

THE DIRECTORIA DE NAVEGAÇÃO DA MARINHA DO BRASIL

With reference to the Regulations in the preceding pages, the following article has been communicated to the International Hydrographic Bureau by Vice-Admiral H. DA GRAÇA ARANHA, Director General of Navigation of the Brazilian Navy.

The principal object of the *Directoria de Navegação da Marinha do Brasil* is to superintend the hydrographic services, lighting and buoyage along the whole of the immense and rich coast of the country, including all the harbours and islands along the coast. Its seat is on the historic and picturesque Fiscal Island, one of many islands in the beautiful bay of Guanabara in the harbour of Rio de Janeiro.

The head of the *Directoria de Navegação* is a Flag Officer of the Navy, and the second in command is an officer of Captain's rank; under them are four divisions, each under a Commander and each having the number of officers necessary for carrying out their various duties.

The First Division comprises the administrative part of the *Directoria*; the Second Division, Hydrography and allied subjects; the Third Division, Lighting and Buoyage, and, finally, the Fourth Division, Finances.

The technical courses in Navigation and Hydrography for Lieutenants are about to be commenced. The courses have been inaugurated this year, and the following subjects will be studied in some detail and with special reference to their application in practice:—

Geodesy, Hydrography, Stereophotogrammetry, Navigation, Marine Meteorology, Magnetism, Oceanography, and Lights and Beacons, including Radio-beacons and Direction Finders.

Officers who undergo this course, which will commence in April and finish at the end of November, will be given the certificate of Hydrographer and will be selected for preference to command hydrographic expeditions, to instruct in Hydrography and Navigation, to command surveying vessels, and for the Lighthouse Service, as well as to represent the *Directoria de Navegação* at national and international geographical and hydrographical congresses. One of the chief results will certainly be to develop a hydrographic frame of mind among our Naval Officers, thus ensuring complete uniformity in the work of this important branch.

The activity of the *Directoria de Navegação* is always considerable, for the scope of its operations extends over a coast roughly 6300 miles in length, besides innumerable rivers and some navigable lagoons. There are certain places to which access is very difficult, but where there are lights and light-buoys of great importance to mariners which, for this reason, must be maintained in an efficient condition.

From the great extent of the zone which has to be supervised, an idea can be formed of the anxiety and responsibility placed on the Director-General of Navigation. In addition to a duly specialised and adequate staff, the *Directoria de Navegação* must have ships of a type adequate for hydrographic purposes and for the Lighthouse Service; for this purpose it is already

studying the best types, not only of surveying ships, but also of lightship tenders.

The survey of the coastline and islands by means of aerial stereophotogrammetry offers great advantages, duly recognised by the *Directoria* which is at present making investigations into the best type of aircraft and the most efficient stereophotogrammetrical apparatus to be adopted.

The operations of the *Directoria* are by no means circumscribed, particularly during the last two years, although it possesses but few ships and those old-fashioned and inadequate. Certain lighthouses have been completely rebuilt and others have undergone considerable repairs and improvements. Buoyage, both lighted and unlighted, has been improved, thus fulfilling its object.

The Hydrographic work is carried out with all the accuracy recommended at present, and besides the survey of small bays we are well on the way to completing that of the fine Ilha Grande Bay, 70 miles West of Rio de Janeiro, where the Brazilian Fleet exercises every year. This survey is being made with particular care and great accuracy, and its completion will bear eloquent witness to the capacity of Brazilian Hydrographers.

In all our hydrographic surveys it has been made obligatory, after sounding, to carry out a hydrographic sweep at different depths so as to make sure that no pinnacle rocks exist, as these are not usually detected by soundings however carefully and closely taken.

In addition we have determined the accurate geographical co-ordinates of various places on the coast, using the prismatic astrolabe for the astronomical observations, the time at the prime meridian being obtained by means of W/T time signals from the astronomical observatory of Rio de Janeiro.

At some places, magnetic observations have been made at the same time, to determine the elements of the terrestrial magnetism, besides tidal constants with the aid of harmonic analysis.

We are now erecting our first radio-beacon at São Thomé, in the State of Rio de Janeiro, and we have already completed our study of the places on the coast where other radio-beacons will be erected in due course. In this way all the needs of air navigation will be taken into consideration.

The proposed surveying ships must have the following characteristics:—tonnage, about 900; moderate draught; minimum speed, 15 knots; radius of action, 4,000 miles; excellent accommodation for the whole crew of about 60; excellent accommodation for oceanographic study and for plotting; library, photographic dark-room, etc.; excellent cold storage and a plentiful supply of water; complete apparatus for navigation, hydrography and oceanography; four boats with powerful motors, capable of use in the open sea for sounding and hydrographic sweeping up to depths of 30 metres (16 ½ fms.).

The ship must also have a seaplane for aerial photogrammetric surveying, complete with the necessary apparatus for launching and hoisting in.

The lightship tender will be of slightly heavier tonnage than the surveying ship, but will be different in certain respects:—lower speed; fewer boats (these being fitted for work with buoys); less accommodation; holds capable

of stowing buoys of the different standard types ; storage cylinders for illuminating gas for automatic lighthouses and for light-buoys ; an excellent mechanical workshop, and a small optical workshop.

When these ships become part of the *Directoria de Navegação*, the development and intensity of the work will be increased and the *Directoria de Navegação* will be able to undertake the surveying of all our immense coast accurately and completely ; the arrangements for this purpose are already being studied, and it will be possible to keep the lighting and buoyage of the coast and the harbours in a continuous state of perfect efficiency.

