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(Nautical Officer, Marine Division, Meteorological Office)

Prior to 1936 synoptic observations from the sea were provided almost entirely by voluntary observers on merchant ships apart from those obtained from the relatively small number of naval vessels. These observations, although extremely valuable to the forecaster, were necessarily restricted in nature, and more or less haphazard as regards position.

As trans-oceanic aircraft became a possibility, it became obvious that more detailed information was necessary than could be obtained from voluntary observers in moving ships in order to provide meteorologists and aircraft with accurate information about weather conditions at sea, both on the surface and in the upper atmosphere.

In 1936-37, the British Meteorological Office placed a meteorologist aboard a cargo steamer on the North Atlantic trade route for several voyages and obtained special synoptic observations as an experiment. Visual observations of cloud heights and of upper winds were obtained in this ship by tracking the movement of pilot balloons by using compass bearings and sextant altitudes.

In 1938-39 the French fitted out a merchant ship as a stationary meteorological ship in the North Atlantic. Radio-sonde and surface observations were obtained and transmitted ashore by w/t. About the same time the Germans had two special ships performing similar functions in connection with their trans-oceanic airways—one in the North Atlantic and one in the South Atlantic. The British Meteorological Office was exploring the possibility of fitting out a vessel specifically for this work in 1939.

The 1939-45 war put an end to the above activities but during the latter part of the war the USA and UK employed a number of small naval vessels as stationary meteorological ships in the North Atlantic.

When the war ended, the naval stationary vessels were withdrawn and observations depended again solely on merchant ships. However, these were not capable of providing upper air observations and in 1946 the International Meteorological Organization (IMO), the forerunner of the World Meteorological Organization (WMO), recommended the establishment of stationary meteorological ships in certain areas. Shortly after the International Civil Aviation Organization (ICAO) passed a similar resolution in Dublin and it was subsequently agreed that a total of 13 stations be established in the North Atlantic by July 1947.

The USA, Canada, France, Holland, Belgium, Norway, Sweden, UK, Eire, Denmark, Iceland, Portugal and Spain were all signatories to the 'Ocean Weather Ship' Agreement and the allocation of stations was as follows:

United States .. .. .	7
Canada and United States jointly .. ..	1
France .. .. .	1
United Kingdom .. .. .	2
Norway, Sweden and UK jointly .. ..	1
Holland and Belgium jointly .. .. .	1

It was decided that Portugal, Denmark and Iceland already contributed sufficiently by their stations in the Azores, Greenland and Iceland respectively, and that Eire should merely provide an annual monetary contribution to the scheme.

The duties of the weather ship would include:

- (a) Meteorological observations including surface observations, special observations of meteorological phenomena, upper air observations for wind, temperature, pressure and humidity—all to be reported by radio at the synoptic hours. In addition, observations from merchant ships would be collected and re-transmitted by radio.
- (b) Search and Rescue (SAR) facilities for aircraft and shipping in distress. This implied provision of special boats and other life-saving equipment.
- (c) Navigational aids to aircraft in flight consisting of search-radar and special radio equipment including a radio-beacon on which aircraft could 'home',
- (d) Oceanographic and other scientific observations.

