asiatic Steam Nav. Co., Ltd.
<i>Bahadur</i>	Asiatic Steam Nav. Co. Ltd.
<i>Chanda</i>	British India Steam Nav. Co., Ltd.
<i>Dara</i>	British India Steam Nav. Co., Ltd.
<i>Dumra</i>	British India Steam Nav. Co., Ltd.
<i>Dwaraka</i>	British India Steam Nav. Co., Ltd.
<i>Englishtan</i>	Scindia Steam Nav. Co., Ltd.
<i>Havildar</i>	Asiatic Steam Nav. Co., Ltd.
<i>Islami</i>	Asiatic Steam Nav. Co., Ltd.
<i>Jaladuta</i>	Scindia Steam Nav. Co., Ltd.
<i>Jalaganaga</i>	Scindia Steam Nav. Co., Ltd.
<i>Jalayyoti</i>	Scindia Steam Nav. Co., Ltd.
<i>Jalamani</i>	Scindia Steam Nav. Co., Ltd.
<i>Jalamohan</i>	Scindia Steam Nav. Co., Ltd.
<i>Jalarashmi</i>	Scindia Steam Nav. Co., Ltd.
<i>Jalaveera</i>	Scindia Steam Nav. Co., Ltd.
<i>Jalavihar</i>	Scindia Steam Nav. Co., Ltd.
<i>Jalayamuna</i>	Scindia Steam Nav. Co., Ltd.
<i>Jehangir</i>	Asiatic Steam Nav. Co., Ltd.
<i>Kampala</i>	British India Steam Nav. Co., Ltd.
<i>Karanja</i>	British India Steam Nav. Co., Ltd.
<i>Karapara</i>	British India Steam Nav. Co., Ltd.
<i>Khandalla</i>	British India Steam Nav. Co., Ltd.
<i>Khosrou</i>	Asiatic Steam Nav. Co., Ltd.
<i>Maharaja</i>	Asiatic Steam Nav. Co., Ltd.
<i>Masimpur</i>	Burma Oil Co.
<i>Nadir</i>	Asiatic Steam Nav. Co., Ltd.
<i>Nahadevi</i>	Asiatic Steam Nav. Co., Ltd.
<i>Nurjehan</i>	Asiatic Steam Nav. Co., Ltd.
<i>Pundit</i>	Asiatic Steam Nav. Co., Ltd.
<i>Rajput</i>	Asiatic Steam Nav. Co., Ltd.
<i>Rajula</i>	British India Steam Nav. Co., Ltd.
<i>Shahjehan</i>	Asiatic Steam Nav. Co., Ltd.
<i>Shirala</i>	British India Steam Nav. Co., Ltd.
<i>Singu</i>	Burma Oil Co.
<i>Sirsa</i>	British India Steam Nav. Co., Ltd.
<i>Subedar</i>	Asiatic Steam Nav. Co., Ltd.
<i>Tairea</i>	British India Steam Nav. Co., Ltd.
<i>Vasna</i>	British India Steam Nav. Co., Ltd.
<i>Yenang Young</i>	Burma Oil Co.
Supplementary Ships :	
<i>Akbar</i>	Asiatic Steam Nav. Co., Ltd.
<i>Badarpur</i>	Burma Oil Co.
<i>Bamora</i>	British India Steam Nav. Co., Ltd.
<i>Barla</i>	British India Steam Nav. Co., Ltd.
<i>Barpeta</i>	British India Steam Nav. Co., Ltd.
<i>Begum</i>	Asiatic Steam Nav. Co., Ltd.
<i>Binfield</i>	British India Steam Nav. Co., Ltd.
<i>Itaura</i>	British India Steam Nav. Co., Ltd.
<i>Jaladurga</i>	Scindia Steam Nav. Co., Ltd.
<i>Jalagopal</i>	Scindia Steam Nav. Co., Ltd.
<i>Jalakrishna</i>	Scindia Steam Nav. Co., Ltd.
<i>Jalaratna</i>	Scindia Steam Nav. Co., Ltd.
<i>Jalavijaya</i>	Scindia Steam Nav. Co., Ltd.
<i>Malika</i>	Asiatic Steam Nav. Co., Ltd.
<i>Nurani</i>	Asiatic Steam Nav. Co., Ltd.
<i>Pasha</i>	Asiatic Steam Nav. Co., Ltd.
<i>Risalder</i>	Asiatic Steam Nav. Co., Ltd.
<i>Rizwani</i>	Asiatic Steam Nav. Co., Ltd.

