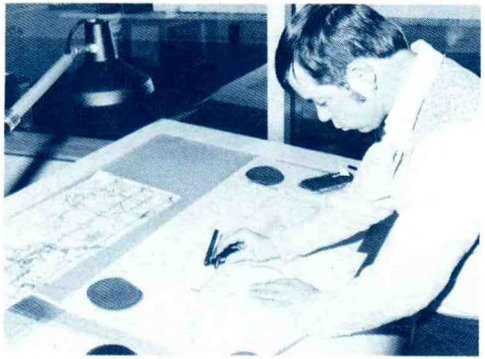
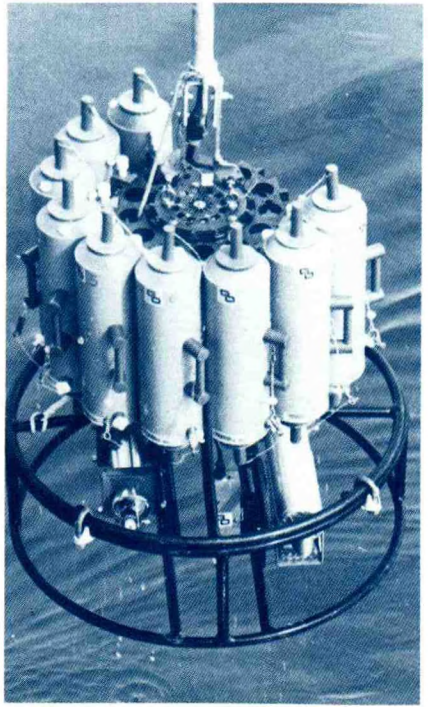
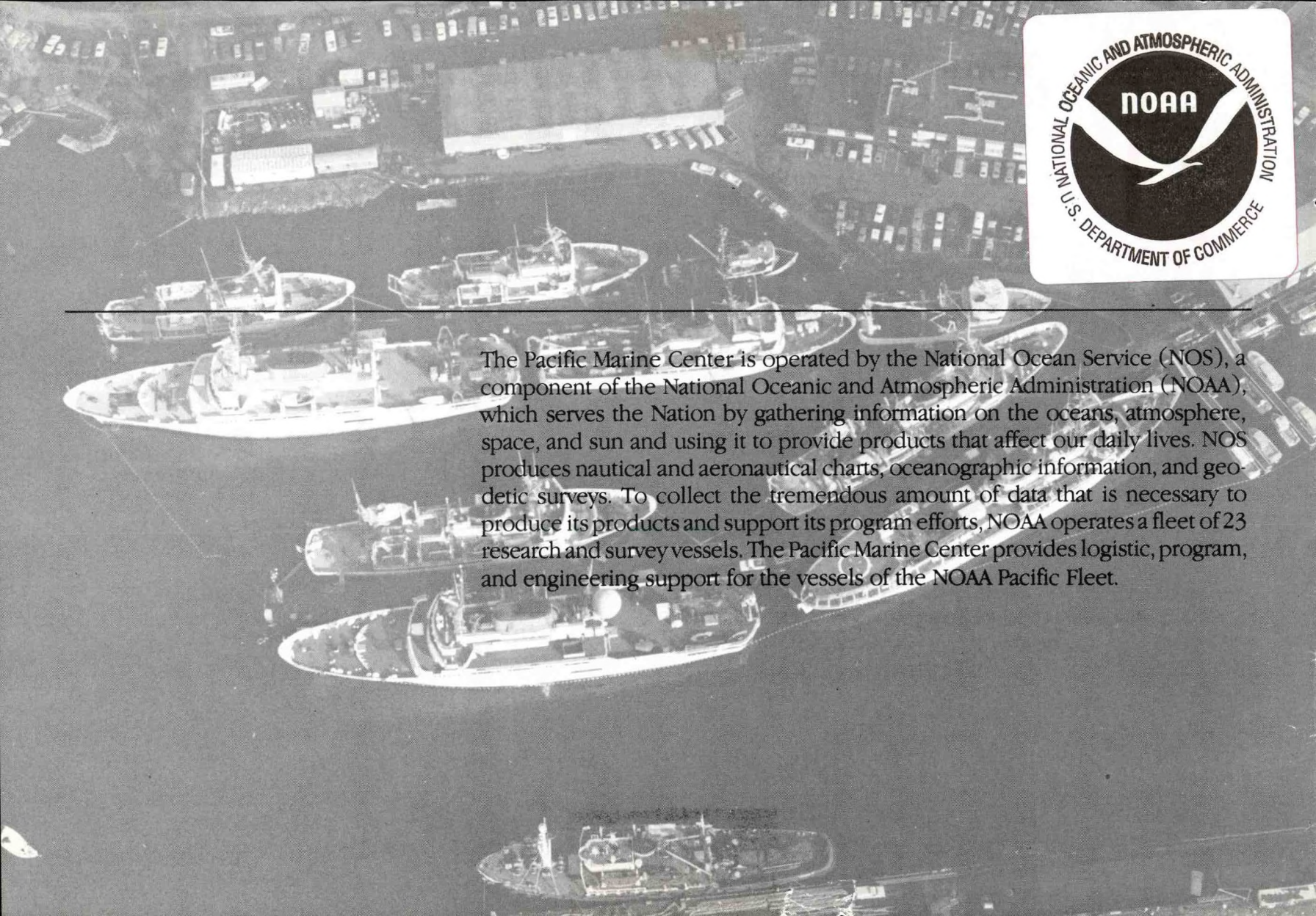
The Pacific Marine Center Serves NOAA's Pacific Fleet