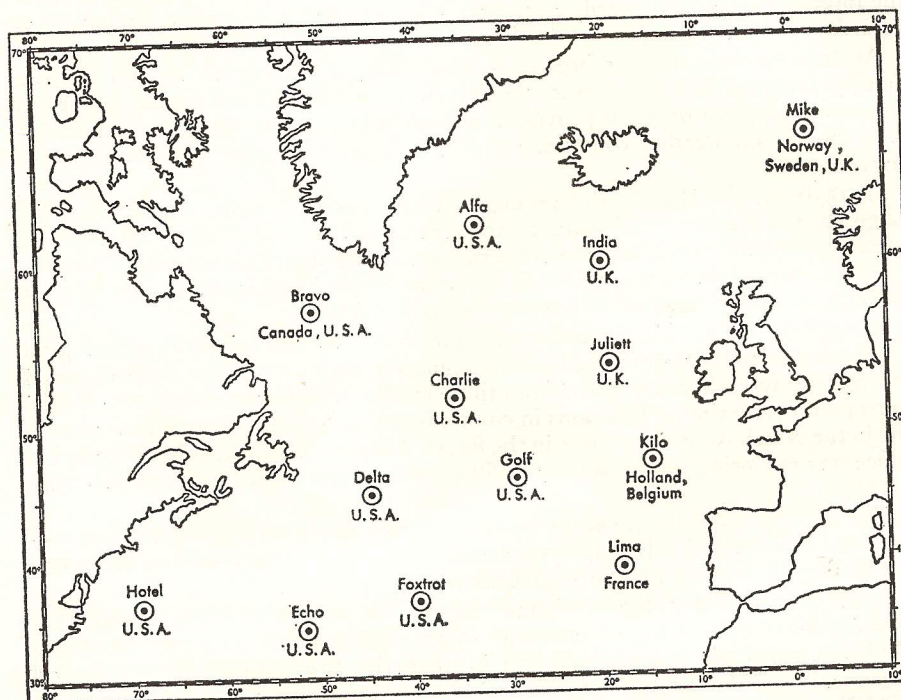


Fig. 1. Positions of the Ocean Weather Stations as agreed at the ICAO Conference, London 1946

The UK plan for the operation of its two stations was to employ four ex-naval Corvettes of the 'Flower' class. These vessels were about 65 metres in length, were built on whaler lines and had a loaded displacement of about 1100 tons. They were oil-fired steam vessels with reciprocating engines giving a maximum speed of 16 knots and an economical speed of 9 knots. Their civilian crew numbered 54 and the ships were directly administered by the Meteorological Office. Each vessel was to spend about 27 days at sea followed by approximately 15 days in port.

On 31 July 1947 the ex-Royal Navy corvette H.M.S. *Marguerite* became the first Ocean Weather Ship and was renamed *Weather Observer* by the then Secretary of State for Air, in Shadwell Basin, London Docks. She had been extensively converted from a war vessel by H.M. Dockyard, Sheerness and her unusual appearance and rig caused considerable interest in shipping circles on London river. On 1 August 1947 *Weather Observer* sailed from London under the command of Captain N. F. Israel D.S.C., to take up her station in the North Atlantic. She was followed by the *Weather Recorder* in October, the *Weather Watcher* in November and the *Weather Explorer* in February 1948.

In April 1949, at the invitation of ICAO, a conference on Ocean Weather Stations was held in London to consider the plan set up at the 1946 Conference to see if it would be practicable to reduce the number of stations. As a result of this conference the number of stations in the North Atlantic was reduced from 13 to 10; the four British Ocean Weather Ships would continue to operate but the reduction in stations would mean very considerable economies in fuel, stores and spares. In 1954 the number of internationally agreed stations was further reduced to nine.

1949 also saw the authorisation for issue of badges and insignia to personnel of the Ocean Weather Service and the granting of permission for the ships to wear the Blue Ensign defaced with the Ocean Weather Service badge. During the year the Ocean Weather Ships supplied meteorological and navigational assistance to a flight of RAF Vampire aircraft flying to the United States. Air/sea rescue exercises in conjunction with aircraft of RAF Coastal Command were carried out successfully at intervals to keep the ships' companies conversant with air/sea rescue organization and drill. In the Marine Division Report of the Year ending 31 March 1950 it is recorded that 4172 aircraft—both Civil and RAF—made use of the weather ships' navigational aids and the ships assisted in three SAR emergencies.

During 1950 a scheme was implemented whereby a Dutch weather ship would carry out five periods of duty each year at one British station, thereby permitting the 'lay-up' of each British weather ship annually for survey, repairs and overhaul.