FLEET LIST (Canada) VOLUNTARY OBSERVING SHIPS

The following is a list of observing ships voluntarily co-operating with the Meteorological Service of Canada.

NAME OF VESSEL	OWNERS
Selected Ships	
<i>Aorangi</i>	Canadian Australasian Line.
<i>Canadian Challenger</i>	"Canadian Challenger", Ltd. (Canadian National Steamships).
<i>Canadian Constructor</i>	"Canadian Constructor", Ltd. (Canadian National Steamships).
<i>Canadian Cruiser</i>	"Canadian Cruiser", Ltd. (Canadian National Steamships).
<i>Fort Amherst</i>	Furness, Withy & Co.
<i>Fort Townshend</i>	Furness, Withy & Co.
<i>Imperial Alberta</i>	Imperial Oil, Ltd.
<i>Imperial Quebec</i>	Imperial Oil, Ltd.
<i>Imperial Toronto</i>	Imperial Oil, Ltd.
<i>Imperial Winnipeg</i>	Imperial Oil, Ltd.
<i>John S. Pillsbury</i>	Upper Lakes and St. Lawrence Transportation Co. Ltd.
<i>Lady Nelson</i>	"Lady Nelson", Ltd. (Canadian National Steamships).
<i>Lady Rodney</i>	"Lady Rodney", Ltd. (Canadian National Steamships).
<i>Lake Minnewanka</i>	Western Canada Steamship Co.
<i>Lake Pennask</i>	Western Canada Steamship Co.
<i>Lake Sicamous</i>	Western Canada Steamship Co.
<i>Lake Winnipeg</i>	Western Canada Steamship Co.
<i>Ottawa Valley</i>	Montreal, Australia, New Zealand Line
<i>Waihemo</i>	Canadian Union Line, Ltd.
<i>Waikawa</i>	Canadian Union Line, Ltd.
<i>Wairuna</i>	Canadian Union Line, Ltd.
<i>Waitomo</i>	Canadian Union Line, Ltd.
<i>Yamhill</i>	Imperial Oil, Ltd.
Lightships :	
<i>Lurcher Lightship</i>	Minister of Transport.
<i>Sambro Lightship</i>	Minister of Transport.
Supplementary Ships :	
<i>Lake Maitou</i>	Western Canada Steamship Co.
<i>Pinnacles</i>	Shell Canadian Tankers Ltd.
<i>Rupert Island</i>	Hudson's Bay Co.
<i>Tantara</i>	Johnson Walton Steamships

LIGHT VESSELS

The following Light Vessels voluntarily observe and report from coastal waters of Great Britain.

NAME OF VESSEL	MASTERS
<i>Dowsing</i>	J. R. Audley, S. R. Smith
<i>East Goodwin</i>	A. Giblin, F. M. England
<i>Gallop</i>	F. I. Butcher, L. A. Brett, P. G. Blyth
<i>Humber</i>	B. Hadden, R. J. Middleton, E. A. Sparks.
<i>Newarp</i>	W. J. Sheaf
<i>Royal Sovereign</i>	G. W. Broom, C. G. Isaac
<i>Shipwash</i>	W. J. Hall, J. W. R. Reeve
<i>Smith's Knoll</i>	

