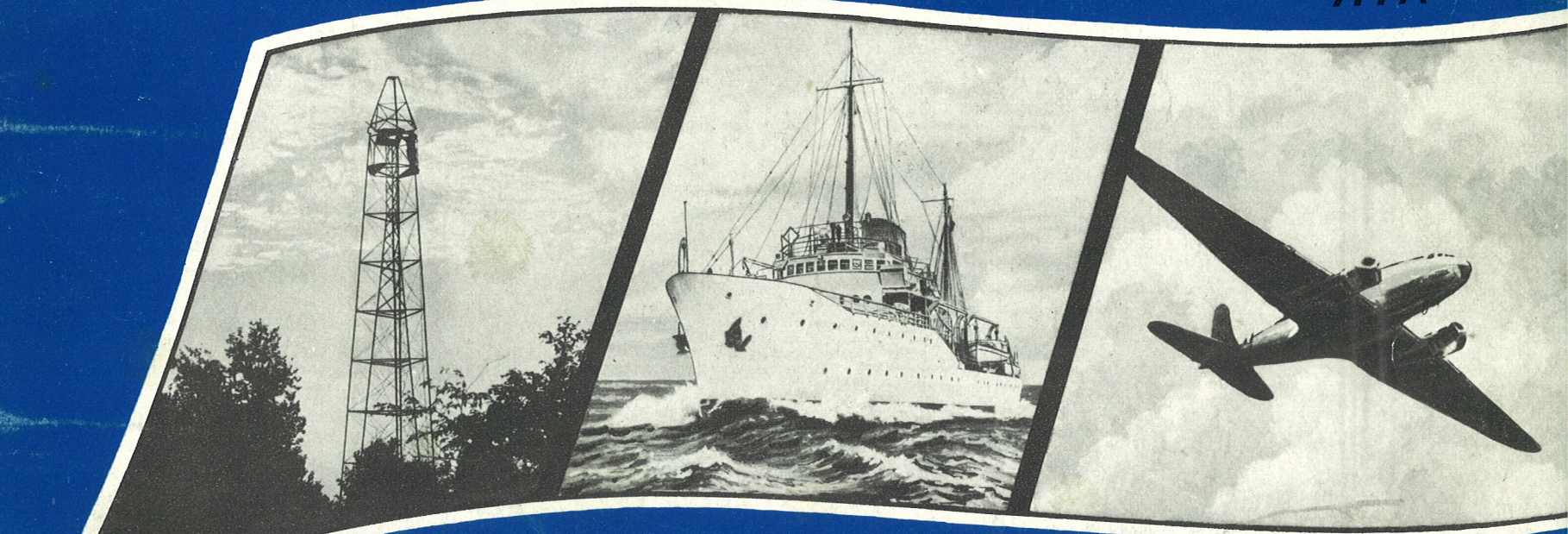
# COAST and GEODETIC SURVEY

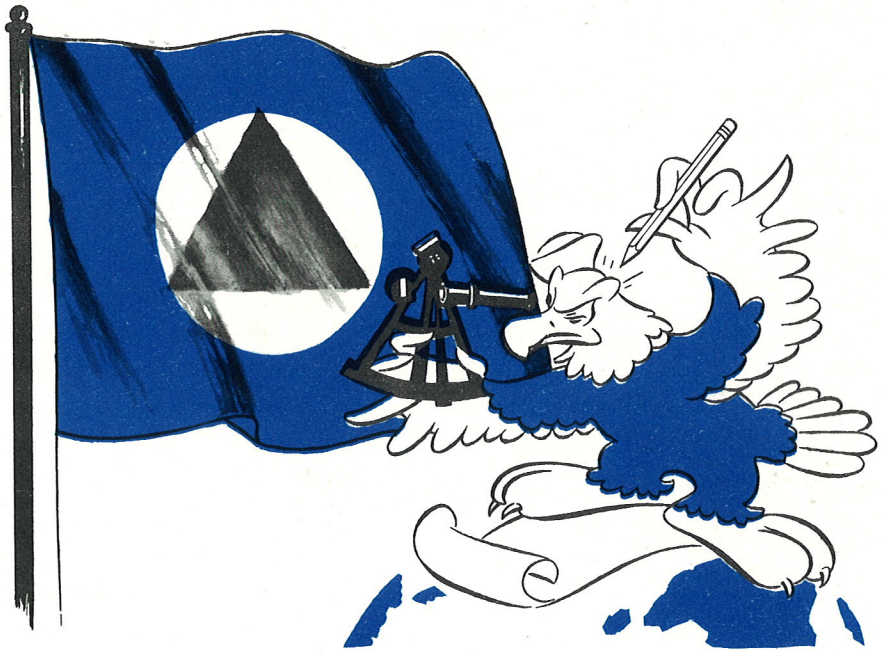
LAND SEA AIR



## Combined Operations

U.S. Department of Commerce

Washington, D.C.



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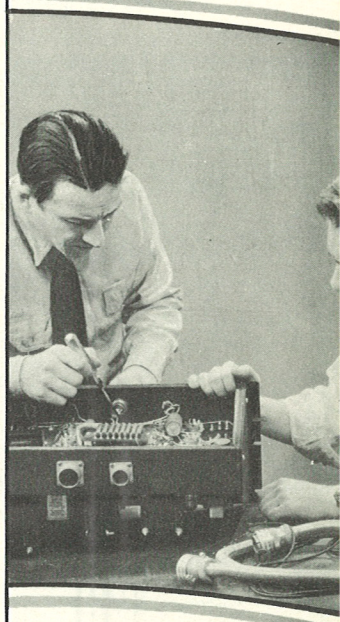
# TRAVEL-
# ADVENTURE-
# CAREER



*The Coast and Geodetic Survey offers a satisfying career to graduate engineers, a career of travel and adventure, with security and opportunity for advancement in one of the oldest and most respected scientific organizations in the Federal Governmant. Field work is highly diversified and includes operations in Hydrography, Topography, Photogrammetry, Astronomy, Triangulation, Leveling, Magnetics, Gravity and Seismology. The Bureau is a recognized leader in developing and promoting improved surveying and mapping practices. Our engineers have developed many new surveying instruments, such as the nine-lens camera, and have done much work in the field of electronics. Coast and Geodetic Survey engineers travel the length and breadth of the country and its territories by land, sea, and air in carrying out their assigned duties.*

*Highlights of present day activities are illustrated in this brochure.*

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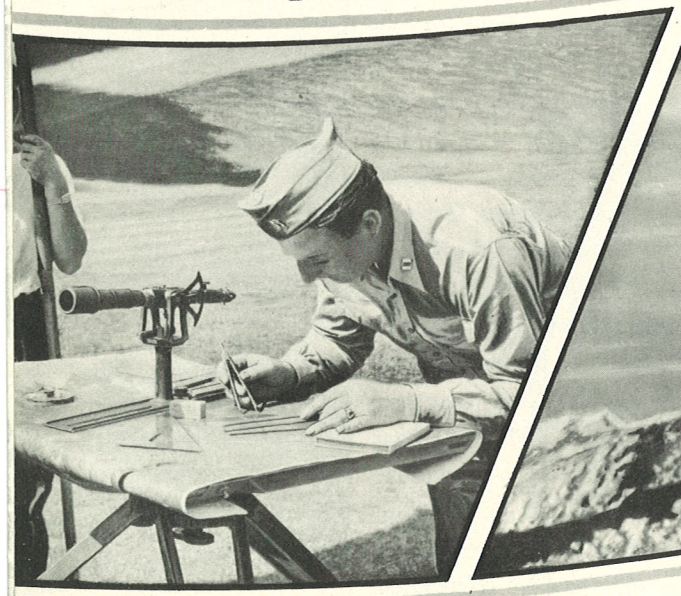
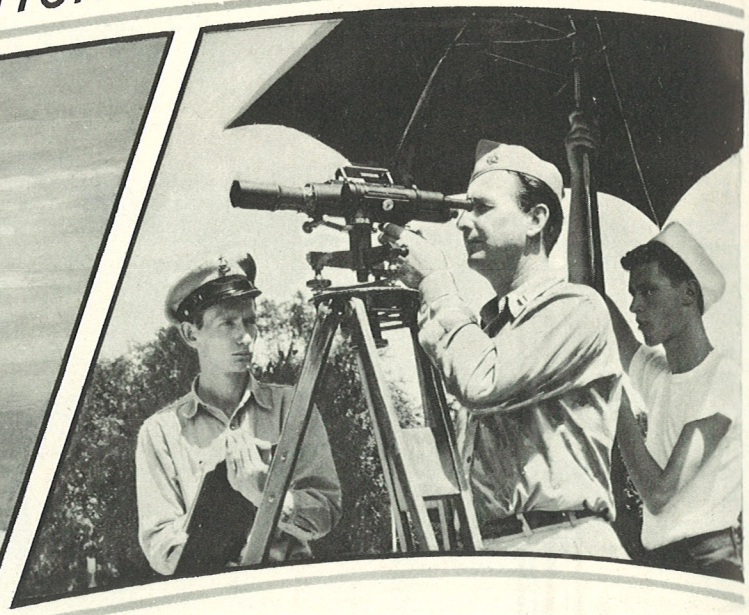
# LAND