In 1951 oceanographical work consisting of towing plankton recorders, plankton sampling, taking sea water samples and jettisoning of drift bottles was commenced on behalf of the Ministry of Agriculture, Fisheries and Food and the Scottish Home Department, Fisheries Division.

At the request of Cambridge University, 20 shearwaters were taken to sea in *Weather Recorder* in July 1952 and released when the ship was more than 100 n. mile away from any land. The first bird arrived back to its nest at Skokholm Island, 450 n. mile away, within 36 hours and a total of 18 birds returned.

During the year ending 31 March 1954, 8422 civil and military aircraft made use of the aero-navigational facilities provided by the ships. The year also saw the commencement of observations utilising a wave-recorder, loaned by the then National Institute of Oceanography, aboard *Weather Explorer*. This ship also attended the Review of the Fleet by H.M. the Queen at Spithead on 15 June 1953. Special routine observations of the sea water temperature-gradient were made aboard *Weather Recorder* with a bathythermograph loaned by the Admiralty to depths of 150 metres and during 1954 arrangements were made to equip the other three weather ships with bathythermograph equipment. Also during 1954 magnetic variation swings were carried out on station for the Hydrographic Department of the Admiralty.

Owing to a serious boiler defect which necessitated her withdrawal from service for six weeks, *Weather Explorer* was unable to carry out her duties on station from 20 February to 16 March 1955. The R.R.S. *Discovery II* was therefore chartered from the National Institute of Oceanography to undertake this patrol. Special air-sea rescue and radio equipment was supplied for the voyage and a temporary shelter erected on the after deck for balloon filling. She was thus able to carry out the normal communication duties of a weather ship and modified navigational aids to aircraft were available but no radar fixes were possible.

In connection with the Meteorological Office centenary celebrations, *Weather Recorder* visited Edinburgh in June 1955 and *Weather Explorer* was at Cardiff the following August. During these periods over 3400 visitors were conducted around the ships.

By 1957 the four British weather ships had completed 10 years' service. Being former 'Flower' class corvettes, they were designed for rough work and had certainly lived up to their reputation for good sea-keeping qualities. They were also very economical to operate and had carried out their duties very effectively. However, they were now beginning to 'show their age' and needed to be replaced by somewhat

newer vessels. It was therefore decided to convert four 'Castle' class frigates to Ocean Weather Ships.

On 16 May 1958 the former frigate H.M.S. *Oakham Castle* was renamed *Weather Reporter* by Lord Hurcomb, the then Chairman of the Meteorological Committee, thus marking the beginning of her career as a weather ship. *Weather Reporter* replaced *Weather Explorer*—the former 'Flower' class corvette H.M.S. *Thyme*. *Oakham Castle* was built in Glasgow by A. J. Inglis and launched in July 1944. Her conversion to a weather ship, which involved extensive work and took about nine months to complete, was carried out by James Lamont and Company at Glasgow. The new weather ships were somewhat bigger than their predecessors with a length of 70 metres compared with 65 metres; hence they provided larger and more comfortable accommodation. They also had the advantage of greater fuel capacity. They were propelled by a 4-cylinder steam reciprocating engine associated with two oil-fired water tube boilers. In November 1959 the second 'Castle' class frigate, H.M.S. *Amberley Castle*, was taken over by the Air Ministry for conversion to a weather ship at Blyth Dry Dock and Shipbuilding Company. She was commissioned and renamed *Weather Adviser* by Lady Sutton, wife of the then Director-General of the Meteorological Office on 22 September 1960 at Greenock. She replaced *Weather Observer* which was the first British weather ship to take up duty on a North Atlantic station in August 1947. *Weather Adviser* sailed on her maiden voyage on 28 September 1960.