MARID SHIPS

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

NAME OF VESSEL	CALL SIGN	CAPTAIN	OWNERS/MANAGERS
<i>Actuality</i>	GPPF	W. Conn	F. T. Everard & Sons, Ltd.
<i>Allurity</i>	MQFS	W. N. Fisher	F. T. Everard & Sons, Ltd.
<i>Amsterdam</i>	MFBP	C. R. Baxter, D.S.C.	British Railways (Eastern Region)
<i>Angelo</i>	GQFY	S. N. Stokes	Ellerman's Wilson Line, Ltd.
<i>Ariosto</i>	GKPW	A. Morril	Ellerman's Wilson Line, Ltd.
<i>Atlantic Coast</i>	GWSY	P. A. Johnson	Coast Lines, Ltd.
<i>Baltraffic</i>	GTXX	F. S. J. Butcher	United Baltic Corporation, Ltd.
<i>Belhaven</i>	MNXZ	P. L. Irvine	London & Edinburgh Shipping Co., Ltd.
<i>Belvina</i>	MLZF	J. Philip	London & Edinburgh Shipping Co., Ltd.
<i>British Scout</i>	GJKD	R. S. Hughes	British Tanker Co., Ltd.
<i>Cambria</i>	GBKT	W. H. Hughes, D.S.C.	British Railways (London Midland Region)
<i>Clupea</i>	GOAJ	J. Jappy	Scottish Home Department (Fishery Division).
<i>Corfen</i>	GDJX	E. R. W. Allen	Wm. Cory & Son, Ltd.
<i>Corfleet</i>	GWTD	A. G. Waller	Wm. Cory & Son, Ltd.
<i>Corfoss</i>	MAHX	F. E. W. Farrant	Wm. Cory & Son, Ltd.
<i>Cormain</i>	MAHT	R. B. Armstrong	Wm. Cory & Son, Ltd.
<i>Cormeoad</i>	GDBX	T. Slack	Wm. Cory & Son, Ltd.
<i>Cormist</i>	GDVT	R. J. Barrow	Wm. Cory & Son, Ltd.
<i>Cormoat</i>	GLKV	J. U. Hansen	Wm. Cory & Son, Ltd.
<i>Cormull</i>	MAHS	E. S. Keane	Wm. Cory & Son, Ltd.
<i>Corncrake</i>	MJKL	R. Beattie	General Steam Nav. Co. Ltd.
<i>Crane</i>	MMCS	J. W. Howgego	General Steam Nav. Co. Ltd.
<i>Drake</i>	MMYC	R. B. Langley	General Steam Nav. Co. Ltd.
<i>Duke of Argyll</i>	GNVX	F. Adern, D.S.C.	British Railways (London Midland Region)
<i>Duke of Lancaster</i>	GCPQ	E. B. Serjeant	British Railways (London Midland Region)
<i>Duke of Rothesay</i>	GNVL	H. Thompson	British Railways (London Midland Region)
<i>Eildon</i>	MLZL	J. Little	G. Gibson & Co., Ltd.
<i>Empire Cedric</i>	GRSC	W. N. Johnson	Frank Bustard & Sons, Ltd.
<i>Empire Doric</i>	MAVQ	—	Frank Bustard & Sons, Ltd.
<i>Empire Gaelic</i>	MAVR	H. T. Green	Frank Bustard & Sons, Ltd.
<i>Explorer</i>	MRCZ	D. S. Sandison	Scottish Home Department (Fishery Division).
<i>Falcon</i>	MNXL	S. W. Devlin	General Steam Nav. Co., Ltd.
<i>Golden Dawn</i>	—	Lieut. A. Adamson, M.B.E., R.N.R.	The Captain
<i>Grebe</i>	MAEY	E. C. Painter, D.S.C.	General Steam Nav. Co., Ltd.
<i>Guernsey Coast</i>	MANS	F. C. Lucas, M.B.E.	British Channel Islands Shipping Co., Ltd.
<i>Harrogate</i>	MNDB	C. H. Tully	Associated Humber Lines.
<i>Hibernia</i>	MBMT	R. Woodhall	British Railways (London Midland Region)
