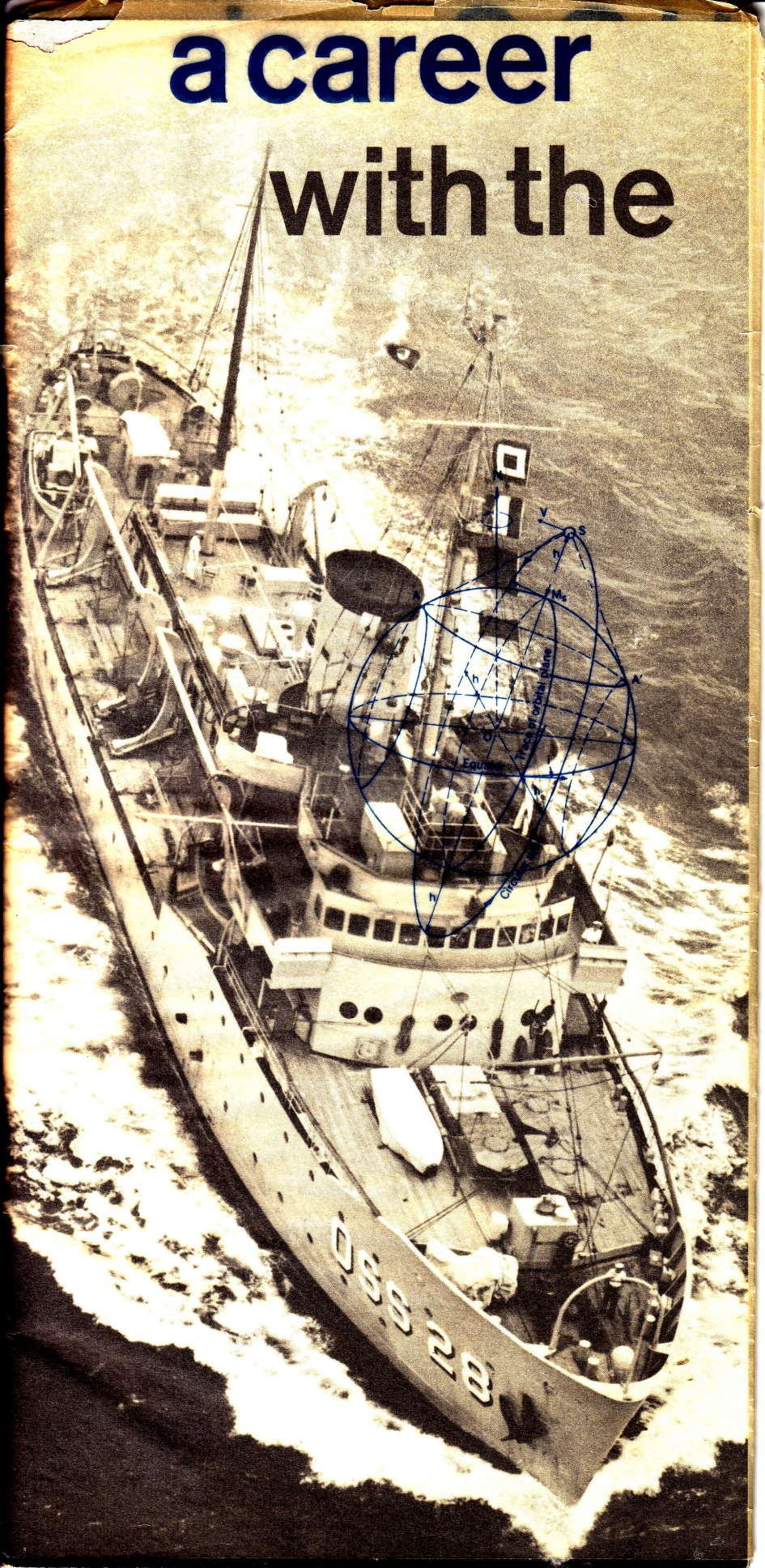
a career with the



U.S. Coast + Geodetic Survey

**as Commissioned Officers,
Civilian Scientists and Engineers.**

The diagram on the front cover shows areas of the earth from which a navigational satellite is visible.

The challenge of land, sea and space

The waters of the earth are a mystery to man. They cover seven tenths of his planet and have hid their treasures and their very meaning from him for centuries. The sea is the last great frontier for man before the stars.

Only recently, with the modern specter of the land's water, food and mineral resources being depleted, have we turned to the seas for help.

Scientists estimate that the sea could feed all men in the coming population explosion... that the seas could irrigate the world's great deserts and transform them into fruitful farmlands... that there is enough oil and natural mineral wealth beneath the sea to run our industries for centuries. It seems the promise of the seas is almost limitless.

But the seas can only be used properly if they are truly understood. The great promise of the sea will not be fulfilled until we dramatically increase our knowledge about it.

Increasing man's knowledge about land, sea and space is the job of the U.S. Coast and Geodetic Survey.

Behind every scientific study and field survey done by the Survey are the dedicated men and women who have chosen oceanography, geophysics and geodesy as their career. We hope this booklet will show you what they do.

One hundred and fifty years of proud tradition

The United States Coast and Geodetic Survey was founded in 1807 under President Thomas Jefferson. It is one of the first technical bureaus of the Federal Government.

