THE NEARLY NON-MAGNETIC SHIP

BY

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Introduction

Nearly a half century ago, long before any need was envisaged for a Mine Counter Measures Vessel (MCMV) with a minimum magnetic signature, and indeed long before magnetic discipline had been invented, the Director of Naval Construction at the Admiralty was involved in the design of a 'non-magnetic' survey vessel which, on the 18th April 1939, was launched as the Royal Research Ship *Research*. Unfortunately war intervened and the vessel was never to be completed. However, her place in the history of a project to map terrestial magnetic variation is of considerable interest and this article brings together the circumstances which led to her design and construction.

The 'Carnegie'

Provision was made in the 1935 Naval Estimates for the construction of a 'non-magnetic' survey vessel to take over the task of charting the earth's magnetic field in continuation of an enterprise initiated in the early years of the century under the direction of the Carnegie Institution's Department of Terrestial Magnetism. The requirement for this long-term undertaking stemmed in fact from a world wide need for improvement in the accuracy of prediction of change in terrestial magnetic variation in order to facilitate more accurate navigation[1].

In 1907–8 some preliminary work had been carried out using a small craft named *Galilee* which completed three voyages before responsibility for the task was taken over by the 323-ton purpose-designed auxiliary brigantine *Carnegie*, a U.S. registered wooden-hulled craft built at Brooklyn in 1909 to the order of the Carnegie Institution of Washington, D.C. The sketch design had been prepared by Dr. Louis A. Bauer, Director of the Department of Terrestial Magnetism, and in so far as possible the *Carnegie* was constructed and fitted out using non-magnetic materials, the hull planking being secured to the frame timbers with locust-wood tree-nails whilst elsewhere copper or bronze bolts and spikes were employed as fastenings. The hull was copper sheathed. All rigging was of hemp and the bronze anchors with their 11-inch manilla cables were worked by a wooden hand-operated capstan. Bronze was employed also to the maximum extent in the construction of the 100 bhp auxiliary (petrol) engine, although presumably the heavily stressed components such as the crankshaft must have been of steel. On the domestic side the same considerations applied, galley utensils being of copper or aluminium, the table cutlery of Mexican silver, and uniform trappings of bone, brass, or silver. In all, the total iron and steel content in the *Carnegie* was reputedly little more than one ton.

The *Carnegie* remained in service, working mainly in the Pacific, for some twenty years but on the 29th November 1929, in the course of her seventh voyage, she caught fire following an explosion while embarking petrol in drums at Apia in Western Samoa and was burned out. This disaster resulted too in the deaths of her master, Captain Ault, and a cabin hand. She had been, of course, the only vessel of her kind and her loss put a period to the magnetic survey work undertaken on behalf of the Institution. Fortunately the data amassed immediately prior to her destruction had already been forwarded to Washington. Thereafter, economic recession and lack of funds prevented her early replacement. However, much had been accomplished and indeed, in addition to her work on magnetic variation, the *Carnegie* had been responsible for the discovery and surveying of a series of deep mountain ridges in the western Pacific.

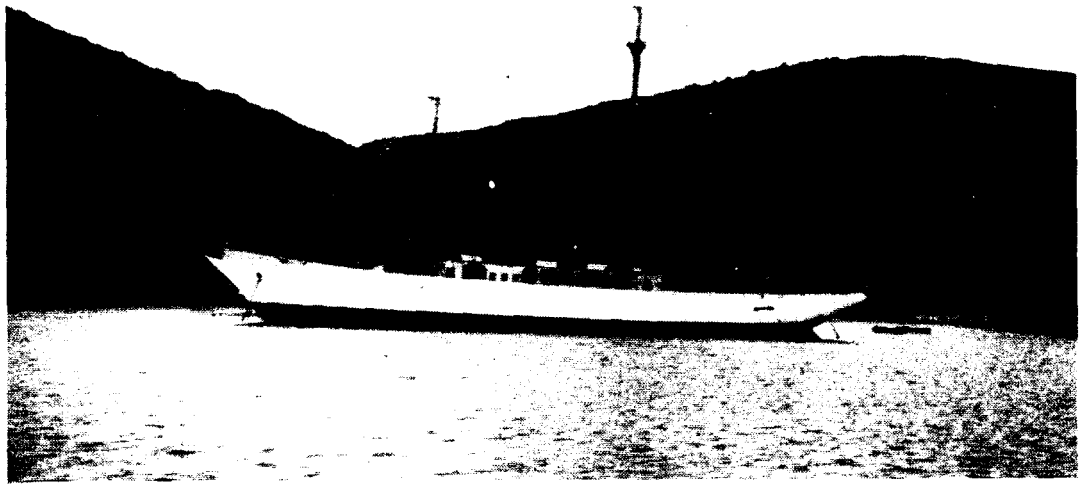

FIG. 1—R.R.S. 'RESEARCH'

The 'Research'

At this time the British Admiralty, amongst other authorities and institutions, was similarly interested in terrestial magnetism and once the world depression had run its course, consideration was given to the construction of a 'non-magnetic' survey vessel to continue the work initially sponsored by the Carnegie Institution.