<i>Highwood</i>	MLOQ	J. Coupland	E. R. Newbigin, Ltd.
<i>Hindlea</i>	GWDQ	A. E. Holder	Hindlea Shipping Co., Ltd.
<i>Isle of Guernsey</i>	GQYI	F. E. Trout	British Railways (Southern Region)
<i>Isle of Jersey</i>	GRBQ	A. Light	British Railways (Southern Region)
<i>Isle of Sark</i>	GTSR	C. E. Durley	British Railways (Southern Region)
<i>London Merchant</i>	MBRZ	C. A. Piper	London Scottish Lines, Ltd.
<i>Malmo</i>	GQCQ	A. D. Seath	Ellerman's Wilson Line, Ltd.
<i>Melrose</i>	MCFD	G. Simpson	G. Gibson & Co., Ltd.
<i>Melrose Abbey</i>	GSYW	J. Laverack	Associated Humber Lines
<i>Minna</i>	GKPS	T. Mather	Scottish Fisheries.
<i>Moray Coast</i>	MKDL	J. T. Williams	Coast Lines, Ltd.
<i>Ocean Coast</i>	GYMP	— Mearns	Coast Lines, Ltd.
<i>Petrel</i>	MBCV	W. G. Aplin	General Steam Nav. Co., Ltd.
<i>Plover</i>	MLLV	J. W. Tait	General Steam Nav. Co., Ltd.
<i>St. Clair</i>	MMFX	T. Gifford	North of Scotland & Orkney & Shetland Steam Nav. Co., Ltd.
<i>St. Clement</i>	GRGM	W. J. Ramsay	North of Scotland & Orkney & Shetland Steam Nav. Co., Ltd.
<i>St. Helier</i>	GLBT	R. Pitman, D.S.C.	British Railways (Western Region).
<i>St. Julien</i>	GLEV	L. J. Richardson	British Railways (Western Region).
<i>St. Magnus</i>	GFYK	W. G. Stout	North of Scotland & Orkney & Shetland Steam Nav. Co., Ltd.
<i>St. Ninian</i>	GJBB	A. M. Dundas	North of Scotland & Orkney & Shetland Steam Nav. Co., Ltd.
<i>St. Rognvald</i>	GCDS	W. Mackay	North of Scotland & Orkney & Shetland Steam Nav. Co., Ltd.
<i>Salerno</i>	GSPW	— Poultney	Ellerman's Wilson Line, Ltd.
<i>Scotia</i>	GPYM	E. A. Bruce	Scottish Home Dept. (Fishery Division).
<i>Selby</i>	MLFT	A. W. Johnston	Associated Humber Lines.
<i>Sieve Bawn</i>	MQCC	J. L. Williams	British Railways (London Midland Region)
<i>Sieve Bearnagh</i>	MLNL	A. E. Willmott, D.S.C., R.D., R.N.R.	British Railways (London Midland Region).
<i>Sieve Bloom</i>	MQDD	W. E. Meade	British Railways (London Midland Region).
<i>Sieve Donard</i>	MQCQ	R. E. Sherwood	British Railways (London Midland Region).
<i>Sieve League</i>	MQCM	F. G. J. Manning, D.S.C.	British Railways (London Midland Region).
<i>Sieve More</i>	MQBM	J. Hughes	British Railways (London Midland Region).
<i>Southern Coast</i>	MASD	J. Studholm	Coast Lines, Ltd.
<i>Truro</i>	GJTO	J. B. Dunkley	Ellerman's Wilson Line, Ltd.
<i>Vanellus</i>	GDVW	J. E. Green	British & Continental S.S. Co., Ltd.
<i>Vienna</i>	GTBR	A. Pearson Sutton	British Railways (Eastern Region).
<i>Wandle</i>	MKBB	J. B. Dry	South Eastern Gas Board.