Beginning as a Survey of the Coast it became the Coast and Geodetic Survey in 1878 when the bureau was given the added responsibility of establishing geodetic control in the interior of the country.

Its responsibilities and activities have expanded with the growth of our nation. As new territory was added, geodetic control was extended, the production of coastal charts was increased, tides and currents were recorded, magnetic observations were made, and the Gulf Stream was explored. The Pacific Coast, Alaska, Hawaii, and the Caribbean were pioneered by the men of the Survey seeking new knowledge in the interest of science and navigation.

Now as the world moves into the nuclear and space age the Coast and Geodetic Survey has prepared for the tasks which lie ahead by establishing an Office of Research and Development during a reorganization in 1960. This body provides for major shifts in program direction with emphasis on scientific research and development in the fields of oceanography, geodesy, geophysics and astronautics. Through the years the Coast and Geodetic Survey, administered by engineer trained commissioned officers assisted by civilian engineers and scientists, has contributed much to the fields of science and research.

Responsibilities of the Survey today

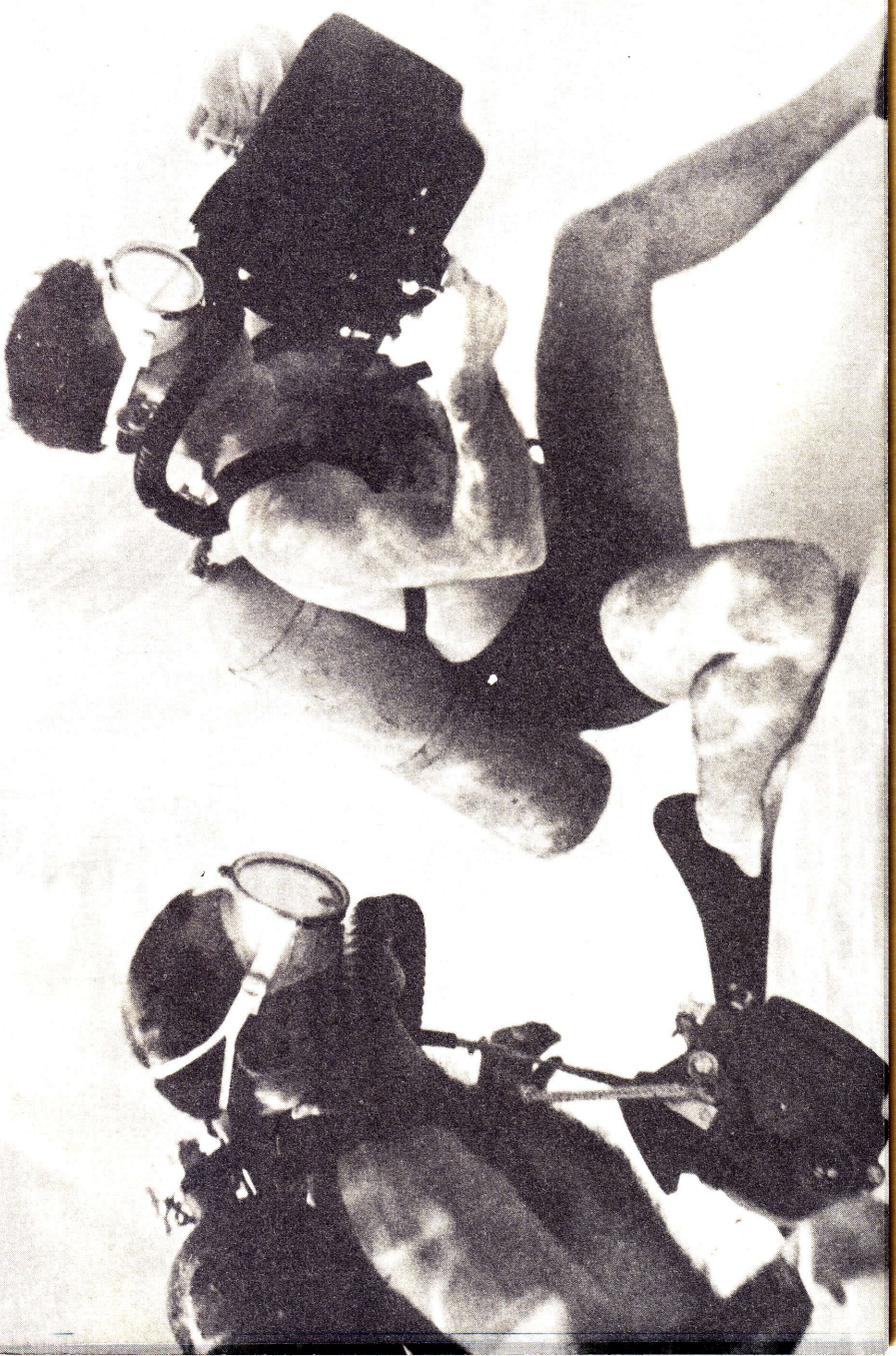
The activities of the Coast and Geodetic Survey in the fields of engineering, science and higher mathematics provide data vital to the development of industry, navigation and to the national defense. Officers of the Survey span the entire globe wherever our ships, planes and field parties seek new and important information in the interest of navigation, engineering and science.