The third of the 'Castle' class frigates to be converted—H.M.S. *Pevensey Castle*—was renamed *Weather Monitor* on 12 May 1961 by Mrs A. C. Best, wife of the then Director of Services of the Meteorological Office at Blyth Dry Dock and Shipbuilding Company. She replaced *Weather Recorder* which was then withdrawn from service after 14 years as a weather ship. Formerly H.M.S. *Genista* and prior to her weather ship duties, she had seen service as an escort vessel during the 1939-45 war mostly in the South Atlantic and Indian Ocean areas and took part in the invasion of Madagascar. In addition to her normal duties as a weather ship, *Weather Recorder* had shown her usefulness in other ways. In January 1948 she rescued the whole crew of the Norwegian steamer *Veni*, aground on the Isle of Islay and in August 1955 she stood by the disabled m.v. *Argobeam* for two days in heavy weather and directed tugs to her.

*Weather Surveyor*, the fourth and last of the 'Castle' class frigates to be converted, was renamed and commissioned by Provost J. Reid of Greenock on 21 December 1961. Formerly H.M.S. *Rushen Castle* she also was converted by Blyth Dry Dock and Shipbuilding Company and replaced *Weather Watcher*.

In September 1961 *Weather Adviser* visited the Isle of Man whilst *en route* to her North Atlantic station. She aroused considerable interest and a number of visitors were shown round the vessel. During the year radar wind observations attained an average height of 60 200 feet, the maximum being 90 500 feet.

A new Ocean Weather Ship Base at Greenock, made necessary because of the inclusion of the site of the old base in the construction work of a new dry dock at Greenock, was completed and occupied in July 1962. During this year *Weather Adviser* assumed the duties of control vessel in the Search and Rescue operation for survivors of an American Super Constellation aircraft, forced by engine trouble to ditch in the Atlantic on 23 December, in a position approximately 165 n. mile from *Weather Adviser's* North Atlantic station. She was not the nearest ship to the position of the ditched aircraft and, when she arrived in the area, the 48 survivors of the 76 persons on board had been picked up by a merchant ship. The weather ship, however, recovered 11 bodies.

During the year the weather ships carried out sea temperature and salinity soundings to depths of 3000 metres and one ship, *Weather Reporter*, continued to carry the National Institute of Oceanography's wave recorder to instrumentally record wave heights.

In 1963 the Flight Safety Foundation Award, for distinguished service to aviation,

was made to the personnel manning all the weather ships in the North Atlantic. The Flight Safety Foundation, with headquarters in New York, was a world-wide organization dedicated to the furtherance and improvement of air safety in all forms of flight. The award in the form of a plaque is permanently exhibited at the Headquarters of ICAO in Montreal and a certificate was awarded to each ship. The ships also had the distinction of being awarded the 'Hunt' Trophy in 1964. This award, in the form of an inscribed silver tray, was awarded annually by the Guild of Air Traffic Control Officers to the organization considered to have made the most outstanding contribution to Air Traffic Control.

On 1 November 1965, towards the end of her period on station, *Weather Monitor* answered a distress signal from the British ship *Newfoundland* bound from Liverpool to St John's, Newfoundland. A dangerous fire had broken out in No. 1 hold and the Master required ships in the vicinity to stand by. *Weather Monitor* immediately proceeded at full speed towards *Newfoundland's* position. On her arrival on the scene the fire was under control but still considered to be dangerous. At her Master's request *Weather Monitor* escorted *Newfoundland* to Cobh—maintaining her normal meteorological program of surface and upper air observations *en route*.

During February and March 1968 the British weather ship on duty at ocean station 'Alfa' ( $62^{\circ} 00'N$ ,  $33^{\circ} 00'W$ ) had on board a Control Officer and provided special advice by radio to British trawlers fishing north of Iceland at the request of the then Board of Trade, as a result of the earlier loss of two British trawlers in the same area during exceptionally severe gales and freezing conditions. Later, this task was transferred to a trawler chartered by the Board of Trade, carrying an Advisory Officer accompanied by a meteorologist and a doctor.