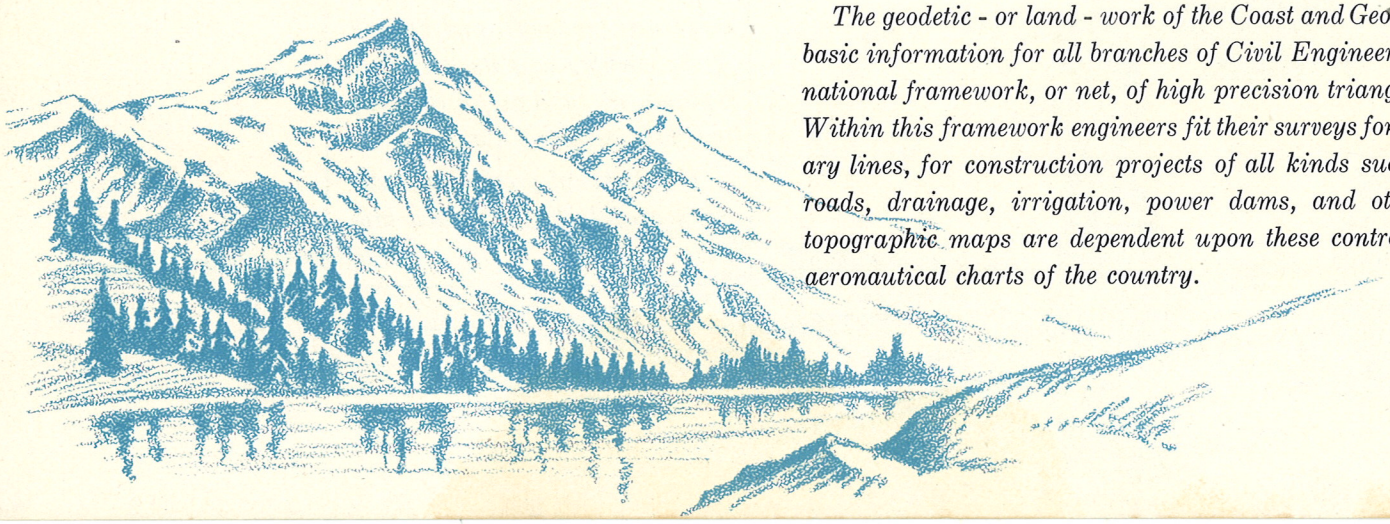
TOPOGRAPHY

TRIANGULATION

LEVELING





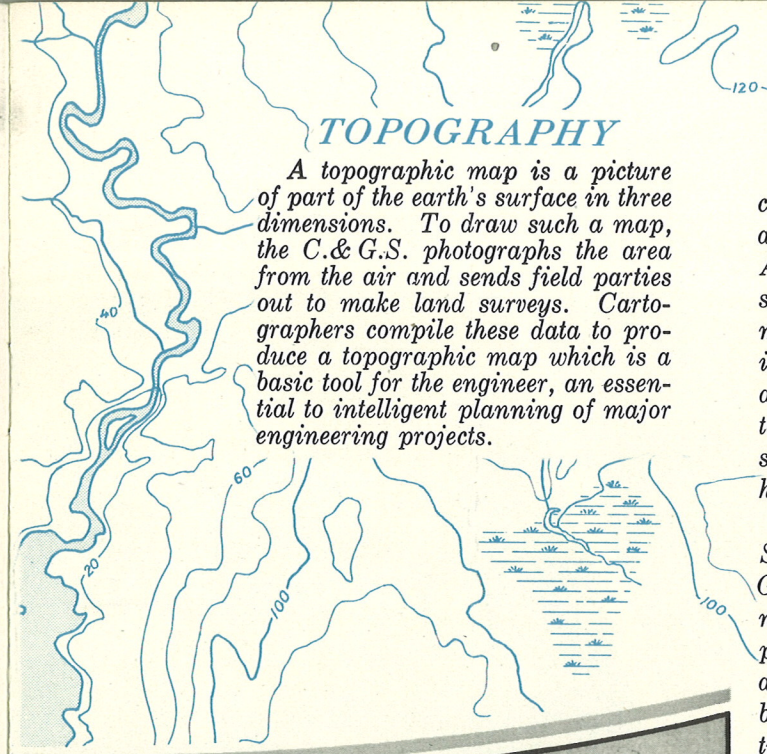


*The geodetic - or land - work of the Coast and Geodetic Survey provides basic information for all branches of Civil Engineering by establishing a national framework, or net, of high precision triangulation and leveling. Within this framework engineers fit their surveys for property and boundary lines, for construction projects of all kinds such as highways, railroads, drainage, irrigation, power dams, and others. The national topographic maps are dependent upon these control surveys as are the aeronautical charts of the country.*

ING

## TOPOGRAPHY

*A topographic map is a picture of part of the earth's surface in three dimensions. To draw such a map, the C.& G.S. photographs the area from the air and sends field parties out to make land surveys. Cartographers compile these data to produce a topographic map which is a basic tool for the engineer, an essential to intelligent planning of major engineering projects.*



TRAVERSE

## TRIANGULATION

*Triangulation consists of a network of connecting triangles; the apexes of the triangles being permanently marked stations. All angles are measured with precise instruments. The instruments are often mounted on tall portable steel towers to clear intervening obstructions. At intervals along the network base lines are precisely taped. The latitude and longitude of all stations in the network are computed with a high degree of accuracy.*

*Plane coordinate systems for all the States have been developed by the Coast and Geodetic Survey based on this triangulation network. Many states have adopted the plane coordinate systems for use in locating and describing property lines and political boundaries. Project location surveys are tied into the triangulation network.*

## TRAVERSE

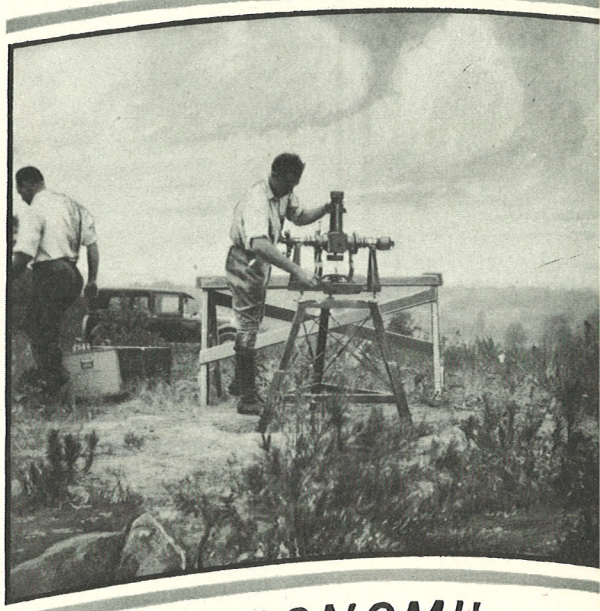
*Traverse measurements are sometimes made to establish horizontal control stations. These measurements are made with instruments and procedures designed to give results equal to triangulation of the same class. The geographic positions of these marked stations are computed from the data thus obtained.*

## ASTRONOMY

*As a part of its work in triangulation, the Coast and Geodetic Survey determines the latitude and longitude of selected stations by observation on the stars and determines the azimuth of selected lines from similar astronomic observations. These astronomic stations are coordinated into the triangulation network.*

## LEVELS

*The leveling network consists of thousands of bench marks in nearly every state. The elevations of these marks with relation to sea level are determined with precise instruments developed by the Bureau. There are three or more bench marks in almost every city and town in the land which furnish basic information for city planning and surveys for water supply, drainage, sewage lines, and street layouts.*