Thus in September 1936 an order was placed with Philip & Son of Dartmouth for the construction of a 757-ton composite brigantine to be named *Research*. She was to be naval manned and Lieutenant-Commander Douglas H. Fryer, Royal Navy, a hydrographic specialist, was appointed as commanding officer designate although in fact the vessel was to be operated as a Royal Research Ship under the blue ensign instead of the white ensign. The Carnegie Institution co-operated closely with the Director of Naval Construction's department[2] in the design of the *Research* which like the earlier vessel was to be rigged as a brigantine although contemporary advice by sailing ship masters suggested that a brig rig might have been more easily managed. The sail area totalled 12 000 square feet. A Petter Atomic diesel engine of 160 bhp driving a two-bladed feathering screw provided auxiliary propulsion, the designed speed under power alone being $6\frac{1}{2}$ knots. Three auxiliary diesel engines, one of 18 bhp and two of 9 bhp apiece, provided power for electric lighting, heating, air compressor, winches, pumps and domestic services. Bronze alloys were employed where possible in the manufacture of the propulsion and auxiliary engines, non-magnetic stainless steel alloys being employed only for the heavily-loaded stress-bearing parts[3].

The composite-built hull of $142\frac{1}{2}$ feet overall length and 34 feet beam was teak planked and copper sheathed on brass frames, the stem, keel, and stern being also of teak whilst the false keel was of Canadian rock elm. The hull was sub-divided by eight watertight bulkheads. Anchors, cables, and wire rigging were of aluminium bronze and likewise non-ferrous materials were employed for domestic items such as cooking utensils, cutlery, and storage containers as well as for fuel and lubricating oil drums. Fresh-water tanks of teak provided stowage for 40 tons whilst the fuel stowage was for 14 tons, sufficient for 3000 miles.

All in all, the *Research* was '. . . designed to eliminate all possible causes of magnetic interference . . .[4]' in so far as this objective was a practical proposition at the time. She was intended in addition be to equipped for meteorogical and oceanographical survey work. In appearance, however, she was relatively conventional although the choice of a brigantine rig can only be regarded as decidedly outmoded; it is for consideration that a schooner rig might have been more practical and less labour intensive since it was intended that she should cruise mainly under sail. The proposed ship's company comprised six officers and twenty-two ratings together with four scientists. In all the capital cost was to be about £188 500.

The first rivet in the keelson of the *Research* was driven by Mrs. Fryer, wife of Lieutenant-Commander Fryer, on the 8th October 1937[5] and the vessel was launched with due ceremony on the 18th April 1939 after being named by Mrs. Spencer Jones, the wife of the Astronomer Royal. Thereafter, fitting out continued afloat at Noss and on the 23 July in that year she was inspected by Their Majesties King George VI and Queen Elizabeth. In the meantime, Lieutenant-Commander Fryer had been sent off to sea to gain experience in deep-water sail, crossing the Atlantic in one of Erikson's grain ships and returning in another of the same fleet, the 2376-ton Finnish-registered barque *Pommern*.

It was planned that the *Research* should commission for service in October 1939 and that she should visit the Carnegie Institution in Washington and then, after calling at South American ports, should spend some eighteen months surveying in the South Atlantic between Tristan da Cunha and the Cape. The cruise was to end with a call at Durban and was to be followed by three years working in the Indian Ocean. These plans were, of course, to be wrecked by the outbreak of war in the wake of the German invasion of Poland in September of that year.

By September the lower masts had been stepped and the work of fitting out was well under way. Events in Europe, however, brought to an end all but immediately essential surveying work, and the *Research* was laid up above Noss in the River Dart. There she was to remain for the duration of the war and for several years more, forgotten by all but the few responsible for her safety.

In the event, the *Research* was never to be completed, in part for reasons of economy but primarily because other means of undertaking magnetic surveys had been developed in the wake of meeting the needs of war. For thirteen years in all she lay at her moorings in the Dart, her intended role completely forgotten by those who had long since accepted the incomplete hulk as part of the landscape. Eventually the *Research* was offered for sale and on the 20th October 1952 she arrived in Plymouth for breaking up by Hocking Bros. Perhaps some use could have been made of her, but presumably Treasury policy dictated that she should be sold to the highest bidder who, inevitably, considering the value of the materials employed in her construction, proved to be the shipbreaker.

Notes:

1. At the time that this project was first conceived, the gyroscopic compass had still to be invented. The German engineer Dr. Anschutz developed the first practical gyro compass in 1908.
2. 'Generous help has been offered by the Carnegie Institution in the loan of personnel and the specifications of the *Carnegie* and the instruments used in her.' (*The Times*, 15 August 1938).
3. In a report dealing with the Navy Estimates for 1938, it was stated that 'Some difficulty is being experienced in obtaining supply of suitable non-magnetic material for the crankshaft.' (*The Times*, 5 March 1938).
4. *Deep Water Sail* by Harold Underhill. (Brown, Son & Ferguson Ltd., Glasgow, 1952).
5. She had been officially 'laid down' on 9 September 1937. (*The Times*, 11 June 1938).