Late in March 1968, *Weather Reporter*, while on station in the North Atlantic rescued the American pilot of a single-engined aircraft *en route* from Newfoundland to the Azores, who had been blown off course and advised to ditch because of a shortage of fuel and instrument trouble. The rescue was carried out in darkness with a 23-knot wind and a 5-metre swell.

During 1971 the biological sampling program for the Institute of Marine Environmental Research was intensified with an investigation of the vertical distribution of plankton throughout the year in the upper 500 metres at Station 'India' ( $59^{\circ} 00'N$ ,  $19^{\circ} 00'W$ ) using a Longhurst/Hardy Plankton Sampler. In association with the investigation into vertical plankton hauls, water samples for phytoplankton analysis and extra net hauls for analyses of toxic organo-chloride residues in the plankton were made.

*Weather Adviser*, with the research vessels *Discovery* and *Researcher* took part in the Joint Air-Sea Interaction Experiment (JASIN) in the area of Station 'Juliett' ( $52^{\circ} 30'N$ ,  $20^{\circ} 00'W$ ) in September 1972. The purposes of the experiment were:

- (a) To examine the structure of the atmospheric boundary layer by making repeated vertical soundings simultaneously from the three ships.
- (b) To make spatial and temporal measurements of temperature and currents in the oceanic mixed layer with a view to including advective terms in heat budget calculations for the mixed layer.
- (c) To make surface measurements from three buoys to allow estimation of fluxes across the air-sea interface and of their horizontal variability. In particular, to measure horizontal pressure gradients to allow calculation of the geostrophic wind.
- (d) To test our ability to measure currents in the top 10 to 20 metres of ocean in the presence of surface waves.
- (e) To examine vertical gradients of currents and density at the bottom of the oceanic mixed layer and across the seasonal thermocline.

During the early hours of 11 January 1974, *Weather Adviser* on Station 'Juliett' in very heavy weather conditions, received a distress message from the Greek vessel *Despina* reporting that her rudder was out of action and requesting urgent assistance.

After ascertaining the *Despina's* position by means of cross D/F bearings from ships in the vicinity, *Weather Adviser* proceeded at all possible speed in the prevailing weather conditions towards the disabled vessel now located some 125 n. mile to the eastward. Soon after daylight an RAF Nimrod aircraft sighted the *Despina* and circled her at an altitude of 2000 feet, thus enabling *Weather Adviser* to pinpoint the position by means of her air-search radar. Shortly after midday surface radar contact was established with the disabled vessel but, at about this time, the distress was cancelled by the *Despina* as she had managed to effect temporary repairs to her steering gear. However, at her master's request *Weather Adviser* escorted the *Despina* towards Cobh and was not finally released until the south-west coast of Ireland was sighted.

For budgetary reasons the United States phased out their weather ships from the western side of the North Atlantic between 1973 and 1974. The British weather ships, having been in service for about 14 years, continued to give satisfactory service although, as a natural consequence of their age, repair and maintenance costs began to mount.

In the few years prior to 1975 the more reliable jet-engined aircraft had superseded many piston-engined airliners, aircraft navigational aids had become more sophisticated and aircraft flying between Europe and North America now tended to use the 'Polar' route instead of the more or less East-West route. Thus there was no further need for the weather ships' commitment to air navigation and special search and rescue involvement for aircraft in distress. On 30 June 1975 the ICAO Joint Financing Agreement on North Atlantic Ocean Stations terminated and the UK ceased to operate weather ships on stations 'India' and 'Juliett' but WMO planning made provision for the UK to man the new ocean weather station 'Lima'.

From 1 July 1975 and pending the ratification of a new Joint Financing Agreement on North Atlantic Ocean Stations (NAOS) under the auspices of the World Meteorological Organization, NAOS operating states organized a network of ocean weather stations in the central and eastern North Atlantic. The new network consists of the following stations:

'Charlie' latitude 52° 45' N longitude 35° 30' W—manned by USSR ships.

'Lima' latitude 57° 00' N longitude 20° 00' W—manned by UK ships.