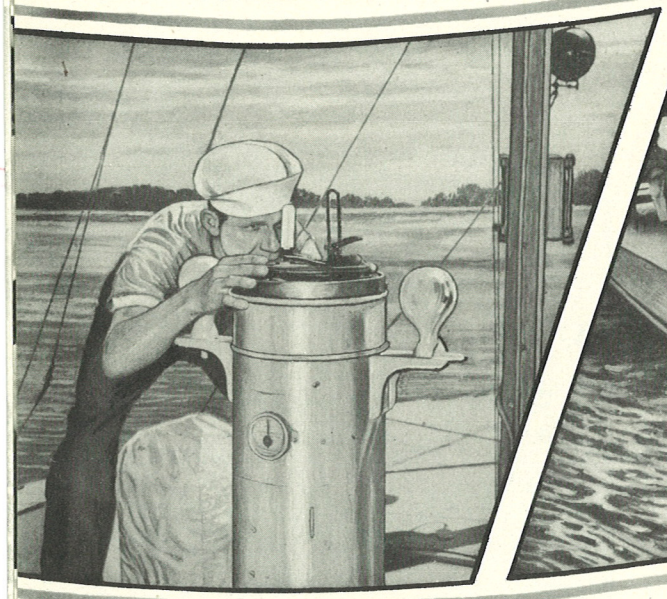
ASTRONOMY

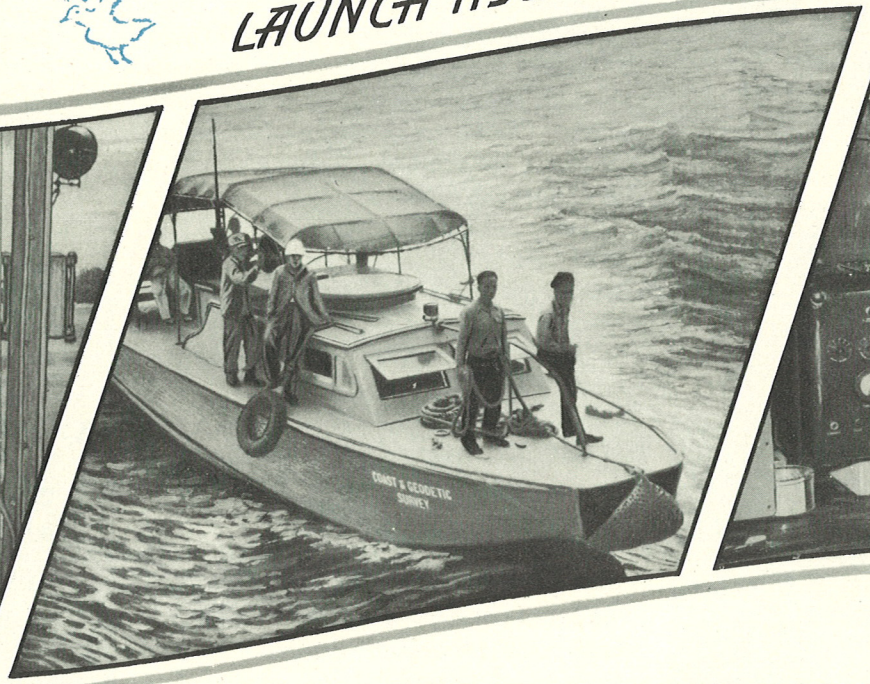
# SEA

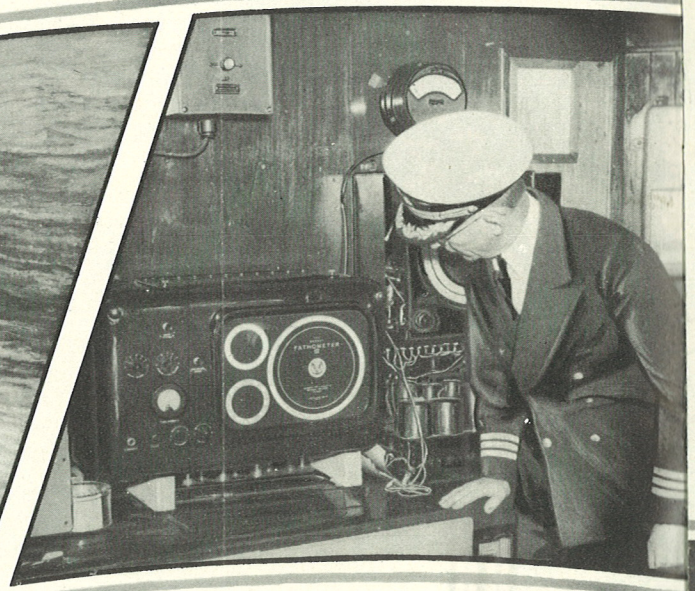
## AZIMUTH

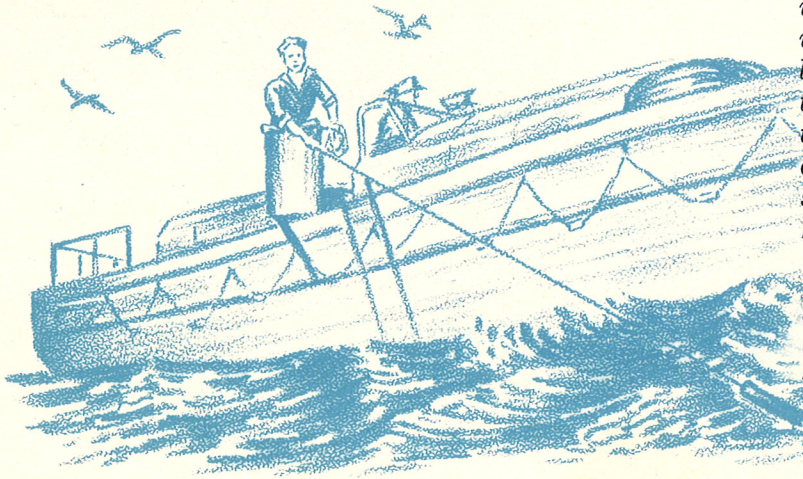
## LAUNCH HYDROGRAPHY

## ECHO SOUNDING





*Charting our coastal waters is one of the greatest tasks of the Coast Survey. It is a never ending job to keep the charts up to date as man and nature are continually changing channels and shoreline. Approximately 100,000 miles of shoreline and over a million square miles of water area in the United States, Alaska, the Hawaiian and Virgin Islands must be charted. The operation of mapping the ocean floor is called hydrography. Continuous profiles of the ocean floor are drawn by recording fathometers. The location of these profiles are plotted from sextant angles or by means of positions obtained with electronic eqiupment such as Shoran or the Electronic Position Indicator.*

*The hydrographers' records are processed and turned over to a cartographer who constructs the familiar Coast and Geodetic Survey nautical chart showing the channels, shoals, fishing banks, depth curves and various other information necessary for safe navigation in the area.*