NOTICES TO MARINE OBSERVERS

Postal Arrangements

The quarterly numbers of *The Marine Observer* are published on the last Wednesdays of December, March, June and September.

The Marine Observer is addressed to the Captain, S.S./M.V....., c/o the owners, and captains are requested to make their own arrangements for forwarding.

Shipowners, Marine Superintendents, and all concerned in the despatch of mails to ships are asked to kindly facilitate the despatch and delivery of mail received at their offices from the Meteorological Office and " Air Publications and Forms Stores ", to their ships abroad.

Addressed to the captains of ships, this contains information required for the conduct of meteorological work at sea, and is most effective if received by the captains at the earliest possible date.

Ice Observation

Drifting ice, derelicts, and other floating dangers to navigation are reported by all means of communication at the disposal of the master.

See Appendix III, pages 106-108 of the *Marine Observer's Handbook*, Sixth Edition.

It is also desirable that more detailed information than can be given in a TTT wireless message should be available to the Meteorological Office for the purpose of research, and for Admiralty Charts and Sailing Directions.

Marine observers will greatly assist by noting the conditions of ice, either drifting or fast, in the pages provided at the end of the logbook (Form 911), or on Form 912, which may be supplied to the captain of any British ship on application to a Port Meteorological Officer or Merchant Navy Agent.

Observing ships using the Trans-North Atlantic tracks are requested to record not only when ice is encountered, but also when they have passed through the ice region during the ice season without encountering ice. In this case a " nil " report should be returned, since it is desirable as far as possible to determine when tracks have been clear of ice.

RETURN OF LOGBOOKS

Owing to the need for strict economy in the use of paper, observing officers should endeavour to fill up their logbooks (Forms 911), before returning them to the appropriate Meteorological Service, except when insufficient space remains for the recording of observations during a further complete passage.

Meteorological Services for Shipping

Captains of British ships are requested to notify the Marine Branch of the Meteorological Office of areas in which meteorological services for shipping appear inadequate. Suggestions for the improvement of these services are always welcome.

Fleet List Call Signs

The inclusion of the signal letters (call signs) of the British Selected Ships in the Fleet List is largely for the benefit of those meteorological service who might wish to identify the ships concerned in a " collective " message.

Observations of Sea Surface Temperature

All Selected Ships are gradually being supplied with a new type of bucket to obtain samples of sea water for observing the sea water temperature.

Before the war it was the practice for Voluntary Observing Ships to make their own canvas buckets. For many reasons, a simple canvas bucket is not a very suitable receptacle for this purpose—largely because the temperature of the water is liable to be affected by evaporation, conduction and convection effects, and also because it is difficult to get a good sample with an open bucket. This new Mk. III bucket, being insulated, prevents losses or gains of heat due to the causes above mentioned, and its spring lid ensures a reasonable sample of water being easily collected.

Cases have arisen of ships losing these new buckets overboard, and for the remainder of the voyage failing to record sea-water temperatures. The present model of the Mk. III bucket has some defects and this may account for some of the losses. A better type of bucket will soon be supplied. Nevertheless, it is inevitable that these buckets will occasionally be unavoidably lost overboard, but, as they are rather expensive, voluntary observers are specially requested to take reasonable steps to ensure that they are not lost overboard through any carelessness. For example, the end of the line should certainly be made fast to the rail before obtaining a sample of water.

Mention should always be made at the beginning of the logbook as to the type of bucket in use, and if by some mischance the special bucket is lost overboard this should also be recorded in the logbook.

If the Mk. III bucket is lost overboard, masters are requested to have a canvas bucket made aboard the ship and used for the remainder of the voyage. It would be preferable if this bucket had a double "skin" with an air space between, so as to give it some form of insulation. A note should be made in the logbook when this bucket is used.

