MARITIME REPORTER
AND
ENGINEERING NEWS

Peterson Delivers All-Aluminum Research Vessel Alcoa Seaprobe
(SEE PAGE 7)

SNAME Annual Program
(SEE PAGE 10)

OCEANS The New Frontier
(SEE PAGE 15)

NOVEMBER 1, 1971

Through the Northwest Passage in a herring boat.

Not very long ago, a specially constructed icebreaker-tanker made headlines when it traversed the Northwest Passage.

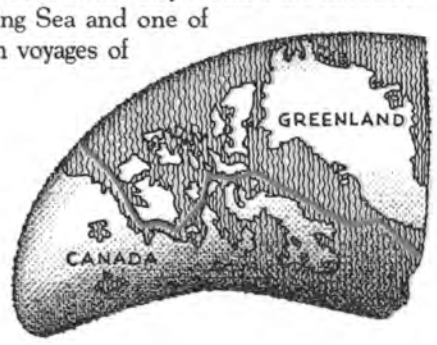
Sixty-four years ago, Roald Amundsen did the same thing in a herring boat, the *Gjoa*.

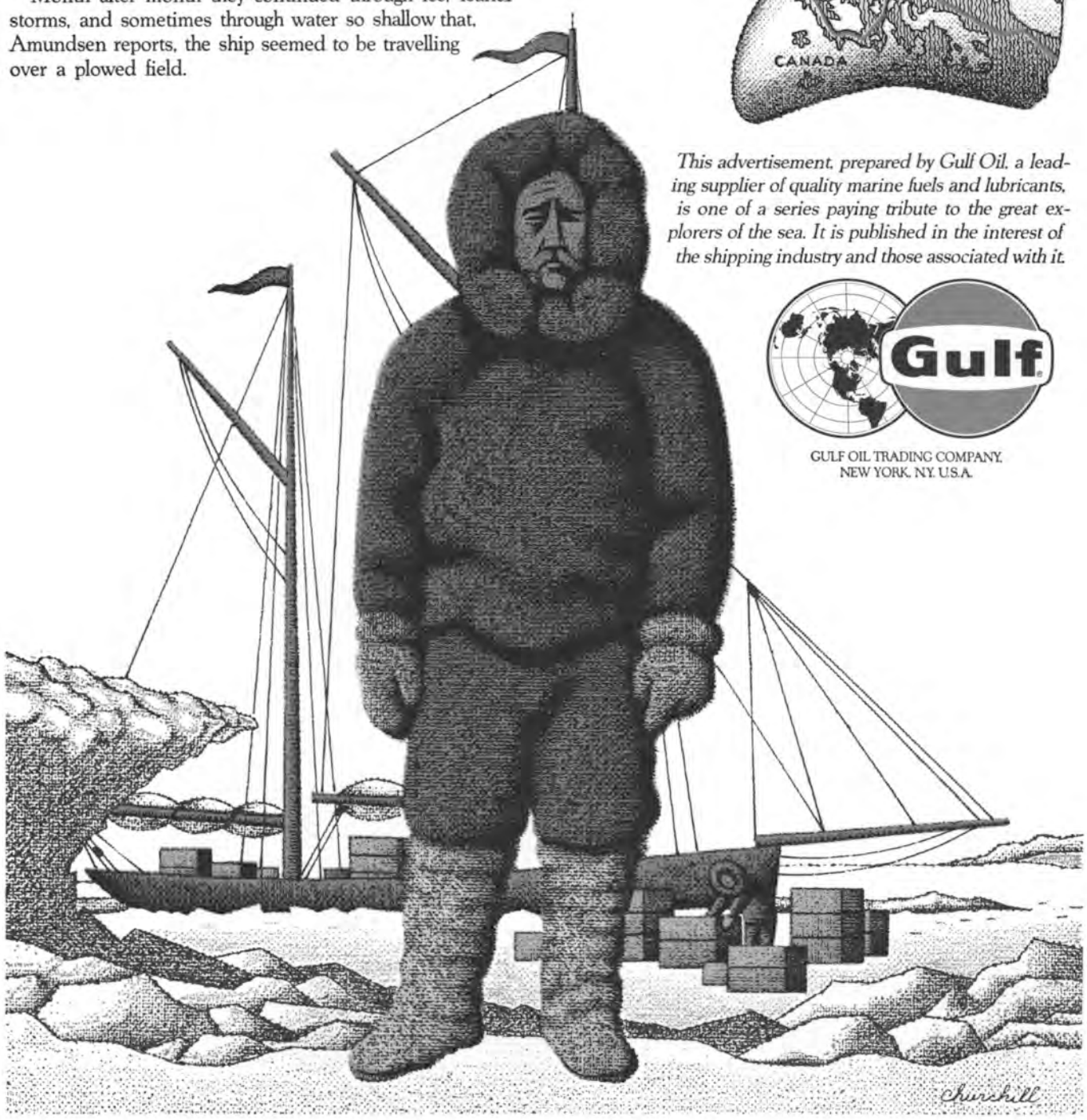
Amundsen and his party left Greenland in August 1903 with enough supplies to last four years. On September 1st they struck an unmarked reef, and though they had to jettison five tons of supplies, they continued. They spent the winter of 1903-04 doing scientific research around the magnetic North Pole.

Month after month they continued through ice, fearful storms, and sometimes through water so shallow that, Amundsen reports, the ship seemed to be travelling over a plowed field.

On August 17th, 1905, the *Gjoa* dropped anchor off the cape of Colborne. They had successfully made the trip through the Northwest Passage. But they still had a thousand miles to go to reach their ultimate destination.

It was August 30, 1906 when they reached the northern entrance to the Bering Sea and one of the great exploration voyages of history was over.





This advertisement, prepared by Gulf Oil, a leading supplier of quality marine fuels and lubricants, is one of a series paying tribute to the great explorers of the sea. It is published in the interest of the shipping industry and those associated with it.

Gulf

GULF OIL TRADING COMPANY,
NEW YORK, N.Y. U.S.A.

Coast Engineering To Design New Class Ferries For Delaware

Coast Engineering Company, Norfolk, Va., was recently awarded a contract by the Delaware River and Bay Authority, Newcastle, Del., to design a new class of ferries to operate between Cape May, N.J., and Lewes, Del. The ferries are to replace the present vessels now in service.

The vessels are to be especially designed for shallow draft operation, with a capacity of 100 autos and 800 passengers, and a speed of approximately 15 knots. Measurements will be approximately 320-feet long by 68-feet over-deck by 18-feet deep with a load draft of 7 feet. Propulsion will be twin-screw driven by two diesel engines of about 1,500-hp each.

The vessels will be built to ABS and Coast Guard requirements for the service intended. Many innovations tested on other ferries designed by Coast Engineering will be incorporated into these ships to improve performance and operating efficiencies.

The design is being done under the personal supervision of **Harry W. Keeling Jr.**, naval architect and president of the firm, and **John C. Chivvis Jr.**, chief naval architect.

Operator Applies For Mortgage Insurance On Offshore Drilling Unit

An application for loan and mortgage insurance to help finance construction of a $17-million semisubmersible offshore deep drilling craft has been filed with the Maritime Administration. This is the first application for such a non-self-propelled unit to come to MarAd. Western Company of North America, Fort Worth, Texas, is the applicant.

Western said it planned to use the "vessel" throughout the world where gas and oil deposits are being developed in ocean depths in excess of 250 feet. It is planned to have the unit built by Bethlehem Steel Co. in its Beaumont, Texas, yard.

British Group Forms Container Repair Firm

According to reports from London, a new company, Orsett Container Repairs, Ltd., has been formed by the London Graving Dock Group and Lamport & Holt.

The new firm will provide a container repair and refurbishing service in Felixstowe, Tilbury and Southampton, using the existing facilities of the group in all three ports.

MARITIME REPORTER AND ENGINEERING NEWS
No. 21 Volume 33

107 EAST 31st STREET
NEW YORK, N. Y. 10016

MUrray Hill 9-3266, 3267, 3268, 3269

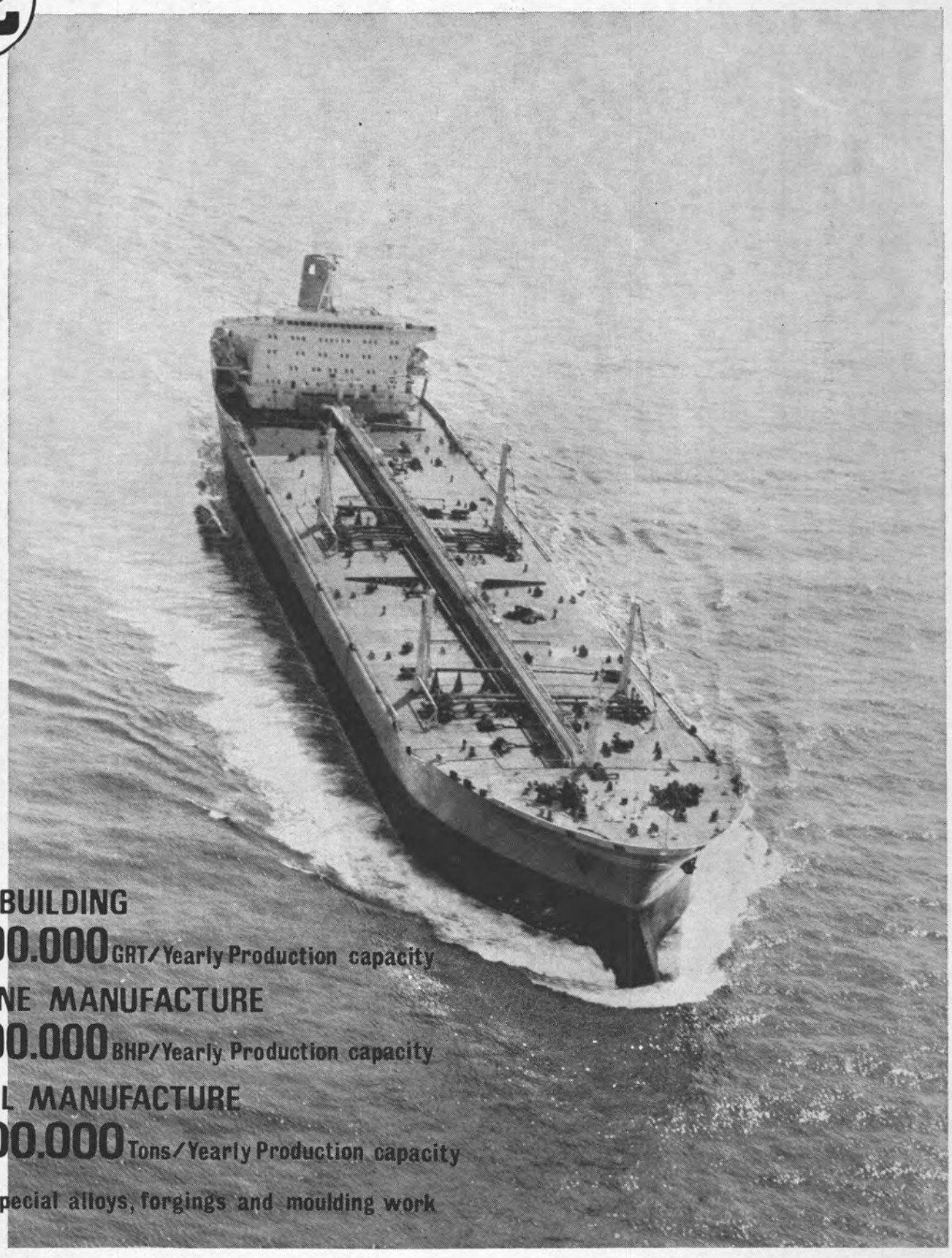
ESTABLISHED 1939

Maritime Reporter/Engineering News is published the 1st and 15th of each month by Maritime Activity Reports, Inc., with executive, advertising and editorial offices at 107 East 31st Street, New York, N. Y. 10016; publishing office at 41 First Street, Hoboken, New Jersey 07030

Controlled Circulation postage paid at Hoboken, New Jersey 07030

Member BPA
Business Publications Audit of Circulation, Inc.

ASTILLEROS ESPAÑOLES, S.A.



SHIPBUILDING
500.000 GRT/Yearly Production capacity

ENGINE MANUFACTURE
500.000 BHP/Yearly Production capacity

STEEL MANUFACTURE
200.000 Tons/Yearly Production capacity

of special alloys, forgings and moulding work

HEADOFFICE: **SPAIN**

17, Padilla. Madrid-6 Spain. - P. O. Box n.º 815. Phones: 225 21 00/01
Telex: 27690 - Astil-E. and 27648 - Astil-E. Cable address: ASTILLEROS-MADRID.

WALL MARINE ROPES

- LST Mooring Line
- LST Work Boat Rope
- Super-8-Braid
- POLY-*plus*
- POLY-*cron*
- Polypropylene
- Polyethylene
- Nylon
- Dacron*
- Manila

A complete line of quality ropes for every marine application, Sizes 3/16″ diameter through 15″ circumference. Tensile strengths one pound to over one half million pounds.

EST 1830 WALL ROPE

WALL ROPE WORKS

Beverly, New Jersey 08010

Leadership in Rope Research and Development

*DuPont polyester fiber

Peterson Builders Delivers All-Aluminum

Research Vessel ALCOA SEAPROBE

A visionary oceanographic concept became a reality at Peterson Builders, Inc., Sturgeon Bay, Wis. as the all-aluminum research vessel, Alcoa Seaprobe, completed builder's and owner's trials and headed for the Atlantic Ocean. Once at sea, further tests of the vessel's deep-ocean search and recovery systems will be conducted before the ship proceeds to her home port of Washington, D.C., for special dedication ceremonies.

The Alcoa Seaprobe concept is based on ideas originally formulated by **Willard Bascom** of Ocean Science and Engineering, Inc. The vessel is owned by the Aluminum Company of America and will be operated by its subsidiary, Ocean Search, Inc. The 243-foot Alcoa Seaprobe is one of the most advanced deep-ocean search and recovery vessels afloat. It also is a striking example of aluminum marine construction.

George G. Scholley, Alcoa Seaprobe project manager and vice president of Ocean Search, Inc., said:

"When we moved from the drawing board to the shipyard in 1969, we faced a number of major aluminum and ocean engineering challenges Raising of the Ocean Search, Inc. flag over the Alcoa Seaprobe marks the successful completion of phase one of this imaginative venture. We expect continued progress as the vessel probes the sea and undertakes numerous deep-ocean projects."

The ship carries a youthful, 33-man crew, and can accommodate 19 engineers and scientists. The captain is **Robert A. Wilson,** 35, a graduate of the California Maritime Academy. Speaking about the Alcoa Seaprobe, he said:

"The crew represents a cross-section of talent as distinctive as the Alcoa Seaprobe herself. Graduates of some of the country's top maritime academies are working side-by-side with seasoned veterans of land and off-shore drilling operations.

"She is an exciting, well-engineered venture. A quick look at her design and capabilities makes it easy to understand why men were eager to sign aboard."

Aluminum Construction

More than a million pounds of Alcoa aluminum sheet, plate and extrusions, and nearly six million feet of aluminum welding wire were used in the construction of the 1,700-ton vessel. The ship was completed on schedule by Peterson Builders, Inc., and confirms a growing awareness that major aluminum marine construction can be accomplished economically and efficiently with conventional shipyard equipment.

The construction of the Alcoa Seaprobe provides a practical "reference manual" of advanced aluminum fabrication techniques that will aid shipbuilders around the world. Actually, two recent aluminum developments related to marine construction were applied on a large scale in building the Alcoa Seaprobe.

The first development was the temper of the aluminum, designated H117, which insures virtual immunity to exfoliation corrosion for marine alloys 5456 and 5086. Alcoa Research Laboratories developed advanced fabricating methods to produce the improved temper. Aluminum alloy 5456-H117, primary material for the hull construction of the Alcoa Seaprobe, is available from Alcoa for general marine use, along with assistance on fabricating and joining techniques.

Principal Characteristics

Length overall	243 ft.
Beam	50 ft.
Draft-hull	8 ft.
Draft-propellers	14 ft.
Displacement	1,700 tons
Speed	10 knots
Range	6,600 miles
Endurance	45 days
Center well	12 ft. by 36 ft.
Pipe racker capacity	20,000 ft.
Crew	33
Scientific party	19

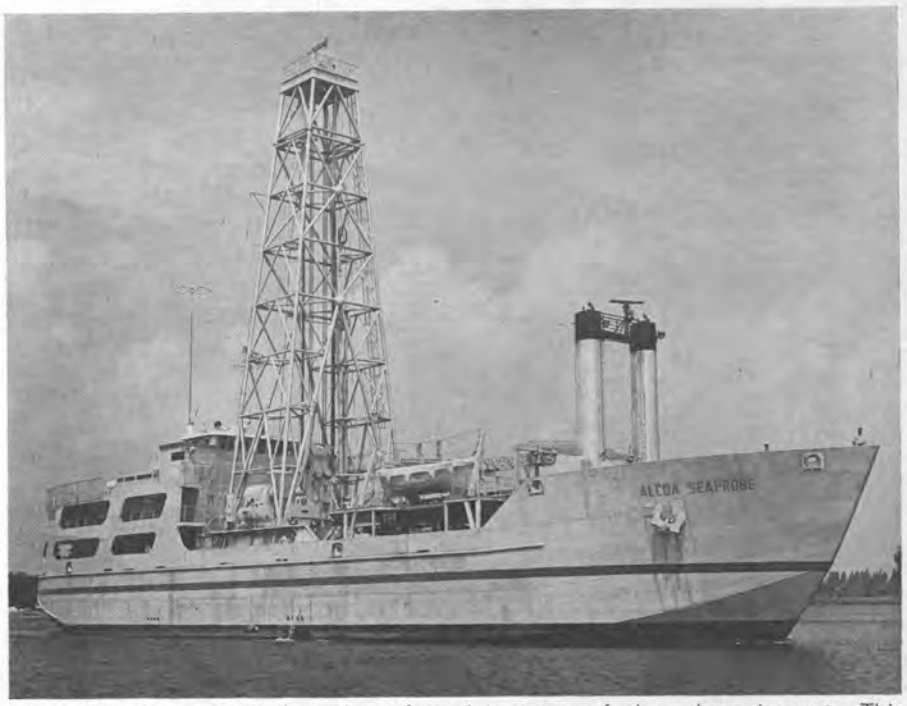
The second development was in welding. The new welding specifications used were compiled by Alcoa specifically for shipbuilding. Introduced early this year, they were used in the construction of the Alcoa Seaprobe and are available from the company.

M. Lee Peterseim, manager-commercial marine sales for Alcoa, commented:

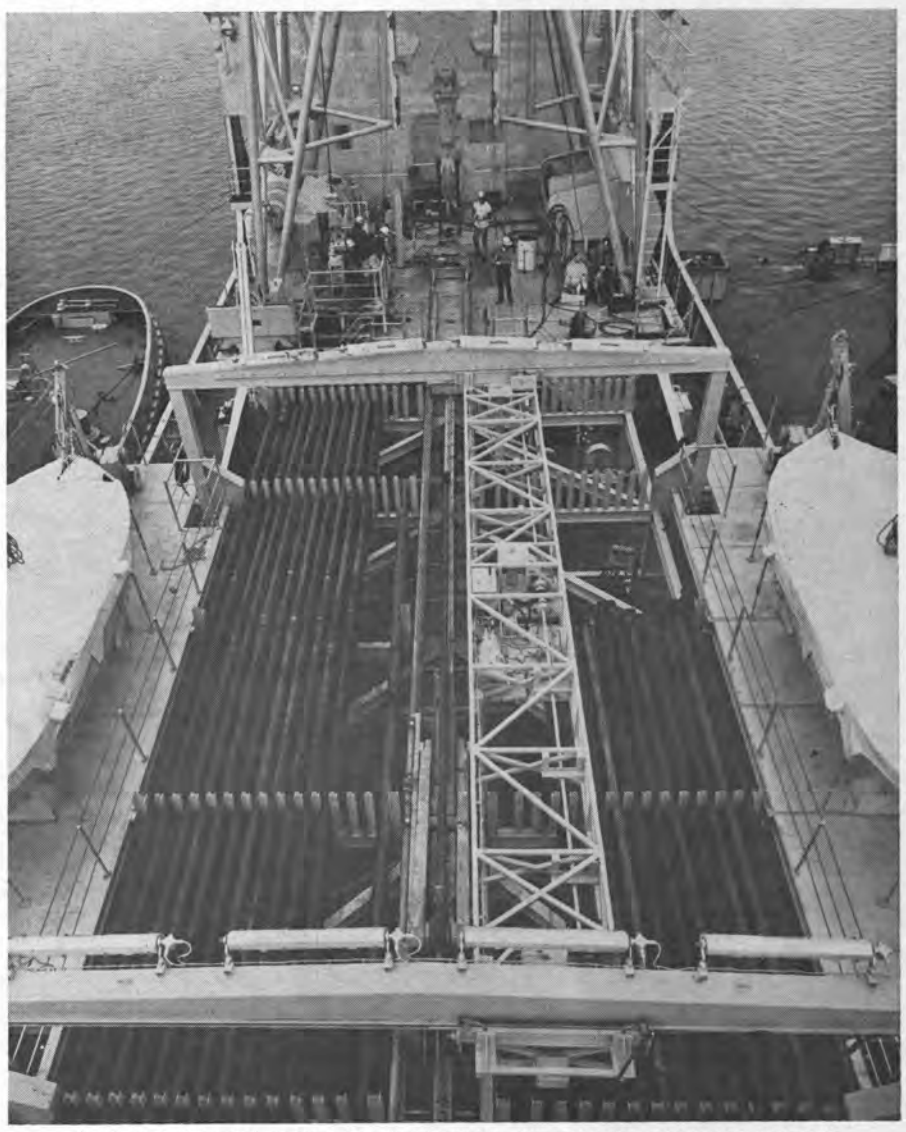
"The use of these two Alcoa developments assured that the construction of the Alcoa Seaprobe exploited the latest technology in the application of aluminum for oceangoing vessels. We expect these modern construction developments, which have been approved by the American Bureau of Shipping and the U.S. Coast Guard, to produce the finest example afloat of aluminum's seaworthiness.

"The construction and operation of the Alcoa Seaprobe will provide theoretical and practical data that will be useful anytime a marine vessel is contemplated and constructed. Experience with this vessel confirms our belief that major construction involving aluminum can be accomplished with conventional shipyard equipment. In addition, the ship is the first all-alu-

(Continued on page 9)



Alcoa Seaprobe on builder's trials performed in excess of planned requirements. This all-aluminum vessel not only introduced new techniques in construction methods but its capabilities for research exceed those of any existing or proposed vessel.



A view of the semi-automatic pipe-handling equipment which feeds multiple sections of 3 and 4-inch drill pipe into the sea below. Beneath the aluminum derrick, which rises 102 feet above the deck, a crew of "roughnecks"—men experienced in land and off-shore drilling operations—send the pipe down through an opening in the ship's hull at the rate of 30 feet per minute.

Alcoa Seaprobe—

(Continued from page 7)

minum structure of its type to comply with Coast Guard regulations for structural fire protection."

Aluminum sheet, plate, extrusions, tubular products and welding electrode from Alcoa plants at Davenport, Iowa; Lafayette, Ind., and Massena, N.Y. were used in building the Alcoa Seaprobe. As an example of the product requirements for a job of such scope, more than one thousand miles of aluminum electrode and filler rod were used to join the hull, framing and superstructure sections.

The Design

The 243-foot (overall length) Alcoa Seaprobe has a 50-foot beam, a hull draft of 8 feet and a total draft over the vertical-axis propellers of 14 feet, and a displacement of 1,700 tons. The ship has a 45-day cruising range of approximately 6,600 miles. It has a speed of 10 knots.

The hull form incorporates a chine which allowed for extensive use of flat plates for the shell. Amidships is the drawworks which are similar to those on off-shore oil-drilling platforms. A helicopter platform is provided on the stern of the vessel.

Propulsion is provided by two Voith-Schneider, cycloidal, omnidirectional propulsion units. The main source of electrical power for driving these vertical-axis propellers are two 800-kw General Motors diesel generator sets. Auxiliary power is supplied by two 250-kw General Motors diesel generator sets. The propulsion motors and controls were supplied by Electric Machinery Manufacturing Company.

The Alcoa Seaprobe can be controlled either from a console on the bridge or a console in the search/recovery control center. These units were supplied by Decca.

The derrick has a height of 132 feet above the waterline. It is constructed of 6061-T6 aluminum tubing and 5456-H321 aluminum plate. It was designed for a hook load of 250 tons with a safety factor of two.

The drawworks is an EMSCO 800 with a 600-hp motor-generator power supply for d-c control. The 4½-inch diameter OD, upset-internal flush pipe in 60-foot sections is handled by a semi-automatic pipe-handling system.

There are two A.B. Chance 5-ton Oceanographic cranes with interchangeable winch drums for handling equipment on the deck or over the side.

Operations

The Alcoa Seaprobe is a dynamically positioned ocean working platform. The ship can be precisely navigated for fine grain area searches and can hold a precision position in the open sea against winds and currents with the aid of the following systems:

1. Ocean-bottom-mounted acoustic reference systems,
2. Land-based, precision short-range and medium-range radio location systems,
3. Radar positioning relative to land-based or moored reference points, and
4. Worldwide positioning systems employing satellites and/or VLF Omega.

Using a semi-rigid pipe system, the Alcoa Seaprobe deploys a search, identification and sensor package in close proximity to the ocean floor. The system is designed to permit accurate control of the sensor package relative to the ship's working platform and with regard to the sea floor or objects on the floor.

A thruster system at the working end of the pipe provides precision control and positioning of sensor packages, recovery mechanisms, viewing or recording systems, and real-time television examination of deep-ocean objects.