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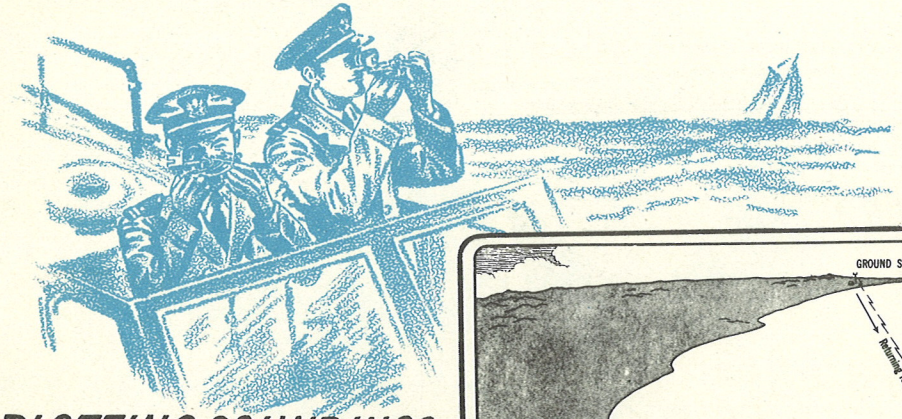
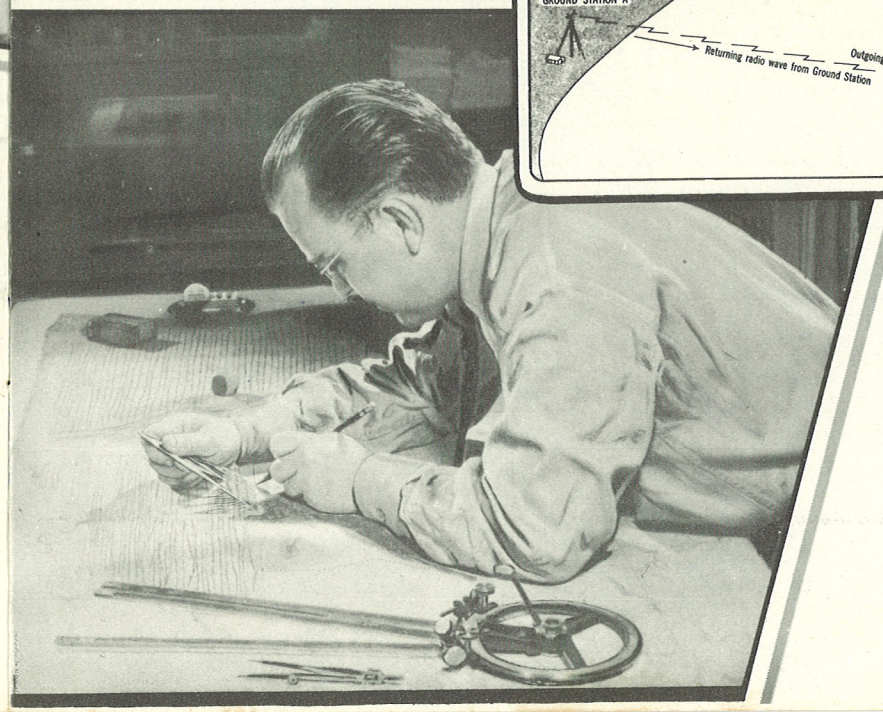
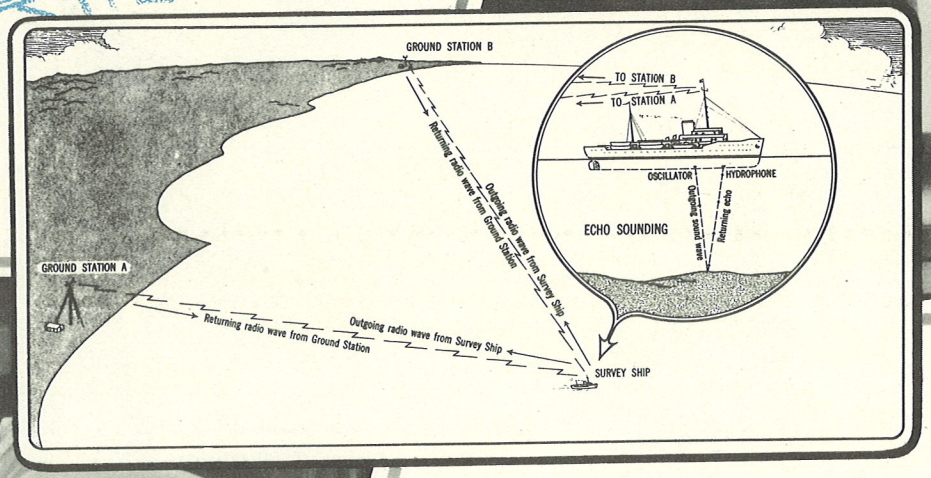
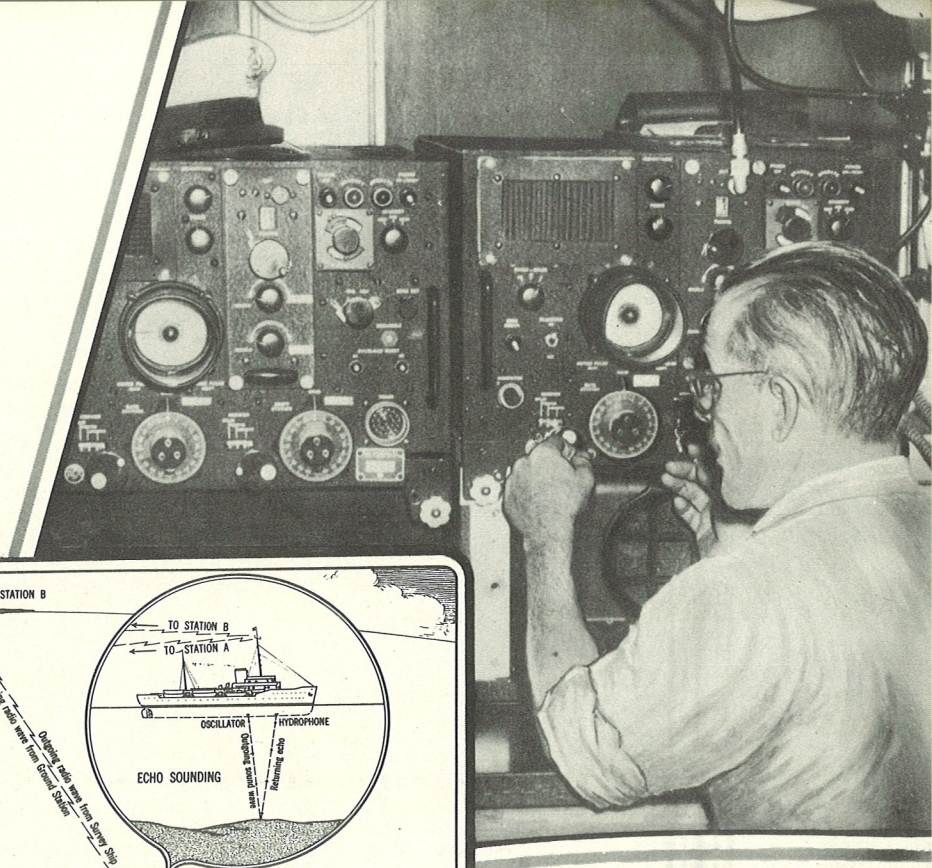
*The demand for better charts and better instruments for navigation has grown proportionately with the growth of the maritime industry. The development of surveying instruments and methods in the Coast and Geodetic Survey has kept pace with this demand.*



## PLOTTING SOUNDINGS





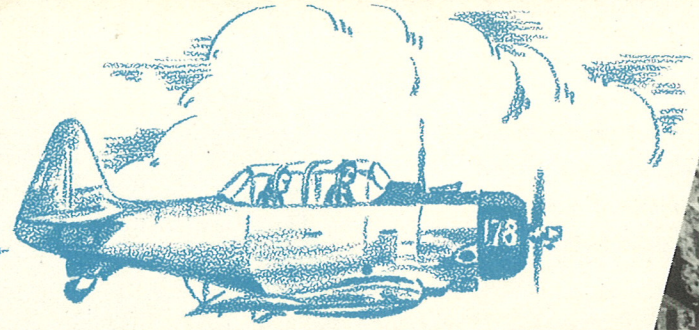



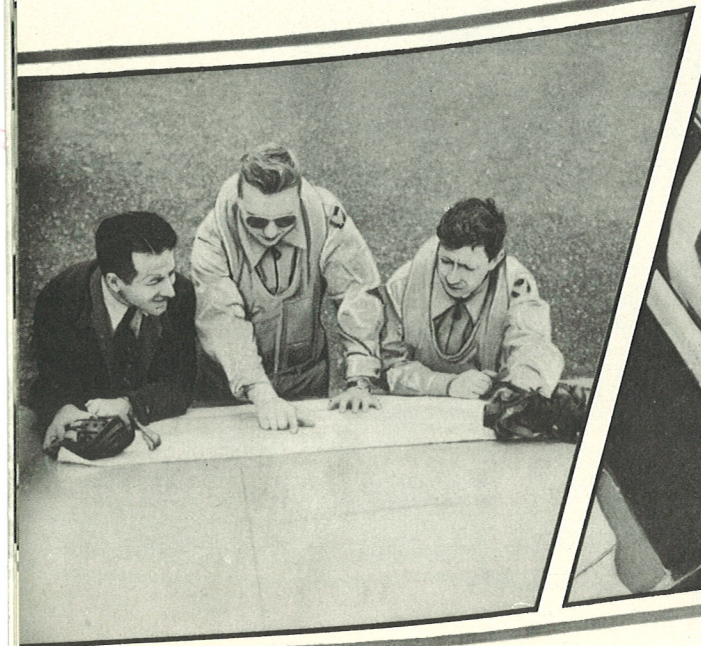
## LOCATING POSITION

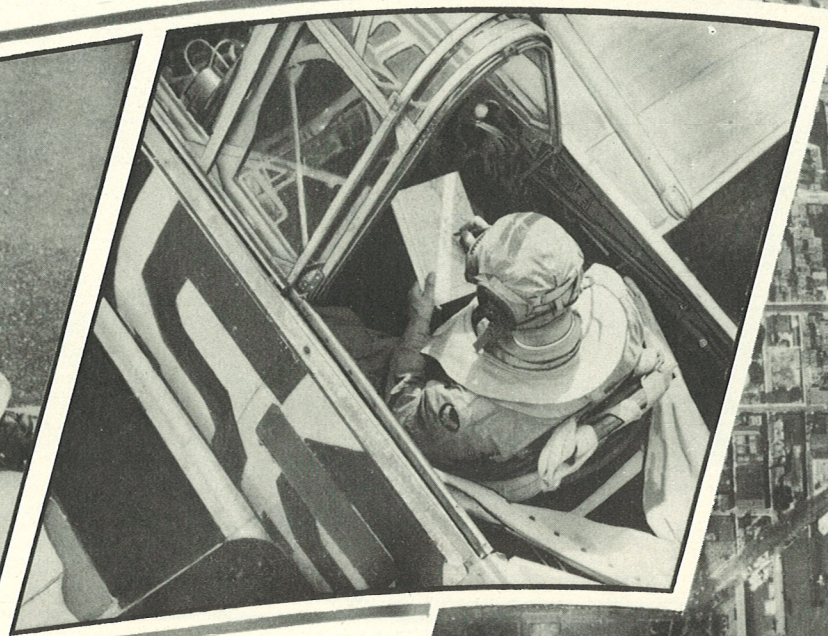
### ELECTRONIC POSITION INDICATOR

*While the old fashioned lead line, the sextant, and wire drag still have their places in hydrographic surveying, they have been largely replaced by products of modern science, the fathometer and shoran. As a result output is far greater and accuracy is increased. The use of these new instruments permits continuous operation by day or night, in fair weather or fog, and in areas far out of sight of land.*