U.S. DEPARTMENT OF COMMERCE
National Oceanic and
Atmospheric Administration
National Ocean Service







The Pacific Marine Center is operated by the National Ocean Service (NOS), a component of the National Oceanic and Atmospheric Administration (NOAA), which serves the Nation by gathering information on the oceans, atmosphere, space, and sun and using it to provide products that affect our daily lives. NOS produces nautical and aeronautical charts, oceanographic information, and geodetic surveys. To collect the tremendous amount of data that is necessary to produce its products and support its program efforts, NOAA operates a fleet of 23 research and survey vessels. The Pacific Marine Center provides logistic, program, and engineering support for the vessels of the NOAA Pacific Fleet.

The Pacific Marine Center

A working ship at sea requires much more than the personnel and equipment needed to accomplish its mission. NOAA ships serve as both homes and workplaces, so maintenance and provisioning of them require careful planning and the expertise of many people. The ships must be supplied with fuel, spare parts, and household goods and supplies. Mission schedules must be precisely arranged, and the right equipment must be on board and operating properly. While at sea, the crew of a ship may need medical assistance or advice on how to repair a part or perform a task. In many ways, the vessel's link with the land is vital to its ability to fulfill its needs and perform its mission.

NOS's Pacific Marine Center in Seattle, WA, provides these and many other services for the vessels of the NOAA Fleet located on the west coast. Under the command of a rear admiral in the NOAA Corps, one of the Nation's seven uniformed services, the Marine Center provides logistic and engineering support for the vessels, and processes and compiles hydrographic and photogrammetric survey data.

Approximately 500 personnel work at the Marine Center and aboard the ships. These include officers of the NOAA Corps, and wage marine and civil service employees who provide a wide range of skills. The officers and crews of the NOAA vessels, with their varied skills and experience, work closely with the Marine Center personnel to accomplish program objectives.

The Marine Center's location on the east side of Lake Union in Seattle, WA, serves as home port to the NOAA ships *Oceanographer, Discoverer, Surveyor, Fairweather, Rainier, Miller Freeman, McArthur, Davidson,* and *John N. Cobb.* Lake Union, a recreational and industrial area with marine repair yards and marinas nearby, provides an ideal location for the ships. The lake's freshwater is less damaging to the vessels than saltwater, and the ships have access to the saltwater of Puget Sound through the Hiram M. Chittenden Locks.