Using sonar and television for target location and identification, Alcoa Seaprobe is designed to be capable of selectively lifting multi-ton weights from the sea floor. This lift capacity is made possible by the tensile strength of the 4½-inch diameter drill pipe.

The business end of the Alcoa Seaprobe system is located at the end of a pipe string made of 60-foot segments of drill pipe threaded together to reach the ocean depths required. Depending upon the task at hand, sensor systems are deployed for fine-grain bottom search and examination, target identification and marking, or oceanographic sampling and measurement. Recovery devices ranging from multi-purpose grappling claws to coring tools are available for lifting bottom objects or cores to the surface. A cable affixed to the exterior of the pipe provides the necessary electrical power, telemetry control signals, and data transmission circuits between the shipboard control consoles and the sensor systems probing the deep ocean.

Search—The basic search "pod" deploys side-scan sonar to sweep a 2,400-foot path along the sea floor. The pod is configured with forward looking sonar, television, still camera, target-illumination systems, and a dropable acoustic beacon to use in marking specific target locations.

Additional sensors, detectors and other special devices may be added to the pod to meet the requirements of specific missions.

Recovery—Heavy object recovery devices utilize rugged electromechanical and hydraulic systems for closure and holding control. Precise positioning of the recovery device with respect to the target is effected by sonar and transponder sensing devices in concert with remotely monitored television and target-illumination systems.

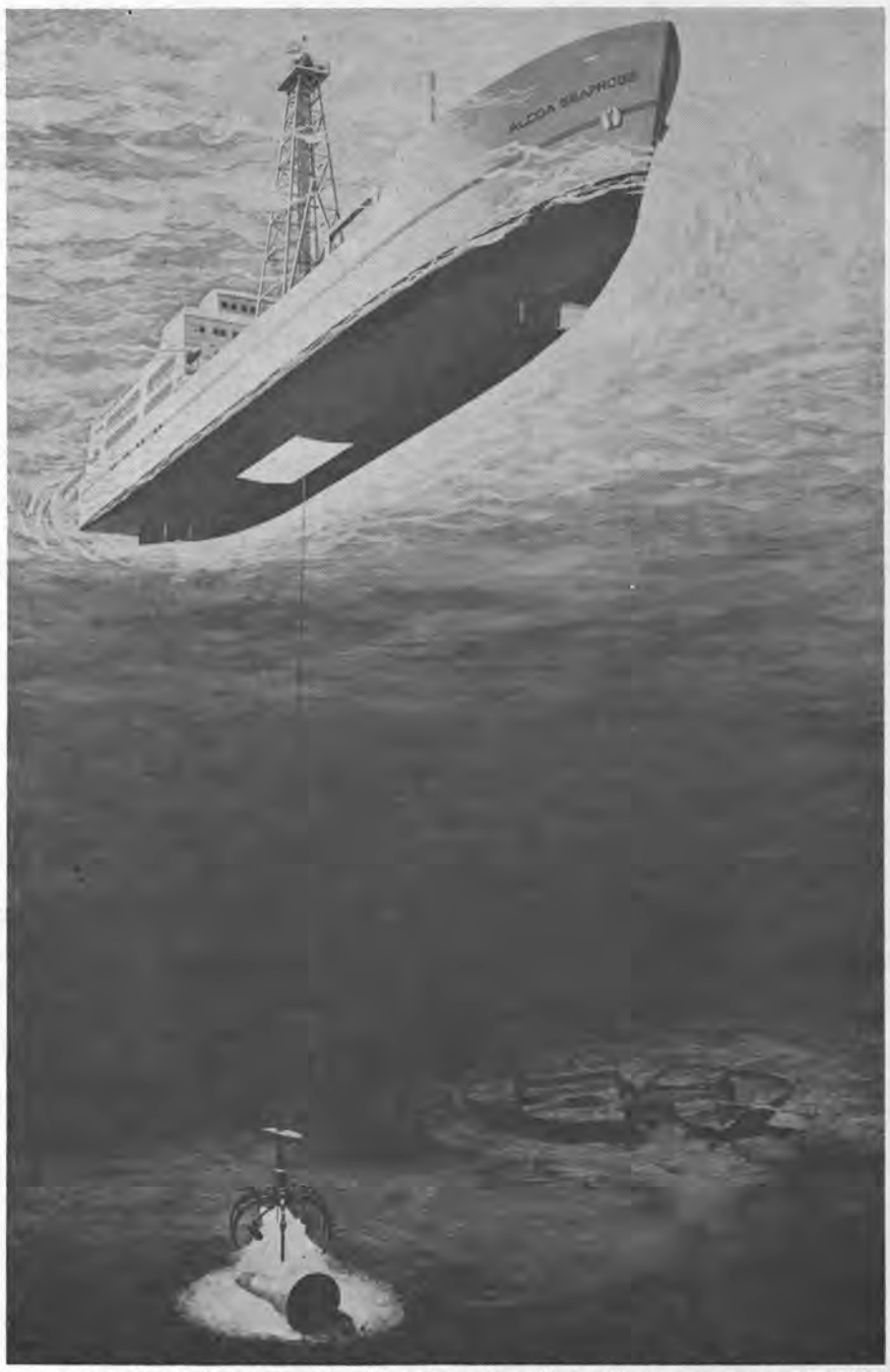
Sampling—In concert with television examination, bottom samples may be selectively recovered for the purpose of magnetic, chemical, biological, geological and paleontological studies. Shipboard precision navigation systems and a thruster system to control the end of the drill string permit finite positioning of devices and sensors with regard to the ocean floor.

Coring—The Alcoa Seaprobe can be outfitted to core in water depths to 18,000 feet. A bottom-oriented acoustic reference system is used to maintain position in the open ocean and permits wire-line recovery of cores for paleontologic and magnetic stratigraphy. Cores also can be recovered for studies concerned with the mechanism of sediment supply, transport, deposition, and to confirm seismic survey data for scientific or other exploratory purposes.

Its capabilities for research and exploratory oceanographic functions exceed those of any ship existing or proposed.

Ocean Search, Inc. is a venture of the Aluminum Company of America and Ocean Science and Engineering, Inc. It was formed to coordinate a variety of worldwide exploratory projects related to the ocean environment and its enormous potential for mankind's welfare. Alcoa has joined OSE in this venture which spearheads Alcoa's expanded involvement in oceanography.

Ocean Search, Inc. invites both individual scientists and organizations to conceive and propose projects now which will challenge the capabilities of this new deep-ocean tool, the Alcoa Seaprobe.



This artist's sketch depicts how the Alcoa Seaprobe will be able to recover objects 6,000 feet down and weighing as much as 200 tons. The ship possesses the capacity to remain almost stationary above a target on the bottom of the sea, and then to lower a string of pipe which will support and power coring or drilling equipment, or search and recovery gear.

Suppliers

Manufacturers, other than those mentioned previously, supplied the following equipment for the Alcoa Seaprobe:

Windlasses	Clark Chapman & Co.
Airhorns	Kahlenberg
Distilling Plant	AMF Cuno Div.
Echo Sounder	Edo Western Corp.
Loran	ITT Mackay Marine
Anchors	Baldt
Emergency Generator	Kohler
Cathodic Protection	Engelhard Industries
Radar	Decca
Air Conditioning	Carrier Corp.
Switchboards	Federal Pacific
Monitoring System	Decca
Radio Equipment	ITT Mackay and RF Communications

79th Annnal Meeting Of SNAME Schedule

U.S. And European Marine Design Experts Will Present Outstanding Technical Papers

Twelve outstanding papers by technical authorities from the United States, The Netherlands, Norway and Sweden will be presented at the 79th Annual Meeting of The Society of Naval Architects and Marine Engineers on November 11 and 12, 1971, at The New York Hilton Hotel in New York City.

Daniel D. Strohmeier, the Society's president, will deliver his annual address at the close of the technical sessions on Thursday, November 11. The president's address will be followed by a business session.

The 12 technical papers to be presented are:

Paper No. 1—"A Mathematical Method of Determining Hydrodynamically Induced Forces on a Semisubmersible" by **J.P. Hooft.**
Synopsis—An approximate method is presented with which those hydrodynamic forces (added mass and damping) and wave-excited forces can be determined which have to be known in order to calculate the motions and strength of semisubmersible platforms which are still in the design stage. The derived calculation method enables the design of semisubmersible platforms from a point of view of good behavior in a seaway.

Paper No. 2—"Directional Stability and Control of Ships in Restricted Channels" by **Haruzo Eda.**
Synopsis—The primary purpose of this paper is to evaluate ship controllability in various channels with a major emphasis on the relationship between channel dimensions and acceptable ship size. To achieve this objective, a technical procedure has been developed utilizing digital computer capability and available hydrodynamic data. A series of digital simulations and stability analyses was made with a wide range of parameter variations.

Paper No. 3—"A Statistical Study of Wave-Induced Bending Moments on Large Ocean-going Tankers and Bulk Carriers" by **Robert S. Little** and **Edward V. Lewis,** with an appendix prepared by **Fred C. Bailey.**
Synopsis—The advent of the mammoth tanker provided the impetus for the American Bureau of Shipping to undertake and sponsor a study of full-scale measurements of hull-girder stresses in five large ships with the objective of determining what stress levels were being encountered under actual service conditions. This paper describes the study and constitutes a preliminary report on the findings of the project.

Paper No. 4—"Tankers and the Ecology" by **Joseph D. Porricelli, Virgil F. Keith,** and **Richard L. Storch.**
Synopsis—Modern tanker design must consider the impact of the ship on the environment and minimize the risk that its cargoes present to the ecology. The sources, magnitudes and ecological effects of oil pollution are presented. This includes a worldwide tanker casualty analysis of 1,416 recent incidents. Based on the analysis, tanker-design proposals are described and analyzed in terms of need, effectiveness and practicality.

Paper No. 5—"Three Winning Designs—FDL, LHA, DD-963: Method and Selected Features" by **Reuven Leopold** and **Wolfgang Reuter.**
Synopsis—A general framework for the design process is described and examples are provided. Versions of this process often get "lip-service" but rarely are rigorously applied. The authors believe that the design discipline is equal in importance to the availability of technology in realizing the potential of introducing innovation into a new ship concept.

Paper No. 6—"A Simple Approach to the Strength Analysis of Tankers" by **Richard Nielsen, Pin Yu Chang** and **Laurent C. Deschamps.**
Synopsis—This paper presents new approaches to the structural analysis of tankers. For the longitudinal-strength studies, the ship's hull is treated as a grillage. For the transverse-strength analysis, the application of finite elements is employed but with a new twist, for the currently used coarse-mesh macro analysis is eliminated. The degrees of freedom can be thus increased with an accompanying reduction in computer time by 50 to 85 percent.

Paper No. 7—"The Design of Ships to Avoid Propeller-Excited Vibrations" by **F. Everett Reed.**
Synopsis—Propeller-excited vibrations have been either accepted as a characteristic of high-powered ships or were corrected at a great expense after the ship was built. This is unnecessary. Modern technology and large computers, if properly applied, not only can free the shipbuilder from the expense of correcting excessive vibration, but also can lead to efficient ships that attain new standards of vibration-free operation.

Paper No. 8—"Prediction of the Power Performance of the Series 62 Planing Hull Forms" by **J.B. Hadler** and **E. Nadine Hubble.**
Synopsis—Results are presented of the first systematic study of the propulsion of planing craft, using propellers driven by inclined shafts with a rudder located behind each propeller. The results have been synthesized into design charts that may be easily used by the planing-craft designer in making preliminary design and trade-off studies on propulsion systems of planing craft.

Paper No. 9—"The Design, Construction, Testing, and Operation of a Deep-Diving Submersible for Ocean-Floor Exploration" by **William Watson.**
Synopsis—The submersible Guppy has become well known in ocean circles. It is a new type of undersea vehicle, quite different from the norm. This paper relates the experience of the members of the Aero/Hydro Space Division of the Sun Shipbuilding & Dry Dock Company in the design, construction and operation of this unusual boat. Guppy has an operational depth of 1,000 feet and carries a crew of two.

Paper No. 10—"LNG Carriers: The Current State of the Art" by **William duBarry Thomas** and **Alfred H. Schwendtner.**
Synopsis—LNG transport is a rapidly expanding, changing and challenging technology. The rapid escalation in ship size is perhaps the most evident manifestation of change. Ships are presently on order which represent nearly a five-fold increase in capacity over the first ships placed in commercial service only seven years ago, and these, at 125,000 cubic meters, may be dwarfed in the foreseeable future by giants of 250,000 cubic meters or perhaps larger.

Paper No. 11—"The Periodically Unattended Engine Room on the TT Thorshammer" by **Bjorn Svenning, Sig Broman, Daniel E. Shaw,** and **Robert O. Butcher.**
Synopsis—Advances in automation and centralized control of modern ships have led to full acceptance of the periodically unattended engine room. The first turbine tanker, the Thorshammer, to receive "EO" classification for unattended engine-room operation by Det norske Veritas is now at sea. This paper describes the powerplant and control system, with emphasis on the features and trials related to the "EO" classification.

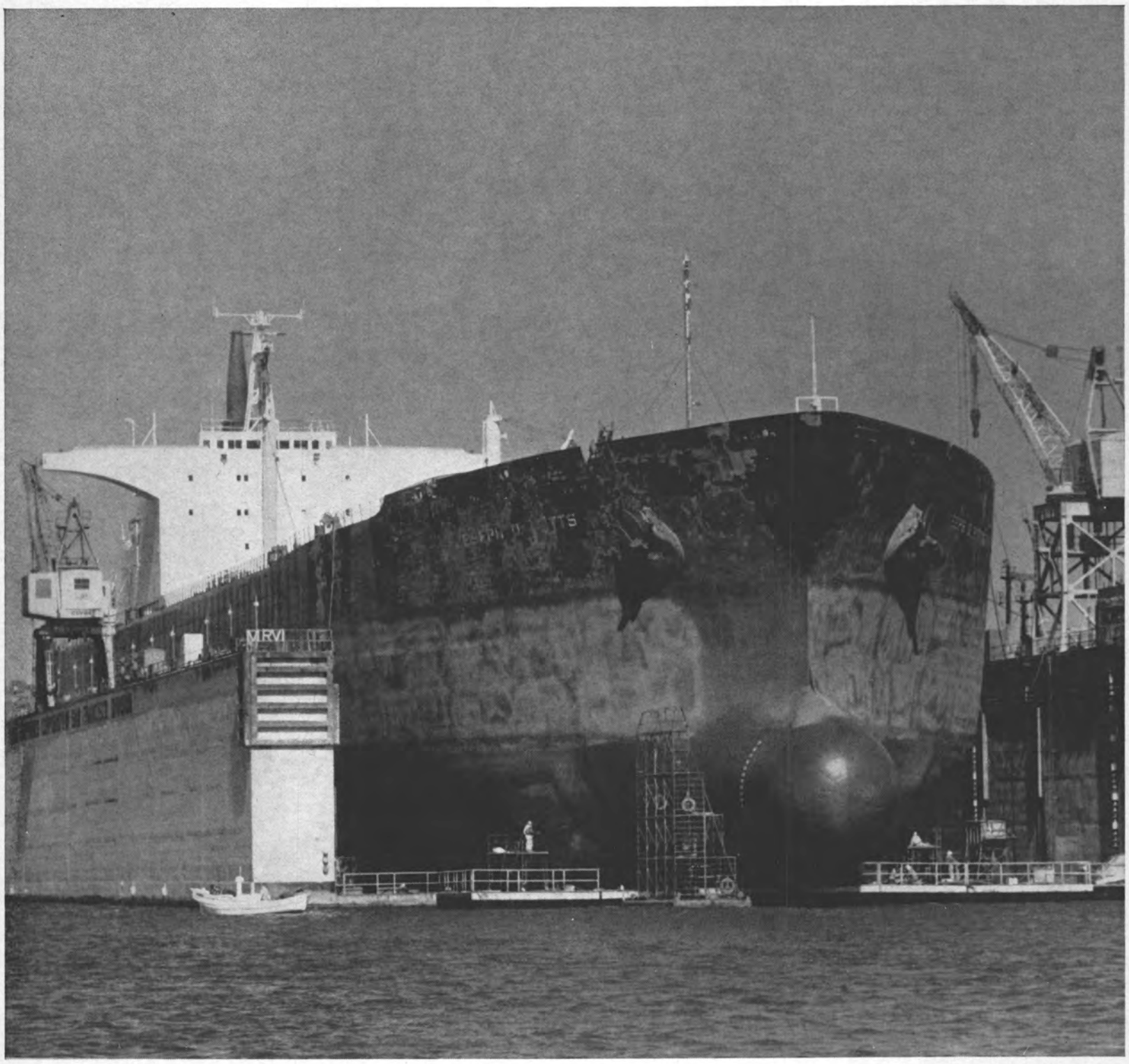
Paper No. 12—"The Marine Business in the Central United States" by **Donald P. Courtsal.**
Synopsis—There are over 14,000 miles of commercially navigable inland and coastal waterways in the central United States. A unique and prosperous marine-transportation system has developed on these waterways. This paper describes the magnitude of the business, the physical limitations of the waterways, operating patterns and some of the technical aspects of the business. Particular emphasis is placed on the maneuvering of barge fleets and on the design of floating equipment.

A discussion period will follow the presentation of each paper.

The Annual Banquet, for members only, will be held in the Grand Ballroom of The New York Hilton on Thursday evening with Mr. **Strohmeier** presiding. The principal speaker will be Adm. **George H. Miller,** USN, special assistant to the administrator, Maritime Administration.

A ladies' champagne brunch and a program of entertainment will be held in the Sutton Ballroom at The New York Hilton on Friday morning.

The Society's Annual Dinner Dance, in the hotel's Grand Ballroom, on Friday evening will conclude the 1971 Annual Meeting.



Quick lift: 40 min., 23 sec.

The tanker Joseph D. Potts is big all over: 811 feet long, wide as a 10-lane highway, drawing 43 feet fully loaded.

She calls for king-size drydock facilities – so her owners (Mathiason Tankers Industries Inc.) brought her to Todd's Alameda yard for painting and repair.

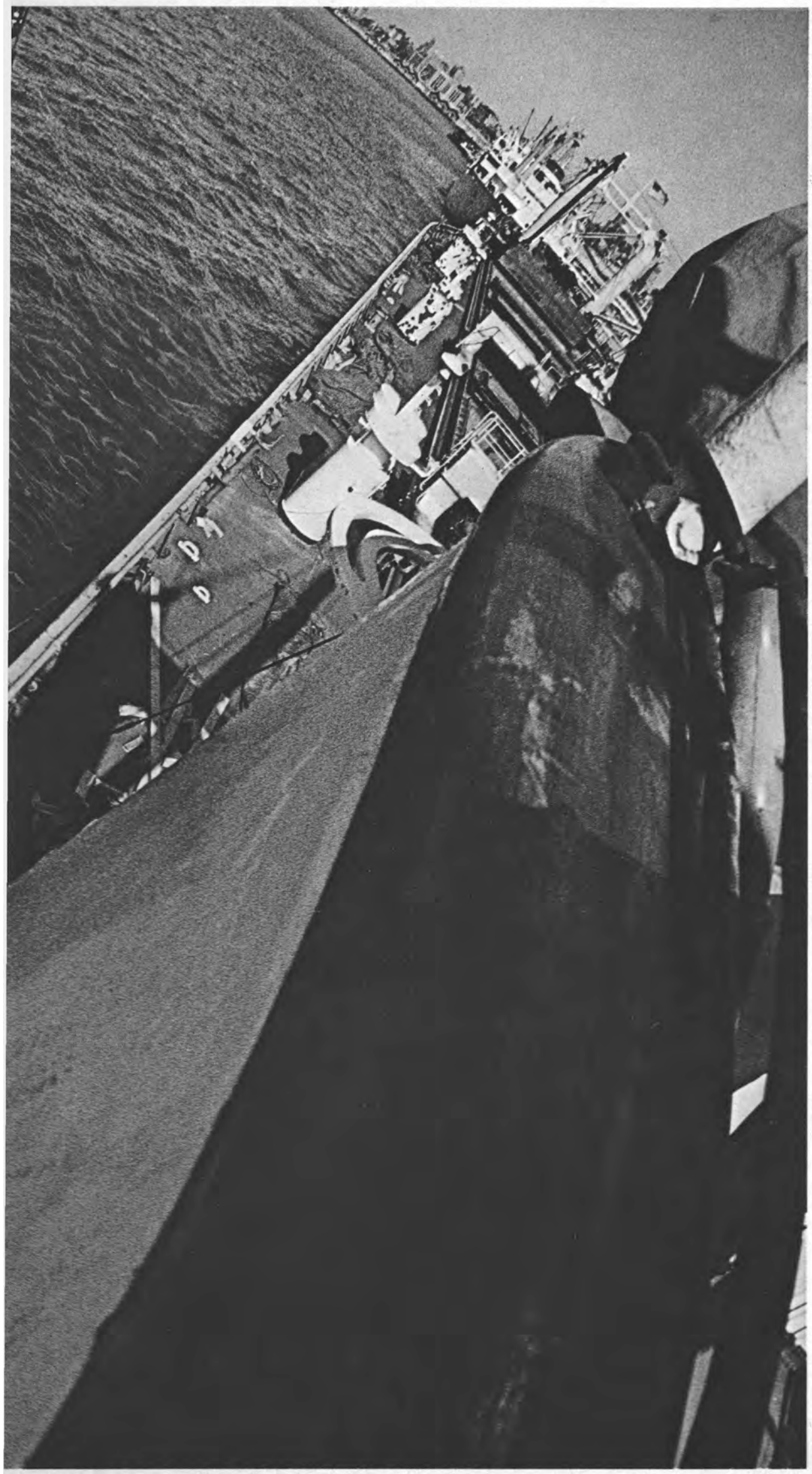
There Todd's new mobile ship repair facility (MRV No. 1) lifted the huge tanker–one of the biggest on the Pacific Coast–in a shade over 40 minutes. Another demonstration that Todd has what it takes to do the big jobs quickly and efficiently.

TODD SHIPYARDS CORPORATION • New York • Brooklyn • New Orleans • Galveston • Houston • Los Angeles • San Francisco • Alameda • Seattle. Executive offices: One State Street Plaza, New York, N.Y. 10004. Phone: (212) 344-6900. Cable: "Robin" New York.

Talk to TODD

Shell helps

trim the time for turn-arounds.



A ship makes money when it's moving, not when it's tied up in port. So Shell and Shell distributors have set up bulk delivery systems at most major U.S. ports to speed the loading of bulk lubricants.

One Shell bulk delivery system encompasses the use of those 450-gallon aluminum tanks you see on the small delivery vessel in our picture. Traditionally, lubricants were delivered in 55-gallon drums. The drums were hoisted aboard or pumped out, one at a time into a ship's storage tanks. A tedious, time-consuming operation.

By using the 450-gallon tanks, lubricants can be pumped aboard a ship *three times* as fast as with 55-gallon drums. *Three times as fast.* This trims costs.

Consider: the average cargo ship loads about 3500 gallons of lubricants in a single delivery. Daily operating costs run from $3000 to $8500. You can see how time saved is money earned. Thus it's no small wonder that shipowners warm to Shell's fast, bulk delivery systems.

Marine bulk lubricants deliveries such as this one require precise coordination of both men and equipment. The equipment must be responsive and dependable—the men good at handling it. It takes some doing. But at Shell we think it's good business to go out of our way for our customers.

Shell Commercial Marketing,
One Shell Plaza,
Houston, Texas 77002.

We go out of our way to take care of you.

SHELL

It looks like a ship. It functions like a ship. But it's a barge.

Viewed from the bow, Tide Mar 19 looks like a tanker.

Which is exactly what she was before we started searching for the most economical method to carry 122,000 barrels of liquid cargo.

Sure, we could have achieved this capacity by buying a ship or building a barge. But that would mean added expense which would have to be passed along to customers.

Instead, we found a T-2 tanker in excellent condition, had the engines removed, and lopped off the stern. For power, we simply hooked up one of our 3600 HP tugs. (It might interest you to know we have several like this up to 4200 HP).

Particularly well suited for short coastal hauls, Tide Mar 19 boasts tremendous pumping capacity made possible by four pumps boasting a combined rating of 17,000 BPH against a 300-foot head. On numerous occasions, we have loaded Tide Mar 19 in less than 7 hours and off loaded in 10.

Other vital statistics include overall length of 383-feet, beam of 68-feet, and molded depth of 39-feet 3-inches, with certification for Grade B cargo.

If economy is your thing, think about Tide Mar 19.

Better yet, give us a call and let us tell you more.

Tidewater Marine Service, Inc.
For more information write: General Offices, 3308 Tulane Avenue, New Orleans, Louisiana 70119. Phone (504) 822-1740
Telex 58-4216, Cable TIWADEX

Tidewater Marine

OCEANS – The New Frontier

Foreword

The population of the United States could reach 300 million people in the next 30 years. If this prediction comes true, then our nation must find and develop new sources of food, minerals and fuels to accommodate her people.

But known land-based reserves of natural resources are being rapidly depleted, and competition from other nations for these resources is increasing. More and more, industry, whose role is to convert these resources into the products people need, is looking to the oceans and, in particular, to the Continental Margins off our shores as a storehouse of vital raw materials.

Geologists and scientists have located potentially vast supplies of oil, gas and sulfur, iron, manganese, nickel and cobalt, and other minerals. These minerals are waiting for man to develop practical methods of recovering them, and venturesome companies are working hard to develop such techniques.

The resources of the Continental Margins and the deep ocean floor will become vital to the welfare and security of this nation not only during the next 30 years but for centuries to come.

The United States Government has proposed a treaty in which this nation would renounce a major portion of this vital mineral heritage and place these resources under the control of an as-yet-undefined International Seabed Resources Authority. It is conceivable that such a regime would be controlled by nations whose interests may be different than, or even hostile to, our own. It is an ill-conceived and shortsighted plan.

The American people are largely unaware of our Government's efforts to create such an international agency, with potentially broad powers over our nation's future economy. It is important that the people and America's leaders be made aware of the importance of the resources of the oceans and that they appreciate the consequences of surrendering them to an international regime.