# AIR





## FLIGHT CHECKING

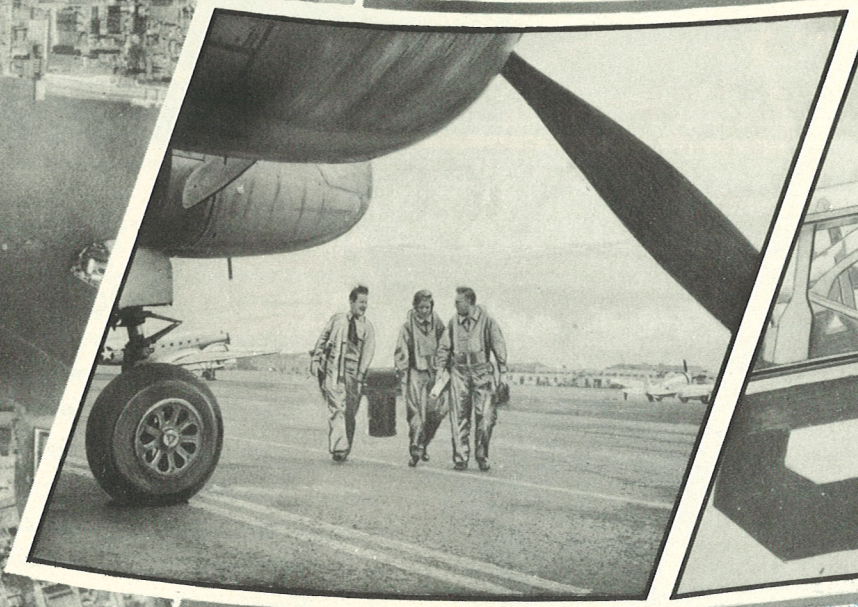
*Aeronautical charts of the United States and its possessions are compiled and published by the Coast and Geodetic Survey. Before a chart is released for sale to the public an experienced observer makes a detailed visual comparison of the chart and the ground. This is done by flying over the charted area and verifying landmarks, air ports, visual aids to navigation, railroads, and highways. Deletions or additions of information are made on the basis of this inspection and the chart is released.*

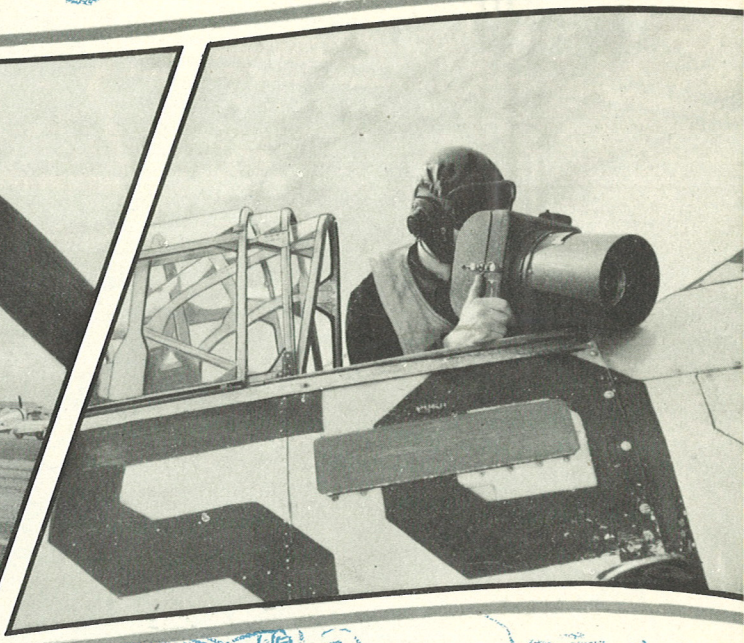
*Nine-lens Air photograph of New York City taken at 3,500 feet*

photograph
ity taken at

## *PHOTOGRAMMETRY*

*is the relatively new science of topographic mapping by aerial photography. No other method of surveying can match the wealth of information and fullness of detail recorded by the aerial camera. A Coast and Geodetic Survey photographer flying at 14,000 feet can photograph 125 square miles with one exposure of the nine-lens camera which was developed by this Bureau. These pictures are inspected in the field for interpretation of detail and location of control points. Mapping which formerly took years to accomplish can now be done in a few months with far better results.*