'Mike' latitude 66° 00' N longitude 2° 00' E—manned by Norwegian and Dutch ships.

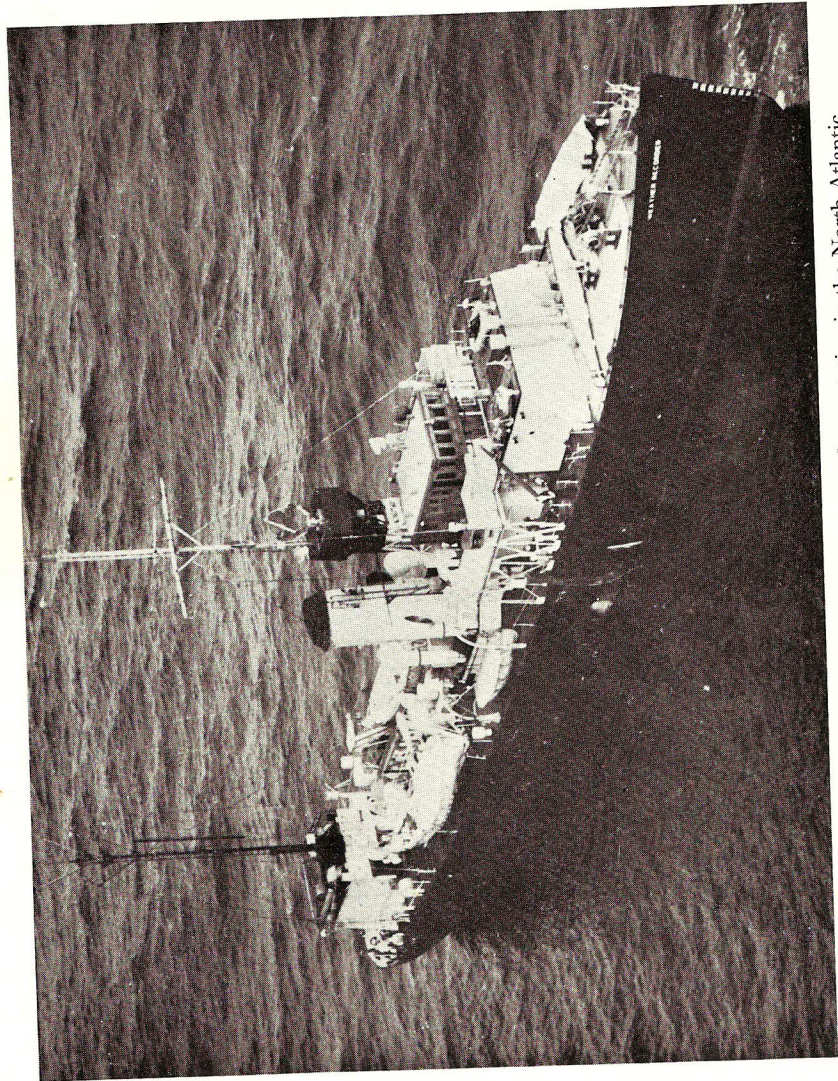
'Romeo' latitude 47° 00' N longitude 17° 00' W—manned by French ships.

The alteration in the UK operating commitment to the NAOS network from two to one ocean station reduced the UK requirement for weather ships from four to two vessels and, as financial support for the construction of new purpose-built weather ships could not be obtained, the opportunity was taken to refurbish two of the existing four ex-'Castle' class frigates to extend their service to 1981. The ships selected for refurbishment were *Weather Adviser* and *Weather Monitor* and these were withdrawn from service pending a shipyard being available.

*Weather Reporter* and *Weather Surveyor* manned Station 'Lima' until the refurbished vessels returned to service. Although all aviation commitments were now discontinued these ships continued to keep a listening watch on the international aircraft distress radio frequency in addition to carrying out the meteorological and oceanographical work as before. The new WMO Agreement for Joint Financing of North Atlantic Ocean Stations entered into force on 1 December 1976.