The Marine Center also provides support to the *Townsend Cromwell,* based in Honolulu, HI; the *David Starr Jordan* in San Diego, CA; and the *Murre II* in Juneau, AK. The Marine Center has additional office space on Lake Washington at Sand Point in Seattle.

The Office of Marine Operations at the NOS headquarters in Rockville, MD, provides the Marine Center with administrative, policy, and program planning direction, but the Marine Center performs the myriad tasks that the operation of a fleet of ships requires.

Ships of the NOAA Fleet

The Pacific Marine Center supports a fleet of research and survey vessels, which operate in the Pacific Ocean and adjoining seas, Alaskan waters, off the Hawaiian Islands, and off the coasts of Central and South America.

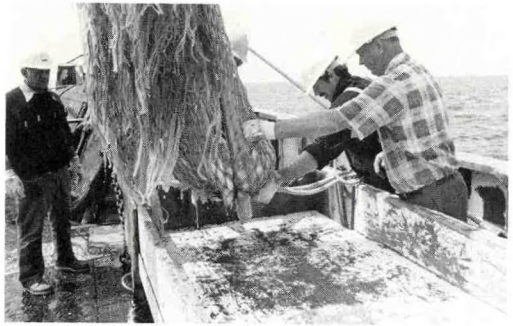
The NOAA Fleet conducts surveys and performs research that support the work of all NOAA components, which are the National Ocean Service; the National Weather Service; the National Marine Fisheries Service; the National Environmental Satellite, Data, and Information Service; and the Office of Oceanic and Atmospheric Research. To perform the varied tasks they are faced with, the vessels are equipped with specialized scientific laboratory facilities, deck machinery, small boats and launches, and electronic systems that support communications, navigation, scientific investigations, and data acquisition and processing.

Oceanographic Research

The NOAA ships *Oceanographer, Discoverer,* and *Surveyor,* PMC's largest research vessels, engage in worldwide research, primarily investigating the ocean's physical and chemical properties, air-sea interactions, and marine geology.

The vessels are equipped to analyze much of the data that they collect. Physical samples can be analyzed in the ships' laboratories or in one of the specialized vans that may be brought on board for processing chemical, biological, or gaseous samples. Mud, silt, and other bottom marine geological samples are analyzed in the ship's wet lab, which can be hosed down afterwards. The vessels are also capable of housing meteorological, photographic, and gravity laboratories.

Electronic equipment used for oceanographic research occupies many locations throughout the ships. On deck, electronics equipment is attached to cables to show the



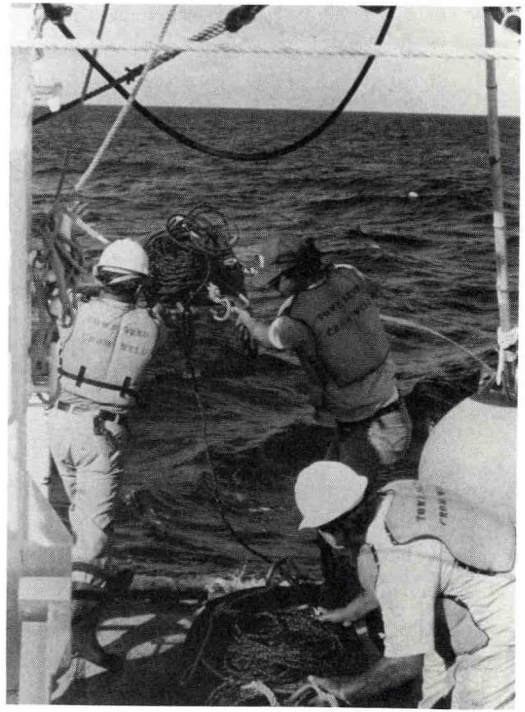
amount paid out, the tension under tow, and the cable angle during dredging operations for hard samples such as manganese nodules. Electronic equipment mounted in the hull of the ship includes sonic depth finders; current profilers, which measure the direction of currents at various depths beneath the ship; and multibeam swath survey systems, which produce maps of the sea floor. In the laboratory, electronic equipment is used to analyze water samples for salt content, traces of metals, and microscopic organisms.