On the land, Geodetic Surveys provide horizontal and vertical control for missile guidance, satellite tracking, production of maps and charts. This control is also used by government and private engineers for construction and surveys. Gravity surveys and magnetic surveys provide data for computing the shape of the earth essential in missilery and magnetic guidance systems. Seismological studies provide data for the study of structures to withstand earthquakes and to give warning to inhabitants of the Pacific Ocean Area of impending tidal waves.

On the sea Hydrographic Surveys provide data for the construction of charts used by the Merchant Marine and ships and submarines of the Navy. Oceanographic surveys supply detailed information about the physical and chemical properties of the sea, currents both surface and submerged, the geology of the earth's crust, and gravity and magnetic properties of the ocean areas essential to the national economy and defense.

In the air, aerial photographs are obtained for establishing controls for hydrographic surveys, for the location of airway navigational aids, for airport surveys, and for the preparation of maps and charts of our coastline.

the Coast Survey



Knowledge of the mean and extreme rise and fall of the tide is a critical need of mariners, construction engineers, scientists and the American people. Without the tidal datum planes developed by the U.S. Coast and Geodetic Survey there would be no accurate way to predict the tides, and general engineering and construction work in or near the water would be impossible. These important observations also provide data for the study of crustal movements of the earth and furnish information often required in legal cases involving maritime interests.

Tidal observation stations providing this data are located all along the nation's coastline.

Primary stations are where observations will continue for a number of years to derive basic tidal data for the area. Ideally, they are located on a Federal, State, or municipal wharf. Occasionally they may be located on a public amusement and recreation pier. Secondary stations are operated for brief periods of time to obtain information on: tides affected by the wind, exposed channel approaches, the upper reaches of tidal rivers, the outer coast, and abnormal tides due to shore configurations.

Tidal currents are closely related to the hydraulic characteristics of the tides and therefore the velocity and direction of the currents are important to those engaged in marine activities. Operations to determine this data are expensive and complex. But with the advent of nuclear submarines and the recent discovery of fast moving submarine currents the importance of this data has become critical.

Another branch of Oceanography that has gained great refinement in the Survey during the past Century and a half is that of hydrography.

Hydrography provides a 'look' at the ocean floor. This information is a valuable tool for the cartographer engaged in the construction of nautical charts.

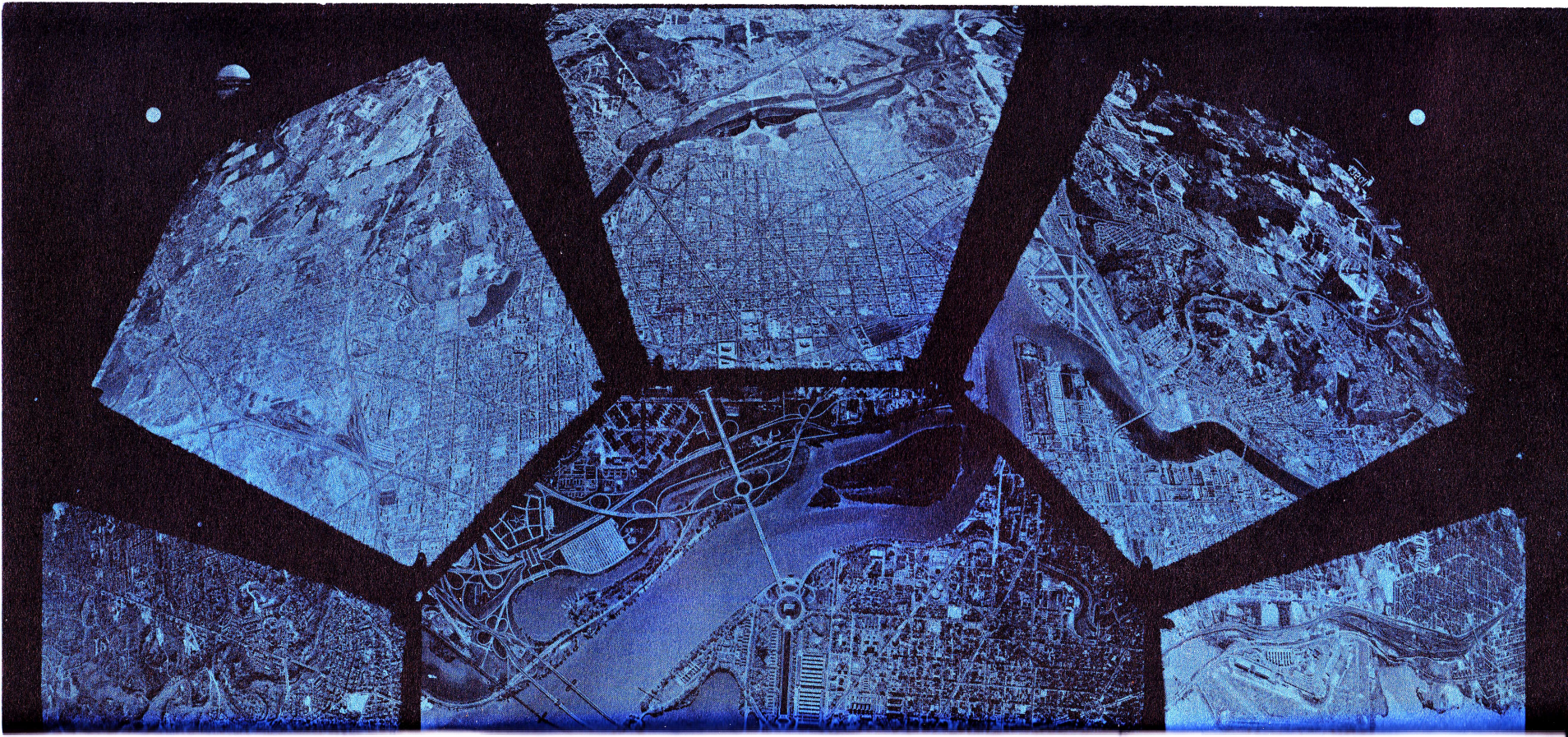
With modern echo-sounding equipment, hydrographic engineers may know in a matter of seconds the exact depths of water and piece together the topography of the ocean floors. Various types of echo-sounders are in common use, but all work on the same basic principle. They measure the time for a sound wave to travel through the water, reflect from the bottom and return to the source. The machine automatically converts the time interval to depth, using an average value for velocity of sound in sea water. The resulting depth is displayed as a continuous profile on graph paper, so that the depth beneath the sounding vessels at any instant is known.