Industry believes that the American people will agree that our nation's interests lie in forthrightly asserting our exclusive jurisdiction over the resources of our Continental Shelf and Slope and in establishing a progressive ocean resources policy that will encourage private individuals to probe this new frontier.

We hope this paper will inform the public about the potential importance of these resources to our country and will stimulate discussion leading to the establishment of a farsighted and progressive national ocean resources policy.

This is the first part of the paper titled "Oceans—The New Frontier," which was prepared by the National Association of Manufacturers' Natural Resources Management and Conservation Committee. The second half of this paper will be presented in our next issue, November 15, 1971.

The New Frontier

America's dependence upon the oceans and their resources has influenced our nation's political history since its earliest days, revealing cycles of interest and apathy that paralleled this country's needs and technical capabilities.

In the 1600-1700s, coastal colonies, which were surrounded by a hostile and unsettled wilderness, relied upon the seas for communications with the Old World and as an avenue of foreign trade. The livelihood of the early colonists depended upon ships and was centered in the seaports that were established by this growing industry. As a result, maritime interests flourished as the colonists recognized the importance of a free sea and a sound maritime policy.

During the 1800s a developing nation turned its attention inward as immigrants from Europe opened the West and began to settle a continent. A network of railroads was built and the country's attention shifted from coastal states to unsettled inland areas. As a result, maritime interest declined as the oceans provided a shield behind which this country developed.

At the start of the 20th Century, the United States was well on its way to becoming a major world power. Once again, maritime interests flourished as two world wars taught us the importance of maintaining a strong Navy and an efficient merchant marine. By the end of the Second World War, the United States was a major seapower, fully recognizing the importance of the world's oceans in areas of security and world trade. Since that time, however, rising labor and ship construction costs have contributed to the decline of the American merchant marine.

In the 1960s, atomic power created a new generation of submarines, expanding our Navy's interest in a three-dimensional arena extending from the ocean's surface down to its deepest depths. At the same time, rapid advances in science and technology provided a new dimension to man's understanding of the seas. No longer was man's interest in the seas limited to the narrow spectrum of trade and security, but through the eyes of science and industry, we began to see the world's oceans in new depth and perspective.

Through rapidly expanding science and technology, we learned that:

—The world's oceans stabilize our climate, generate a major portion of our weather, and are the principal sources of rainfall upon which all life on the Continents depend.

—The ocean floor contains abundant quantities of hydrocarbons (oil and gas), minerals, and metals, which are considered vital to the future of all mankind.

—They supply a wide variety of foods, which in future years will become a major source of protein for the world's expanding population.

—Many marine organisms contain pharmacologically active substances which scientists believe will become the source of the "wonder drugs" of tomorrow.

—The coastal zones provide recreation for growing numbers of people and act as a nursery and breeding ground for two-thirds of the world's fish catch.

—The world's oceans are a gigantic laboratory about which we know little, except that man's future existence will depend upon his ability to use their resources.

By the mid-1960s, the world's oceans were no longer the private domain of the biologists and oceanographers. One by one, seemingly unrelated industries recognized their role in exploring and understanding the seas, committing funds and personnel to develop their stake in the world's oceans. Today, more than 2,000 companies in a wide variety of industries earn all or part of their income from the sea. Many organizations, ranging from large, widely diversified corporations to small, highly specialized firms are involved in some part of this new industry.

Architects are designing habitats for undersea living.

Pharmacologists are developing new drugs from marine plants and animals.

Lawyers and **Diplomats** are debating the legal status of the oceans and their resources.

Engineers are designing sophisticated sub-sea equipment.

Nutritionists are developing new sources of protein from marine organisms.

Recreation Experts are building underwater parks.

Manufacturers of Submersibles are building vehicles in which oceanographers can explore the ocean bottom.

Geologists are locating large deposits of minerals and metals such as sulfur, tin, manganese, nickel, copper, oil and gas.

Ocean Resources

The surface of the earth measures 197 million square miles, of which 70 percent, or 139 million square miles, is covered by water. The volume of the world's oceans is so great that if the earth's crust was a smooth ball unmarked by valleys and mountains, the oceans would cover this planet to a depth of 8,800 feet.

Scientists have come to realize that the world's continents are enormous islands whose roots extend down into the earth's crust and that these continents extend out past the shores spreading out below the surface of the ocean like gigantic mountains down to the abyssal plain and the deep ocean floor. This region is known as the Continental Margins and is divided into three areas: the Shelf, the Slope, and the Rise.

The Continental Shelves, which are believed to contain the greatest concentration of resources, extend from less than one mile to more than 800 miles offshore. On the average, the greatest depth of the Continental Shelf is about 600 feet, and this depth is considered easily accessible to man via submersibles and diving projects such as the Navy's SEALAB.

The Continental Slope, which may be 10 to 20 miles wide, extends from the outer edge of the Continental Shelf to the top of the

(Continued on page 17)

OCEANS— The New Frontier

(Continued from page 15)

Continental Rise. The Rise is a wide thick apron of land-derived layered sediments which slant gently down to the abyssal plain. The Slope and Rise are believed to be rich in resources. In comparison, the Continental Shelves constitute 7 percent and the Slopes and Rise about 17 percent of the 140-million square miles of ocean floor.

The abyss, or the deep ocean floor, appears to be a flat rolling plain at a depth of 10,000 to 18,000 feet under the surface of the sea. The deep ocean floor is scarred with deep trenches and studded with seamounts and tablemounts, which are flat-topped mountains that often rise to within a few hundred feet of the ocean's surface.

The average depth of the ocean floor is approximately 12,000 feet, and 79 percent of the ocean floor, which contains vast reserves of resources, is at a depth of less than 18,000 feet. Both industry and Government are developing manned submersibles capable of descending to 20,000 feet. When completed, this new generation of research submarines will provide a working platform from which 98 percent of the ocean bottom, or almost twice the total area of the land mass, will be accessible for scientific observation.

The most successful recovery of underwater resources has been the production of offshore oil and gas, presently limited to relatively shallow shelf areas. U.S. petroleum companies have invested more than $13 billion in offshore activities. Offshore royalties and bonuses have resulted in the collection by the Federal Government of more than $4 billion, four times the revenues generated for all similar leases on shore. On a worldwide basis, more than $25 billion has been spent to date. In 1969, over 17 percent of the world's oil production was produced from offshore sources. By 1980, it is estimated that offshore wells will account for 35 percent of the world's oil production for an increase in quantity of more than 200 percent.

As an example of the world's increasing need for fossil fuels (coal, oil and natural gas), one company recently announced that it produced as much oil in the first seven months of 1968 as it did in its first 50 years of operation.

Turning to another group of natural resources, it is estimated that the consumption of metals in world markets in the next 35 years will equal all the metal used by mankind over the last 2,000 years. Worldwide use of all important minerals is expected to double within 15 years, and triple within 30 years. Yet known land-based sources are rapidly being depleted.

As this picture unfolds, it becomes evident that unless the resources of the seas are efficiently developed by the industrial and scientific communities of all nations of the world, society as we know it today cannot hope to endure. The world's oceans are a gigantic laboratory about which we know little, except that man's future existence will depend upon his ability to use the products they produce.

Geologists state that areas of the deep ocean floor lying beyond the limits of national jurisdiction—which constitute more than 50 percent of the earth's surface—contain vast reserves of oil, gas, copper, manganese, phosphorite, nickel, cobalt, and other metallic elements.

In experimental drilling on the ocean floor, scientists have found evidence of oil deposits 12,000 feet under the ocean's surface. Geologists believe similar oil deposits may exist in other deep ocean areas.

In the Pacific Ocean, unconsolidated surficial deposits such as red clays containing aluminum and iron oxides, manganese, copper and nickel are believed to cover one-half of the entire deep ocean floor.

It is estimated that the ocean floor is covered with 10,000 billion tons of calcareous oozes similar to the limestone being mined on land, and that another 10,000 billion tons of siliceous oozes, similar to diatomaceous earth now being used for insulation, concretes, and other industrial uses may also be found.

Thick layers of metalliferous muds containing large concentrations of heavy metals such as iron, manganese, copper, zinc, silver, lead and gold have been found in deepwater basins in the Red Sea and may exist in other areas of the world's oceans. Just the upper layer of metal-rich muds found in the Red Sea is believed to contain $2.3 billion in copper, zinc, lead, silver, and gold. This estimate does not include the iron, manganese, mercury and other metals that would also be recovered in mining operations. Seawater contains vast amounts of dissolved minerals.

The manganese, iron, nickel, copper, cobalt and other metallic elements normally found in solution in seawater precipitate down through the water column forming solid nodules on the ocean floor. Concentrations estimated as great as 100,000 tons per square mile of these metal-bearing nodules can be found on the ocean floor. The Pacific Ocean alone is believed to contain an estimated 1.5 trillion tons of these metal bearing nodules. Techniques to recover and process manganese nodules from the deep ocean floor are rapidly being developed and observers believe that the first mining attempts will be operational within two to three years.

Estimates of the value of ocean floor deposits vary greatly, but experts agree that when practical technology to mine these deposits is developed, the revenues derived will be in the billions of dollars. It is important to mention that there is no rule in existing international law which governs nations or entrepreneurs in recovering these resources. Such activity would be subject only to the principles and rules of international law in general, and to the law of the sea in particular.

The technology needed to recover the resources of the ocean floor is in an embryonic stage and will require substantial development before exploration of the deep ocean floor will occur on a substantial scale. Present knowledge regarding the extent and distribution of the resources of this area is limited and incomplete. While companies have successfully recovered oil, gas, and other minerals from the relatively shallow depths of the Continental Shelf, there is insufficient knowledge about the techniques and equipment that must be developed before resources can be harvested from the deep ocean floor.

At this stage, it is impossible to anticipate what special problems the recovery of resources from deepwater areas will present. In this regard, the policy of the Federal Government should assure a climate that encourages private enterprise to invest in this area, and in which a risk investment, if successful, will yield a reasonable profit. While it is generally agreed that the entrepreneur must be guaranteed special concessions designed to protect his investment and to provide a reasonable rate of return, the present lack of knowledge about the problems of working in deepwater areas does not provide accurate insight into the type of concessions that should be granted. For example, as with land mining agreements, an entrepreneur mining the deep ocean floor must be guaranteed security of tenure over the area he is working, and he must be assured of an area to develop marine mineral resources which is greater than the area normally required for land exploration. At this early stage of investigation, the extent of these concessions—tenure and size of area to be awarded—cannot be accurately determined.

In the hostile environment of the ocean floor, the cost for completing an oil well in the relatively shallow depth of the Continental Shelf is two to three times greater than the cost of completing a well on land, and this increase in cost becomes greater with depth.* Appropriate arrangements for working the deep sea floor must be established to make investments in this area profitable, and incentives for working this area must not be impaired by unrealistic conditions or prohibitive license fees.

This future recovery of marine mineral deposits will depend upon industry's interest and incentive to expand its current engineering capability. Because of the speculative nature of marine mining and the high risk involved in recovering minerals from the depths of the ocean floor, the entrepreneur must be assured maximum safeguards to protect his investment. Much more information and data will be required before realistic arrangements can be concluded for the promotion of long-range development. With this in mind, it is premature for the United States Government to commit this nation to an international regime with full licensing authority to govern and control exploration and exploitation of deep ocean resources.

At present, there is a legal vacuum concerning the deep ocean floor—or that area lying beyond the limits of national jurisdiction. The characteristics and status of the international machinery that may eventually govern this area cannot be determined until certain basic legal questions have been answered. Many legal experts believe that a commitment on machinery which will control and manage this area cannot and should not be made until a legal regime with a comprehensive and balanced set of principles has been accepted by all nations involved.

Considering the fact that there will be a very low level of activity in this area for a number of years to come, the international community should make temporary arrangements through which it can observe progress and become familiar with the special problems that recovery of resources from deepwater areas is certain to cause. A desirable step might be the establishment of an international registry to serve as a public record of activity.

Such an international registry would take the limited form of recording activity within the agreed international area, and might gradually be strengthened and expanded as needs, requirements, and more significantly, as experience dictates.

Questions such as the protection of proprietary information, selection of the most capable applicant, obtaining a reasonable return on risk investment, and preventing operators from holding areas of the seabed for purely speculative reasons are complex and will need careful consideration before an equitable and viable solution is found. More information, experience, and data are needed before the international community is capable of developing guidelines that will encourage rather than discourage activity in this area.

*Drilling a well in water of moderate depth presently costs an estimated $11 million as compared to an onshore cost of $4 million. The cost for developing a well at this same depth currently averages $13 million as compared to an onshore cost of $4 million.

Lockheed Oil Spill Remover On Display In San Francisco

The shiny new prototype of an oil spill removal device, which resembles the paddle wheel of an old river boat, recently went on display in San Francisco, near famed Fisherman's Wharf.

Called Clean Sweep by its developer, Lockheed Missiles & Space Co., of Sunnyvale, the four-foot-diameter, seven-foot-long Clean Sweep unit is mounted between the twin hulls of a catamaran.

The Clean Sweep on display is a production prototype of oil recovery devices which Lockheed plans to build and market to companies, consortiums, refineries and Government agencies engaged in combating oil slicks.

Lockheed recently received a patent for Clean Sweep, and the firm has been awarded a contract by the U.S. Coast Guard to develop an air-transportable eight-foot-diameter unit to tackle high seas oil spills.

The Clean Sweep concept is a series of parallel metal discs joined by overlapping metal vanes set in slots around the outside edge of the "drum."

As Clean Sweep rotates in a slick, oil is drawn into the drum and adheres to the sides of the discs. Wiper blades set permanently at a near vertical position inside Clean Sweep wipe oil from the discs. The oil runs into a central channel inside the unit's axle is pumped to storage.

The metal vanes act to draw oil inside Clean Sweep. As they move up the back side of the rotating unit, their overlapping position prevents excess oil from passing out of the drum.

Following its display on the San Francisco waterfront, the catamaran-mounted Clean Sweep will be used for testing prior to the start-up of production for commercial units.

Hamlet And Rawson Named GE Marine Sales Managers

Robert F. Hamlet

Edward M. Rawson

Robert F. Hamlet has been appointed General Electric's regional marine sales manager for the Gas Turbine International Operations, and **Edward M. Rawson** has been appointed GE's manager of marine gas turbine propulsion system sales in Europe. The announcement was made by **Agostino J. Travaly,** manager of gas turbine marine sales for the Gas Turbine Business Operations.

As manager of regional marine sales, Mr. **Hamlet** is responsible for the development of marine heavy-duty gas turbine business in the European area.

Prior to his recent appointment, Mr. **Hamlet** held several marine sales positions, including a position as sales engineer for GE's Marine Sales Organization in New York. He was responsible for major shipowners and oil companies. A graduate of the Massachusetts Maritime Academy, Mr. **Hamlet** received a B.S. degree in marine engineering. He has been in GE's marine business since 1957, when he joined GE's Marine Turbine and Gear Department in Lynn, Mass.

Based in London, England, Mr. **Rawson** is responsible for the sale of marine heavy-duty gas turbine propulsion systems. Prior to his recent appointment, he was marine sales representative for the Far East and Australia. Mr. **Rawson,** a graduate of the Massachusetts Maritime Academy with a B.S. degree in marine engineering, has been in the marine business with GE since 1956. He has held sales positions in the Marine Turbine and Gear Department, Lynn, Mass., the Domestic Marine Sales Operation, New Orleans, La., and the Industry Control Department's marine operation, Roanoke, Va.

According to Mr. **Travaly,** "The rapid worldwide growth of gas turbine marine business results in our expansion of manpower abroad to meet the needs of the maritime industry."

GE is the world's leading producer of gas turbines which are used worldwide by the maritime industry, electric utilities, and gas transmission companies. Market growth for gas turbines has more than quadrupled from 1965 to 1970.

Mooremack Seeks Subsidy For Refitting Six Freighters

Moore-McCormack Lines has applied to the Maritime Administration for a Federal subsidy to help meet the estimated $978,768 cost of refitting six of its C-4 Constellation class freighters for additional container capacity. The line said it will spend $163,128 on each ship to install deck fittings for 96 containers, and convert some of the fittings for 40-foot units to accommodate 20 footers. Most of the cost per ship, $107,884, will go for structural changes in hatch covers.

The six ships were delivered in 1964 and 1965 and are now employed in service between U.S. Atlantic ports and the East Coast of South America and between the U.S. Atlantic ports and South and East Africa.

The vessels have a speed of 24 knots and carry a 36-man crew. Each ship has accommodations for 12 passengers.

In a Clutch...Wichita delivers!

HOW IS THIS FOR PERFORMANCE?

Over 50,000 HOURS on each of these Wichita-equipped workboats powered by Nordberg Diesels!*

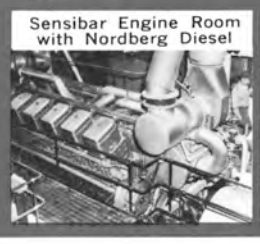
Need Propeller Shaft Braking?

WICHITA ATD-242 WATER-COOLED BRAKE
Provides quick, smooth stops of propeller shaft for fast reversing on Great Lakes Bulk Carrier.

Towboats, Navigator and Mariner
These 6,400 h.p. twins, owned and operated by Union Barge Line Corp., have seen almost continuous service since 1962. Each has a pair of engines driving through dual Wichita ATD-242 Marine Clutches externally mounted to Western Reverse Gears.

J. R. Sensibar Owned and operated by Columbia Transportation Division of Oglebay Norton Co., the 11,300 ton J. R. Sensibar was repowered May, 1960 with a Nordberg Marine Diesel. This engine is rated 3,200 b.h.p. at 515 r.p.m.—drives through an 800kw. generator to a single Western Reduction Gear with Wichita Clutch to a controllable pitch propeller turning at 155 r.p.m.

Sensibar Engine Room with Nordberg Diesel



Wichita 42" double-plate Clutch on Western Gear

J. R. Sensibar Control Panel

Ocean Crown
Owned and operated by Crown Zellerbach Canada, Ltd., the Ocean Crown in 1962 was repowered with a 13½" x 16½" eight-cylinder inline Diesel Engine rated 2,000 h.p. at 515 r.p.m. Clutches are Wichita ATD-236 Marine.

Daniel Webster
Owned and operated by A. L. Mechling Barge Lines, Inc.—the Towboat Daniel Webster is powered by two 2,160 h.p. Nordberg engines through Western Reverse Gears and two Wichita ATD-236 Marine Clutches.

WICHITA MARINE CLUTCHES OFFER: ★More positive control of propeller speed through entire range. ★Quicker response, giving the operator a better "feel" of the vessel. ★Smoother operation with single remote-control lever. ★Sharply reduced maintenance cost.

For the best solution to your work boat clutch needs . . . consult your nearest Wichita Engineer!

WICHITA CLUTCH CO., INC.

P. O. BOX 1150 WICHITA FALLS, TEXAS 76307

CONTACT YOUR NEAREST WICHITA ENGINEER

LARRY W. McDOWELL, Long Beach, California
R. M. HOFFMAN COMPANY, Sunnyvale, California
ANDREW T. LOBEL COMPANY, Denver, Colorado
CLUTCH ENGINEERING CO., Weatoque, Conn.; Martinsville, New Jersey (Met. N. Y.)
FRANK W. YARLINE COMPANY, Chicago, Illinois
G. M. SOMMER CO., INC., Detroit, Michigan
ALLIED-CALLAWAY EQUIPMENT COMPANY, Kansas City, Missouri
A. L. MARTIN & COMPANY, St. Louis, Missouri
FREMONT & LEWIS, INC., Cincinnati, Ohio
ROBERT R. KING COMPANY, Tiffin (Cleveland), Ohio
NORMAN RUPP COMPANY, Portland, Oregon
W. G. KERR COMPANY, Pittsburgh, Penn.
MOTION, INC., Memphis, Tennessee
DONALD E. HARMAN, Dallas, Texas
NORMAN L. WILLIAMS, Houston, Texas
SALES ENGINEERING CO., Salt Lake City, Utah
C. ARTHUR WEAVER CO., Richmond Virginia
GEORGE A. MINNS, LTD., Burnaby, B.C., Canada
DOMINION POWER PRESS EQUIPMENT, LTD., Burlington, Ontario, Canada; Montreal, Quebec, Canada

LICENSEES FOR BRITISH COMMONWEALTH & EUROPE
WICHITA UNITED, LTD., Bedford, England

CONTINENTAL OFFICE
WICHITA UNITED, LTD., Rotterdam, Holland

WICHITA Clutch COMPANY, INC. WICHITA FALLS, TEXAS, U.S.A.

WRITE
for Wichita Clutch Catalog!

*Total of 307,284 hours on these 5 Wichita Clutch equipped vessels.

DECCA HAS IT.

RADAR . . .

A new generation of solid state radars for small vessels of all classes.

. . . and RADAR

"X" or "S" band with true or relative motion and anti collision features. . . . for medium or large tonnage.

GYRO COMPASS

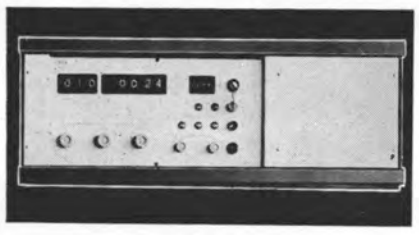
Compact master compass with wide choice of repeaters.

DECCA PILOTS

The most efficient course keeping available.

DECCA NAVIGATOR

The standard position fixing coastal navaid.



ISIS

Integrated ship instrumentation systems for alarm, monitoring and data logging.

RADIO

State of the art communications. VHF., SSB, and complete ship's stations.

DECCA HAS IT.

An incomparable choice of marine electronics with incomparable value and incomparable support from 85 service centers in the U.S.A. . . . 360 world-wide.

ITT DECCA MARINE, INC.
386 PARK AVE. SOUTH. NEW YORK. N.Y. 10016
(212) 685-5157

SNAME Honors Editor And 27 Authors At India House In New York

At the ceremony commemorating the publication of The Society of Naval Architects and Marine Engineers 1971 edition of "Marine Engineering," (seated) left to right: author **R.T. Pennington,** author **Charles D. Rose,** editor **Roy L. Harrington,** president of the Society **Daniel D. Strohmeier,** author and control committee chairman **John R. Kane,** author **C.E. Habermann,** control committee member **John H. Lancaster,** author **J.W. Market;** (middle row) left to right: SNAME public relations chairman **John R. Blackeby,** author and control committee member **Jens T. Holm,** author **C.L. Long,** author **G.W. Soete,** author and control committee member **W.E. Jacobsen,** author **M.R. Gross,** author **Irving W. Smith,** author **J.M. Gruber,** author **William I.H. Budd,** author and control committee member **Laskar Wechsler,** control committee member **Robert E. Yohe,** author **W.O. Nichols,** author **W.L. Williams,** author **Philip Liu;** (top row) left to right: author **E.A. Catlin,** author **E.E. Stephenson,** author **Harold W. Semar,** author **J.F. Sebald,** author **Burr Melvin,** author **Watt V. Smith,** control committee member **Ernst G. Frankel,** publications committee chairman **A. Dudley Haff,** author **A.O. White,** and secretary of The Society of Naval Architects and Marine Engineers **Robert G. Mende.**

The Society of Naval Architects and Marine Engineers held a ceremonial luncheon on September 29, 1971 at India House, New York City, to honor the editor, the chapter authors and the members of the control committee of its recently published 1971 edition of "Marine Engineering."

Daniel D. Strohmeier, president of the Society, officiated.

Narrating the myriad technological advancements that have occurred since the publication of Volumes I and II of the original "Marine Engineering" in 1942 and 1944 respectively, the 1971 edition is dramatically different in content from the original, having been completely rewritten. It covers naval as well as merchant practice, is comprehensive, factual, and accurately represents the consensus of opinion of the marine industry. Fulfilling its purpose, "Marine Engineering" acquaints those already familiar with basic engineering fundamentals with the various engineering disciplines and applications which make up marine engineering.

Technical editor **Roy L. Harrington,** who has carefully reviewed each chapter, has had 12 years of technical ship design experience in a major shipyard. His background and literary prowess qualify him to expertly bridge the academic and practicing professional points of view of the SNAME membership.

The 27 authors are highly competent engineers, each being a specialist in his field. The sum of their experience and learning constitutes an all-inclusive book of marine engineering knowledge.

In addition, a control committee of 10 experts in the field has provided sound guidance throughout all stages of the prepublication of the book.

At the book signing ceremony are left to right: editor **Roy L. Harrington;** author and chairman of the control committee **John R. Kane;** and president of the Society **Daniel D. Strohmeier.**

Handsomely bound in rich red and containing 882 pages and many illustrations, this edition is priced at $30 for members and $45 for nonmembers (add $2.50 for overseas handling). Copies may be ordered from the publisher, The Society of Naval Architects and Marine Engineers, 74 Trinity Place, New York, N.Y. 10006.

Esso And Hitachi Sign Contract For Four Huge Tankers

Contracts have been signed between Esso Tankers Inc., an affiliate of Standard Oil Company (New Jersey) and Hitachi Shipbuilding & Engineering Co., Ltd. for the construction of four 277,000-dwt tankers.

The tankers will be built by Hitachi in Japan for delivery late 1973 through late 1975. The vessels will have the following measurements and characteristics: length, 1,066 feet; breadth, 173 feet; draft, 72 feet, and operating speed, 15.4 knots.

The vessels will be propelled by 36,000-shaft-horsepower steam turbines and will be used in Esso's fleet in international tanker service.

State Of Maine Seeks Boatbuilder/Manuf. For Rockland Plant

The state of Maine is seeking a boatbuilder or marine equipment manufacturer to move into the former Maine Shipbuilding plant in Rockland, Maine.