A smaller vessel, the *McArthur*, is used to collect fish and bottom sediment samples, which are prepared and stored on board so that they can later be analyzed in a laboratory. The *McArthur* is equipped with echo sounders, small fish nets, and mechanical devices for collecting the samples, which scientists prepare and analyze in the ship's laboratory.

Fishery Research

The Pacific Marine Center provides support to the *Miller Freeman, Townsend Cromwell, David Starr Jordan, John N. Cobb,* and the *Murre II,* which are outfitted to conduct fishery research.

Each vessel of NOAA's Fleet that supports fishery research was designed for the study of a particular species and habitat of fish, so each is unique in its configuration, but all are engaged in estimating the populations of various species of fish and determining whether their numbers are increasing or decreasing. Fishery research also involves assessment of the effects of pollution on fish habitats, examination of fish, and analysis of water. Tests of fishing equipment are also conducted aboard the vessels.



Their laboratory facilities vary, but all the vessels provide wet laboratories where biological specimens are washed, examined, and preserved and sea water is analyzed. The ships' dry laboratories contain instrumentation needed for further analysis.

In addition to the electronic equipment necessary for safe navigation and communication, all of these vessels have echo sounders to determine the depth of the water and fish finders and sonars to find and track the movement of fish. The *Miller Freeman* and *Townsend Cromwell* are equipped with netsondes, acoustic devices that provide information on the operation of the net. Doppler speed logs on the *Miller Freeman* and *David Starr Jordan* report the speed of the ship's movement over the sea floor.

Researchers usually provide any specialized nets that are needed. The crews use winches and net reels to deploy and return the nets and use winches and A-frames for fishery operations and oceanographic measurements made "over-the-side," that is, in the water and away from the ship. Cranes and booms may be used in these operations and to resupply the vessel.

Hydrographic and Bathymetric Surveying

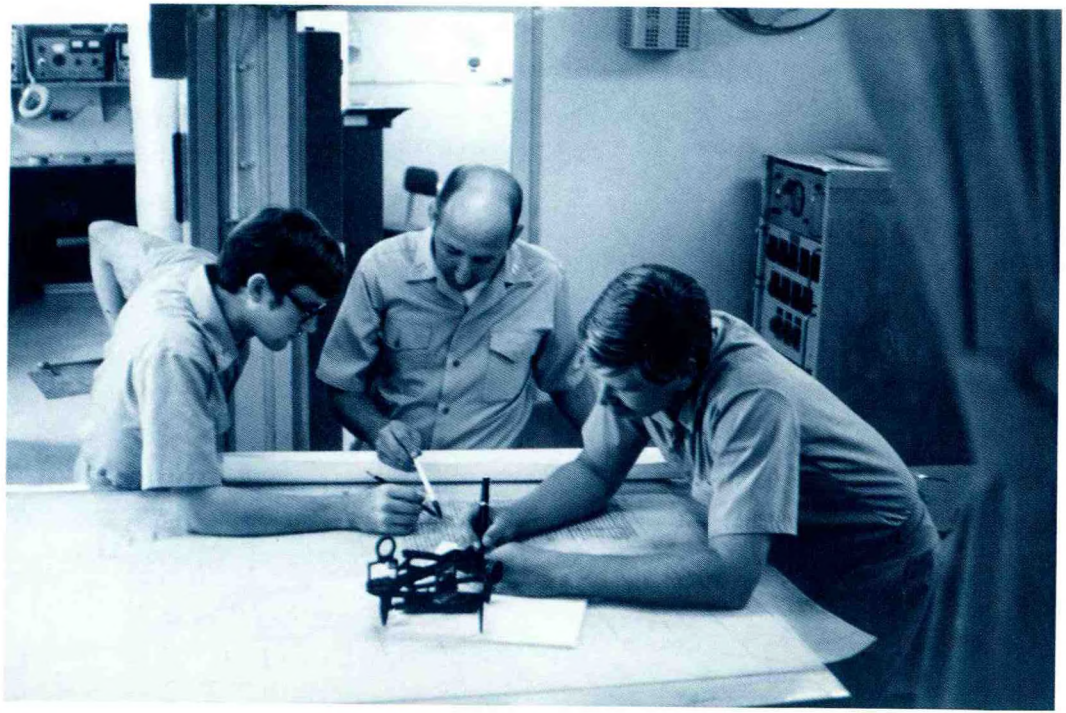
The *Fairweather, Rainier, Davidson,* and *Surveyor* are equipped to perform hydrographic and bathymetric surveys, which provide the bottom configuration and obstruction and water depth information that is needed for preparing nautical charts and bathymetric maps. The areas surveyed along the west and Alaskan coasts are frequently in remote locations, far from sources of supply, but the endurance of these vessels enables NOAA to conduct these operations safely and efficiently.