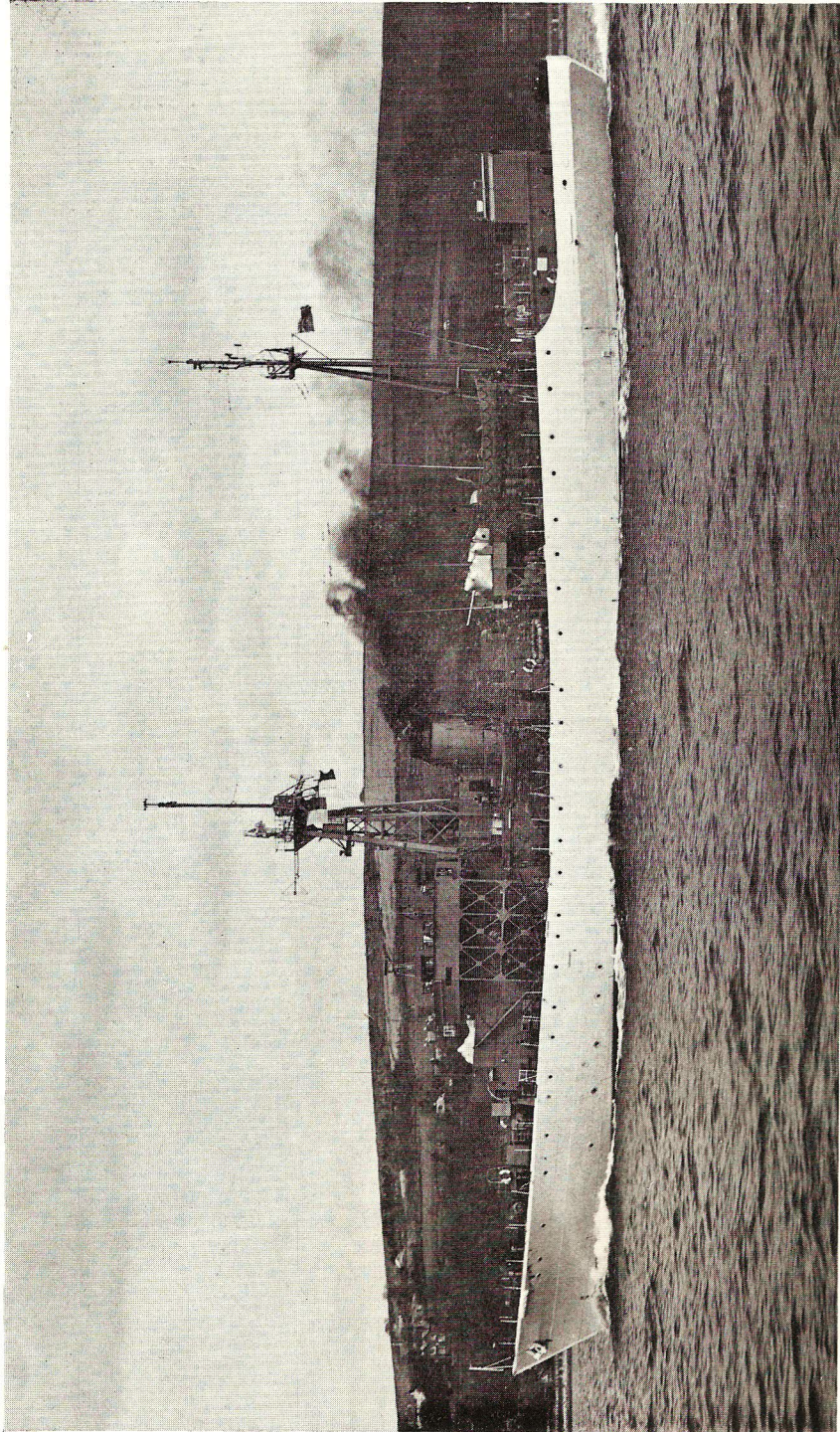
In July 1976 *Weather Adviser* and *Weather Monitor* proceeded to Manchester Dry Docks Company for refurbishment. This consisted of improvement to accommodation and crew recreation spaces, provision of a new, fully-equipped, modern bridge structure, fitting a completely new galley, conversion of the ships' electrical power supply from D/C to A/C, automation of the boiler controls, installation of new upper-wind finding equipment and the complete re-equipping of the communications installation.