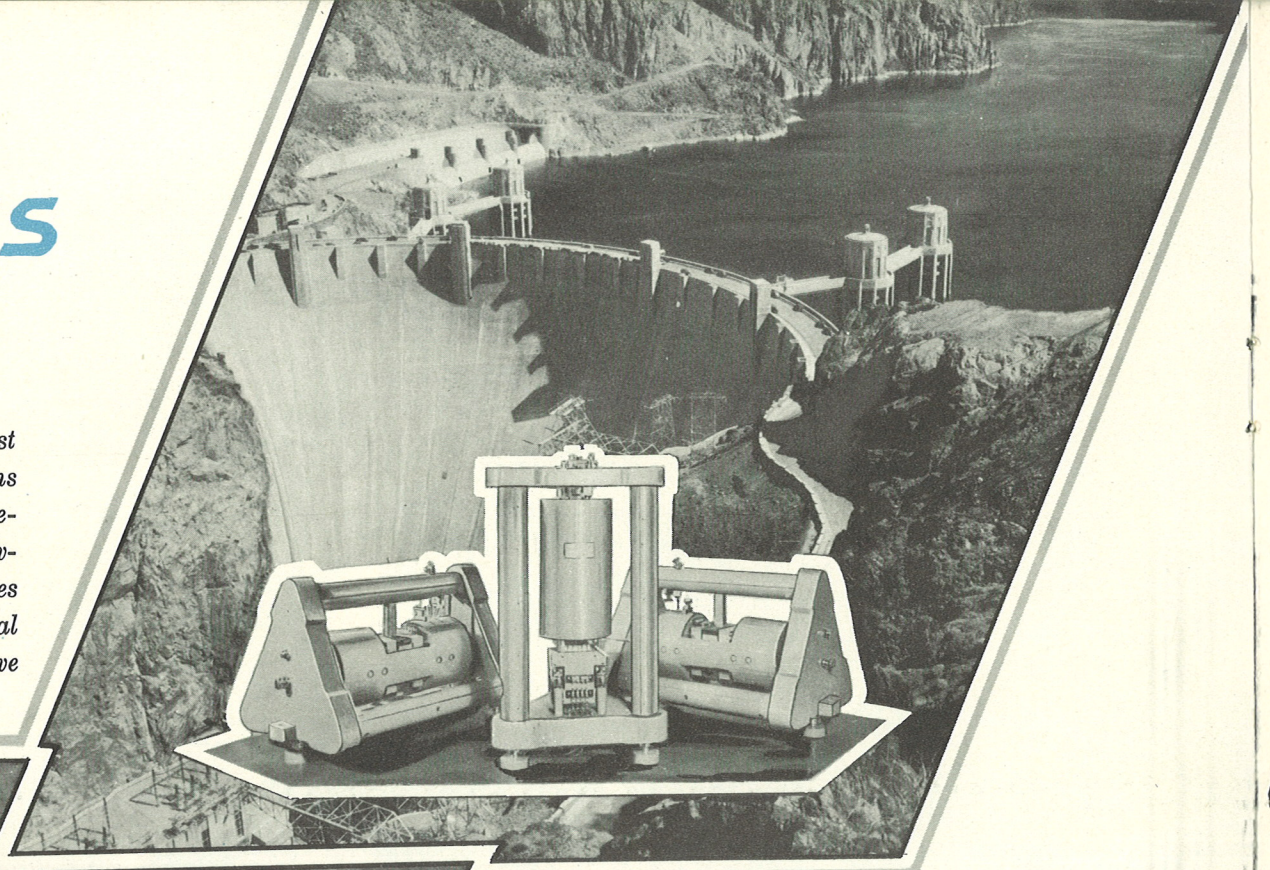


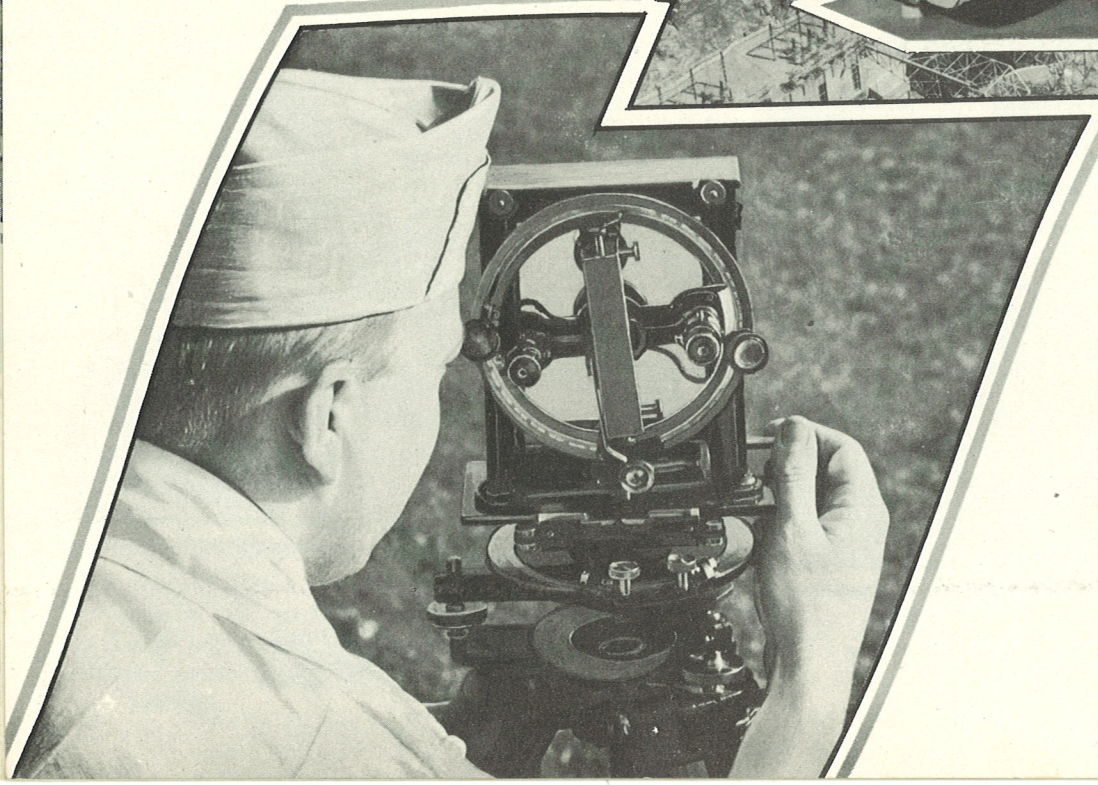


# ALLIED SCIENCES

## SEISMOLOGY

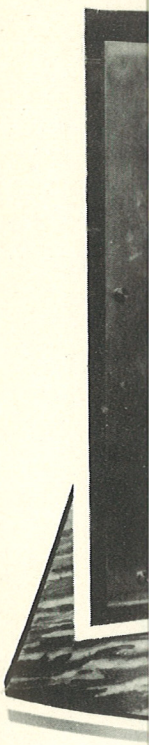
*is the science of earthquakes. The Coast and Geodetic Survey coordinates observations and study, maps seismic zones, makes interpretations, and publishes digests of seismic activity. The Survey also observes and analyzes violent earthquake motions for use in structural engineering, and conducts a seismic sea wave warning service in the Pacific basin.*





## GEOMAGNETISM

*Geomagnetic observations and surveys are essential for the determination of the variation of the compass needle and other purposes. The Coast and Geodetic Survey makes magnetic surveys of the United States and possessions, and occasionally in foreign areas. It is the repository of magnetic data collected on a world wide survey. Some of the work is done by air borne observers. This information serves navigators, land surveyors, geophysical prospectors, and communications engineers confronted by magnetic storms that disrupt telegraphic and radio services and radio navigational aids.*



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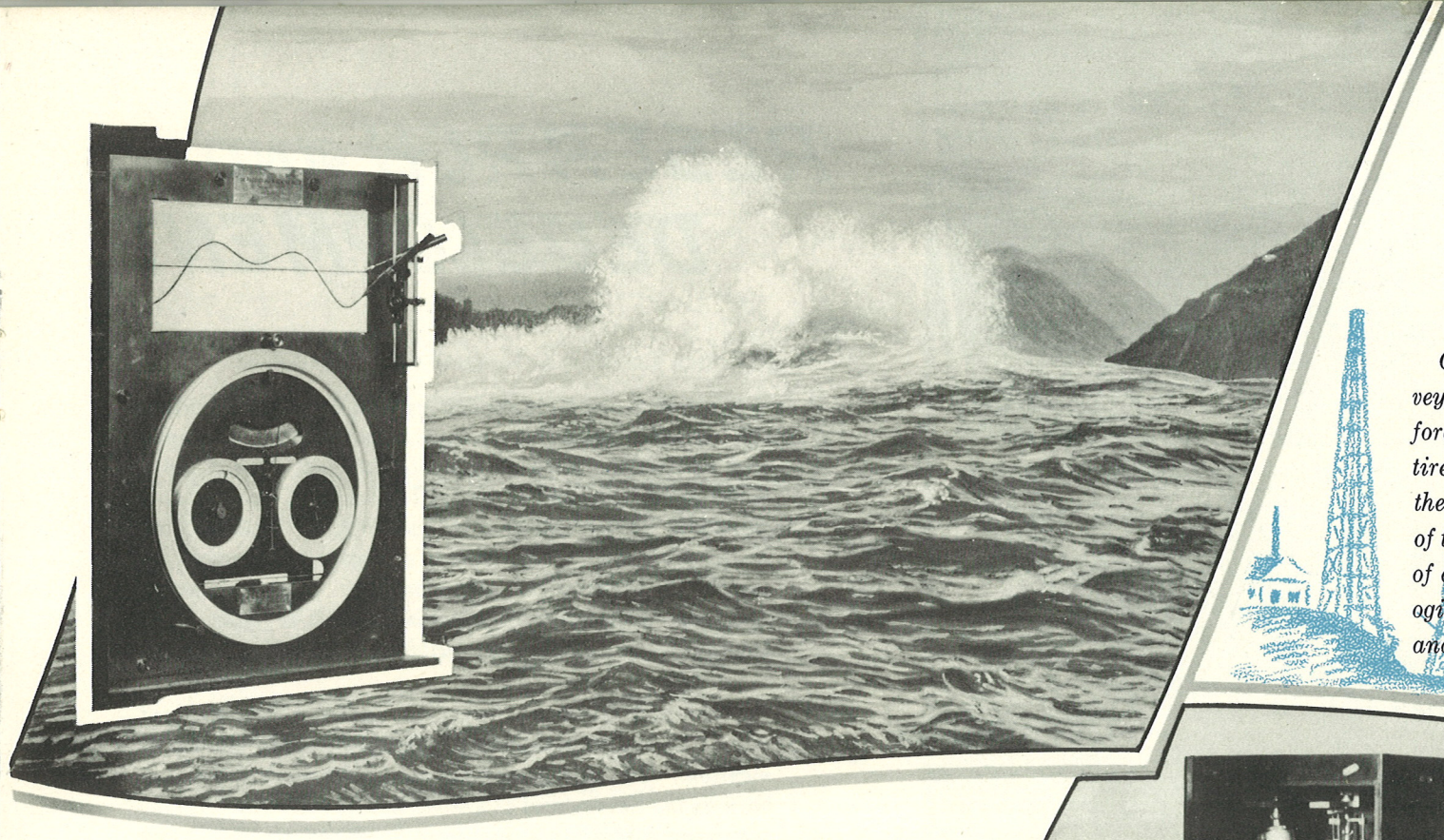