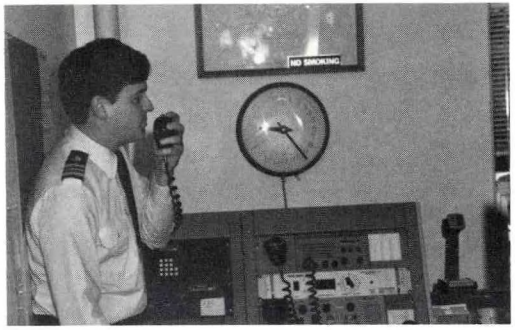
Since knowledge of a ship's exact position is necessary during hydrographic surveying, all the ships are equipped with modern navigation equipment, including Loran-C receivers, radars, gyrocompasses, and survey accuracy positioning systems. Water depths are measured by echo sounders, which provide continuous depth profiles.

All of the vessels are equipped with computer systems that acquire and display sounding data in real-time and provide the helmsman with steering commands. The *Surveyor* and *Discoverer* are equipped with deep-water survey systems that produce charts of bottom contours in real-time, and the *Davidson* has a similar system for surveying in shallower waters. These capabilities have made these ships valuable resources in the surveying of the Exclusive Economic Zone, an area of nearly 3.4 million square nautical miles over which the President confirmed U.S. sovereign rights and control in 1983.

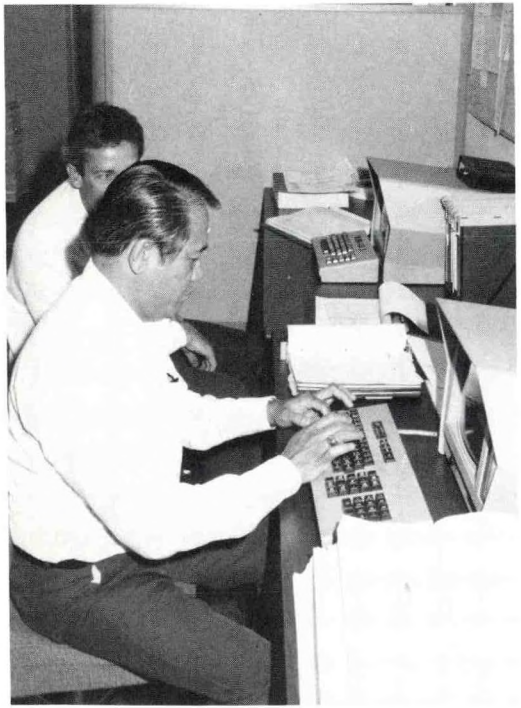
Each of the vessels outfitted for hydrographic surveying is equipped with launches that are used to survey areas close to shore where the larger vessels cannot go. The launches are also equipped with echo sounders, survey positioning systems, and computer systems that are compatible with those of the mother ships.

Deck machinery on the vessels includes oceanographic winches with conductive cable and wire rope, A-frames, cranes, and booms. The winches and A-frames are used to make over-the-side oceanographic measurements, and the cranes and booms lift heavy gear, small boats, and supplies for the ship.