In some fast ships it is realised that observations with a canvas bucket are not really practicable, but condenser intake readings are used instead. On all such occasions mention should be made in the logbook that condenser intake readings are being used.

Ship reports in the St. Lawrence River

The following is an extract from a letter received from the Canadian Meteorological Division :

" We should like to obtain ship reports in the lower St. Lawrence River and Gulf, as an assistance in making and checking the forecasts for marine areas in that region. Radio weather reports at standard hours are desired in the St. Lawrence River and Gulf below the Isle of Orleans. They should preferably be in F.M.22 (six groups), but F.M.23 (four groups) would be acceptable. They should be addressed to Weather Dorval, and may be forwarded through any coastal radio station by radio-telegraph or radio-telephone."

GREAT BRITAIN—LOCAL WEATHER FORECASTS

Masters of ships and others interested in the movements of shipping and in the loading and discharging of cargo can obtain local weather forecasts from the forecast centre nearest to the port, free of charge. The addresses and telephone numbers of the forecast centres nearest to the main ports of Great Britain are given below, corrected to May, 1950.

Enquirers by Telephone should ask for "The Forecaster."

PORT	ADDRESS OF NEAREST FORECAST CENTRE	TELEPHONE No.
Aberdeen	The Meteorological Officer, Dyce Airport, Aberdeenshire	Dyce 331. Ex. 70
Bristol	The Meteorological Officer, Bristol Airport, Whitchurch, Bristol	Bristol 26451. Ex. 22
Cardiff	The Senior Meteorological Officer, Air Traffic Control Centre, Royal Air Force, Eastern Avenue, Barnwood, Gloucester	Gloucester 24465/6/7. Ex. 110, 111.
Dundee	The Senior Meteorological Officer, H.Q. No. 18 Group, Royal Air Force, Pitreavie Castle, Dunfermline, Fife	Inverkeithing 264/5 Ex. 118/9.
Falmouth	The Senior Meteorological Officer, H.Q. 19 Group, Royal Air Force, Mount Batten, Plymouth, Devon	Plymstock 2224. Ex. 108/9.
Glasgow	The Meteorological Officer, Renfrew Airport, Renfrewshire	Renfrew 2352. Ex. 21/3.
Hartlepool	The Senior Meteorological Officer, Royal Air Force, Watnall, Nottingham	Nottingham 45731/5. Ex. 230/1.
Hull	The Senior Meteorological Officer, H.Q. No. 1 Group, Royal Air Force, Bawtry, Doncaster, Yorkshire	Bawtry 363/7. Ex. 105
Kirkwall	The Meteorological Officer, Hatston Airport, Orkneys	Kirkwall 421. Ex. 2.
Leith	The Senior Meteorological Officer, H.Q. No. 18 Group, Royal Air Force, Pitreavie Castle, Dunfermline, Fife	Inverkeithing 264/5 Ex. 118/9.
London	The Director, Meteorological Office, Air Ministry, Kingsway, London, W.C.2	Holborn 3434. Ex. 629.
Liverpool	The Senior Meteorological Officer, Speke Airport, Liverpool, 19	Garston 1240. Ex. 21/2.
Milford Haven	The Senior Meteorological Officer, H.Q. No. 19 Group, Royal Air Force, Mount Batten, Plymouth, Devon	Plymstock 2224. Ex. 108/9.
Newcastle	The Senior Meteorological Officer, Royal Air Force, Watnall, Nottingham	Nottingham 45731. Ex. 230/1.
Plymouth	The Senior Meteorological Officer, H.Q. No. 19 Group, Royal Air Force, Mount Batten, Plymouth, Devon	Plymstock 2224. Ex. 108/9.
Southampton	The Senior Meteorological Officer, Southampton Airport	Eastleigh 87228. Ex. 8/10.
Swansea	The Senior Meteorological Officer, Air Traffic Control Centre, Royal Air Force, Eastern Avenue, Barnwood, Gloucester	Gloucester 24465/6/7. Ex. 110.