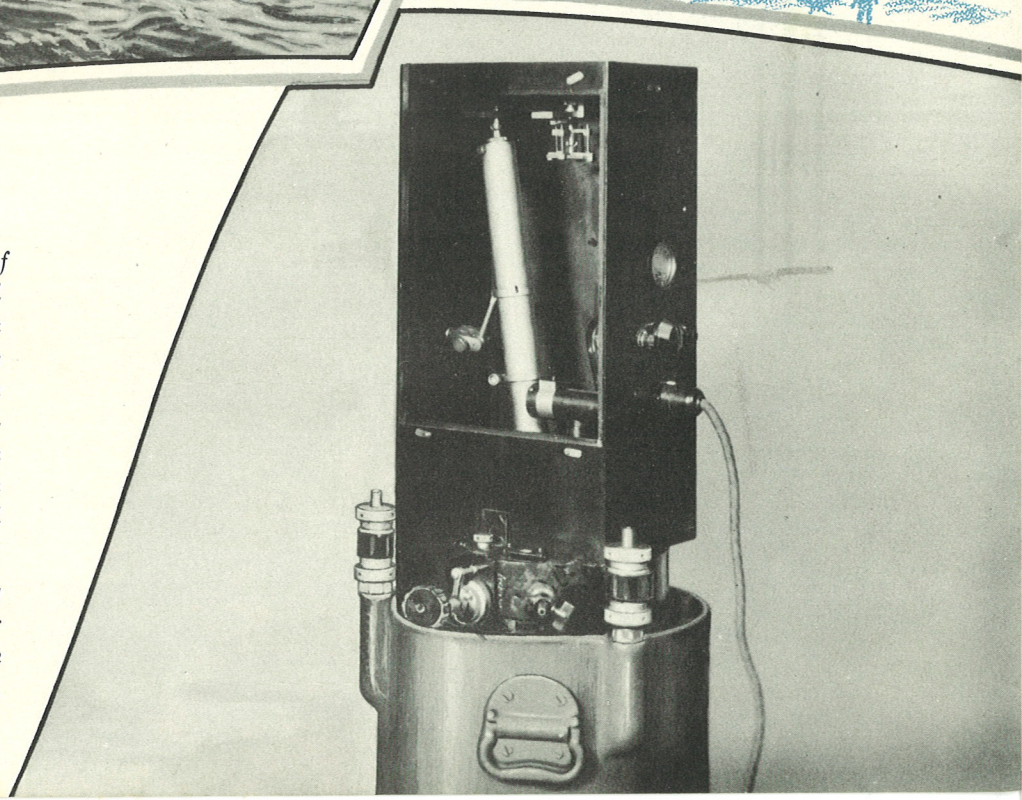
## GRAVITY

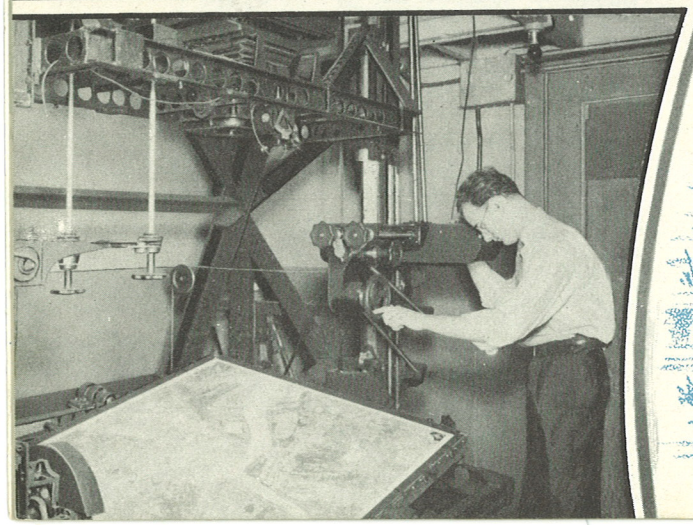
*Coast and Geodetic Survey engineers measure the force of gravity over the entire country. Aside from the purely scientific aspects of this survey, the results are of a practical benefit to geologists in their search for oil and mineral deposits.*

## TIDES & CURRENTS

*The study of tides throughout the world and the observation of the periodic rise and fall of the tide along the coasts of the United States are an essential part of the work of the Coast and Geodetic Survey. Some of this work is done by hydrographic survey parties and some by engineers assigned to this project exclusively. The stage of the tide at any point for any date and time can be predicted mathematically by analysis of recorded observations. The end products of this work serves many practical purposes. Tide predictions are published a year in advance for many ports all over the world.*

*Tidal currents are observed by engineers in waterways along our coasts. These observations are analyzed in the same manner as the tides, and the results furnished for the use of the maritime services and the general public in the form of current predictions, current charts and miscellaneous publications.*





# RESEARCH AND DEVELOPMENT

*The Coast and Geodetic Survey plays a most important role in maintaining American superiority in surveying and mapping. Through its international affiliations it exerts great influence in the establishment of international standards in surveying and cartographic methods and instrumentation. The Survey's engineers conduct research in electronics, oceanography, photogrammetry, chart reproduction and many allied scientific fields. The laboratories are designing, building and testing new instruments.*

*Coast and Geodetic Survey personnel have developed many new instruments in the past which are worthy of mention. The tide predicting machine was designed and built by the Survey and is unique in this country, Among surveying instruments they have developed are the Fisher precise level; the Parkhurst theodolite which measures angles to one second of arc; the Reading nine-lens camera and other photogrammetric equipment; the Brown gravity meter which is the basic pendulum type of meter now in use; the Roberts current meter which measures the strength and direction of the current and automatically radios the results to a central station or ship; the Green seismic sea wave detector which is designed to set off an alarm at the approach of a tidal wave; and, finally, the Electronic Position Indicator which is used to determine precisely the position of a ship two or three hundred miles away.*

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## COAST AND GEODETIC SURVEY
### WASHINGTON

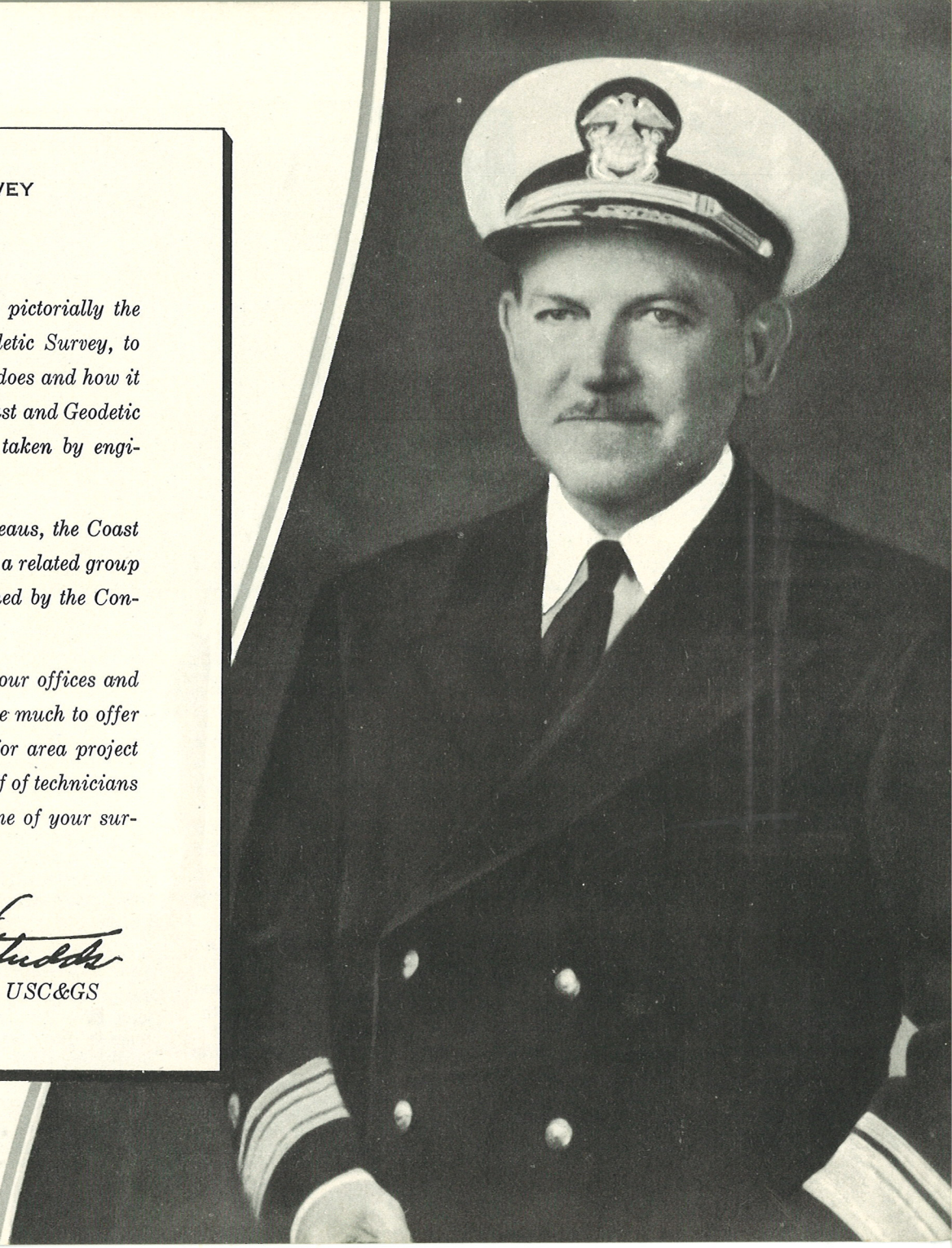
*This booklet was designed to illustrate pictorially the major field activities of the Coast and Geodetic Survey, to give you a brief glimpse of what the Bureau does and how it operates. These are typical scenes from Coast and Geodetic Survey life; many of the photographs were taken by engineers in the field.*