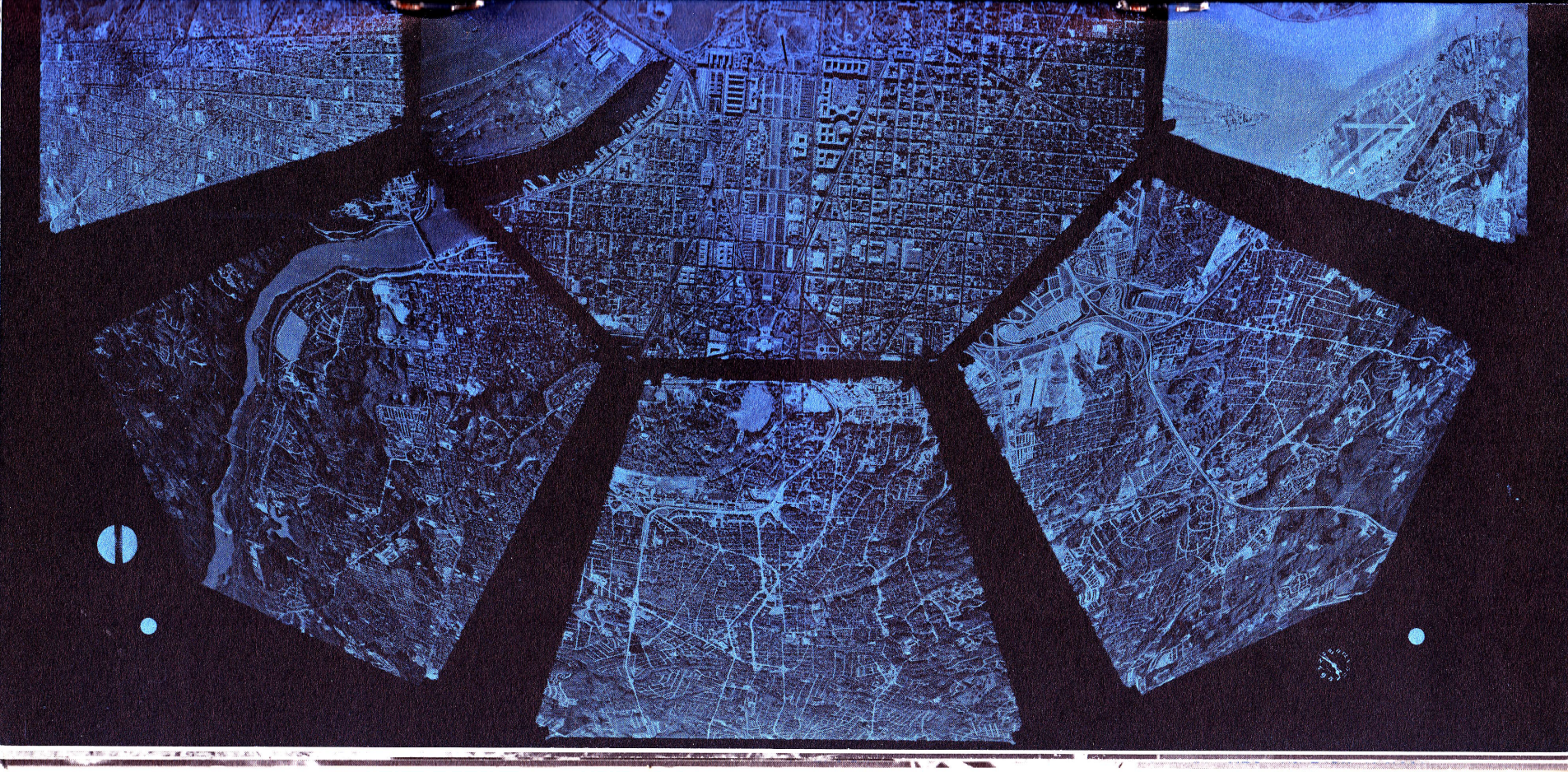
The hydrographic survey extends from deep water areas to the high waterline along the shore. The vessel engaged in this work must be positioned exactly in reference to known points on shore. This may be done by observing angles to known signals on shore every few minutes or with electronic equipment beaming radio signals from ship to shore receivers. Both methods achieve the same results.