Pursuing this quest, the Department of Economic Development has designed a descriptive flyer which presents in detail the 55,000-square-foot building on 26 acres with 720 feet of ocean frontage. The description is available without cost from Dept. ME/S, Suite 901, 20 East 46th Street, New York, N.Y. 10017.

Todd Awarded $9.5 Million AML Conversion Contract

American Mail Line has signed the first contract for subsidized ship work in the new fiscal year with Todd Shipyards. The agreement calls for converting AML's C-4 Oregon Mail to a containership. The work will be done at Todd's San Pedro, Calif., shipyard.

Addition of a 105-foot midsection to give the ship capacity to haul 836 of the 20-foot containers will cost $9,463,323, according to the Maritime Administration. The government's subsidy share of the total cost will be 41.5 percent, the same rate that prevailed earlier this year on eight similar conversions undertaken by American President Lines.

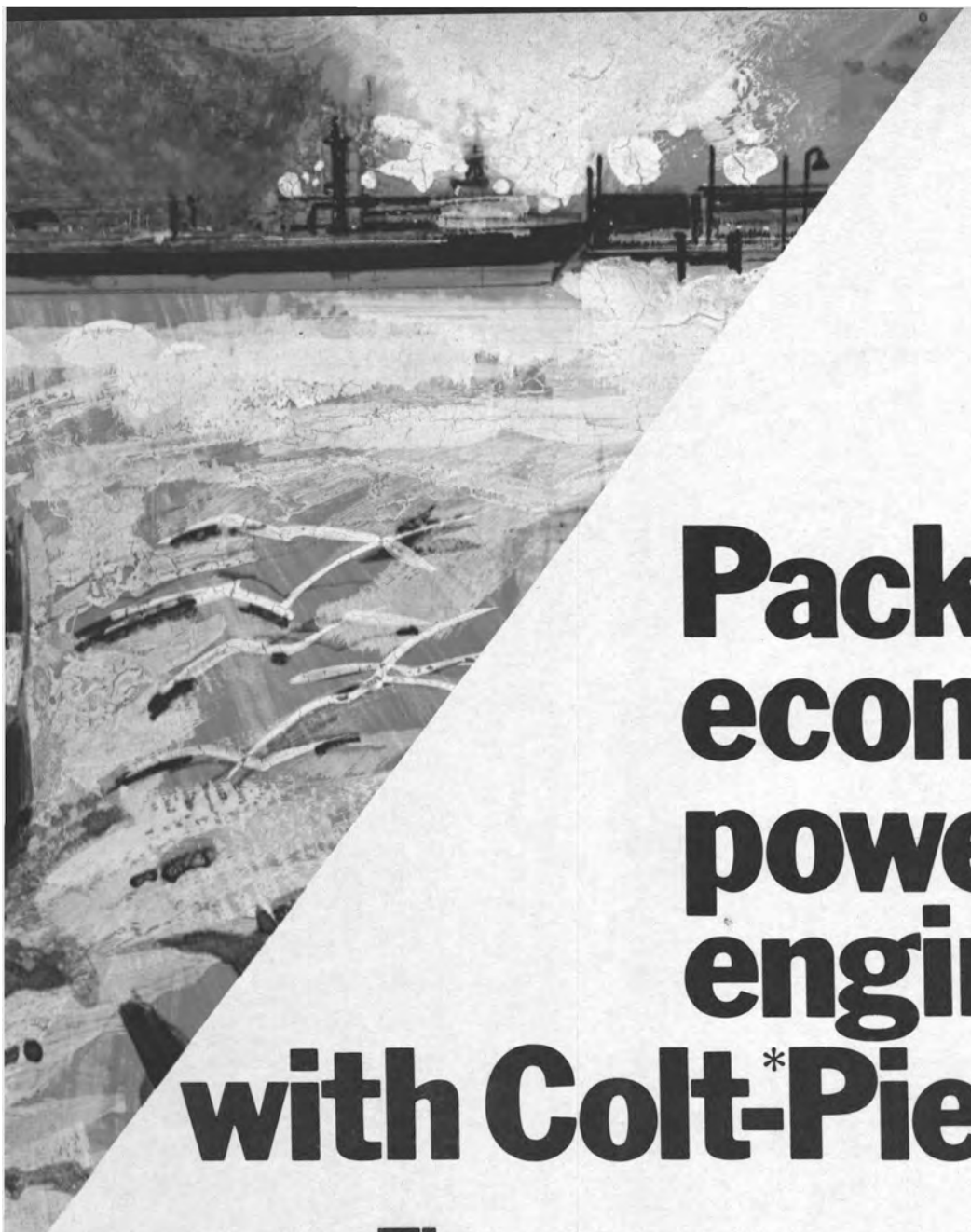
Three Promotions At Matson Navigation

Matson Navigation Company has promoted **William E. Plymale** to the position of manager of freight operations. He was formerly assistant general manager of freight operations.

Efren Sanchez has been promoted to container operations manager, and **David J. Field Jr.** has been promoted to fleet operations superintendent. Mr. **Sanchez** was formerly container operations superintendent and Mr. **Field** was regional operations superintendent in Northern California.

FALCON LADY

For a full-size print of this original oil of the Falcon fleet without advertising, write on your company letterhead to Phil Wallach, President Colt Industries Power Systems Division, Beloit, Wisconsin 53511



Pack more economical power into less engine room with Colt-*Pielstick Diesels

The new Falcon fleet of U.S.-built tankers puts to sea.

The Four Falcon Tankers—37,276 dwt with 15,000 BHP.—set the pace for new U.S. Flag merchant vessels. They are the first large U.S. ships to answer the demand for greater cargo space with big diesel power tucked into small space. And do it with Pielstick diesels from Colt Industries.

The Pielstick PC-2 is the world's most widely used medium-speed, high horsepower marine diesel engine. Ratings from 4,000 to 9,000 hp., and in 8 to 18 cylinder "V" engines.

The Colt-Pielstick is more economical than steam or gas turbines. With savings proved in merchant marine service around the world. And, it is also more compact and lighter in weight than steam turbine plants, which allows for the design of larger payloads through smaller engine rooms, far aft installations, greater flexibility of machinery arrangements. And every unit is backed by a world-wide service organization with facilities in most major ports.

Since 1913, our Fairbanks Morse diesels have provided the finest in marine propulsion. Now, the Colt-Pielstick diesels answer the demand for higher horsepower and economical propulsion requirements.

Write today for the new Colt-Pielstick color brochure. Colt Industries, Power Systems Division, Beloit, Wisconsin 53511

*S.E.M.T.-Pielstick is a registered trademark of Societe d'Etudes de Machines Thermiques, Paris, France.

Colt Industries

Southeast SNAME Hears USCG Boat Standards Paper At Fall Meeting

The fall meeting of The Society of Naval Architects and Marine Engineers Southeast Section was held on October 1, 1971, at the Coral Reef Yacht Club, Miami, Fla. Over 75 members and guests attended the dinner and technical session which followed. Section chairman **Frank C. De Grim** presided over the business meeting and ex-chairman **Robert W. Hobbs** led the technical session.

Comdr. **Richard Brooks,** USCG, Chief of the Boating Standards Division, Office of Boating Safety, U.S. Coast Guard Headquarters, Washington, D.C., presented a paper on the subject titled "The Coast Guard Boating Standards Program," and led the lively discussion which followed.

In his paper, Commander **Brooks** reviewed the history of recreational boat standards and Federal legislation in the United States, supplemented with statistics of the industry, covering the production and accident record leading to the present Coast Guard involvement. The need for comprehensive standards covering load capacity, safe powering, flotation, fire and explosion, and lifesaving devices on almost all water craft was presented, with accent upon the manufacturer's responsibility in the new standards being prepared.

Comdr. Richard Brooks

Commander **Brooks** stated that the 1970 Federal Boat Standards Law specifies that the Coast Guard is authorized to prepare the standards in question, administer their application, and assess necessary penalties for noncompliance. The new regulations are expected to be released in early 1972, and will include a minimum standard covering the particulars of construction and performance required to avoid safety defects, for which the manufacturer will be held responsible under the law.

Officers attending the meeting of the Southeast Section in Miami, left to right, are: **Edward L. Teale Jr.,** vice chairman of the Section; **Frank C. De Grim,** chairman, and **James S. Krogen,** secretary-treasurer.

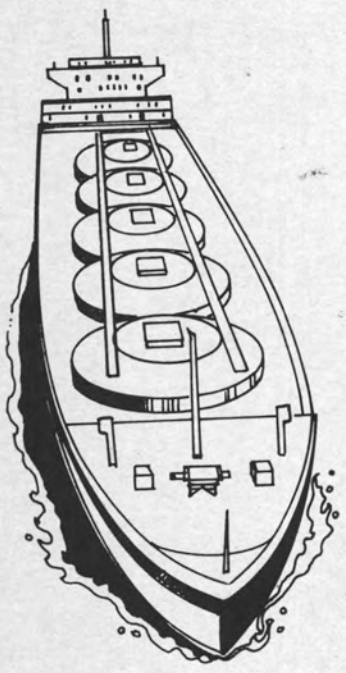
On Saturday morning following the meeting, **Jean E. Buhler,** chairman of the steering committee for the 1973 spring meeting of the Society, which will be held at Disney World, presided over a meeting of his committee.

The next meeting of the Southeast Section is scheduled for January in Jacksonville, Fla., with a visit to Rudolph F. Matzer's testing tank facility planned.

Dillingham Affiliate Offers Oceanographic Equipment Catalog

Oceanographic Engineering Company, Box 2949, San Diego, Calif. 92112, an affiliate of Dillingham Corporation, announces the availability of a new oceanographic/environmental lease equipment catalog from its Field Operations group. Complete with descriptive data on specifications and applications, the catalog lists items available for a few days or several months.

Consulting, field engineering, and technical assistance can be provided by Field Operations to ensure economical application of lease equipment.



From -28°F to -320°F... Steels to handle the liquefied gases

Armco makes the special steels you want and provides the data you need with them

Need to store or transport liquefied gas? Armco has a full array of steels noted for notch toughness — plus the data you need to make the best use of them at low service temperatures. Starting with Armco LTM for handling refrigerated liquefied ammonia, through 9% Nickel Steel for liquid oxygen and nitrogen containment, Armco delivers the low-temperature steels. Write for details or check your needs on the attached coupon. Our latest development is CRYONIC 5, a special steel for containment of ethylene at —155 F and liquid natural gas at —258.6 F.

Armco Steel Corporation, Dept. H-81,
P.O. Box 723, Houston, Texas 77001

ARMCO STEEL ARMCO

Mail to:
Armco Steel Corporation, Dept. H-81,
P.O. Box 723, Houston, Texas 77001.
Send me data on steels for the following low temperature or cryogenic applications:

Name _____

Title _____

Company _____

Street _____

City _____ State _____ Zip _____


MADE IN U.S.A.
0
5
10
15
20
25
30
RPM
HUNDREDS

response!

As your power needs change we respond. Over a decade ago we responded to your need for more power, more profit with the Cat D343. Now there are four engines in the 5.4 inch bore family delivering high-output power with traditional Caterpillar reliability.

High-horsepower engines now match bold hull concepts, stretched versions of established designs and the increased use of non-traditional hull materials.

Four engines with identical bore and stroke—D343, D346, D348, D349—so similar that in vee design 75% of the parts are interchangeable. Engines that turn 1800 rpm and produce up to 1200 hp.

The GRANDEUR, Robin Boat Rental's 100 ft. crewboat was repowered with 5.4 in. bore engines. Twin Caterpillar V12 D348 diesels, each producing 725 hp at 1800 rpm, were installed by Equitable Equipment Co. to increase GRANDEUR's ability to transport crews and supplies to offshore oil rigs.

According to Mr. Vincent J. Robin, president of Robin Boat Rental, the increased speed and dependability has been put to good use. "GRANDEUR is more responsive now; even with a full load it maintains speed. And it maneuvers better when getting in on a floating barge." It was his decision to repower with Cat, and Mr. Robin is happy with his choice: "The GRANDEUR is performing like a new boat."

Attesting to Robin's satisfaction with the GRANDEUR's performance is the ALICIA VICTORIA II, a new 105 ft. crewboat just added to the fleet. Its power—two Cat D348 Marine Diesels.

Specify Cat 5.4 in. bore engines for repower or original installation. More than 800 fully equipped Caterpillar dealer facilities world-wide stand ready to serve you.

GRANDEUR: 100 ft. steel hull crewboat owned by Robin Boat Rental, Harvey, Louisiana; two Caterpillar D348 diesels; 25 mph.

Engine	D343	D346	D348	D349
No. of cyl.	in-line 6	60° V8	60° V12	60° V16
Intermittent HP @ 2000 RPM	460	610	920	1220
Continuous HP @ 1800 RPM	365	480	725	970
Cu. In. Displ.	893	1191	1786	2382
Weight (lbs)	5772	9700	11,390	14,800

CATERPILLAR

Raytheon Co. Offers New Product Literature On Sonar Transceivers

New product literature describing sonar transceivers produced by Raytheon Company's Ocean Systems Center, Portsmouth, R.I., is now available from the company.

The literature describes Model PTR-105A, used for oceanographic applications at all depths over the frequency range of 2 kilohertz to 50 kilohertz, and Model PTR-106A, a special-purpose low-frequency unit containing a bottom-triggered time-variable gain circuit for sub-bottom profiling in shallow water. The PTR-106A is available separately or as part of a complete sub-bottom profiling system.

For copies of the product literature, write to Marketing Manager, Raytheon Company, Ocean Systems Center, P.O. Box 360, Portsmouth, R.I. 02871.

Great Lakes Section Hears Three Papers At Annual Fall Meeting

The fall meeting of the Great Lakes and Great Rivers Section of The Society of Naval Architects and Marine Engineers was held at Louisville, Ky., on September 29-30, 1971. One hundred Great Lakes and Great Rivers representatives attended the sessions and the afternoon tour on September 30.

An open panel on the subject of "Sewage Control for Great Lakes Vessels—the Technical Problem" was held on September 29. The session was taped and reprints will be produced detailing the discussions of the more than 15 firms represented and the question and answer session by Society members.

Shown above at the meeting in Louisville, left to right (standing) are: **Ralph F. Clark,** author, president of Marine Loss Control, Inc.; **R.H. Suehrstedt,** chairman of the Great Lakes and Great Rivers Section; **John O. Greenwood,** Section public relations chairman; (seated) Prof. **J.B. Woodward III,** Section papers chairman; Comdr. **William M. Devlin,** USCG, author; and **Frank Foster,** author, sales manager, Carlisle & Finch Co.

The morning session on September 30 included a business meeting and the following papers: "The Naval Architect & His Influence on Marine Loss Control" by **Ralph F. Clark,** president, Marine Loss Control, Inc.; "Xenon Lamp Searchlights" by **Frank Foster,** sales manager, Carlisle & Finch Company and "Aids to Navigation on the Arkansas Waterway" by Comdr. **William M. Devlin,** United States Coast Guard.

After lunch, the ladies in attendance toured the area on the steamer Belle of Louisville, while the gentlemen boarded buses for the trip to Jeffersonville, Ind. and a tour of the modern facilities of Jeffboat, Inc. A barge launching climaxed the afternoon at 3 p.m.

A reception and dinner concluded the fall meeting. Plans were announced for the next meeting to be held at Cleveland, Ohio, on January 18, 1972. This winter meeting will feature several films of maritime interest during the afternoon session, as well as technical papers during the morning session.

Panocean Appoints Robert M. Pentz

The appointment of **Robert M. Pentz** as manager of the Panocean Agency to direct all of its activities in both the United States and Canada, has been announced by **Peter Burbank,** president of A.L. Burbank & Co., Ltd., general agents in the U.S. for Panocean. Panocean Shipping & Terminals Ltd. operates chemical and special liquid bulk tankers, with terminals in Rotterdam, Antwerp and a new terminal under construction in Eastham, England.

MTRB Meets To Review Maritime Research Goals

Maritime Transportation Research Board members discuss maritime problems during coffee break at the meeting at the University of Michigan. Left to right: **John B. Oren, Edgar F. Luckenbach Jr.,** Rear Adm. **Edward J. O'Donnell,** USN (ret.) and **James J. Henry.**

The Maritime Transportation Research Board, under the chairmanship of **Edgar F. Luckenbach Jr.,** met September 15-17 at the University of Michigan, Ann Arbor, to review national maritime research goals. The Board, which is a unit of the National Research Council-National Academy of Sciences-National Academy of Engineering, meets twice a year to recommend long-range plans for maritime transportation research and to review the progress of its committees and panels. The members of the Board and its panels and committees contribute their time and effort to the work of the National Academy, which is a private, nonprofit organization chartered by Congress to provide advice to the Government.

The meeting was highlighted by a presentation by Rear Adm. **George Miller,** USN, of the Maritime Administration, U.S. Department of Commerce, who explained the Administration's new effort to coordinate Department of Commerce and Department of Defense planning concerning the role of the U.S. Merchant Marine in national defense.

During its deliberations, the Board took time off to visit the naval architecture facilities of the University of Michigan. Prof. **Harry Benford** and Board member Prof. **Raymond Yagle,** explained the University's naval architecture program and arranged for the members of the Board to discuss design projects with several of the school's students.

Before adjourning September 17, the Board reviewed the progress of three ongoing research projects. The first of these projects is being conducted by the Shipbuilding R&D Panel under the chairmanship of Dr. **John C. Warner,** president emeritus of the Carnegie Institute of Technology. This panel is analyzing the shipbuilding industry in the United States to determine what private and Government research and development should be undertaken to revitalize the U.S. shipbuilding industry. The second project reviewed is one to determine what the U.S. strategy should be with respect to nuclear merchant ship development. This panel is being chaired by **Edwin Haefele** of Resources for the Future. The third study, which is being conducted under the chairmanship of Dr. **Carl C. Chambers,** vice president for engineering affairs of the University of Pennsylvania, is dealing with the question of what support, if any, universities and institutional research organizations should receive from the United States Government and industry for maritime research.

The Board tentatively approved three additional research projects to be initiated in the forthcoming fiscal year. The first is a study of the organization of human resources in the maritime industry. This effort will analyze, among other things, the changing relationship of man to his work aboard ship with an eye toward changing the traditional organization and relationships of men aboard ships at sea. The second study will be a continuation of the Board's previous efforts in merchant marine safety. This project will be directed toward improving the procedures for the collection of merchant marine casualty and loss statistics. It will also analyze and make recommendations in the area of human failure as a cause of ship losses and casualties. The third project will assist the maritime industry in planning for conversion to metric standards and units of measurement when the Department of Commerce recommendations for a national metric program are enacted.

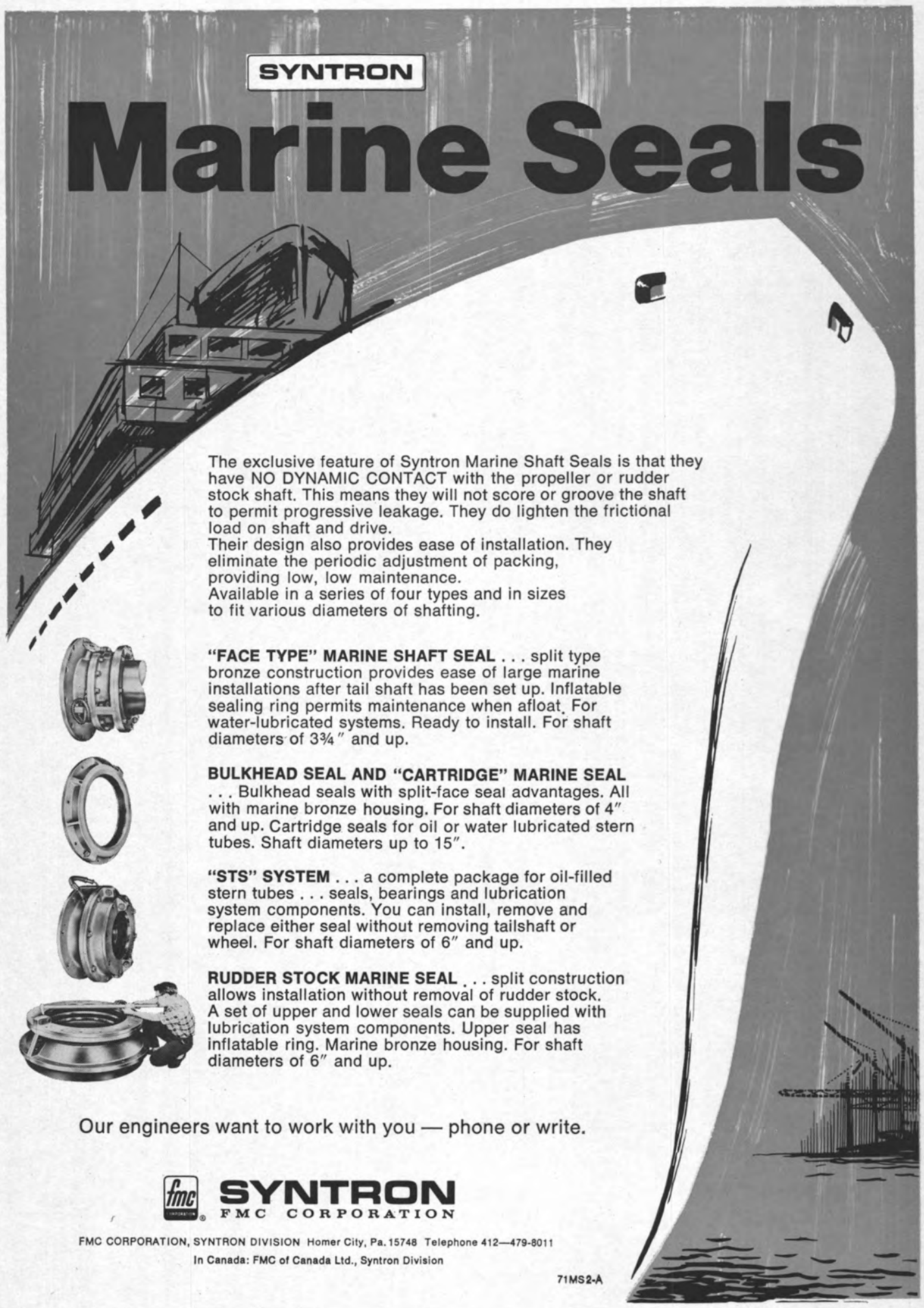
For long-range planning, the Board directed that study definition panels be set up to recommend R&D action on the following subjects: (1) the present and projected relationship of the U.S. merchant marine to bulk cargo imports; (2) the future role of coastal and inland waterway routes as a transportation alternative to new highway construction; (3) the criteria for a competitive U.S. merchant marine, and (4) the future national requirements for ports.

The members of the Maritime Transportation Research Board are: MTRB chairman **Edgar F. Luckenbach Jr.,** president and chairman of the board, Luckenbach Steamship Company, Inc.; MTRB vice chairman **Richard M. Michaels,** director of research, The Transportation Center, Northwestern University; **John Storm Bull,** president, Moran Towing and Transportation Company, Inc.; **Robert A. Carl,** Special Assistant to the Under Secretary of the Navy; Prof. **Louis E. Davis,** professor of organizational sciences, director of the center for organization studies, Graduate School of Management, University of California at Los Angeles; **John T. Gilbride,** president, Todd Shipyards Corporation; **Paul Hall,** president, Seafarers International Union; **James J. Henry,** president, J.J. Henry Co., Inc.; **Ran Hettena,** vice president of operations, Maritime Overseas Corporation; **David C.G. Kerr,** partner, Macfarlane, Ferguson, Allison & Kelly; Dr. **Samuel A. Lawrence,** vice president for administration, Cornell University; **Albert E. May,** vice president, American Institute of Merchant Shipping; Prof. **Harold M. Mayer,** department of geography, Kent State University; **Kenneth A. Meyers,** general manager-Northeastern region, Corrugated Container Division, Continental Can Company; Rear Adm. **Edward J. O'Donnell,** USN (ret.), superintendent, State of New York Maritime College; **Robert J. Pfeiffer,** executive vice president, Matson Navigation Company; **Richard F. Pollard,** vice president, The Chase Manhattan Bank; **Maurice L. Sellers,** naval architect, Newport News Shipbuilding and Dry Dock Company; **Nathan S. Simat,** president, Simat, Helliesen & Eichner, Inc.; **Walter Wells,** vice president and manager, marine office, Appelton & Cox; Prof. **Raymond A. Yagle,** department of naval architecture and marine engineering, University of Michigan; **Robert T. Young,** president, American Bureau of Shipping, and **Charles Zeien,** vice president, Sun Shipbuilding and Dry Dock Company.

The executive director is Rear Adm. **John B. Oren,** USCG (ret.), and **Harvey C. Paige** is the executive secretary. The project managers are: **Leonard E. Bassil, John H. Leeper, Richard W. Rumke,** and **S. Lynn Walton.**

SYNTRON

Marine Seals



The exclusive feature of Syntron Marine Shaft Seals is that they have NO DYNAMIC CONTACT with the propeller or rudder stock shaft. This means they will not score or groove the shaft to permit progressive leakage. They do lighten the frictional load on shaft and drive.
Their design also provides ease of installation. They eliminate the periodic adjustment of packing, providing low, low maintenance.
Available in a series of four types and in sizes to fit various diameters of shafting.

"FACE TYPE" MARINE SHAFT SEAL . . . split type bronze construction provides ease of large marine installations after tail shaft has been set up. Inflatable sealing ring permits maintenance when afloat. For water-lubricated systems. Ready to install. For shaft diameters of 3¾″ and up.

BULKHEAD SEAL AND "CARTRIDGE" MARINE SEAL . . . Bulkhead seals with split-face seal advantages. All with marine bronze housing. For shaft diameters of 4″ and up. Cartridge seals for oil or water lubricated stern tubes. Shaft diameters up to 15″.

"STS" SYSTEM . . . a complete package for oil-filled stern tubes . . . seals, bearings and lubrication system components. You can install, remove and replace either seal without removing tailshaft or wheel. For shaft diameters of 6″ and up.