NAUTICAL OFFICERS AND AGENTS OF THE MARINE DIVISION OF THE METEOROLOGICAL OFFICE, GREAT BRITAIN

Captains and observing officers of the Voluntary Corps of Marine Observers will always be welcomed at headquarters, where the Marine Superintendent will be pleased to show them how their observations are utilised in meteorological research and weather forecasting.

Headquarters

Commander C. E. N. Frankcom, O.B.E., R.D., R.N.R., Marine Superintendent, Meteorological Office, Air Ministry, Headstone Drive, Harrow, Middlesex. (Telephone : Harrow 4331, Ext. 324.)

Commander J. Hennessy, R.D., R.N.R., Deputy Marine Superintendent. (Telephone : Harrow 4331, Ext. 323.)

Mersey

Commander M. Cresswell, R.N.R., Port Meteorological Officer, Room 617, Royal Liver Building, Liverpool, 3. (Telephone : Central 6565.)

Thames

Commander C. H. Williams, R.D., R.N.R., Port Meteorological Officer, Room 4, Ibex House, Minorities, London, E.C.3. (Telephone : Royal 1721.)

Bristol Channel

Mr. J. C. Matheson, Port Meteorological Officer, 2 Bute Crescent, Cardiff. (Telephone : Cardiff 4474.)

Southampton

Captain J. R. Radley, Port Meteorological Officer, 19 Queen's Terrace, Southampton. (Telephone : Southampton 4295.)

AGENTS

Clyde

Captain W. W. Elliott, c/o Thomas Hastie & Son, 2-4 Tullis Street, Bridgeton, Glasgow. (Telephone : Bridgeton 3219.)

Forth

Captain G. More, " Craigneuk ", Dechmont, West Lothian. (Telephone : Dechmont 19.)

Humber

Captain R. E. Dunn, c/o Principal Officer, Ministry of Transport, Trinity House Yard, Hull.

Tyne

Captain F. B. West, Custom House Chambers, Quayside, Newcastle-on-Tyne. (Telephone : Newcastle 23203.)

**OFFICERS OF THE METEOROLOGICAL SERVICES OF
THE BRITISH COMMONWEALTH**

AUSTRALIA

Melbourne

Lt.-Cdr. S. W. S. Robertson, D.S.C., R.A.N. Port Meteorological Officer,
Meteorological Branch, Dept. of Interior, P.O. Box 1289K, Melbourne,
Victoria (Telephone F.J. 9171).

CANADA

Headquarters

Controller, Meteorological Division, Department of Transport, 315 Bloor
Street W., Toronto, 5.

Halifax

O.I.C. Dominion Public Weather Office, 728 Dominion Public Building, Halifax,
N.S. (Telephone : 3-8314.)

Saint John

Officer in Charge, The Observatory, Saint John, N.B. (Telephone : 3-3500.)

Vancouver

Mr. R. F. Kennett, 815 Bower Building, 543 Granville Street, Vancouver, B.C.
(Telephone : PACific 3032.)

NEW ZEALAND

Wellington

The Director, Meteorological Office, Kelburn, Wellington, New Zealand.
(Telephone : 44418.)

Marine Meteorological Officer, Post Office Box 72. (Telephone 44-418 ;
Ext. 930.)

Auckland

Port Meteorological Officer, Meteorological Office, Mechanics Bay,
Auckland. (Telephone : 49551.)

Lyttleton

Officer-in-Charge, Meteorological Office, Wigram Aerodrome. (Tele-
phone : 32-585.)

Dunedin

Officer-in-Charge, Meteorological Office, Taieri Aerodrome, Dunedin.
(Telephone : 21-666.)

SOUTH AFRICA

Cape Town

A. B. Crawford, Meteorological Office, Post Office, Maitland, Cape Town.

**Some Atlases prepared in the Marine Branch of the Meteorological
Office and published by His Majesty's Stationery Office**

Atlantic Ocean

Monthly Meteorological Charts of the Atlantic Ocean (M.O. 483, 1948).
19 $\frac{3}{4}$ in. \times 24 in. £2 15s. (1s.).