Obstruction Location

In certain areas where coral heads, pinnacle rocks, sunken wrecks, and other obstructions are known to exist, safety of navigation and accuracy of charts cannot be guaranteed by hydrography alone. The chance always exists that an obstruction dangerous to navigation lies between adjacent sounding lines and has gone undetected.

To guard against this possibility, certain areas are wire-dragged. In simple terms, the wire-drag consists of a horizontal 3/16 inch steel wire, 3,000 to 12,000 feet long, which is maintained at a predetermined depth below the water surface by a system of buoys, floats and weights. Towlines from both ends of the drag are secured to two towing vessels, and the drag is towed across the area to be cleared. Any obstruction closer to the surface than the horizontal wire is caught on the wire and stops its forward progress. With the location of the obstruction thus localized, its depth is determined and the depth of the drag is decreased by steps until the obstruction is cleared.






the
Geodetic
Survey

The Office of Physical Sciences, through its operating divisions, provides geodetic, geophysical and cartographic data for charting and scientific purposes and for defense needs. It conducts research in physical sciences in accordance with the plans and assignments of the Bureau's overall research and development program. The Office of Physical Sciences is comprised of the Divisions of Geodesy, Geophysics and Photogrammetry.

Photogrammetry

This division does the detailed surveying and mapping throughout the United States that is required to locate aids to navigation and to supply the topographic information needed for the publication and maintenance of aeronautical and nautical charts.

Most of these surveys involve the use of aerial photographs and the principal operational phases include: aerial photography, field surveys, and photogrammetric measurements with stereoscopic plotting instruments.

Pilots for aerial photography are selected from the Commissioned Corps and trained in the Army Flight Schools. Photography is done with the Bureau's unique nine-lens camera and the latest type single-lens cameras. Extensive use is made of infrared and color photography.

Field surveys are made by small mobile survey parties. These parties operate throughout the United States and the officers in charge of them are chosen for their initiative and ability since they are detached from any immediate supervision. Surveys include triangulation, traverse, leveling, the identification of control on aerial photographs and the collection of data required for nautical and aeronautical charts. A variety of modern surveying instruments are used including electronic distance measuring equipment.

Leveling

The engineer or mapmaker needs to know the latitude and longitude of monumented points, accurate lengths and directions between these points, and their elevations.

Leveling is the process by which accurate elevation of thousands of monumented points are determined.

Equipment used in this work is familiar to all engineers.

Leveling is a daytime operation. In work of the highest accuracy, called first-order, observations between benchmarks are taken twice, once forward and once backward along the line. Leveling of the second-order is usually done in one direction only and is used to break down the areas within the first-order level net. Leveling of the first-order is usually accurate to within 1/20 of an inch per mile.

This work is vital to engineers and air navigation.

Triangulation

Triangulation is the framework of our national mapping and provides starting and tie points for property surveys, reclamation projects and highway surveys in addition to many other engineering projects.

The triangulation network is based on a series of astronomic positions and is the means for determining the geographic latitude and longitude of thousands of monumented points covering the entire country. It determines very accurately the lengths and directions of the sides of large triangles from two or three miles in length to as much as 30 miles or more.

The angles of these triangles are measured very precisely, usually better than one second, and the side lengths are computed. The work is done at night employing high grade theodolites and electric signal lamps mounted on mountain tops in the West or on portable steel towers in relatively flat and timbered country in the East. Occasionally, a triangle side or base line must be measured directly, either with precise tapes or by modern electronic measuring devices.