RUDDER STOCK MARINE SEAL . . . split construction allows installation without removal of rudder stock. A set of upper and lower seals can be supplied with lubrication system components. Upper seal has inflatable ring. Marine bronze housing. For shaft diameters of 6″ and up.

Our engineers want to work with you — phone or write.

fmc SYNTRON
FMC CORPORATION

FMC CORPORATION, SYNTRON DIVISION Homer City, Pa. 15748 Telephone 412—479-8011
In Canada: FMC of Canada Ltd., Syntron Division

71MS2-A

Independent Aluminum Marine Fuel Tanks Approved By USCG

The Marine Safety Council of the United States Coast Guard has approved the use of independent aluminum marine fuel tanks for commercial service. The Coast Guard's authorization covers fuel tanks fabricated with ¼-inch Type 5086 aluminum alloy and other alloys acceptable to the commandant.

To qualify for Coast Guard approval of their commercial use, the aluminum marine fuel tanks were determined to be corrosion resistant in a marine atmosphere.

The following steps were taken to qualify the aluminum alloy for Coast Guard approval:

First, the Aluminum Association supplied the Coast Guard with documented, historical evidence of aluminum's ability to resist corrosion. The documentation included written testimony of individual boat owners over the last two decades.

Second, to test the marine fire resistance of aluminum fuel tanks, the Aluminum Association retained Tropical Marine Testers, Inc. in North Palm Beach, Fla., to conduct a fire test as specified in Standard E-3 of the Marine Department, Underwriters Laboratories (formerly Yacht Safety Bureau).

The standard requires that a test tank filled to one-quarter capacity with gasoline be subjected to a specific temperature range during a 2½ minute test sequence. The tank is suspended over a pan of flaming gasoline. A temperature sensor located one inch from the bottom of the tank must indicate a temperature in the 950°F-1450°F range after 45 seconds of test. Within 75 seconds, the sensor must indicate a temperature between 1250°F and 1550°F, and continue within this range for an additional 75 seconds.

The test fuel tank fabricated with ¼-inch marine aluminum alloy successfully survived the test procedure intact.

U.S. Coast Guard approval of the use of independent marine fuel tanks fabricated with ¼-inch marine aluminum alloy applies to all commercial boats, including offshore crew and supply boats.

The Coast Guard regulations authorizing the use of these aluminum fuel tanks are scheduled to be published later this year in the Federal Register.

Prudential-Grace Lines Names Frank Harlocker To Executive Post

Frank R. Harlocker

Frank R. Harlocker has been appointed executive vice president for traffic and sales at Prudential-Grace Lines, Inc., it was announced by **Spyros S. Skouras Jr.**, chief executive officer of the line. Mr. **Harlocker** will also be a member of the firm's executive committee. He will report to **A.T. de Smedt,** president of Prudential-Grace Lines.

Prior to his new appointment, Mr. **Harlocker** was president, chief executive officer and a board member at American Union Transport Forwarding, Inc. He was previously president and a director of Acme Fast Freight, Inc., and president, chief executive officer and a director at D.C. Andrews & Company. Mr. **Harlocker** is presently a director of the Maritime Association, Port of New York.

T.J. Stevenson Appoints Maldonado

The appointment of **Ralph Maldonado** as assistant vice president for T.J. Stevenson & Co., Inc., has been announced by the company. The firm was recently named as general agents in the United States for the independent Korean-flag express liner service of the Korea Shipping Corp., Ltd., which operates between the United States and Korea and Japan.

In his new post, Mr. **Maldonado** will be responsible for the development and operation of KSC's services and vessels.

Steamship Accountants Elect Esposito Pres.

At their annual convention in Boston, Mass., the Association of Water Transportation Accounting Officers elected **Michael J. Esposito,** senior vice president of American Export Lines Inc., as president. They also elected **Thomas B. O'Brien,** assistant treasurer of Farrell Lines Incorporated, as executive vice president. Regional vice presidents elected were: **Benjamin Abramowitz,** controller of Marine Carriers Corp.; **Lloyd J. Fitzpatrick,** vice president, finance, of Lykes Bros. Steamship Co., Inc., and **James W. Lipscomb,** vice president of Columbia Steamship Co. **John P. Mooney,** auditor of Farrell Lines Incorporated, was elected secretary-treasurer.

Elected to the executive committee were: **J. Robert Pierson,** vice president of Victory Carriers; **Robert E. Schenk,** controller of Farrell Lines Incorporated; **John J. McKenna,** assistant treasurer of Moore-McCormack Lines, Inc.; **John F. Moynihan,** group controller of Sea-Land Service, Inc., and **Arthur C. Cramer,** assistant treasurer of American Foreign Steamship Co.

J.J. Henry Co. Appoints C. Richard Schaeffner

C. Richard Schaeffner

C. Richard Schaeffner, a former vice president of the Advanced Marine Technology Division of Litton Ship Systems, has been appointed West Coast representative of the J.J. Henry Co., Inc., New York City based firm of naval architects and marine engineers.

As AMTD vice president in Culver City, Calif., Mr. **Schaeffner** was responsible for the integration of engineering and the direction of design for the Navy's Amphibious Assault (LHA) ship. He also directed the design of the Navy's proposed Fast Deployment Logistic (FDL) ship, for which J.J. Henry Co. was the design agent. Mr. **Schaeffner** was also vice president, engineering and sales engineering for Litton's Ingalls Shipbuilding Corporation, Pascagoula, Miss.; assistant manager of the New Orleans branch of the George G. Sharp Company; manager of operations for the Madco Shipyard, Madisonville, La., and a partner in Delta Engineering Associates.

Mr. **Schaeffner** is past chairman of the Gulf Coast Section of The Society of Naval Architects and Marine Engineers and is a member of the American Welding Society and of the Technical Committee of the American Bureau of Shipping. He is a graduate of Fordham University and of the University of Michigan's department of naval architecture and marine engineering.

His headquarters are at 4818 Lincoln Boulevard, Marina Del Rey, Calif. **J.J. Henry,** president of the firm said that Mr. **Schaeffner's** office will serve J.J. Henry Co.'s Design Division in New York and its Production Divisions in Moorestown, N.J., and Cohasset, Mass.

Sterling To Publish Containerization Book

A new book, written by **Lawrence J. Rimaldi** and scheduled for spring publication at $6.95 a copy by Sterling Publication Co., Inc. of New York, offers a training course in containerization and intermodal transport.

Called "Containerization: The New Method of Intermodal Transport," the book is designed as a basic text for the businessman whose goods have to be transported, or the employee of a shipping company. It calls attention to the enormous changes that are taking place and will take place in the handling of goods, not only in the ports, but by truck, rail, and air, because of intermodal coordination.

Sterling Publication Co., Inc. is located at 419 Park Avenue South, New York, N.Y.

KNOWN 'ROUND THE WORLD

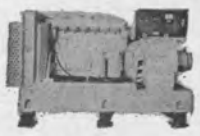
THE BOSTON METALS CO.

313 E. BALTIMORE ST. • BALTIMORE, MD. 21202

Main Office: (301) 539-1900 Marine Dept.: (301) 355-5050

DIESEL GENERATOR SETS

1



G.M. 6-71 DIESEL GENERATOR SET

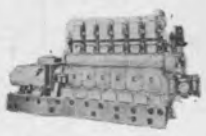
60 KW— 440/3/60 — 1200 RPM—with switchgear.

2

350 KW 120/240 VDC DIESEL GENERATOR SET

Ingersoll-Rand heavy duty type S engine—8 cyl.—505 HP—10½ x 12. GENERATOR: G.E. 350 K.W. 120/240—600 RPM—switchgear. Good condition—as removed from Grace Line ships.

3



250 KW DIESEL GENERATOR SET

ENGINE: Enterprise 12 x 15 DSG-6—6 cyl.—450 RPM crank No. 50J. GENERATOR: Westinghouse 250 KW—120/240 DC—1040 amps—450 RPM. Typical serial No. 3S-10P-913. Complete with switch gear.

$12,500.

4

UNUSED 500 KW 120/240 VDC BALDWIN/ALLIS CHALMERS DIESEL GENERATOR SET

ENGINE: Baldwin-DeLaverne 725 HP—12⅞"x15½"—8 cyl.—500 RPM—air starting. Dry weight 54050 lbs. GENERATOR: Allis-Chalmers 500 KW—120/240 VDC—500 RPM—550 RPM overspeed. 60°C rise—class B insulation—3-wire—25% unbalance—2083 amps—stab. shunt—open—drip-proof—self-ventilated—8-poles.

5

UNUSED 100KW SUPERIOR DIESEL GENERATOR SET

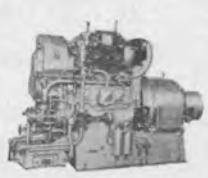
GENERATOR: 120/240 VDC—417 amps—stab. shunt—1200 RPM. DIESEL: Superior GBD-8—8 cyl.—5½x7.

6

UNUSED 10 KW SUPERIOR DIESEL GENERATOR SET

GENERATOR: Delco 10 KW — 120 VDC — 83.3 amps—1200 RPM. ENGINE: Superior diesel—2 cyl.—4½x5¾ — 15 HP — heat exchanger cooled.

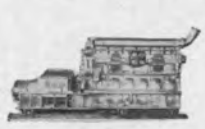
7



100 KW G.M. 3-268A DIESEL GENERATOR SET

Like new. ENGINE: G.M. 3-268A—3 cylinder—6½" x 7" bore and stroke. GENERATOR: General Electric—100 KW—440 volts—3 phase—60 cycle.

8



250 KW COOPER BESSEMER DIESEL GENERATOR SET

250 KW Cooper Bessemer constant duty diesel generator set. ENGINE: Cooper Bessemer FS-6—6 cylinder—8¾" x 11" bore and stroke—900 RPM—3968 cubic inches. GENERATOR: General Electric 250 KW—312 K.V.A.—type ATI—frame 975Y—450 volts—3 phase—60 cycle—80% P.F. continuous. EXCITER: 4.5 KW—120 volts. With switch gear.

TURBO GENERATOR SETS

9

WESTINGHOUSE 440/3/60 200 KW UNIT

GENERATOR: Westinghouse 200 KW—250 KVA—450/3/60—1200 RPM—80% PF—with 40 KW—120 VDC on same shaft. GEAR: 9989/1200 RPM—double helical. TURBINE: Westinghouse—540 PSI—superheat 322°F. Test 930 PSI 800°TT. Also operates 615 PSI—850°TT.

10

WESTINGHOUSE 60 KW 120 VDC M-20-EH

120 VDC—1800 RPM TURBINE: M-20-EH—20 lbs—dry & saturated—25" vacuum. 7283 RPM. GEAR: 7283/1800. GENERATOR: 60 KW—120 VDC—500 amps—SK—stab, shunt wound.

11

300 KW WORTHINGTON-MOORE CROCKER-WHEELER UNITS

AP2 ExMedina Victory units. Worthington-Moore turbine—440 lbs—740°TT—28½" vac.—type S4—5-stage—6097 RPM—serial 7547 & 7548. GEAR: 14x7—6097/1200. GENERATOR: Crocker-Wheeler 300 KW 120/240 DC—1250 amps—type 102-H—compound—973643—999759—armature flange 8¼"—bolt circle 7"—12 holes. Also new armature in stock (weighs 1840 lbs). Also have 2 units—generator 102 HP—300—KW120/240—stab. shunt—1200 RPM.

12

VICTORY 300 KW WESTINGHOUSE TURBO GENERATOR SET

440# — 740°F — 5930 RPM — 2A-9794-15-16-17 — coupling non-recessed on steam end of pinion—5¾". GENERATOR: Westinghouse 300 KW—120/240 DC—1250 amps—1200 RPM—C.B. 208.4.

13

G.E. 600 KW GEARED TURBO GENERATOR SETS

G.E. 600 KW geared turbo generator sets—525 lbs—825°F. **TURBINE:** Type FN3-FN-20—6-stage—882 HP—600 KW—525/565 lbs. G—superheat 355/371°F—exhaust pressure 1" abs. Test steam chest 850# G. 10033 RPM—6390 lbs steam flow per hour. **REDUCTION GEAR:** Single helix—single reduction—10033/1200. **GENERATOR:** G.E.—600 KW—450/3/60—1200 RPM—type ATI—0.8 PF—961 amps continuous—2 hours 25% overload—(750 KW) 1200 amps—5 minutes (900 KW) 1400 amps. Totally enclosed—water cooled—amb. temp. reg. 50°C. **EXCITER:** 7.5 KW—120 VDC—direct connected. Complete with rheostat type voltage regulator & motor operated generator field rheostat.

FURNISHED WITH ABS OR LLOYD'S CERTIFICATE

14

WESTINGHOUSE MAIN GENERATOR LEVER OPERATED CONTROL CUBICLES

— COMPLETE —

15

1000 KW G.E. TURBO GENERATOR—READY TO GO—WITH A.B.S.

TURBINE: Type FSN—eight stage—9268 RPM—525 lbs—825°TT or 590 PSI & 0° superheat. Turbine serial No. 53729. GEAR: Serial 54804—9268/3600. GENERATOR: Serial 5596572—1000 KW—450 volt 3-phase 60 cycle—3600 RPM—0.8 PF—type ATB—2-pole—complete with air cooler. EXCITER: EDF—10.2 KW—120 volts—4-pole—3600 RPM—direct conected. UNIT JUST COMPLETELY OVERHAULED & IN EXCELLENT CONDITION—READY TO INSTALL.

TURBINE ROTORS

MAIN PROPULSION

16

19 STAGE WESTINGHOUSE H.P. ROTOR FOR AP2 VICTORY

Reconditioned — balanced—with ABS. Serial 4A-2079—type B—19 stage reaction blades. Excellent — just out of shop. 13" Flange diameter with 14 bolts.

17

SPECIAL!

COMPLETE TURBINE OR ROTORS

8500 HP G.E. C-3 Victory—Sun C-4's

L.P.—Serial 77943 H.P. Serial 77942
G.E.I. 16263

18

NEW L.P. BLADE RINGS

for large 8500 H.P. Victory

Joshua Hendy Westinghouse

19

NEW 8500 H.P. G.E. TURBINES

Large Victory or C-3

H.P. #72271 L.P. 72272

10 BOXES SPARE PARTS, TOOLS & FITTINGS. WITH MANEUVERING VALVES.

ALSO AVAILABLE

20

U.S.M.C. RECONDITIONED SET H.P. & L.P.

With 13 boxes spare parts. H.P. 77994—L.P. 77987—with maneuvering valves.

21

9500 H.P. G.E. — C-3 OR VICTORY

H.P.—8-stage—6159 RPM—serial 62043
L.P.—8-stage—3509 RPM—serial 62042
G.E.I. 16263

22

6000 H.P. G.E. — NORTH CAROLINA C-2

H.P.—8-stage—serial 78040
L.P.—7-stage—serial 78043
G.E.I. 16262

23

VICTORY SHIP AP2 H.P. & L.P. TURBINES NEW — UNUSED — 6000 HP SETS

G.E.—H.P. & L.P.—with throttle valve
Westinghouse—L.P.—with throttle valve
Allis-Chalmers—H.P. & L.P.—with throtle valve

AUX. GEN. ROTORS

24

250 KW & 300 KW ALLIS-CHALMERS ROTORS

Typical serial No. 3067—will interchange with most 250 KW & 300 KW Allis-Chalmers as installed on Victory's and Moore C2-C3 vessels.

25

300 KW 5965 RPM JOSHUA HENDY

Turbine—3H-69	Gear—52269
Turbine—3H-52	Gear—52252
Turbine—3H-62	Gear—52262

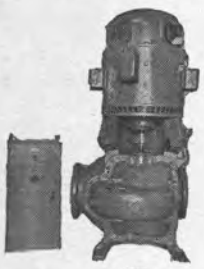
T-2 ROTORS, STATORS COOLERS, ETC.

26 **ELLIOTT 10-STAGE MAIN PROPULSION TURBINE ROTOR**

#28702—Ex-Texas Trader—will interchange with large G.E. 1st Row—1 1/8" to shroud—1 3/16" O.A.H. 2nd Row—1 7/16" to shroud—1 9/16" O.A.H.

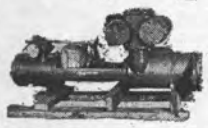
27 **UNUSED G.E. MAIN GENERATOR AIR COOLER**

PUMPS



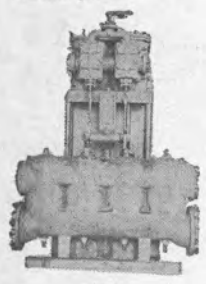
28 **VICTORY AP2 MAIN CIRCULATOR**

Ingersoll-Rand — 18 VCM—20" x 18"—10,500—10 lbs. MOTOR: 75 HP—Allis Chalmers—230 VDC—670 RPM. Spare unused armature. Motor frame F.B.V.—162.



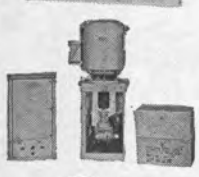
29 **UNUSED 10x9x12 VERTICAL SIMPLEX FUEL OIL TRANSFER PUMPS**

Furnished on some T-2 Tankers. 160 GPM Bunker C —viscosity 70 to 700 SSF 122°F @ 100 lbs. discharge pressure. WP steam 150 lbs.—exhaust 10 lbs. 1¼" steam inlet—1½" exhaust. 4" Pump suction—3½" discharge.



30 **WORTHINGTON 16"x14"x18" VERTICAL DUPLEX STRIPPING PUMP**

1400 GPM @ 110 PSI—suction lift 11.5 ft. — steam back pressure 15 lbs. 14" Suction — 10" Discharge — 2½" Steam — 4" Exhaust. Overall width 6'8"—Overall height 9'1½"—depth 3'9½" —wt. approx. 10,000 lbs.



31 **NEW BLACKMER FUEL OIL TRANSFER PUMP**

Rotary—50 GPM—50 lbs.—2"—5 HP—440/3/60—with starter & spares.

32 **UNUSED BLACKMER VERTICAL ROTARY PUMP**

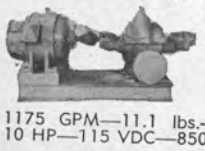
4"—100 GPM—100 PSI—15 HP — 440/3/60 — gear head.

33 **R-2418 WATEROUS CARGO PUMP**

Bronze—14"—top discharge—capacity 2500 GPM—20 PSI. Bilge service—oil service—2400 GPM—75 PSI. Reduction gear. ENGINE: Cummins JN-130M—6 cylinder—4⅛ x 5—130 HP—air starting.

34 **UNUSED BOILER FEED PUMP**

Worthington Triplex—36.5 GPM—590 PSI—variable stroke—2¾ x 5—P_2—S_2—R_2 vessels. 40 HP—230 VDC—1800/2400 RPM.

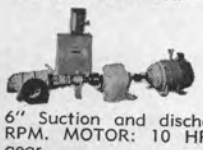


35 **UNUSED WARREN BRONZE PUMP**

1175 GPM—11.1 lbs.—8" x 8". MOTOR: Reliance 10 HP—115 VDC—850—RPM—76 amps.

36 **NEW WORTHINGTON VERTICAL SUBMERSIBLE BILGE PUMP**

For emergency use on passenger ships, etc. PUMP: JAS—264 GPM—171' head—two 6" inlets—one 5" outlet. Motor: 40 HP—230 VDC—149 amps.

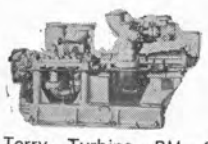


37 **EXCELSIOR MOLASSES PUMP—SIZE 5½"**

6" Suction and discharge—210 GPM—45 PSI—125 RPM. MOTOR: 10 HP—230 VDC—Frame 67—with gear.

38 **NEW—UNUSED BRONZE VERTICAL LST BALLAST PUMP**

1500 GPM—56' head or 25 lbs. — 8" suction — 6" discharge. MOTOR: Century 30 HP—230 VDC—110 amps—1750 RPM — 40°T rise — stab. shunt—BB drip proof —controls available.



39 **UNUSED SIZE 4 BUFFALO FEED PUMPS**

Terry Turbine—BM—273 HP—550 RPM—exhaust 15 lbs—590 PSI—superheat 0°—425 GPM Buffalo Pump—discharge pressure 750 lbs—5" x 4"—built for USN DD destroyers.

WINCHES AND WINDLASSES

40 **VICTORY UNIT WINCHES**

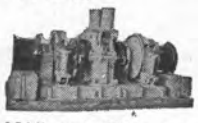
50 HP—230 VDC—U-1, U-2, U-4, U-5—reconditioned.

41 **MODEL U-6 DOUBLE DRUM WINCHES WITH GYPSIES**

50 HP—230 VDC—reconditioned.

42 **HYDE NO. 7 WINDLASS**

1¾" Chain—Wildcat centers 3'3"—Handles 3000 lb anchors. MOTOR: 8.7/35 HP—440/3/60—1800/450 RPM.



43 **NEW—UNUSED LINK BELT WINDLASS**

1⅝" and 7000 lb. anchors. 56" Centers—50 HP—230 VDC—spares.

44 **IDEAL WINDLASS—UNUSED**

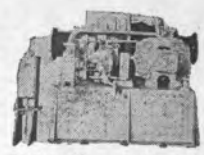
1-5/16" Chain—36" Centers—15 HP—115 VDC—1750 RPM—6000 lb. line pull.

45 **UNUSED 70 HP McKIERNAN-TERRY WINDLASSES**

2¾" Chain and two 10640 lb anchor & 30 fathoms chain @ 30 FPM. 70 HP—230 volts—shunt DC motors—233 amps—550 RPM—55°C rise. Wildcat centers 47½". Base 9'5" wide x 11' long. Weight 36,000 lbs.

46 **LCT-6 JAEGER GASOLINE DRIVEN WINCH**

With torque converter & free declutchable drum, 31,000 lbs @ 6 FPM or 3000 lbs & 350 FPM. DRUM: 20"x23¾"x37½". GYPSY: 15"x13". Twin Disc torque converter—6 cyl. Hercules gas engine model WXLC-3. Total weight approx. 4500 lbs—serial 81843.



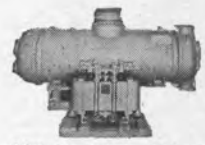
47 **4 SINGLE DRUM ELECTRIC HYDRAULIC WINCHES**

From Navy Research Ship Liberty AGTR-5. Like new. Mfg. by Lakeshore Engineering Co. Gypsy heads can be operated separately from drum. 7400 lbs @ 220 FPM; 624 ft. of ¾" rope in 5 layers. Total weight of winch, motor & pump 7221 lbs. OAW 84¼"; OAL 88"; OAH 58". With remote control stands.

MISCELLANEOUS

48 **VICTORY AP2—WESTINGHOUSE MAIN PROPULSION GEAR**

6000 SHP—Serial 4A—1620—Medina Victory.



49 **UNUSED 1135 SQ. FT. C.H. WHEELER CONDENSER**

20" Ex. inlet—⅝" Cu-Ni tubes—with or without air ejector.

50 **1 PAIR OF 300 HP UNION DIESEL ENGINES**

Port and starboard—model 06—1300 HP at 350 RPM —4 cycle—direct reversible—11 x 15—overhauled 1966—in good condition. Just in from Navy.

51 **MODEL O-2-D M&T RECONDITIONED UNITS**

Hydraulic starting steering, raising & lowering tailfin. Navy reconditioned 1965—fully checked out by us. Will demonstrate running. Wt. about 9500 lbs. PROPELLOR: 48"x24"—3 blade.

52 **HYDE 30" DOCK CAPSTAN**

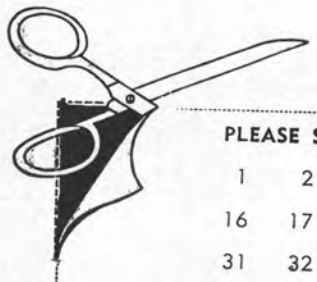
10" x 10"—reversible—W.P. 125 lbs—2½" steam—3" exhaust.

53 **DOUBLE INPUT—SINGLE OUTPUT DIESEL REDUCTION GEARS**

Farrell-Birmingham — 3200 SHP. Reduction gear: 1.81:1—handles two 1600 HP diesels @ 720 RPM. With hydraulic couplings & Fawick clutch. Port and starboard.

54 **INGERSOLL-RAND MODEL 40 AIR COMPRESSOR**

Two stage—135 CFM—7" x 6¼" x 5"—110 lbs—870 RPM—inner cooler. MOTOR: Allis-Chalmers 40 HP—230 VDC—145 amps—1750 RPM—Model EB 121.



PLEASE SEND INFORMATION ON THE FOLLOWING: (Please circle items) 11/1/71

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54						

NAME..... COMPANY.....

ADDRESS..... POSITION..... PHONE.....

CITY..... ZONE..... STATE.....

T-2 TANKER MAIN & AUXILIARY EQUIPMENT

From 2 Vessels Reconditioned by U.S. Gov't

ALL MATERIAL IN FIRST CLASS CONDITION WITH A.B.S.

MAIN PROPULSION ROTOR — G.E.

Large Schenectady — serial 77418—reconditioned Bethlehem Steel 1970—all stages magnafluxed.

2 COMPLETE G.E. TURBINES

#61818 and #61834—large Lynn—all stages magnafluxed.

WILL INTERCHANGE WITH ELLIOTT MAIN TURBINE

- 2 COMPLETE SETS MAIN DIAPHRAGMS..
- 2 COMPLETE SETS LABYRINTH PACKING
- THRUST BEARINGS
- COMPLETE GOVERNOR ASSEMBLIES
- OPERATING CYLINDERS
- CONTROL VALVES
- SHAFT BEARINGS

ALSO

THROTTLE VALVE ASSEMBLY

G.E. REVOLVING FIELDS

Rewound 1968—main propulsion—by G.E. Seattle. Re-checked June 1971 by G.E. Service Shop—A.B.S.