Fleet Support Services



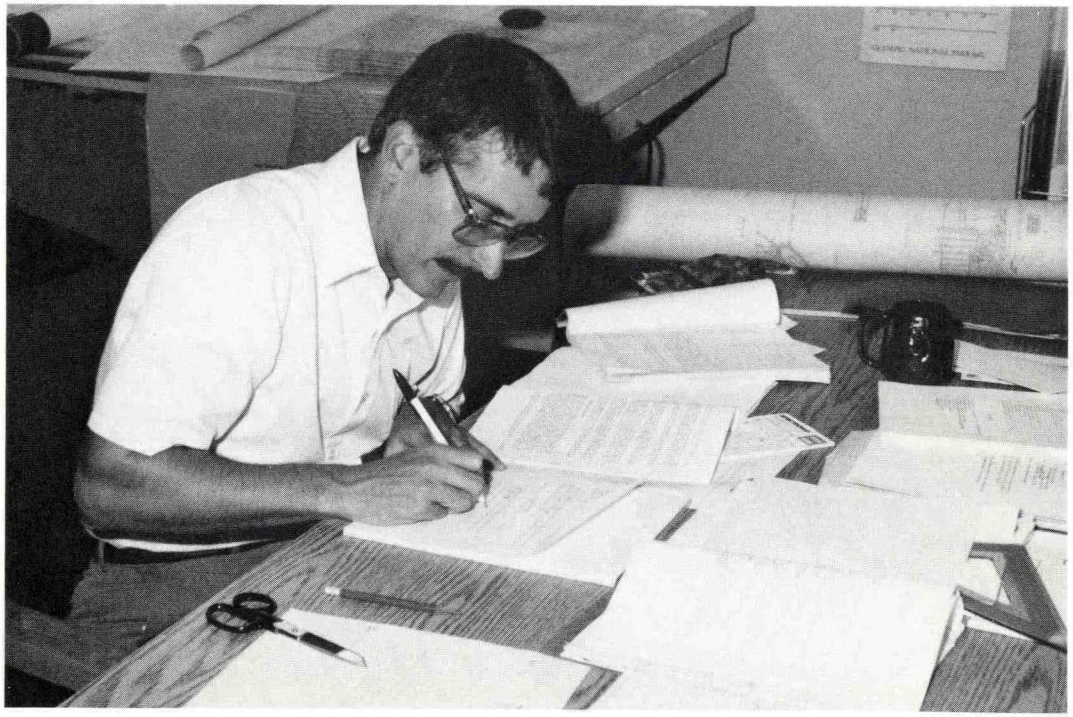
Shore-based personnel at the Pacific Marine Center provide the many services needed to keep the ships operating. Engineering personnel prepare specifications for repair, maintenance, and modification and oversee contractors' work to ensure that it conforms to the specified standards.

Electronics engineers and technicians direct their attention to the on-board equipment. Before each voyage, they ensure that a vessel has the proper equipment to perform its assigned mission, that it is in good working order, and that navigation and communication equipment is properly functioning. When electronic systems require modification or new systems must be acquired and installed, they prepare specifications for the work. Technicians at the Marine Center repair equipment as needed and often accompany the ship to provide maintenance service during its mission.

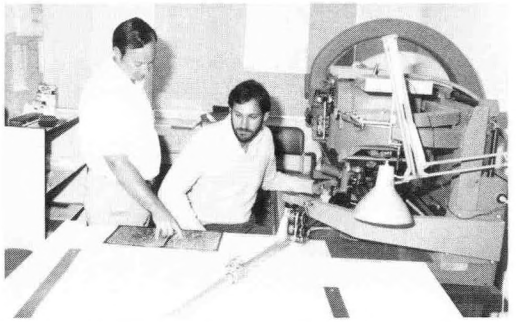
The officers and crew of a vessel are responsible for its supply and maintenance. They work with the electronics and engineering personnel to ensure that the vessel is capable of performing its assigned missions and that equipment is in working order. At the end of each mission, ship personnel process data, write reports, and prepare for the next project by purchasing fuel and supplies, performing needed maintenance activities, and taking aboard equipment and gear to test and store it.