Monthly Sea Surface Temperatures of the North Atlantic Ocean (M.O.
527, 1949). 19 $\frac{3}{4}$ in. \times 12 $\frac{1}{4}$ in. 10s. (3d.).

Quarterly Surface Current Charts of the Atlantic Ocean (M.O. 466, 1945).
22 $\frac{1}{2}$ in. \times 17 $\frac{3}{4}$ in. 12s. (6d.).

Monthly Ice Charts of Western North Atlantic (M.O. 478, 1944). 12 in.
 \times 7 $\frac{1}{2}$ in. 4s. (3d.).

Indian Ocean

Monthly Meteorological Charts of the Indian Ocean (M.O. 519, 1949).
15 $\frac{1}{4}$ in. \times 22 in. £3 3s. (11d.).

Indian Ocean Currents (M.O. 392, Second Edition 1939, reprinted 1950).
30 in. \times 20 in. 10s. (3d.).

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Monthly Meteorological Charts of the Eastern Pacific (M.O. 518, 1950).
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Monthly Meteorological Charts of the Western Pacific (M.O. 484, 1947).
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Monthly Sea Surface Temperatures of Australian and New Zealand Waters
(M.O. 516, 1949). 19 $\frac{3}{4}$ in. \times 12 $\frac{1}{4}$ in. 10s. (3d.).

Quarterly Surface Current Charts of the Western North Pacific Ocean,
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South Pacific Ocean Currents (M.O. 435, 1938, reprinted 1944). 34 $\frac{1}{2}$ in.
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Weather Map. An introduction to modern meteorology. M.O. 225 i, 3rd edition, 1939. 8vo. (see also Meteorological Glossary, in continuation of the "Weather Map"). 3s. (3s. 3d.) *Out of stock, being reprinted.*

Meteorological Glossary (continuation of the "Weather Map", q.v.). M.O. 225 ii, 3rd edition, 1939. 8vo. 7s. 6d. (7s. 11d.)

Handbook of Weather Messages, Codes and Specifications. M.O. 510. 8vo.

- Part I. Transmission schedules and station index numbers 1949. 2s. 6d. (2s. 8d.)
Amendment List No. 1 (1950). 6d. (7d.)
Amendment List Nos. 2-3 (1950). Each 1d. (2d.)
Amendment List No. 4 (1950). 2d. (3d.)
 - Part II. Codes and specifications. 1948. 1s. 6d. (1s. 8d.)
Amendment Lists Nos. 1-5. Each 1d. (2d.)
 - Part III. Coding, decoding and plotting. 1948. 2s. (2s. 2d.)
Amendment Lists Nos. 1-7. Each 1d. (2d.)
- (Amendments issued as necessary and priced separately.)*

Instructions for the preparation of weather maps with tables of the specifications and symbols. M.O. 515. 1949. 8vo. 9d. (10d.)
Amendment List No. 1 (1950). 2d. (3d.)

International Meteorological Code adopted by the International Meteorological Organisation, Washington, 1947. **Decode for the use of shipping**, incorporating the code for weather reports from and to ships and the analysis code for the use of shipping. M.O. 509. 1948. 9d. (10d.)

Meteorological Handbook for Pilots and Navigators. M.O. 448, 2nd edition, 1942; reprinted 1949. 8vo. 2s. 6d. (2s. 9d.)

A Short Course in Elementary Meteorology. By W. H. Pick, B.Sc., F.C.P., F.Inst.P. M.O. 247, 5th edition, 1938; reprinted 1949. 8vo. 2s. 6d. (2s. 9d.)

Meteorology of Airfields. By C. S. Durst, B.A. M.O. 507, 1949. 8vo. 2s. (2s. 2d.)

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