WESTINGHOUSE REVOLVING FIELD

With A.B.S.—ex-Ohio Sun.

MAIN G.E. STATOR

With A.B.S. — reconditioned 1970.

WESTINGHOUSE MAIN GENERATOR STATOR

Reconditioned Westinghouse — #39519P915 — Thermoplastic winding.

NEW—UNUSED G.E. MAIN GENERATOR COOLER

Also Westinghouse—reconditioned to A.B.S.

G.E. AUXILIARY TURBINE ROTOR

For 525 KW G.E. Turbine DORV-325M—5645 RPM.

COMPLETE T2 TANKER TURBO GENERATORS

TURBINE: DORV-325M—525 KW—5645 RPM—435 PSIG—28" exhaust. REDUCTION GEAR: S-162—Form D—5641/1200. A.C. GENERATOR: 500 KVA—400 KW—440/3/60—1200 RPM—0.8 PF. D.C. EXCITATION GENERATORS: 75/55 KW—form AL—110 volts D.C.

NEW STYLE AMPLIDYNE

5LY148A—Type A.M.—Frame 605.

75 KW—55 KW EXCITER ARMATURES

Also stators & pedestal bearings—400 KW aux. generator revolving fields.

T2 AUXILIARY GENERATOR S-162 REDUCTION GEARS—PINION & BULL GEAR—BEARINGS

AUXILIARY GENERATOR THROTTLE VALUE

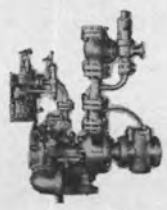
WESTINGHOUSE MAIN CARGO PUMP MOTORS

1 Unit—frame 874—125 HP—440/3/60—168 amps 590 RPM. 2 Units—frame 876C—125 HP—type CS—440/3/60—159 amps—585 RPM.

G.E. MAIN CIRCULATING PUMP MOTORS—125 HP

COFFIN FEED PUMPS

Type C-G 2-A



Type F

WESTINGHOUSE MAIN PROPULSION TURBINE

Profile (unshrouded)—serial 2-A-9361-21.

COMPLETE G.E. THROTTLE VALVE

With governor—for above turbine.

2 WESTINGHOUSE AUX. 538 KW TURBO GENS

Turbines—gears—400 KW generators—(110 KW—32.5 KW—5 KW excitation).

WILL SELL ROTORS—GEARS—EXCITERS SEPARATELY.

ALSO AVAILABLE — EXCITERS

(110 KW—28 KW—5 KW) or (110 KW—32.5 KW—5 KW)

SWITCHGEAR FOR ABOVE

also available.

WEST. MAIN PROPULS'N MOTOR COOLER

T2 ANCHOR WINDLASSES

1 American Hoist & Derrick—12x14 for 2 5/16" chain.
1 American Engineering Co.—12x14 for 2 5/16" chain.

T2 WARPING WINCH

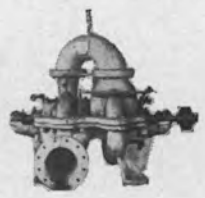
Poop—9x12—AH&D.

T2 DECK WARPING & HOSE HANDLING WINCH

8¼ x 10—Hunt Tool Co.

MAIN CIRCULATING PUMPS

Ingersoll-Rand—24 V.C.M.



INGERSOLL-RAND CARGO PUMPS

200 GPM—100 PSI—Model 6 GT—10" suction—8" discharge.

BRONZE T2 TANKER STRIPPING PUMPS

14x14x12—700 GPM @ 100 lbs. **ALSO EX-MISSION 14x14x12 WILSON-SNYDER IN STOCK.**

T2 TANKER FIRE & BILGE PUMP

Bronze — 10x7x10—vertical duplex. Steam pressure 150 lbs gauge—exhaust pressure 10 lbs gauge — discharge pressure 100 lbs gauge—300 GPM.

MAIN INJECTION VALVES

WRITE FOR INFORMATION ABOUT THE FOLLOWING EQUIPMENT & ANYTHING YOU MAY NEED:

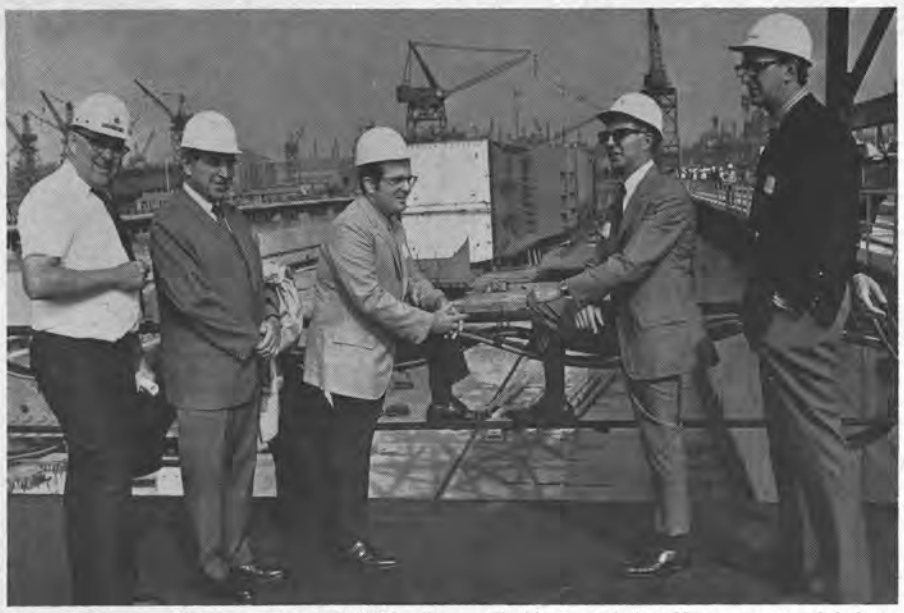
T2 Tailshafts—Mission T2—SAE—2 Tailshafts—T2 Propellors—Mission Propellors—T2 Rudders — Mission Rudders — Large 14½" Rudder Stocks — Auxiliary Steering Rams — Butterworth Heaters—Butterworth Pumps—Bilge Pumps—Auxiliary Circulators—Auxiliary Condensate Pumps—Main Condensate Pumps.

KNOWN 'ROUND THE WORLD

THE BOSTON METALS CO.

313 E. BALTIMORE ST. • BALTIMORE, MD. 21202

Main Office: (301) 539-1900 Marine Dept.: (301) 355-5050



Tom Robinson, Bill Jory, Dave Griffith, Dana Chalfant and **Art Huge,** pictured left to right, pause briefly for the photographer during tour of the Sparrows Point Yard.

Ronald Kiss, Dudley Haff and **Herb Freinberg,** shown left to right at a table in the Sparrows Point Country Club, listen to **Jorgen Strom-Tejsen,** at the microphone.

Chesapeake SNAME Tours Bethlehem Sparrows Point Yard

Bethlehem Steel Corporation opened the doors to Sparrows Point Shipyard on Friday, September 17, and issued a warm welcome to approximately 200 members of the Chesapeake Section of The Society of Naval Architects and Marine Engineers. Expertly organized tours and informative guides provided each visitor with a solid insight into the shipbuilding capability that now exists at Bethlehem-Sparrows Point.

Primary focal points on the tour, in addition to many ships in various stages of construction, included the new panel shop, blast-paint facilities, and the impressive shipbuilding basin recently completed at the south end of the yard. It is significant to note that these new facilities increase both the size and quantity of vessels that may now be fabricated at Sparrows Point.

In 1968, for example, the Bethlehem Steel Corporation Sparrows Point Yard was building tankers and containerships in the range of 34,000 to 69,000 deadweight tons, with a 1968 to 1971 program consisting of 20 ships made up of 16 tankers, two containerships, and two Navy ammunition ships.

This order book represented at the time a "sold out" condition for the two largest shipways through June 1971. The 69,000-deadweight-ton tankers also required lengthening these shipways, which created material-handling and erection problems due to the lengthened ways projecting into the main roadway of the shipyard.

The active state of new ship construction and a favorable market forecast of new business, coupled with an indication of a trend toward even larger ship sizes which would be beyond the yard's existing facilities, prompted the corporation to announce its intention to construct a large building basin capable of building supertankers of up to 300,000-deadweight-ton capacity.

The introduction of the new basin would increase the shipyard's potential steel throughput capacity from the existing 70,000 tons to about 125,000 tons annually, thus creating a deficiency of the ground assembly facilities.

A study was undertaken to establish the best solution to this ground assembly deficiency, bearing in mind the type of construction the yard had been most competitive in building up to that time.

A review of tanker structural unitization indicated that a large percentage of the structural steelweight consisted of flat panel assemblies. Therefore, a panel production line, using advanced assembly techniques similar to those employed in the most modern European and Japanese shipyards, appeared to be the best solution to the problem, and at the same time should result in a reduction in man hours per ton, thereby enhancing the yard's competitive position.

Meanwhile, it could be seen that the proposed location of the new shipbuilding basin would result in the elimination of the large area being used for structural unit touch-up blasting and painting. With the projected increase in annual tonnage, combined with a shortage of real estate and the adverse effects of weather, it became necessary to design a new indoor touch-up blasting and coating facility.

Following the tour, guests and members proceeded to the Sparrows Point Country Club where, after cocktails and a crab cake dinner, Section chairman **Jorgen Strom-Tejsen** set the stage for chapter business and the technical presentations.

Herb Freinberg, assistant yard chief, started things off with a "Job Well Done" to those responsible for the tour, namely **Ed LeBrun** and **Dave Sandebeck. Tom Robinson,** chief architect, followed with a brief pitch for continued effort by all to increase chapter members, and he further noted that 67 names had been added since January '71.

Dud Haff, CTD chief, introduced the main speakers—**David Watson,** assistant hull superintendent, speaking on "The New Panel Shop and Blast-Paint Facilities," and **James Foster,** superintendent, maintenance, whose subject was "The New 1,250-Foot Graving Dock."

Mr. **Watson** and Mr. **Foster** presented in great detail the planning that went into these new facilities, associated construction and operational problems and, of course, the benefits to be derived now that all systems are essentially operational.

Herbert I. Freinberg, assistant yard chief, Bethlehem Steel, congratulating those responsible for arranging the tour.

Dudley Haff, chief CTD at Bethlehem Steel-Sparrows Point, is shown introducing the main speakers for the technical session.

David Watson, assistant hull superintendent, delivering his paper "New Panel Shop and Blast-Paint Facilities."

James Foster, superintendent, maintenance at Bethlehem Steel, delivering his paper titled "The New 1,250-Foot Graving Dock."

General Electric And Mitsui Announce Joint Effort On Ocean Development Projects

The General Electric Co. and the Mitsui Ocean Development and Engineering Co., Ltd. (MODEC) of Japan have signed an agreement for development of ocean technologies and products.

Katsuji Rinoie, executive vice president of MODEC and counselor to the board of Mitsui and Co., Ltd., and **Otto Klima,** vice president and general manager of General Electric's Reentry and Environmental Systems Division (RESD), signed the pact at the General Electric headquarters building in New York. The Ocean Systems Programs Department of RESD, headquartered in Philadelphia, is the focal point for GE's oceanic activities. The Mitsui Ocean Development and Engineering Company is responsible for ocean activities within the Mitsui group.

The agreement, which extends for 10 years, is described as "a significant event in the Japanese and United States oceans industries." It takes effect upon formal approval by the Japanese Government.

Broadly, the agreement calls for: (1) General Electric availability to support Mitsui in carrying out ocean development projects; (2) General Electric licensing of Mitsui in the use of General Electric Ocean Systems technology; and (3) Mitsui availability to support General Electric in executing ocean development projects.

Over the 10-year period, Mitsui will pay General Electric substantial royalties on licenses. However, more significantly, it is anticipated that the agreement will provide a vehicle for development and utilization of new and needed technology for use in the Oceans programs of both Japan and the United States.

Mark Morton, vice president and Group executive of GE's Aerospace Group, of which RESD is a part, said: "This agreement is an important step forward in development of the oceans. Our complementary resources will make us better able in a sound, businesslike way to contribute to man's use of the oceans as well as to scientific knowledge of the effects of such usage."

Katsuji Rinoie and **Otto Klima** shaking hands after the signing. Looking on (left to right) are **K. Sunaga,** executive vice president, Mitsui-New York; **K. Hanawa,** New York representative of Mitsui Shipbuilding and Engineering Co., Ltd., and **Mark Morton,** vice president and Group executive of GE's Aerospace Group.

General Electric will draw heavily upon its experience in development and operation of manned undersea habitats, shipboard waste treatment systems, systems for support of the offshore oil industry, aquanaut support systems, and buoy systems.

MODEC is organized to supply essential engineering, consulting and construction services for such offshore projects as marine equipment, resources exploration and utilization, secondary transportation and integration systems, utility vessels, seaway excavation, bulk material handling and port facilities.

Det Norske Veritas' Japanese Technical Committee Holds Meeting In Osaka

The Japanese technical committee of Det norske Veritas held a meeting in Osaka on September 22-23, 1971, under the chairmanship of professor **Kazuo Terazawa** of Osaka University.

Among matters discussed at the meeting were rule proposals on adjusted requirements to minimum plating thicknesses of ship's sides and outer and inner bottom. A complete revision of the rules for determination of scantlings of rudders and rudder stocks was also discussed. It is proposed to determine scantlings by means of a direct calculation of bending moments and reaction forces.

As for machinery revised rules for pipes of steel, copper and copper alloys for use in piping systems subjected to internal pressure were submitted for discussion.

Revised rules for calculation of stresses due to thermal expansion have also been considered by the committee.

The increasing demand for ships for transport of liquid cargoes and liquefied gases has made it necessary for the Society to develop more advanced rules for the construction of these tanks. This concerns independent tanks as well as tanks which are part of the hull. A rule proposal concerning the construction of such tanks has been discussed by the committee.

Managing director of Det norske Veritas **Egil Abrahamsen,** and chief of the hull department at head office **Andreas Haaland,** also took part in the proceedings.

Hellenic Yards To Build 300,000-Ton Graving Dock —Six 300,000-Dwt Tankers

Hellenic Shipyards Company, Skaramanga, Greece, has announced a contract to add a 300,000-ton graving dock to its already extensive facilities. In addition, orders to build six 300,000-deadweight-ton tankers have already been received.

The dock will be completed in two, to two and one-half years. However, prefabrication will enable the ship construction in the dock to proceed rapidly thereafter.

The announcement was made at the launching at the yard's 21st SD-14 cargoship of 15,000-dwt. Six similar ships, of liner configuration, are under construction, as well as seven 35,000-dwt bulk carriers and five 30,000-dwt product carrying tankers.

Hellenic Shipyards was started in 1956 in a country with little industrial activity and has become one of the leading Mediterranean yards in ship repair, which continues to be a major activity. It has three floating drydocks, with capacities up to 72,000-dwt, and a 250,000-dwt graving dock, temporarily used for new construction.

Another Greek marine project being undertaken by the Niarchos Group is the construction of a diesel engine factory and associated with it, Greece's largest iron foundry. Grand Motori, a subsidiary of Fiat and the Italian Government's IRI, will participate in the diesel factory.

These marine projects are part of a 1970 undertaking by the Niarchos Group with the Greek Government, which also includes major expansion of oil refining facilities and a new aluminum plant for a total investment of more than $200,000,000.

Texaco Contracts For Two Drilling Barges

Texaco Inc. has announced that it is entering into long-term contracts for two new semisubmersible drilling barges, primarily for use in the United Kingdom and other waters of the North Sea.

Texaco said that these drilling barges will be capable of drilling in offshore areas anywhere in the world. One will be built and operated by Storm Drilling Co., Houston, Texas, and the other by Sedco, Inc., Dallas, Texas.

The first unit, scheduled for delivery in February 1973, will be built by Storm in a U.S. Gulf Coast shipyard. The second unit, known as type 701, is to be delivered in the fall of 1973 and will be built by Sedco in the Hawker-Siddeley shipyards at Halifax, Nova Scotia.

NEW LANDMARK: Artist's conception shows how submarine building ways at Electric Boat Division of General Dynamics, Groton, Conn., will appear after they have been enclosed. Berlin Construction Co., Berlin, Conn., has begun work on the enclosure, which will provide an improved year-round environment for production employees. The ways, 502-feet long and 186-feet wide, tower 140 feet above the Thames River. The shipyard development project will also include additional lighting and will not interfere with submarine construction currently under way. Four nuclear powered subs can be built within the structure.

MarAd Awards Curtiss-Wright Contract To Develop Marine Power Transmission Systems

The Power Systems Group of the Curtiss-Wright Corporation, Wood-Ridge, N.J., has been awarded a multimillion dollar two-phase development contract by the Maritime Administration (MarAd) to develop marine planetary gear transmission systems, it was announced by **Leonard Schatz,** director of the Curtiss-Wright Group.

The aim of the MarAd project is to develop a family of transmission systems capitalizing on the advantages of planetary gears over reduction gears currently in use. The epicyclic's compact, readily reversible, modular form make it attractive for a wide variety of ship types and sizes, particularly when combined with gas turbine prime movers.

The first phase of the contract is a one-year program funded by MarAd at a cost of $950,000 to design and detail two planetary modules.

The second phase, funded jointly by MarAd and Curtiss-Wright, will include fabrication and prototype testing. This portion is estimated to cost $6 million and require about three years.

Two types of systems are to be developed leading to a family of derivative reduction gear modules satisfying the needs of merchant vessels for 15,000 horsepower to 75,000 horsepower per shaft.

The first system to be developed is a two-stage planetary with reversing capability; the second is a two-stage planetary with reversing and contra-rotating output shafts.

Mr. **Schatz** emphasized that this work represents a continuation of effort to apply existing aerospace technology to industrial, marine and power generation markets.

Advertise to thousands more buyers in 71-72

Compare the circulation to buyers

Marine sales managers agree . . . it is the shoreside management, executive and engineering personnel in vessel operations, shipbuilding, ship repair and naval architecture who have full responsibility and authority for specifying, ordering and buying all marine equipment and services.

MARINE ENGINEERING/LOG

OCCUPATIONAL BREAKDOWN OF TOTAL CIRCULATION
(INTERNATIONAL DISTRIBUTION REMOVED)

		BUYING POWER CIRCULATION Readers with authority to give business to advertisers
SHIPBUILDING & SHIP REPAIR COMPANIES		
Companies, Presidents, Vice Presidents, Secretaries, Treasurers, General Managers & Purchasing Agents		774
Works Managers & Superintendents		168
Naval Architects, Marine Engineers, Chief Draftsmen		533
Shipbuilding & Ship Repair Personnel (Draftsmen, Foremen, Inspectors & Others) not included in above classification	669	
SHIP OPERATING COMPANIES, OWNERS, AGENTS & BROKERS:		
Companies, Presidents, Vice Presidents, Secretaries, Treasurers, General Managers, Purchasing Agents, Passenger & Freight Agents		1,208
Marine Superintendents, Port Captains, Port Engineers, Port Stewards		925
Deck Captains, First, Second & Third Mates Only	2,276	
Engine Room Chiefs & Licensed Assistants	3,250	
Ship Operating Personnel Ashore & Aboard not included in above classifications	408	
PROFESSIONAL MEN:		984
Naval Architects & Marine Engineers		
Admiralty lawyers	64	
Insurance Companies, Agents & Brokers	48	
NAVY	364	
MARINE SUPPLIES & EQUIPMENT: Manufacturers	1,480	
Ship Chandlers, Dealers & Agents	74	
Bunkers (Coal & Fuel Oil)	4	
ALLIED MARINE INDUSTRIES:		
Freight Agents & Forwarders	2	
Exporter & Importers	4	
Stevedoring Companies not owning Floating Equipment	11	
Government Schools, Libraries, Students & Commercial Organizations	637	
Miscellaneous	478	
Awaiting Classification by Business & Industry	35	
NON BUYING POWER	9,804	

AMERICAN MARKET BUYING POWER TOTAL **4,592**

? **Why settle for half . . .**

for full market coverage...more marine sales

in the AMERICAN MARINE MARKET

With all due respect, the man aboard ship does not specify or buy.
Compare both magazines . . . for the one you feel reaches the largest number of men of importance to you.

MARITIME REPORTER/Engineering News

OCCUPATIONAL BREAKDOWN OF TOTAL CIRCULATION
(INTERNATIONAL DISTRIBUTION REMOVED)

		BUYING POWER CIRCULATION Readers with authority to give business to advertisers
SHIPBUILDING & SHIP REPAIR (U.S. NAVY AND COMMERCIAL):		
Companies, directors, owners, presidents, vice-presidents, secretaries and treasurers		1,025
Superintendents, managers and purchasing agents		1,146
Naval architects, engineers and chief draftsmen		793
Other employees (draftsmen, inspectors, foremen and others employed by shipbuilding and repair companies) not included in above classifications	90	
VESSEL OPERATING COMPANIES– OCEAN, RIVERS, HARBORS, OFFSHORE OIL DRILLING AND RELATED OPERATIONS		
(Owners, Agencies & Brokers) Companies, directors, owners, agents, presidents, vice-presidents, managers, secretaries and treasurers		4,277
Port engineers, superintendents, purchasing agents, port captains, port stewards, naval architects and engineers shoreside		1,275
Other employees ashore not included in above classifications	38	
PROFESSIONAL MEN:		
Naval architects, engineers and consultants shoreside		1,468
Admiralty lawyers and insurance	30	
MARINE SUPPLIES & EQUIPMENT:		
Manufacturers, dealers and agents	2,211	
Ship Chandlers	207	
Allied marine industries	256	
GOVERNMENT:		
U.S. Navy and U.S. Coast Guard shoreside	31	
U.S. Maritime Administration, U.S. Senators, U.S. Congressmen and others in official capacities	42	
SCHOOLS, LIBRARIES AND ORGANIZATIONS	76	
NON BUYING POWER	2,981	

AMERICAN MARKET BUYING POWER TOTAL **9,984**

... MARITIME REPORTER/Engineering News DOUBLES THE SALES POWER OF YOUR AMERICAN ADVERTISING WITH FULL CIRCULATION TO SHORESIDE BUYERS

Patent Rights For Joining Tugs And Barges Offered To Operators By Tug Barge Systems, Inc.

The 11,250-hp tug Martha R. Ingram is shown in the notch of the 285,500-barrel barge I.O.S. 3301.

Tug Barge Systems, Inc., a corporation equally owned by Breit Engineering, Inc. and Ingram Corporation, both of New Orleans, La., has recently been formed. The new company will offer a license for the rights to use certain patents and "know-how" developed by Breit Engineering, Inc. in connection with the rigid joining of oceangoing tugs and barges.

The tug and barge are designed to produce a single integrated unit when the two are joined with a locking system which prevents relative movement and results in a shipshaped form. By itself, the tug has good independent operating characteristics as an oceangoing vessel. Both the tug and the barge, as well as the combination when connected, have been approved and certificated by the U.S. Coast Guard and classed by the American Bureau of Shipping.

Tug Barge Systems, Inc. states that since the tug and barge can be built in separate yards where the efficiencies of specialization may be fully achieved, the tug-barge concept results in a lower cost unit than the cost of a similarly powered and sized ship, yet it can proceed at the same speed. This split of construction also brings about more competition by producing bids from yards that would otherwise be unable to quote on the construction of a large ship.

The method of connection is the heart of the system. It consists essentially of a deep notch with a partial bottom at the stern of the barge with three-sided wedges on the barge notch wings which support the tug. A large hydraulic cylinder at the tug's bow holds the tug securely in position. The tug and barge will then act as a rigid unit in a seaway, such that steering and handling is the same as a ship of the same size. The connection is designed to withstand the highest forces expected in an ocean storm, and separation will never be needed because of weather conditions. Separation could be effected quickly without undue damage under emergency conditions, such as fire, grounding or collision, this feature being in reality an additional factor of safety for life at sea.

The first tug-barge unit in service, the tug Martha R. Ingram and the barge I.O.S. 3301, designed by Breit Engineering, Inc., has been through both hurricanes Edith and Dora without separation and no adverse effects.

Carboline Marine Division Names McGinnis In New York

The Marine Division of Carboline International, St. Louis, Mo., announces the appointment of **J.M. (Jim) McGinnis** as marine coatings sales representative in the New York City area.

Mr. **McGinnis** has 17 years of experience with corrosion control materials and their application in the marine, oil, pipleine and gas distribution industries. He has worked in both sales and sales management capacities. Mr. **McGinnis** is a graduate of the University of New Mexico and a member of the National Association of Corrosion Engineers.

Carboline International develops and manufactures a broad line of corrosion resistant protective coatings, tank linings, deck coatings and anti-fouling materials for ships, boats, barges and marine installations. Headquarters are located at 328 Hanley Industrial Court, St. Louis, Mo. 63144.

Hydrographic Survey Underway Off Southern California Coast

An extensive hydrographic survey is underway off the southern California coast to obtain up-to-date depth and oceanographic information of the sea bottom for nautical charts and bathymetric maps.

The survey is being conducted in a 2,500-square-mile area, including San Pedro Channel and the waters around Santa Catalina and San Clemente Islands. The NOAA ship Rainier is carrying out the three-month project. The 231-foot, 1,660-ton ship under command of Capt. **Roger F. Lanier** of Seattle, Wash., has a normal complement of 79.

The Rainier's mission is part of a long-range program, now in its fifth year, to rechart with modern equipment the entire west coast and to map the sea bottom along the continental shelf. The vessel will provide detailed information on water depths over submerged hazards and channels and the general shape of the ocean bottom for future exploration and marine studies.

The ship is working now off the east coast of San Clemente Island. The vessel will obtain continuous graphic profiles of the bottom's configuration. The survey will reveal the location and extent of underwater features, such as canyons, ridges, mountains, valleys and plains for portrayal on nautical charts and bathymetric maps. This information will be used to show safe approaches to the coast, will aid Federal, state, and industrial interests in exploring and developing shelf resources and will provide marine scientists with an up-to-date reference base for studying the structure, composition and formation of the sea bottom.