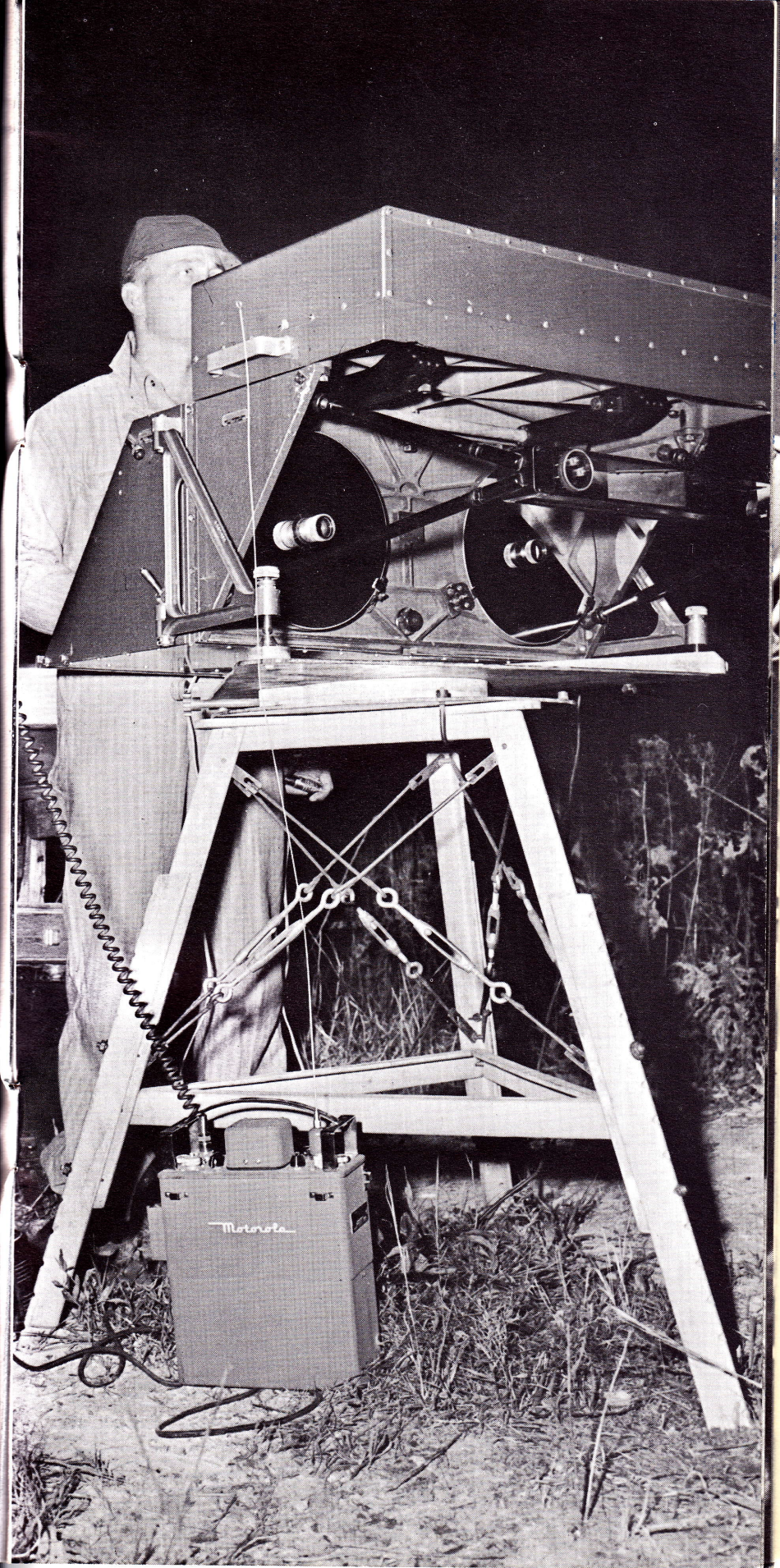
Many special triangulation schemes are established for testing missiles and in locating missile launch sites for the defense of the country.

Geomagnetism

The Bureau operates ten geomagnetic observatories, located all the way from Point Barrow, Alaska to the South Pole. There are three observatories in Alaska, two in the Antarctic, and one each in Virginia, Arizona, Puerto Rico, Hawaii, and Guam.

At each location magnetographs record continuously the variation in the strength and direction of the earth's magnetic field. Periodically, absolute values of the magnetic field vectors are accurately determined for basic control of the variation records. Magnetic data is used for compiling United States and world magnetic charts for navigational purposes — both sea and air, for revising basic land survey data necessitated by the changes in magnetic declination through the years, and for research studies relative to the earth's changing magnetic field and its relation to radio propagation, cosmic ray phenomena, auroral displays, and various other aspects of solar activity.

The observatory at Fredericksburg, Virginia, also includes a magnetic laboratory where instrumental design, development, testing, and calibration activities are carried on by the Office of Physical Sciences itself, and in collaboration with other government agencies.


Motorola

Gravity Studies

Until shortly after World War II gravity observations were made by timing the period of the swing of a pendulum. The pendulum is swung for many hours and the period determined by dividing the total time by the number of swings.

Today gravity observations are made by a small gravity meter and can be done in about five minutes. The basic principle of a gravity meter is the action of the force of gravity on a small weight suspended by a very delicate spring. As the force of gravity increases, this spring is slightly extended and through an ingenious method, the extension of the spring is greatly magnified for reading by the gravity observer.

Besides furnishing basic values of the force of gravity for thousands of points throughout the United States for use of geophysicists and others, these observations are used in the study of the shape of the earth.

Seismology

In the field of seismology, the Bureau operates fifteen seismic stations and collaborates with an equal number located in universities and other government agencies in the United States. Daily telegraphic reports are received from these and many foreign stations for the purpose of locating the epicenters of about 1500 of the largest earthquakes each year. Epicenter data improves our knowledge of the internal structure of our planet.

In its strong-motion program, the Bureau operates 70 strong-motion instruments in the Western United States and seven in South and Central America. These low magnification instruments, which are triggered by earthquakes, record ground motions in different media and the relationship of the movement to various types of structures. Data received from this program is used to formulate earthquake engineering specifications for building codes.

The Seismic Sea Wave Warning System, operated from the Honolulu Observatory, uses both seismic and tidal data in determining whether an undersea earthquake has generated a tsunami. If so, warnings of impending seismic sea waves are issued. This system, which has been in operation since 1947, has been responsible for saving many lives.

