

UNITED STATES NAVAL SURVEYS

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The Hydrographic Office of the United States Navy, in continuation of its policy of charting waters most essential to shipping, has underway and projected an extensive and important plan of activities for its survey ships, a program which, when completed, will furnish up-to-date hydrographic information and charts for the Caribbean coasts of Central America including the approaches to the proposed Nicaraguan Canal; the coasts of the islands of Cuba and Haiti; the Pacific coast of Panama including the Gulf of Panama with the Perlas Islands; and the Venezuelan coasts of the Gulf of Paria.

These waters, now so essential to the maritime interests of the world, bordering on or within the approaches to the Panama Canal, were charted over a century ago, insufficiently, however, to meet the advancing requirements of vessels of the greater size and speed as those developed in the present generation.

The vessels assigned to the task of carrying out this important work are the U. S. S. *Hannibal*, the U. S. S. *Fulton*, and the U. S. S. *Nokomis*.

The most modern equipment will be used in these surveys. The fathometer and the super-sonic apparatus, with which the vessels are equipped, make it possible to obtain a continuous record of the topography of the ocean floor.

In carrying out the survey of the land bordering the Gulf of Paria it was found that the topography and general character is such that the main triangulation for controlling the hydrographic survey could not be laid out with all triangulation points situated on land or even in shallow water. In order to obtain suitable control it was necessary to locate certain main triangulation points off shore in from 30 to 50 feet of water. This was successfully accomplished by building 100-foot towers at these points, the main parts of which were first erected on board the *Hannibal* and then dropped at the desired location. Wooden mattresses, weighted with railroad iron, afforded a good foundation for the corner posts of the towers. In less than three hours a tower was completed and ready to be occupied.

The survey of these areas includes a complete hydrographic survey; triangulation of great accuracy; the establishment of sufficient number of control points with which to tie the aerial surveys already accomplished; astronomical observations of first-order accuracy; base lines; tidal and current observations; magnetic observations; observations of the force, pressure, and temperature of the surface and upper air; and securing samples of bottom for scientific studies.

For the past eight years aircraft has been used extensively in the hydrographic surveys of the Navy. Complete aerial surveys of the coast have been conducted in advance of actual hydrographic work, enabling the engineer to study actual conditions of the terrain before arrival in the field.