The Rainier is equipped with a data acquisition system capable of automatically recording and plotting hydrographic data. The vessel uses an electronic echo sounder to measure and record water depths. This instrument records depths by measuring the velocity of sound waves emitted from equipment mounted in the vessel's hull. Returning echoes are converted to distance or depth and form a continuous graphic profile of the sea floor. The positions of water depth data and underwater features recorded along the vessel's course are determined with electronic instruments. As this is done, automated equipment codes and plots the information.

Foreign-Flag Ships Owned By U.S. Companies Published By MarAd

The Maritime Administration's updated publication "Foreign-Flag Ships Owned by United States Parent Companies as of December 31, 1970," is now available in limited quantities, according to an announcement by that agency.

Copies can be obtained from the Public Affairs Office, Room 4893, Department of Commerce Building, Washington, D.C.

American Export Industries Completes Subsidiary Sale

American Export Industries, Inc. has announced it had completed the sale of its wholly owned computer and aircraft leasing subsidiary, National Equipment Rental, Ltd., to North American Car Corporation, a wholly owned subsidiary of The Flying Tiger Corporation. The sale price was 21 million dollars, payable in cash and notes.

The effect of the sale has been the reduction of AEI's obligation to the banks under a Revolving Credit and Loan Agreement by approximately 33.5 million dollars, according to an AEI spokesman.

NINE FOR SINGAPORE: Show under way during trials recently held in Lake Pontchartrain is Locolina IX an Equity Standard 59-foot water taxi. With the completion of this vessel, Equitable Equipment Company, Inc., New Orleans, La., brought to a successful conclusion a building program involving nine offshore boats for the account of Robin Shipyard (Pte) Ltd. of Singapore. All of the crew boats are named Locolina and are numbered I through IX. Ordered in late 1970, the vessels were completed on schedule and shipped singly and in pairs to Singapore from where they will operate in the Strait of Malacca and the South China Sea. Five of the Locolinas are the well-known Equity 59 footers. The remaining four are the 65-foot vessels, latest in the line of Equity Standard water taxis.

That's the general response from people who see our equipment for the first time.

We've been designing, building and using abrasive blasting and vacuum recovery equipment – and shot blasting systems – for over 30 years.

We've learned the components you need – and the ones you can do without. And we've learned to make the components we've retained versatile, reliable and economical.

Through the judicious application of the principle of simple design.

We build a range of blasters sized to fit practically any job. We've standardized a number of models.

But we have the capacity, the capability and the desire to custom build to your exact specifications.

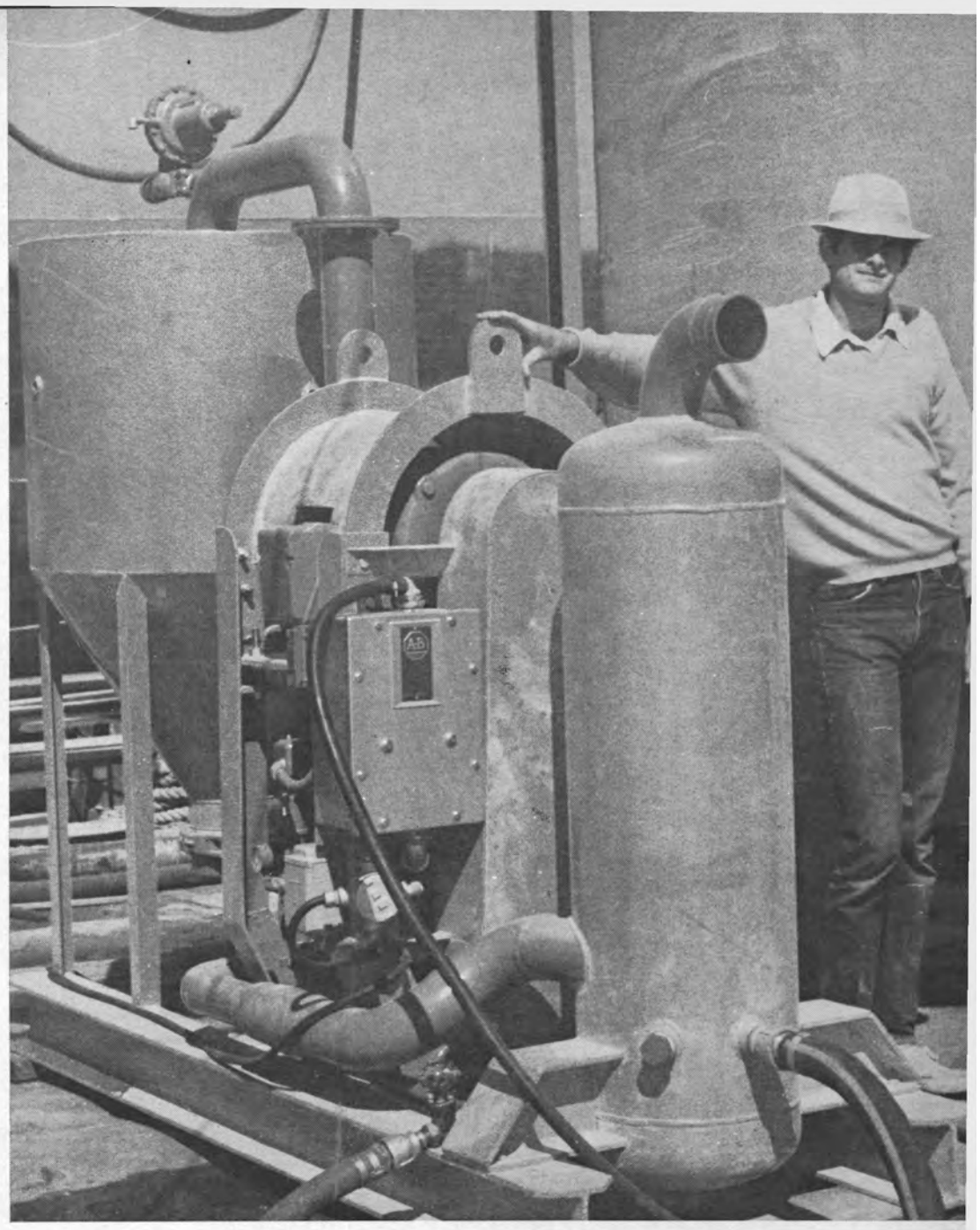
Key Engineering Blast Units are fitted with Key metering and control valves specifically engineered for materials conservation, operating ease, and flexibility.

We'll be happy to arrange for an on-the-job demonstration at one of our satisfied user's locations.

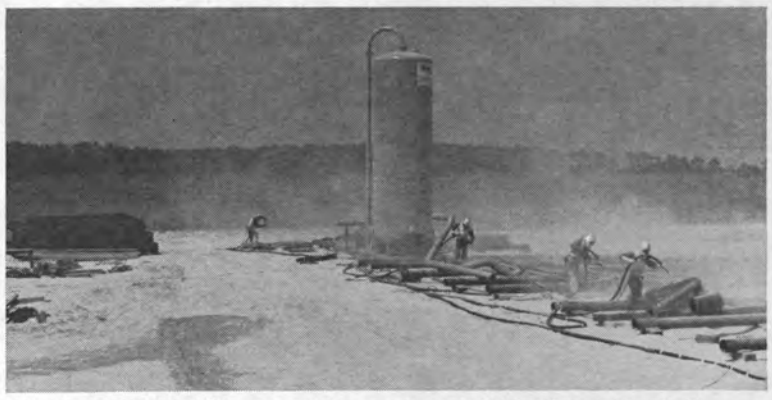
We'd like you to compare our equipment with what you're using – or what you intend to buy.

We believe you'll decide ours is the best you can buy. You can pay more – but you can't buy better.

And if the ecology issue is putting a squeeze on your blasting operations, talk to us about our "wet blast" equipment.



The Key VR-3600 vacuum recovery unit develops 26 inches of mercury for removing spent abrasives and debris. GULFPORT SHIPYARD



Key Blaster Model T-40 equipped to operate up to 8 blast hoses. Uses bulk abrasives and requires no labor except the men handling the blast hoses. Equipped with KEY "dead-man" remote controls and abrasive metering valves BROWN & ROOT

CALL JIM GIESE

KEY engineering

12502 Woodthorpe Lane Houston, Texas 77024
Telephone 713/465-6245

MarAd Opens Seminars On Extending Lakes Navigation Season

A series of seminars to discuss lengthening the Great Lakes-St. Lawrence Seaway navigation season was recently inaugurated by the Maritime Administration, U.S. Department of Commerce.

Held in Washington, D.C., the meeting was attended by representatives of the Great Lakes shipping industry and marine insurers, as well as other interested groups.

Deputy Assistant Secretary of Commerce for Maritime Affairs **Robert J. Blackwell** opened the session, explaining the seminars' purpose as growing out of a study by the agency of Great Lakes marine insurance rates.

"Through these meetings, we hope to provide industry with the fundamental information necessary for a realistic insurance appraisal of an extended season," he said.

Highlighting the first session were presentations by Rear Adm. **W.A. Jenkins,** USCG, Commander of the Ninth (Great Lakes) Coast Guard District, and **Richard D. Jaeschke,** Vice President of Operations of the U.S. Salvage Association.

Admiral **Jenkins** outlined the Coast Guard's efforts to keep Great Lakes sealanes open during the 1970-71 winter season, while Mr. **Jaeschke** discussed the types of casualties sustained by vessels transiting ice-clogged passages, their costs, and possible preventive measures.

Future sessions of the group, which is formally known as the MarAd Great Lakes-Seaway Risk Management Study Group, are scheduled to be held periodically over the next two years in various cities.

Topics to be discussed in future conferences, according to Mr. **Blackwell,** include weather conditions encountered during the winter of 1970-71, the economics of Great Lakes water transport, design considerations for improved vessel performance in ice, the underwriters' view of Great Lakes vessel operations, and the activities of other Federal agencies working to lengthen the Lakes navigation season, particularly the St. Lawrence Seaway Development Corp. and the U.S. Army Corps of Engineers.

Participants in the first session represented Hanna Mining Co., Cleveland-Cliffs Iron Co., Inland Steel Co., Johnson & Higgins, Marsh & McLennan, and the American Institute of Marine Underwriters. Representatives of the Great Lakes Protective Association, Dow Chemical Co., and the Toledo-Lucas County Port Authority also attended.

AMF Appoints Tritten General Manager Cuno Division

Ray A. Tritten

Ray A. Tritten, formerly president of AMF Ben Hogan Company, Fort Worth, Texas, has been appointed division president and general manager of AMF Cuno Division in Meriden, Conn., according to an announcement by **John L. Tullis,** president and chief operating officer, AMF Incorporated.

Mr. **Tritten** was appointed president of the Ben Hogan Company in June 1970. Before joining AMF, he was president of the Day and Night Manufacturing Company and the Payne Company, division of the Carrier Corporation. A native of Utica, N.Y., Mr. **Tritten** graduated from the University of Michigan in 1942, with a bachelor of science degree in chemical engineering. He later served as a lieutenant in the U.S. Navy, prior to joining the Carrier Corporation in 1947.

AMF Cuno is a major manufacturer of a wide range of industrial and consumer water conditioning equipment. AMF Incorporated is a worldwide producer of industrial and leisure time products.

Hoffert-Lowe, Inc. Appoints W.J. Glennon

William J. Glennon

Paul Hoffert, president of Hoffert-Lowe, Inc., has announced the appointment of **William J. Glennon** as manager of their New York operation. Mr. **Glennon** had previously been associated with Marine Engine Specialties Corp. for 14 years, serving for the past 10 years as sales manager for the Marine Division.

Hoffert-Lowe, Inc. is engaged in supplying renewal parts for deck and engine with locations in Norfolk, Va., Jacksonville, Fla., and in conjunction with the Charles Lowe Co. of San Francisco and San Pedro, Calif,. and Seattle, Wash.

Dr. Dyer To Head Ocean Engineering Department At M.I.T.

Dr. **Ira Dyer,** professor of ocean engineering at the Massachusetts Institute of Technology and an authority on underwater acoustics, has been appointed head of the department of ocean engineering at M.I.T. and associate director of M.I.T.'s Sea Grant Program. Announcement of the appointments was made by Dr. **Alfred H. Keil,** dean of the M.I.T. School of Engineering and director of the Sea Grant Program. Dr. **Keil** was head of the department of ocean engineering until his recent appointment as dean of engineering.

The M.I.T. department of ocean engineering, formerly known as the department of naval architecture and marine engineering, is the oldest academic department of its kind in the United States and includes among its alumni over the last half century many of the nation's leading shipbuilders and designers. The name was recently changed to reflect the broadening interests of department faculty and students to include not only ship design but the engineering of total ocean transportation and utilization systems, including harbor and port systems, coastal facilities, etc.

"Dr. **Dyer's** notable abilities as an engineer, researcher, teacher, and administrator make him eminently qualified to guide and direct the future of the department," Dr. **Keil** said. "During the past few years many new research and educational opportunities have been added to the department's program, and Dr. **Dyer** is uniquely suited by experience and training to encourage this continued evolution of the department."

Dr. **Dyer** received his S.B. degree in 1949, S.M. degree in 1951 and Ph.D. degree in 1954, all from M.I.T. From 1951 to 1970, he was a vice president of Bolt, Beranek and Newman, Inc., of Cambridge. At BB&N, Dr. **Dyer** founded and directed the company's Advanced Study Program, founded and directed the company's Physical Sciences Division, and later founded and served as president of the company's subsidiary, General Oceanology. He returned to M.I.T. in 1970 as a senior lecturer and became professor of ocean engineering in June 1971.

Professor **Dyer** is a fellow of the Acoustical Society of America and a recipient of the society's Biennial Award. He presently serves on the editorial board of the Journal of Sound and Vibration, the major publication of the British Acoustical Society. In addition to membership in other professional societies, Professor **Dyer** is chairman of the Boston Research Director's Club.

M.I.T.'s Sea Grant Program, supported by the National Oceanographic and Atmospheric Administration, is a large-scale interdepartmental program of diversified research that brings scientists and engineers from a wide range of disciplines together to work on specific ocean-related projects.

S. Blickman, Inc. Forms Subsidiary— BMI, Inc. In Miss.

BMI, Inc., a manufacturer and supplier of galley equipment, has opened offices and plant at Pass Christian, Miss., according to an announcement by its president, **Bruce B. Blickman.**

Located in the heart of the Gulf shipbuilding area, BMI, Inc. has the capability for engineering and furnishing the galley from the small tug to the largest aircraft carrier, the company states. Its vice president and general manager, **Howard Green,** said: "Since we are a wholly owned corporate subsidiary of S. Blickman, Inc. of Weehawken, N.J., it is our purpose to apply the years of experience gained by our parent corporation in the marine field and to offer this experience to all U.S. shipyards."

Richard V. Warden Elected President ITT Decca Marine

D.H. Toller-Bond, chairman, has announced the election of **Richard V. Warden** as president of ITT Decca Marine Inc. of New York. ITT Decca Marine is a leading supplier of marine electronic navigation aids and automation equipment. Its principal products range from pleasure boat radar to advanced automation systems for mammoth tankers.

Mr. **Warden** was previously associated with Philco-Ford in a variety of management, marketing and technical positions specializing in aerospace systems. He joined ITT in 1962 and became product manager for their communications satellite and marine activities. Most recently, he was manager of worldwide marine products for ITT.

Richard V. Warden

Mr. **Warden** holds bachelor's and master's degrees in aeronautical engineering from Princeton and M.I.T. respectively. He also served as a naval aviator and destroyer navigator. Mr. **Warden's** hobbies parallel his professional background; he has maintained a commercial pilot's license and is an avid yachtsman.

Raytheon Appoints Toyo Trading Co.

Raytheon Company has announced the appointment of Toyo Trading Company, Ltd. of Tokyo, Japan, as the sole agent for Japan for its complete line of oceanographic instrumentation. The appointment covers marketing rights for a wide variety of equipment, including line scan recorders, complete bathymetric survey systems, sub-bottom profiling equipment, and acoustic telemetry and control systems.

The equipment, produced by Raytheon's Submarine Signal Division, Ocean Systems Center, Portsmouth, R.I., is used in surveying offshore resources and oceanographic and ecological studies. It is also used in remote control of offshore oil wells.

Toyo is a trading company specializing in electronic instrumentation and similar product lines.

Canadian Transport Ministry Appoints 3

The appointment of three to senior positions in the Transport Ministry's Canadian Marine Transportation Administration has been announced by Transport Minister **Don Jamieson.**

William A. O'Neil, former Director of Construction, St. Lawrence Seaway Authority, becomes Deputy Administrator, Marine Services.

Adm. **A.H.G. Storrs,** former Director, Marine Operations, C.M.-T.A., is appointed Assistant Deputy Administrator, Marine Services.

D.M. Ripley, former Director, Marine Hydraulics Branch, C.M.-T.A., becomes Senior Advisor, Policy and Planning, of the Administration.

Hoffert-Lowe, Inc. Appoints W.J. Glennon

William J. Glennon

Paul Hoffert, president of Hoffert-Lowe, Inc., has announced the appointment of **William J. Glennon** as manager of their New York operation. Mr. **Glennon** had previously been associated with Marine Engine Specialties Corp. for 14 years, serving for the past 10 years as sales manager for the Marine Division.

Hoffert-Lowe, Inc. is engaged in supplying renewal parts for deck and engine with locations in Norfolk, Va., Jacksonville, Fla., and in conjunction with the Charles Lowe Co. of San Francisco and San Pedro, Calif,. and Seattle, Wash.

Dr. Dyer To Head Ocean Engineering Department At M.I.T.

Dr. **Ira Dyer,** professor of ocean engineering at the Massachusetts Institute of Technology and an authority on underwater acoustics, has been appointed head of the department of ocean engineering at M.I.T. and associate director of M.I.T.'s Sea Grant Program. Announcement of the appointments was made by Dr. **Alfred H. Keil,** dean of the M.I.T. School of Engineering and director of the Sea Grant Program. Dr. **Keil** was head of the department of ocean engineering until his recent appointment as dean of engineering.

The M.I.T. department of ocean engineering, formerly known as the department of naval architecture and marine engineering, is the oldest academic department of its kind in the United States and includes among its alumni over the last half century many of the nation's leading shipbuilders and designers. The name was recently changed to reflect the broadening interests of department faculty and students to include not only ship design but the engineering of total ocean transportation and utilization systems, including harbor and port systems, coastal facilities, etc.

"Dr. **Dyer's** notable abilities as an engineer, researcher, teacher, and administrator make him eminently qualified to guide and direct the future of the department," Dr. **Keil** said. "During the past few years many new research and educational opportunities have been added to the department's program, and Dr. **Dyer** is uniquely suited by experience and training to encourage this continued evolution of the department."

Dr. **Dyer** received his S.B. degree in 1949, S.M. degree in 1951 and Ph.D. degree in 1954, all from M.I.T. From 1951 to 1970, he was a vice president of Bolt, Beranek and Newman, Inc., of Cambridge. At BB&N, Dr. **Dyer** founded and directed the company's Advanced Study Program, founded and directed the company's Physical Sciences Division, and later founded and served as president of the company's subsidiary, General Oceanology. He returned to M.I.T. in 1970 as a senior lecturer and became professor of ocean engineering in June 1971.

Professor **Dyer** is a fellow of the Acoustical Society of America and a recipient of the society's Biennial Award. He presently serves on the editorial board of the Journal of Sound and Vibration, the major publication of the British Acoustical Society. In addition to membership in other professional societies, Professor **Dyer** is chairman of the Boston Research Director's Club.

M.I.T.'s Sea Grant Program, supported by the National Oceanographic and Atmospheric Administration, is a large-scale interdepartmental program of diversified research that brings scientists and engineers from a wide range of disciplines together to work on specific ocean-related projects.

S. Blickman, Inc. Forms Subsidiary— BMI, Inc. In Miss.

BMI, Inc., a manufacturer and supplier of galley equipment, has opened offices and plant at Pass Christian, Miss., according to an announcement by its president, **Bruce B. Blickman.**

Located in the heart of the Gulf shipbuilding area, BMI, Inc. has the capability for engineering and furnishing the galley from the small tug to the largest aircraft carrier, the company states. Its vice president and general manager, **Howard Green,** said: "Since we are a wholly owned corporate subsidiary of S. Blickman, Inc. of Weehawken, N.J., it is our purpose to apply the years of experience gained by our parent corporation in the marine field and to offer this experience to all U.S. shipyards."

Richard V. Warden Elected President ITT Decca Marine

D.H. Toller-Bond, chairman, has announced the election of **Richard V. Warden** as president of ITT Decca Marine Inc. of New York. ITT Decca Marine is a leading supplier of marine electronic navigation aids and automation equipment. Its principal products range from pleasure boat radar to advanced automation systems for mammoth tankers.

Mr. **Warden** was previously associated with Philco-Ford in a variety of management, marketing and technical positions specializing in aerospace systems. He joined ITT in 1962 and became product manager for their communications satellite and marine activities. Most recently, he was manager of worldwide marine products for ITT.

Richard V. Warden

Mr. **Warden** holds bachelor's and master's degrees in aeronautical engineering from Princeton and M.I.T. respectively. He also served as a naval aviator and destroyer navigator. Mr. **Warden's** hobbies parallel his professional background; he has maintained a commercial pilot's license and is an avid yachtsman.

Raytheon Appoints Toyo Trading Co.

Raytheon Company has announced the appointment of Toyo Trading Company, Ltd. of Tokyo, Japan, as the sole agent for Japan for its complete line of oceanographic instrumentation. The appointment covers marketing rights for a wide variety of equipment, including line scan recorders, complete bathymetric survey systems, sub-bottom profiling equipment, and acoustic telemetry and control systems.

The equipment, produced by Raytheon's Submarine Signal Division, Ocean Systems Center, Portsmouth, R.I., is used in surveying offshore resources and oceanographic and ecological studies. It is also used in remote control of offshore oil wells.

Toyo is a trading company specializing in electronic instrumentation and similar product lines.

Canadian Transport Ministry Appoints 3

The appointment of three to senior positions in the Transport Ministry's Canadian Marine Transportation Administration has been announced by Transport Minister **Don Jamieson.**

William A. O'Neil, former Director of Construction, St. Lawrence Seaway Authority, becomes Deputy Administrator, Marine Services.

Adm. **A.H.G. Storrs,** former Director, Marine Operations, C.M.-T.A., is appointed Assistant Deputy Administrator, Marine Services.

D.M. Ripley, former Director, Marine Hydraulics Branch, C.M.-T.A., becomes Senior Advisor, Policy and Planning, of the Administration.

The Global Chartering and Brokerage vessel *ANDROS APPOLON* built by Ishikawajima Heavy Industries, delivered December 1969: fully coated with Devoe high-performance coatings.

New high-performance coating systems give you · 10 year corrosion protection · 2 year anti-fouling · 2 year gloss and color retention.

Devoe Marine, first to provide high-performance epoxy coatings, now introduces a revolutionary new line of these products.

"Second Generation" Devran 230®, will provide protection from corrosion for up to ten years. This is a high-build coating with excellent ease of application characteristics, ideally suited as a coating over both Devran® (epoxy) and Catha-Coat® (inorganic zinc) primers. Devran 230® will let you add more miles of profitable service and reduce your maintenance costs by extending your periods between drydockings.

"Second Generation" Devran 214® anti-fouling coating will provide protection for your ship's bottom from marine environment for two years in any of the world's oceans. It is ideal as an overcoat to Devran 230® for maximum protection and economy.

"Second Generation" Crylitex 239® and Devran 229® gloss finish coats give a bright auto-like finish to freeboards and superstructures and both will retain their gloss and color for two years permitting only touch-up of abraded areas to retain a quality appearance.

Whether you select the new Devoe "Second Generation" super-coatings or the conventional, reliable, Devoe high performance coatings systems, you will get longer service between drydockings because no one knows epoxies better than the men who invented them.

For details on all Devoe Marine products contact the Devoe Marine specialist near you. **Devoe Marine products are dockside worldwide.**

DEVOE
MARINE
PAINTS & COATINGS

DEVOE & RAYNOLDS CO., INC.
Subsidiary of Celanese Coatings Company

Sales Offices: 414 Wilson Avenue, Newark, New Jersey 07105
500 Mandeville Street, New Orleans, Louisiana 70117 • 311 California Street, San Francisco, California 94104
c/o Unsworth Company, 'S-Gravendijkwal, 130 b, Rotterdam, Holland
c/o Koide & Company, Ltd., Highland Mansion Suite 302, 1-53-12, Tomigaya, Shibuya-Ku, Tokyo, Japan

Aqua-Chem, Inc. Announces Top Executive Appointments

John K. Collings Jr., president of Aqua-Chem, Inc., Milwaukee, Wis., has announced the filling of top executive posts at the company's Water Technologies Division and other realignments of responsibilities within the division, which is a leading supplier of seawater desalting and water pollution control equipment. Mr. **Collings** said that **Armando B. Steinbruchel** has been named president and **Robert R. Carnaroli** executive vice president of the division. Both posts had been vacant.

Mr. **Steinbruchel** has been with Aqua-Chem since 1958, most recently as regional manager. He had previously been chief engineer for evaporator systems and played a key role in the development and growth of the company through his technological expertise in the engineering and design of present day Aqua-Chem equipment. He was instrumental in the early development of Aqua-Chem's first water pollution control systems and the first long-tube flash evaporators for desalting seawater. He also played an important part in the design and manufacture of the company's new Spray-Film evaporators just recently introduced. A native of Switzerland, Mr. **Steinbruchel** had been with the Swiss firm of Escher Wyss, Ltd. before joining Aqua-Chem.

Mr. **Carnaroli** has been corporate controller of Aqua-Chem, Inc. for the past year. Prior to joining Aqua-Chem, he had been assistant general manager of the Electric Assembly Products Division of General Cable Corporation and had earlier been with divisions of International Telephone and Telegraph Corporation in management and financial posts.