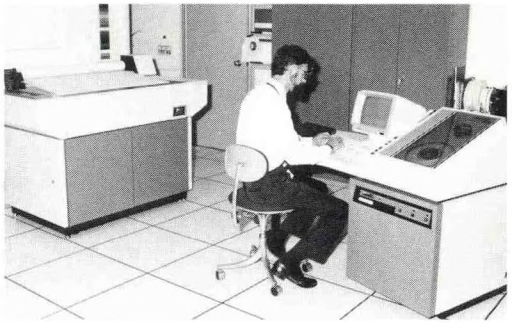
The Marine Center also maintains diving equipment, ensures that all divers working off its ships are properly trained and in good physical condition, and provides assistance in emergency and problem situations involving diving operations.

While at sea, vessel personnel communicate daily with the Marine Center. During these communications, shore-based personnel provide advice on how to handle any equipment problems that have occurred, and when the parts needed to repair the equipment are not in the ship's stock, Marine Center personnel arrange for the vessel to receive the parts as quickly as possible. These daily communications also enable the Marine Center to respond to the ship's administrative needs and requests for fuel, supplies, and services.



Program Support Services



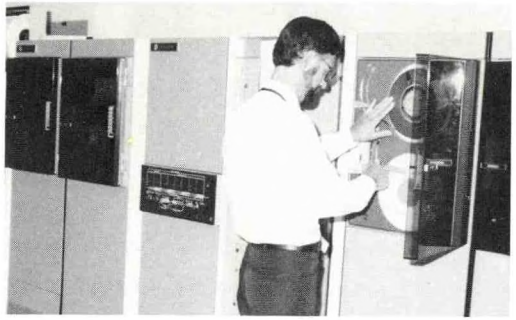


The success of a vessel's mission greatly depends on the planning that goes into it. Marine Center personnel work closely with the users of NOAA vessels to ensure that the proper equipment is available and that proper scheduling arrangements are made. They also assist users in preparing and reviewing project instructions, which provide detailed schedules and descriptions of tasks to be performed.

Other Marine Center personnel support NOS's mission of preparing nautical charts. To collect information needed to supplement the hydrographic data collected by the ships, the Pacific Marine Center operates a photogrammetric field survey party, which provides photogrammetric support services and assistance in establishing geodetic control, and a hydrographic field party, which uses small motor launches to survey coastal waters that are inaccessible to the larger vessels.

Both the field party and the ships submit their hydrographic data in digital and analog formats to personnel at the Marine Center, who check its accuracy and resolve any discrepancies. Many corrections must be made, including those for tide level, sound velocity, and for the positioning system that was used. To verify the accuracy of the data, it is compared with previously collected data and with data collected during other surveys on either side of it. Much more information is collected than will eventually be depicted on a chart to ensure that all dangers to navigation will be shown.

Once the information has been verified, it is electronically processed for storage on hard disks and magnetic tapes, and Marine Center personnel add information that the ships have



Fleet Activities

not provided in a digital format. Such information includes the type of sea bottom in a particular area and shoreline changes observed by the ships' crews.

The digitized information is run through a computer that produces a plot tape. This tape provides the information that the Marine Center's flatbed plotter needs to produce a smooth sheet, which is the Marine Center's final product—a graphic depiction of the hydrographic survey information. Depth curves, shorelines, and aids to navigation are later added to provide the chart that the public sees.

NOAA vessels are well-suited to the nature of oceanographic research, which demands an interplay of a variety of disciplines. To derive information about the character of the ocean, scientists and technicians must study its geophysics, chemistry, physics, and biology. For instance, NOAA vessels have undertaken climate studies in which the interface of the air and sea are examined. Doing this requires a chemical analysis of the composition of the water column and an investigation of the physics involved in the movement of ocean water. NOAA vessels are, of course, also equipped to perform charting surveys, which support the National Ocean Service's nautical charting responsibilities.

While the vessels primarily support missions that are specified by NOAA, their resources are available to other government agencies, private industry, and academia. Using NOAA vessel time, an international group of academicians has studied the effects of hydrothermal vents on the ocean floor, and private industry has contracted NOAA's services to obtain cable route surveys.