(Opposite page 184)



Ex-'Flower' class corvette, O.W.S. *Weather Recorder* on station in the North Atlantic





Copyright James Hall

Ex-'Castle' class frigate, O.W.S. Weather Reporter on trials after her conversion in 1958

To usher in a new, albeit limited, era of British weather ship history it was decided to change the ships' names. Thus, on recommissioning, *Weather Adviser* was renamed *Admiral FitzRoy* by Mrs J. Walsh, wife of the Provost of Greenock on 14 March 1977 and *Weather Monitor* was renamed *Admiral Beaufort* by Mrs M. Fletcher, wife of the new Provost of Greenock on 25 May 1977.

As most readers will know, these new names perpetuate the memory of Vice-Admiral Robert FitzRoy C.B., F.R.S., who established the British Meteorological Office in 1854 and Rear-Admiral Sir Francis Beaufort K.C.B., F.R.S., Hydrographer to the Admiralty 1829-1855 and who devised the Beaufort wind scale in 1805.

O.W.S. *Admiral FitzRoy* sailed from Greenock for Ocean Station 'Lima' on her first voyage under her new name on 20 March 1977. *Admiral Beaufort* relieved her sister ship on Station 'Lima' two months later on 30 May 1977. We wish them both every success in their new lease of life.

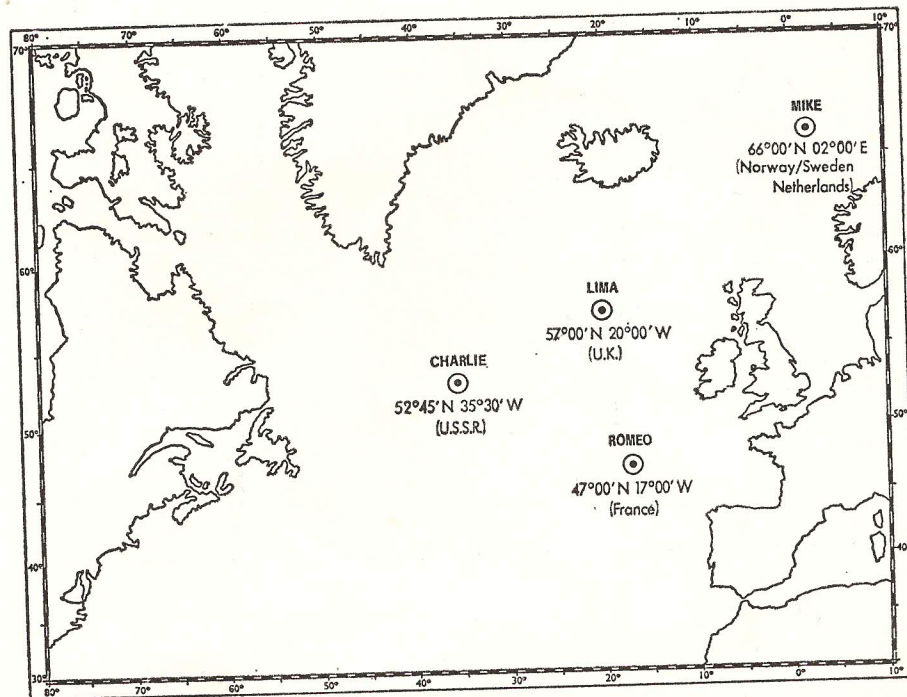


Fig. 2. Positions of the Ocean Weather Stations under the Joint Financing Agreement on North Atlantic Stations, 1975

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