The Coast and Geodetic Survey, in cooperation with other agencies, conducts intensive field operations in order to record and then analyze ground motions caused by nuclear and chemical explosives. The results of these tests are utilized in improving our basic knowledge of ground waves and motions. Such research may eventually lead to accurate methods of detecting clandestine nuclear testing.

Observations are taken on the stars to determine latitude, longitude, and azimuth at scattered points throughout the United States. This is done to "pinpoint" and orient the network of triangulation on the earth's surface. The work is accomplished with very precise portable equipment on at least two nights for each astronomic station.

Latitude is determined essentially by measuring the altitude of stars as they cross the meridian. Longitude is determined by timing the passage of stars across the meridian. This timing is done by comparison with continuous radio signals, based on Greenwich Civil time.

Astronomic stations are usually established at locations accessible by truck, but in some outlying areas, such as Alaska, the personnel and equipment must be flown in.

Accuracy attained is by far the highest in this country except for large permanent observations.

Commissioned Officers

The United States Coast and Geodetic Survey is one of the seven uniformed services of our government... and it is probably the most exclusive. The elite commissioned officer corps is authorized only 185 members.

It is a wonderful life in the commissioned corps. Here a man enjoys a sense of purposeful activity and yet the organization is small enough for you to know every other career officer. This is a subtle advantage not lost on engineers who have found themselves buried in giant corporations.

For the commissioned officer, who must learn all phases of the Survey work, there is a variety of jobs which cannot be matched for interest or excitement by any commercial organization in the world. With the Survey there is the opportunity to live the kind of outdoor, rugged life that every young man dreams of... and there is the opportunity to study for advanced degrees at the nation's finest universities under the sponsorship of the Survey.

The work of the Survey is a man's work, and the nation is proud of the men who do it.

Requirements

To be eligible for a commission you must:

Be a citizen of the United States

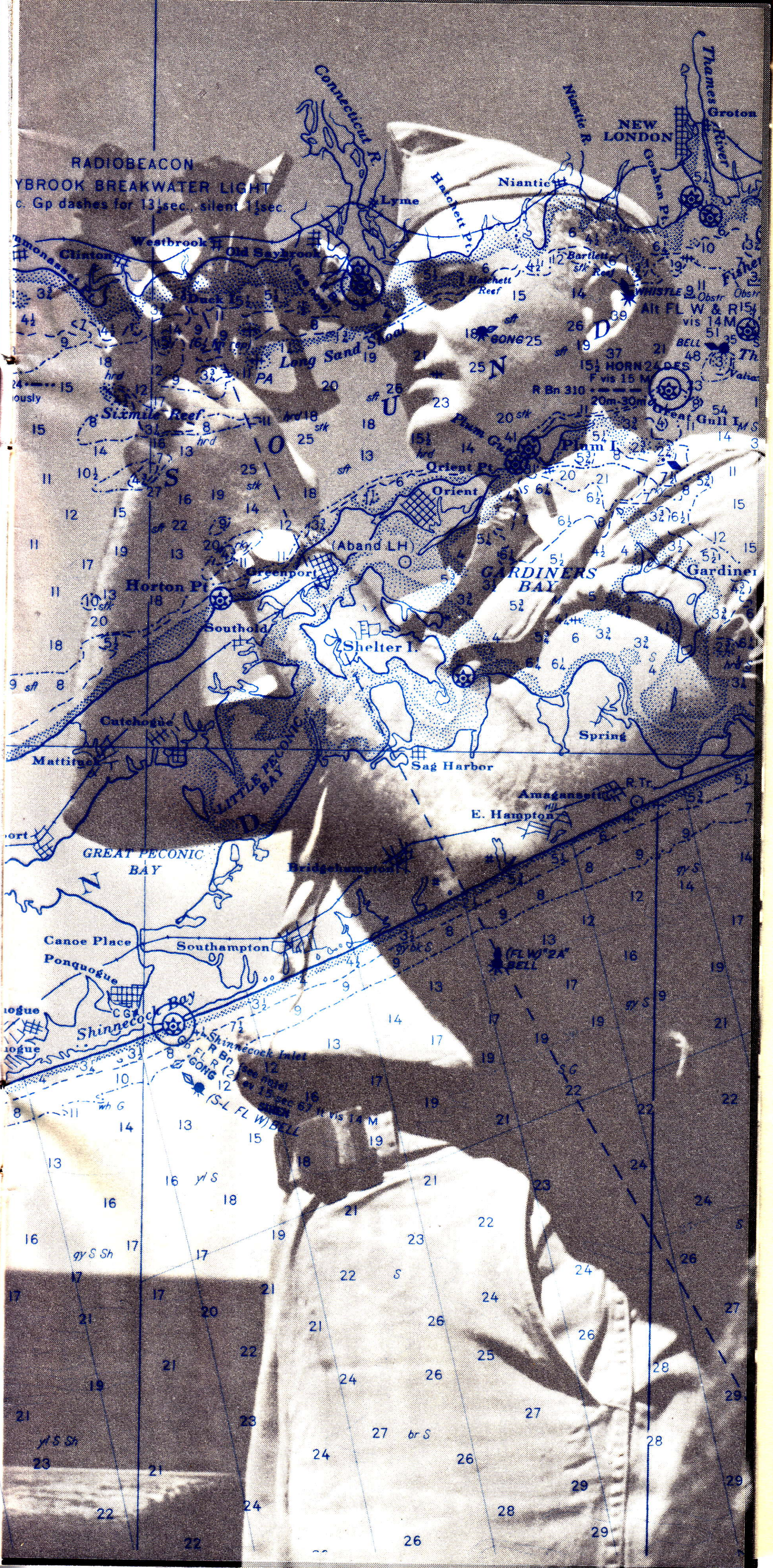
Be between the ages of 20 and 26

Be physically qualified

Hold a Bachelor of Science degree in civil, electrical, or mechanical engineering, or in mathematics, physics or oceanography from an ECPD-accredited institution.

Not have received an induction notice.

Service as a commissioned officer in the Coast and Geodetic Survey will discharge your military obligations.


RADIOBEACON
YBROOK BREAKWATER LIGHT
Connecticut R.
Niantic R.
NEW LONDON
Thames River
Groton
Niantic
Lyme
Clinton
Westbrook
Old Saybrook
Duck I.
Long Sand Shoal
Sixmile Reef
Plum Gut
Plum I.
Orient Pt.
Orient
Aband LH
Greenport
Horton Pt
Southold
Shelter I.
GARDINERS BAY
Gardiner
Spring
Cutchogue
Mattituck
Sag Harbor
LITTLE PECONIC BAY
Amagansett
E. Hampton
GREAT PECONIC BAY
Bridgehampton
Canoe Place
Ponquogue
Southampton
Shinnecock Bay
Shinnecock Inlet
GONG
BELL
HORN
WHISTLE

Scientific Staff

If you decide on a civil service career with the United States Coast and Geodetic Survey opportunities are available to you in the Washington headquarters and in the field service.

Civil engineers work either in the field or in the Washington office. In Washington the engineer interprets field records and performs actual compilation for the nautical and aeronautical charts issued by the Survey. In the field the engineer will qualify as a geodesist or photogrammetrist, in which case your work for the first three to five years will be primarily on all types of field surveys operating throughout the United States.

Oceanographers in the Washington office process and analyze tidal and current data, aerial temperatures, and salinities, and make special oceanographic studies. At times field work is performed on one of our Survey ships.

Geophysicists work in the field of earth physics, geomagnetism, or seismology either in the Washington office, at one of the observatories, traveling throughout the United States and upon special assignments outside the country.

Requirements

A degree in civil engineering qualifies you for an engineering position as well as for geodesist or photogrammetrist. Mathematics majors may qualify for geodesist or oceanographer.
Physics majors will usually qualify for the position of geophysicist.

To apply, write:

The Director
United States Coast and Geodetic Survey
Washington 25, D.C.
Attention: Officer Personnel

(Requests for information about scentific staff positions will be forwarded to appropriate persons concerned).


U.S. COAST AND GEODETIC SURVEY
1807

MONTHLY BASIC PAY AND ALLOWANCES OF COMMISSIONED OFFICERS, U. S. COAST AND GEODETIC SURVEY

		Pay (Dollars)																
		Cumulative years of service														Quarters allowance		Subsistence
Grade	Rank	Under 2	Over 2	Over 3	Over 4	Over 6	Over 8	Over 10	Over 12	Over 14	Over 16	Over 18	Over 20	Over 22	Over 26	Over 30	With dependents	No dependents	
0-8	RADM UH	963.30	1000.00	1022.00	1022.00	1022.00	1100.00	1100.00	1150.00	1150.00	1200.00	1250.00	1300.00	1350.00	1350.00	1350.00	201.00	160.20	47.88
0-7	RADM LH	800.28	860.00	860.00	860.00	900.00	900.00	950.00	950.00	1000.00	1100.00	1175.00	1175.00	1175.00	1175.00	1175.00	201.00	160.20	47.88
0-6	CAPT	592.80	628.00	670.00	670.00	670.00	670.00	670.00	670.00	690.00	800.00	840.00	860.00	910.00	985.00	985.00	170.10	140.10	47.88
0-5	CDR	474.24	503.00	540.00	540.00	540.00	540.00	560.00	590.00	630.00	680.00	720.00	745.00	775.00	775.00	775.00	157.50	130.20	47.88
0-4	LCDR	400.14	424.00	455.00	455.00	465.00	485.00	520.00	550.00	570.00	610.00	630.00	630.00	630.00	630.00	630.00	145.05	120.00	47.88
0-3	LT	326.04	346.00	372.00	415.00	440.00	460.00	480.00	510.00	525.00	525.00	525.00	525.00	525.00	525.00	525.00	130.05	105.00	47.88
0-2	LTJG	259.36	291.00	360.00	370.00	380.00	380.00	380.00	380.00	380.00	380.00	380.00	380.00	380.00	380.00	380.00	120.00	95.10	47.88
0-1	ENS	222.30	251.00	314.00	314.00	314.00	314.00	314.00	314.00	314.00	314.00	314.00	314.00	314.00	314.00	314.00	110.10	85.20	47.88

Act of 20 May 1958 and Act of 10 July 1962