Several types of arrangements are available for establishing the use of NOAA vessel time. *Ancillary projects* are added to the vessel's primary mission and are carried out by ship personnel under the supervision of the commanding officer or chief scientist. If no personnel or equipment are put aboard and the project is considered to be a legitimate and desirable element of the overall mission, no charge is made for the service. *Piggyback projects* are accomplished along with the primary mission on a non-interference basis. The sponsor of a piggyback project may put personnel and equipment aboard, but must pay the food costs for additional personnel and the costs of any modification necessitated by the installation of equipment. Because *cooperative projects* provide valuable data to both NOAA and the cooperating organization, costs are shared. These projects may be conducted by personnel from the cooperating organization along with vessel personnel, or by vessel personnel alone. *Reimbursable projects* are primarily accomplished by vessel personnel for the benefit of the requesting organization, which bears the full cost of the project.

To make the necessary arrangements for conducting these types of projects, Pacific Marine Center personnel work with potential users to identify project objectives, equipment and personnel requirements, and the type of arrangements needed. The potential user may be referred to a NOAA laboratory with similar interests so that the two may maximize their resources.

Updated information on equipment and planned activities is provided through the NOAA Fleet Information Exchange publication that is available from the Pacific Marine Center. A ship operation plan provides additional details on sailing schedules, planned missions, and availability of the various vessels.

The History of the Pacific Marine Center

The U.S. Coast and Geodetic Survey, NOAA's predecessor agency, established the first permanent office in Seattle in 1898, making the office the headquarters for survey work being performed along the Washington and Alaskan coasts. The city soon became a base for three survey vessels in the area, and when the Hiram M. Chittenden Locks were opened in 1916, the ships began using Lake Union as a home port. Before World War II the ships used various locations in the area for moorage, but in 1947 the office leased a former shipyard to serve as a single base for the fleet, which had grown to six vessels. By the early 1960's Seattle was becoming a major center for oceanographic research. New quarters and piers for the office were built on the east side of Lake Union, and the new Seattle Ship Base officially opened in July of 1963. In the mid-1960's the fleet was modernized and expanded and the office became increasingly involved in ship activities. In 1965 when the Coast and Geodetic Survey, the Weather Bureau, and the Central Radio Propagation Laboratory became part of the newly formed Environmental Science Services Administration (ESSA), the office was renamed the Pacific Marine Center and was made responsible for all field operations of ships and field parties. ESSA was reorganized and became the National Oceanic and Atmospheric Administration (NOAA) in 1970.

For further information on the Pacific Marine Center or on the use of NOAA ship time, contact:

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National Ocean Service, NOAA
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NOAA's Pacific Fleet

			GENERAL DESCRIPTION							MISSION						
CLASS	NOAA SHIP	HOME PORT	Length (feet)	Displacement (tons)	Cruising Speed (knots)	Endurance (days)	Survey Launches	Scientific Accommodation	Bow Thruster	Helicopter Platform	Laboratory	Charting & Mapping	Environmental Assessment	Fisheries Research	Atmospheric Research	Oceanographic &
I 	Oceanographer	Seattle, WA	303	4,033	11	31		24	●		●					●
	Discoverer	Seattle, WA	303	4,033	11	31		24	●		●	●				●
	Surveyor	Seattle, WA	292	3,440	12	28		16	●	●	●	●				●
II 	Fairweather	Seattle, WA	231	1,800	11	22	4	4	●		●	●				
	Rainier	Seattle, WA	231	1,800	11	22	4	4	●		●	●				
	Miller Freeman	Seattle, WA	215	1,920	12	31		11	●		●			●	●	
III 	McArthur	Seattle, WA	175	995	10	28		6			●			●	●	●
	Davidson	Seattle, WA	175	995	10	23	2	2			●	●				
IV 	Townsend Cromwell	Honolulu, HI	163	652	10	30		9			●				●	
	David Starr Jordan	San Diego, CA	171	993	10	31		13	●		●				●	
V	John N. Cobb	Seattle, WA	93	250	9	13		4			●				●	
VI	Murre II	Juneau, AK	86	295	9	8		5			●				●	


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