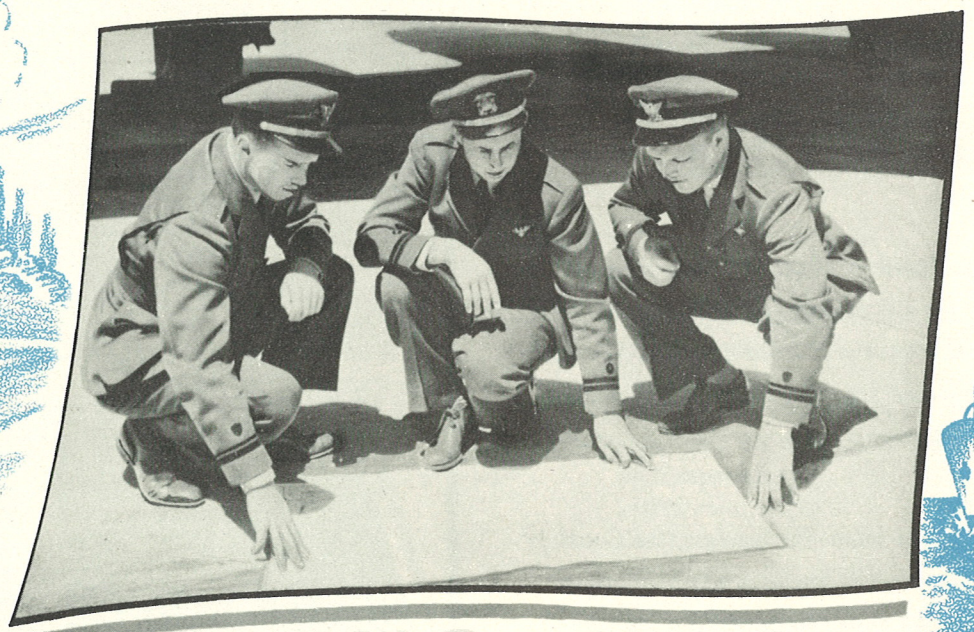
*One of the nation's oldest scientific bureaus, the Coast and Geodetic Survey exists solely to perform a related group of public services which have been determined by the Congress to be a proper function of government.*

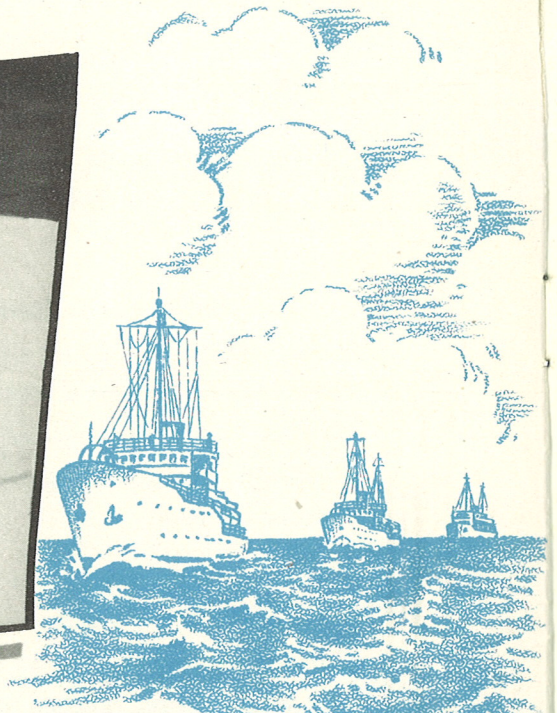
*You are most cordially invited to visit our offices and examine our products and services. We have much to offer engineers, surveyors, and those responsible for area project planning as well as to the navigator. Our staff of technicians and specialists may be able to help solve some of your surveying and mapping problems.*

Robert L. A. Studds

*Rear Admiral, USC&GS*
*Director*







# A CAREER FOR AN ENGINEER

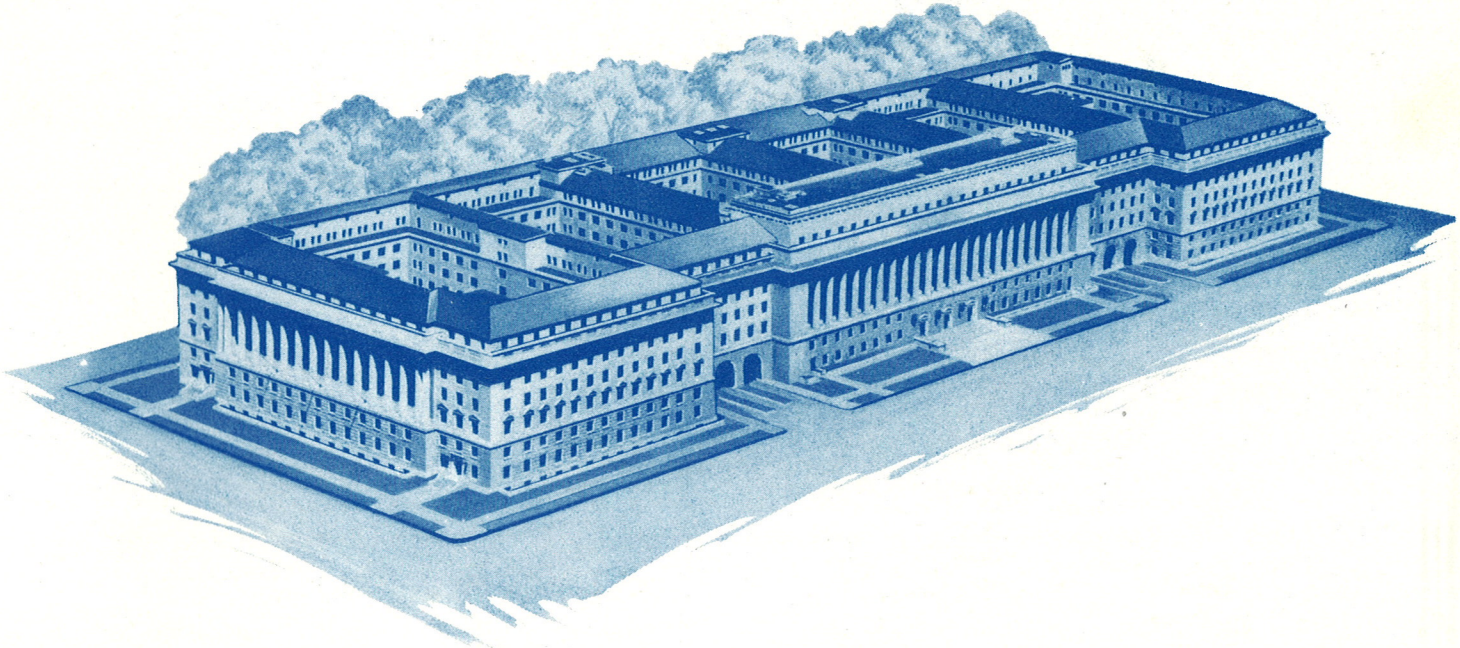
*The Coast and Geodetic Survey is a Bureau of the Department of Commerce with its central office at Washington, D. C. First organized in 1817, it is one of the oldest scientific organizations in the Federal Government. Although its surveying operations are restricted to the United States and its territories, its influence is world wide. Many of the Service field manuals have been translated to foreign languages and adopted as standards by various countries.*

*The Survey is staffed by both commissioned and civilian personnel. The field operations are, for the most part, under the direction of commissioned officers who range in rank from Ensign to Captain. The entire Bureau is administered by a Director and Assistant Director, both career men holding the rank of Rear Admiral.*

*Those of us who have made the Service a career have enjoyed its wide variety of work by land, sea, and air, and the varied locale from metropolis to country village, and from the Arctic wastes to tropical islands. Those interested in research and development have devised new techniques and instruments for advancement of the work*

*Assignments range from junior officer on a survey party to commanding officer of a ship, supervisor of a district office, or chief of a division in the Washington office. The career man is assured of steady advancement in rank, salary, and responsibility.*

*The first Superintendent of the Bureau set very high and rigid standards for the execution of the assigned duties. These standards have never been lowered. The unselfish devotion of many men of science and engineers of the highest calibre have maintained the Bureau's position of integrity and honor. Our goal continues to be: To add to the sum total of man's knowledge of the world in which we live and to provide the best possible charts for safe navigation of our skies and seas.*



*Further information concerning the work and activities of the Coast and Geodetic Survey may be obtained by calling or writing The Director, U. S. Coast and Geodetic Survey, Department of Commerce Building, Washington 25, D.C. or from the District Offices.*

*District or Field Offices are located in each of the following cities: Boston, Mass.; New York, N. Y.; Baltimore, Md.; Norfolk, Va.; Atlanta, Ga.; Tampa, Fla.; New Orleans, La.; Chicago, Ill.; Kansas City, Mo.; Fort Worth, Tex.; Los Angeles and San Francisco, Cal.; Seattle, Wash.; Portland, Ore.; San Juan, P.R. and Honolulu, T.H.*

U.S. COAST & GEODETIC SURVEY
TRIANGULATION STATION
FOR INFORMATION WRITE TO THE DIRECTOR, WASHINGTON, D.C.
$250 FINE OR IMPRISONMENT FOR DISTURBING THIS MARK.
U.S. COAST & GEODETIC SURVEY
MAGNETIC STATION
FOR INFORMATION WRITE TO SUPERINTENDENT, WASHINGTON, D.C.
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