"These appointments, along with other reassignments of responsibilities within the division, will give us a highly capable and efficient organization," Mr. **Collings** said. "Mr. **Steinbruchel** has outstanding capabilities in seawater desalting and water pollution areas, with broad experience in engineering and marketing. Mr. **Carnaroli** is equally capable in administrative and financial operations. We believe they will provide top level leadership for the Water Technologies Division."

In other changes, the Water Technologies Division has gone to the product manager concept, and **Charles D. Rose,** who was formerly vice president, sales, for the division will now become vice president, marketing, in charge of this new function.

Four product managers were named to report to Mr. **Rose** and are responsible for the full range of engineering, manufacturing and marketing of their lines. These are: **Wilmer Pergande,** product manager for vapor compression plants; **Lee Hartenstein,** product manager for marine products, pumps and vacuum systems; **Wayne Wagner,** product manager for packaged and field erected evaporators, chemical waste and radioactive waste concentrators, industrial heat exchangers and pollution control equipment; and **Richard M. Ahlgren,** manager of research and development studies. All have been active with Aqua-Chem for a number of years in their respective fields.

Mr. **Collings** also announced that **Richard J. Stayton** has been named manager of order planning and control and **Russell H. Pipkorn** has been named divisional engineering manager.

Mr. **Collings** said the reorganization within the division is designed "to establish more direct and complete responsibilities within the various product areas which capitalizes on the broad experience of those promoted."

Newport News Jumboizes Same Tanker Second Time

Sixteen years ago the Amoco Delaware was the first ship to be jumboized at Newport News Shipbuilding, a job that established the yard as the innovator in tanker jumboizing. Now the Amoco Delaware is back in Newport News for a second enlargement. When work is completed on her in December, she will stand as the first ship to be re-jumboized at the Newport News, Va., yard.

The new 486-foot forebody for the T-2 tanker Amoco Delaware is launched at Newport News Shipbuilding, the first ship to be re-jumboized at the yard. When the enlargement is completed later this year, the Amoco Delaware will have grown 110 feet since her first appearance at the yard in 1956.

Successful launching of the new forebody took place recently and with it came a payment of $2,320,000 from her owners, Amoco Shipping Company. The new forebody is 486 feet long and will extend the Amoco Delaware's length to 633.5 feet from her present 571.5 feet. When the T-2 tanker first came to the yard in 1956 she was only 523.5 feet long. Her new cargo capacity will be 237,000 barrels of oil.

The Amoco Delaware's jumboizing will be the 24th done by Newport News Shipbuilding.

Trust Your Ship with Bethlehem

We'll take good care of her, whether she's suffered major damage, or needs only minor repair or reconditioning. We have all the necessary skills and tools to make her fit for the next voyage. And quickly, if you're in a hurry. We'll even change her character by conversion, if you wish, or increase her capacity by lengthening or jumboizing.

Whatever you need for your ship, Bethlehem can deliver. We offer complete shipyard service at our modern facilities on each of the three American coasts.

BETHLEHEM STEEL
Shipbuilding

Executive Offices: Bethlehem, PA 18016
Telephone: (215) 694-2424
Sales Offices: 25 Broadway, New York, NY 10004
Telephone: (212) 344-3300 Cables: BETHSHIP

Bethlehem Shipyards:

Drydocks in Baltimore, New York, Boston, Los Angeles, and San Francisco Harbors, and at Beaumont, Texas.

Building Ways at Sparrows Point, Md.; Beaumont, Texas; San Francisco, Calif.; and Singapore.

The McFarland *comes "home" to Bethlehem for repairs. Built by our Sparrows Point Yard in 1967, the U.S. Army, Corps of Engineers' 300-ft-long dredge was in a collision with another vessel late last year off the Gulf of Mexico. At our Beaumont Yard we repaired the damage and made her like new again.*

Work On Galveston's Container Facilities Is Ahead Of Schedule

Work on Galveston's container facilities is progressing ahead of schedule, and the port's first container crane and dock will be ready to handle containerships by the end of 1971, with barge-carrying ship-loading facilities finished to to receive LASH and SEABEE vessels early in 1972.

C.S. Devoy, Galveston port director, reporting to the community on the projects, listed developments as follows:

(1) First 1,000 feet of the 1,700-foot-long container dock in Galveston's East End is 93 percent complete, and the $1,063,000 Japanese-built container crane arrived in mid-August and was erected at Piers 10-12 on October 1.

(2) Contracts amounting to $1,295,104 were awarded for first-stage construction of barge-carrying ship-loading facilities at Pier 35 to handle LASH and SEABEE ships.

(3) The SEABEE mother ship berth on Pelican Island across the Galveston Ship Channel from the Pier 35 barge terminal is presently being dredged to a depth of 45 feet, and the 15-acre barge marshaling area backing it up will be 14 feet deep.

All barges for the Lykes SEABEES loaded in West Gulf ports from Brownsville to Lake Charles will be brought to the Galveston terminal for loading aboard ship.

In a special election on March 10, 1970, Galveston voters approved issuance of $7.7 million in tax obligation bonds to which the Port of Galveston will add $10 million from revenues during the next 10 years for port modernization: to build a $9.2-million container terminal in Galveston's East End between Piers 10 and 14; a barge consolidation terminal at Piers 34-35; berths for LASH and SEABEE ships; and a 15-acre barge fleeting station. Work started in November 1970, and the first Lykes SEABEE vessel, the S/S Doctor Lykes, now being completed at Quincy, Mass., is due in Galveston in January 1972.

Japanese Develop Hydraulic Units To Position Prefabricated Hull Sections

Sohichi Takahashi
Industrial Specialist

Three Japanese companies, Nippon Kokan, Nippon Koki and Kayaba Kogyo, have jointly developed a hydraulic unit that will move heavy prefabricated steel units into accurate position for welding in less than half the time it took with the conventional method.

In constructing ships, steel assemblies, ranging from 20 tons to 300 tons, are prefabricated and continuously transferred to the building ways or building docks by crane. These assemblies are then positioned and welded together to form the ship's hull. When being positioned on the building way, the three-dimensional assembly is moved little by little until it is in position for correct alignment to the previous unit. After positioning, it is secured and the welding process started.

If this positioning accuracy is not maintained, it will result in a warped hull and the later assemblies will be more difficult to fit. In the conventional positioning process an assembly is raised by jacks, moved longitudinally and transversely by jacks and tack welded in position while being supported by a crane. By this method, it is reported to take 28 man hours to secure a prefabricated assembly weighing 300 tons.

The newly developed method uses three hydraulic units to position a 300-ton unit. Each of the identical units are mainly composed of a hydraulic jack which slides horizontally on a stainless-steel foundation. These units are positioned on the building way or dock floor and the prefabricated assembly lowered onto them. Each jack has a 15¾-inch cylinder that can raise the assembly a maximum of 6 inches. Theoretically, this hydraulic unit should be able to handle assemblies weighing 600 tons. Meanwhile, the jack is slid along the stainless-steel foundation by two 7-inch hydraulic cylinders connected to the jack at right angles. By using these horizontal units, the entire jacking unit can be moved within the range of a 10-inch circle.

If the assembly must be moved a greater distance than the travels given above, the assembly is rested on the keel blocks and the moving process repeated.

Each hydraulic jack is provided with its own individual hydraulic pumps. All the control pushbuttons for the three units, 18 buttons in all—forward, backward, right, left, up and down—are mounted in one portable control console. When the relocation of the hydraulic units becomes necessary, it is performed by means of a vehicle used for transporting keel blocks. To improve on this method of moving the units, the companies are planning to convert them into self-propelled types for ease of relocation.

The Tsu Shipyard of Nippon Kokan has used these hydraulic jacks during the construction of a 250,000-dwt tanker. They report that the positioner was applicable to 36 bottom assemblies and 20 other prefabricated sections. This yard also reported that instead of the usual 28 hours for positioning an assembly, it required only four manhours per unit.

Canadian Government National Harbours Board Relocates Head Office

The National Harbours Board of Canada announced that it has moved its head office in Ottawa to the Place de Ville at 330 Sparks Street. The Government agency had previously been located at the Trebla Building at 473 Albert Street.

Grant Johnson Named Exec. Vice President International Paint

Grant Johnson

Thomas M. Reinhardt, president of International Paint Company, Inc., has announced the appointment of **Grant Johnson** to the office of executive vice president and a member of the board of directors of the parent company, with headquarters in New York City.

Mr. **Johnson** joined the International organization in 1965 as West Coast sales manager for the subsidiary, International Paint Co., (California) Inc. He was elected to the board of directors of that company shortly thereafter and was appointed vice president of that firm in 1967. Mr. **Johnson** brings with him 21 years of experience in the shipping industry, having been vice president of Columbia Steamship Co.., Inc. before he joined International.

Astilleros Espanoles Launches Oil Tanker Of Advanced Design

Astilleros Espanoles, S.A., recently launched the advanced-design oil tanker Conoco Britannia at its Cadiz, Spain shipyard.

The 115,000-dwt tanker, whose keel was laid the day after the launching of her sister ship, the Conoco Espana, was christened by **Mrs. John E. Kircher,** wife of the president of Eastern Hemisphere Petroleum Division of Continental Oil Company. Both vessels will be used primarily to transport crude oil from North Africa to Conoco's Humber refinery in Lincolnshire, U.K.

Commissioned by Worldwide Transport Inc., Continental's shipping affiliate, both ships incorporate significant advances in tanker technology, including several design "firsts." They are the first tankers afloat whose diesel engines are capable of burning the same crude oil as carried in their cargo tanks. Both are the first of their size fitted with variable pitch main propellers, and both have bow thrusters operating on each side of the bows, providing greatly increased maneuverability. Automated control devices allow the master to control the engines entirely from the bridge during maneuvering.

The ships feature advanced pollution control and safety equipment, including special reclaimed oil settling tanks and separate plants for obtaining nitrogen from the atmosphere for inerting the cargo tanks for greater safety. All cargo tanks are coated with corrosion resistant epoxy paint. Design of the cargo system utilizes Conoco's free-flow system of loading and discharging and permits a discharge rate of up to 10,000 tons per hour. The tankers will carry approximately 896,000 barrels of crude oil (31,360,000 gallons) and will cruise at 16 knots.

In their principal trade on the eight-day voyage between Libya and the United Kingdom, they will be loaded and discharged offshore through single point mooring buoys and will not normally go alongside any docks.

The Conoco Britannia and the Conoco Espana are also the first oil tankers built for bow loading and unloading of their cargoes. Special facilities enable them to pickup and connect hoses from the mono-buoys at the bows, instead of through normal midships manifolds. Helicopter pads on the tankers will permit embarkation and disembarkation of personnel, documents, provisions and equipment when sea conditions prevent launches from operating to the mono-buoys.

The Conoco Britannia will go into service early in 1972 under the command of Capt. **Carmelo Arregui** and will carry a Spanish crew of 10 officers and 23 men. The Conoco Espana will go on her maiden voyage this month.

Professional

"STABILOGAUGE"
Predetermines **Stability (GM), Mean Draft, Deadweight** and **Displacement** for any distribution of cargo including **Free Surface** and **KG** corrections.

"LOADOSCOPE"
Automatically calculates and displays the **Draft Fore & Aft, Deadweight, Bending Stress** and **Shear Stress** which a ship will have under any longitudinal distribution of load, for any number of preselected stations or readouts.

Acts as a Summary Status Board

American Hydromath Company — **313 Clinton Street**
Hempstead, N.Y. 11550 — **516 538-4949**

J. L. BLUDWORTH
NAVAL ARCHITECT
TUGS
BARGES

4030 Wyne St. Houston, Tex. 77017

BOUCHER SHIP MODELS
Since 1905
Ship Models—Show Case
Plating, Test and Industrial Models
Repairs and Parts
BOUCHER-LEWIS PRECISION MODELS, Inc.
36 East 12th Street, New York 3, N.Y., GR 3-6073

BREIT ENGINEERING, INC.

441 GRAVIER ST.
NEW ORLEANS, LA. 70130
504-524-3575

NAVAL ARCHITECTS & MARINE ENGINEERS
MARINE SURVEYORS

COAST ENGINEERING CO.
& ASSOCIATES
CONSULTING ENGINEERS
NAVAL ARCHITECTS & MARINE ENGINEERS
MARINE SURVEYORS
711 West 21st Street Norfolk, Virginia 23517
Telephone 625-2744

CRANDALL
DRY DOCK ENGINEERS, INC.
Railway and Floating Dry Docks; Waterfront Structures
Consulting • Design • Inspection
Dry Dock Hardware and Equipment
238 Main Street Cambridge, Mass. 02142

CUSHING & NORDSTROM INC.
NAVAL ARCHITECTS, MARINE ENGINEERS
& TRANSPORTATION CONSULTANTS
50 TRINITY PLACE
NEW YORK, N.Y. 10006
TEL: (212) 425-8095 CABLE: NAVARCHS

ARTHUR D. DARDEN
INCORPORATED
1040 International Trade Mart (504) 523-1661
NAVAL ARCHITECTS & MARINE ENGINEERS
NEW ORLEANS, LOUISIANA 70130

DESIGNERS OF **SHARP DeLONG** OCEAN FACILITIES
OFFSHORE
29 Broadway
New York, N.Y. 10006
Tel. 212-422-1275
FIXED
MOBILE
FLOATING

DESIGN ASSOCIATES, INC.
M. KAWASAKI
3308 Tulane Avenue
New Orleans, La. 70119
Naval Architects **Marine Engineers**
Marine Management **Transportation Consultants**
Phone: 822-7430

DESIGNERS & PLANNERS
INCORPORATED
114 FIFTH AVENUE
NEW YORK, NEW YORK 10011
(212) 691-7770

NAVAL ARCHITECTS
MARINE ENGINEERS
P.O. BOX 1080
GALVESTON, TEX. 77550
(713) 502-1002

M. MACK EARLE, P. E.
COMPLETE MARINE ARCHITECHNICAL SERVICE
103 Mellor Avenue **301/747-4744**
BALTIMORE, MARYLAND 21228

CHRISTOPHER J. FOSTER, INC.
WORLD-WIDE EXPERIENCE AS DESIGNERS OF
GRAVING DOCKS • MARINE STRUCTURES
SHIPYARDS • MODERNIZATION • PORT FACILITIES
OFFSHORE TERMINALS • FLOATING DRYDOCKS
MARINE ENGINEERS • NAVAL ARCHITECTS
CONSULTING ENGINEERS
PORT WASHINGTON NEW YORK 11050
(516) 883-2830 CABLE: "CEFOSTA"

FRIEDE AND GOLDMAN, INC.
Naval Architects & Marine Engineers
SUITE 1414, 225 BARONNE STREET
NEW ORLEANS, LA. 70112
523-4621

GIBBS & COX INC
Naval Architects · Marine Engineers
21 West Street, New York, N.Y. 10006

JOHN W. GILBERT ASSOCIATES, INC.
Naval Architects *Marine Engineers*
Brokerage
58 COMMERCIAL WHARF. BOSTON, MASS. 02110

MORRIS GURALNICK ASSOCIATES, INC.
Naval Architects and Engineers
San Francisco, California

·J·J·HENRY·CO·INC·
NAVAL ARCHITECTS · MARINE ENGINEERS · MARINE SURVEYORS
90 West St., New York, N.Y. 10006 — 943-2870
West Park Dr., Mt. Laurel Industrial Pk., Moorestown, N.J. 08057
609-234-3880
430 South Main St., Cohasset, Mass. 02025 — 617-383-9200

L K HOMYER
MARINE ARCHITECTURE & ENGINEERING
Box 408, Corona del Mar, California
Dial (714) 673-6491

6338 Lindmar Dr. Naval Architects
P.O. Box 1068 Marine Engineers
Goleta, Calif. 93017 Hydraulic Ship Lifting
(805) 964-7747 & Moving Systems
HYDRANAUTICS

C. T. ILARIUCCI & ASSOCIATES
MARINE SURVEYORS & CONSULTANTS
"ANYWHERE IN THE CARIBBEAN"
Tourism Pier #3 Office: 724-7570 722-5508
San Juan, P.R. 00902 Home: 723-4013 723-3635
P.O. Box 4351 Cable: MARISURV
San Juan, P.R. 00905 Telex: ITT 345 3020

JAMES S. KROGEN
NAVAL ARCHITECT & MARINE ENGINEER
Tel. 373-8294
1460 Brickell Ave., Miami, Fla. 33131

Littleton Research and Engineering Corp.
Consulting and Contract Research in Applied Mechanics
Hull Vibration and Shock — Noise Control
Structural Analysis — Hydrodynamics
95 Russell Street, Littleton, Massachusetts 01460
Telephone 486-3526 area code 617

ROBERT H. MACY
Naval Architect & Marine Engineer
P.O. Box 758 Phone: 762-5667
Pascagoula, Mississippi

MARINE CONSULTANTS & DESIGNERS, INC.
Naval Architects *Marine Engineers*
Cable Address: "Midship"
Main Off.: 308 Invest. Insur. Bldg. • Cleveland, O. 44114 • (216) 781-9070

Marine Design Associates
NAVAL ARCHITECTS
P.O. Box 2674, Palm Beach, Florida 305/655-6360
Designers-Consultants
Commercial Vessels, Trawlers & Yachts

MARINE DESIGN INC.
NAVAL ARCHITECTS & MARINE ENGINEERS
1180 AVE. OF THE AMERICAS Circle 7-2640
NEW YORK, N.Y. 10036

TUGS, BARGES, WORK BOATS & CONVERSIONS

MARINE MINING & ENGINEERING, INC.
offers expertise in the following disciplines:
Naval Architecture & Marine Engineering
Mechanical Engineering
Mining Engineering
Civil Engineering
in addition, we design and manufacture
Deepwater Dredging Equipment
Dryland Dredging Equipment
Slurry Pumps & Pipelines
Water Quality Control Systems/Dredging & Commercial
as well as provide
Ocean & Inland Tug & Barge Service
Participation in Worthwhile Projects
Please address your inquiries to:
P.O. Box 5032 Concord, Calif. 94520 (415) 682-6622

MARITECH, INC.
Consultants in Marine Technology
38 UNION SQUARE
SOMERVILLE, MASSACHUSETTS 02143
(617) 666-0346

RUDOLPH F. MATZER & ASSOCIATES, INC.
NAVAL ARCHITECTS • MARINE ENGINEERS • MARINE SURVEYORS
RESEARCH & DEVELOPMENT
13891 ATLANTIC BOULEVARD
PHONE 904/246-8438
JACKSONVILLE, FLA. 32225
127 OCEAN SCIENCE CENTER
PHONE 305/848-5223
RIVIERA BEACH, FLA. 33404

JOHN J. McMULLEN ASSOCIATES, INC.
Naval Architects—Marine Engineers—Consultants
NEW YORK HAMBURG MADRID

GEORGE E. MEESE
NAVAL ARCHITECTS • MARINE ENGINEERS
CONSULTANTS • SURVEYORS
DESIGNS FOR YACHTS AND COMMERCIAL VESSELS
WOOD — ALUMINUM — STEEL — PLASTIC
TELEPHONE **194 ACTION ROAD**
COLONIAL 3-4054 **ANNAPOLIS, MARYLAND**

Designer of Marine Liquid Level Gauging **METRITAPE®**
for: CARGO • BALLAST • FUEL OIL • LUBE OIL
• DRAFT • TRIM • BILGE • TIDE & WAVE
Remote Reading • Analog Digital • Indep. of Sp. Gr
METRITAPE, Inc. W. Concord, Mass. 01742 • 617-369-7500

Collins Radio Announces Management Appointments

Collins Radio Company, Dallas, Texas, has announced three major organizational moves aimed at strengthening its top management team.

D.R. Beall, executive vice president of the Electronics Group at North American Rockwell Corporation (NR), was named senior vice president at Collins for finance and administration.

Vice president **R.C. Mullaley** was promoted to senior vice president for marketing. Domestic and international marketing vice presidents will report to Mr. **Mullaley.**

R.L. Cattoi, a vice president of engineering at Collins, was promoted to senior vice president, engineering.

President **Arthur A. Collins** cited Mr. **Beall's** success in administrative and financial posts at Philco-Ford and NR, and said the executive's addition to Collins corporate management will strengthen the company's efforts to regain a profitable position.

Mr. **Mullaley** has been with Collins since 1951 and has experience in broad areas of the company's operations.

Mr. **Cattoi,** who joined the company in 1950, has had major responsibilities in many of Collins engineering activities, including those involving aviation and data systems.

Collins also announced the promotion of three men to assistant vice president posts. They are **L.D. Batson, J.L. Churchill** and **R.R. Mosier.**

Conference To Be Held In April Covering Pollution Control And The Marine Industry

The president of the International Association for Pollution Control, **Thomas F.P. Sullivan,** has announced that the annual conference on Pollution Control and the Marine Industry will be held on April 20-21, 1972, at the Rivergate Auditorium in New Orleans, La. The conference will cover legislation, regulations, standards, enforcement procedures, research and technology, and future concepts for environmental conservation.

The conference will be of an interdisciplinary nature, so numerous other concerned associations are being invited to participate along with Federal, state and local government officials. The program will be directed at middle management in the marine field. Vessel owners, operators, shipbuilders, naval architects, marine suppliers, port and terminal operators and others in the marine field will be in attendance. There will be several hundred exhibits to complement the comprehensive conference program, which was attended by marine specialists from all over the world last year. Further details may be obtained by contacting **Carolyn Bloch,** IAPC Headquarters, Suite 700, 4733 Bethesda Avenue, N.W., Washington, D.C. 20014.

Roger Sommer To Head European Operations For Western Gear Subsidiary

Roger D. Sommer, formerly industrial relations manager of Western Gear Corporation at its Lynwood, Calif., headquarters, has been named vice chairman of the board of directors of Western Gear Europe, S.A., in Belgium.

Mr. **Sommer** will direct Western Gear activities in all European countries and in South Africa from offices located at Transvaalstraat 7, B-2600 Berchum-Belgium, near Antwerp.

Initially, Mr. **Sommer** will concentrate on sales and service activities for Sky Climber, Inc., a Western Gear subsidiary which manufactures powered platforms and scaffold hoists widely used in construction and building maintenance; and Graphic Artis Division, maker of an extensive line of quality offset printing presses and business forms equipment and collating systems. He will report to Western Gear senior vice president **Charles F. Bannan,** board chairman of Western Gear Europe, S.A.

Mr. **Sommer** has a B.S. degree in business administration from Northwestern University, and a master's degree in industrial relations from Cornell University. He has been with Western Gear since 1964.

FIRST OF SIX: The first of six new PACECO SHIPSTAINERS® for K-Lines of Japan is shown being lifted intact to its new home on the deck of the Oregon Maru docked in the Port of San Francisco. The SHIPSTAINERS, especially designed shipboard container handling cranes from Paceco, a Division of Fruehauf Corporation, Alameda, Calif., were ordered by K-Lines earlier this year for installation aboard its three modified containerships. Each of the six cranes being installed fore and aft on the three vessels has the ability to load and unload an average of 32 containers, or 800 to 900 tons of containerized cargo, per hour. The PACECO SHIPSTAINERS are designed with cantilevers on each side, giving them an outreach of 23 feet so that they can load and unload onto the pier from either side of the ship. Once the ship leaves port, the cantilevers fold completely within the crane's gantry frame for compact storage. The Oregon Maru and its two sister ships will inaugurate K-Lines' new container service between the United States and Southeast Asia this fall. Sailings are scheduled for every 15 days.

National Marine Service Opens Houston, Tex., Parts Warehouse

Floyd McKneely, warehouse supervisor, prepares a delivery from loading dock of new National Marine Service Houston Parts Warehouse.

"In keeping with our program of continuing efforts to better serve the marine industry," **E.E. Ahlemeyer,** vice president, Engineering Services Division, National Marine Service, Incorporated, announced, "we have opened a new marine supply warehouse in Houston, Texas. Our broad line of marine diesel replacement parts and vessel supplies will be available for immediate delivery or pickup by our friends along the Gulf Coast." The new address is 3710 Dacoma Street, and the new telephone number, 24 hours a day, is (713) 688-1481.

This facility, under the direction of **N.J. Calvin,** Gulf Coast sales representative, and assisted by **Floyd McKneely,** will stock a complete line of diesel engine parts and boat supplies. This new warehouse, open around the clock, will provide walk-in service, or N.M.S. trucks will deliver the parts direct to location where they are needed.

National Marine Service is one of the largest suppliers of diesel engine parts in the country and brings years of successful service to the Gulf Coast area.

The new warehouse, with over 5,000 square feet for marine diesel parts and boat supplies, will complement their service in Hartford, Ill., by supplying customers along the Gulf Coast.

National Marine pioneered in the marine diesel unit exchange concept and will offer their wide range of exchange parts for engine overhauls.

The host of services National Marine offers from this new location includes certified tankerman service. U.S. Coast Guard certified and bonded tankerman employed by National Marine are now traveling throughout the Gulf Coast area. There has been an increasing demand for this service as a result of the problems of oil and chemical pollution.

National Marine's traveling (marine diesel, pump and electrical) repair teams for marine diesel overhaul in the Gulf Coast will be coordinated and supplied through this new office. It may be obtained by calling **N.J. (Jack) Calvin.**

Overseas Shipholding Group Elects Morton Hyman President

The election of **Morton P. Hyman** as president of the Overseas Shipholding Group has been announced by the bulk shipping company, which owns and operates a fleet of 31 tankers and dry bulk carriers. Mr. **Hyman** has served as a director and secretary of the group since its formation. He succeeds **Joshua Morrison,** who has retired, but who will continue as a member of the firm's board of directors.

The Washington Mail after conversion and jumboizing to a full containership by the San Francisco shipyard of Bethlehem Steel Corporation.

Bethlehem Delivers First AML Full Containership

The Washington Mail as the ship appeared prior to entering Bethlehem's shipyard.

The first of three Mariner-type cargo vessels to be jumboized and converted into full C-6 containerships for American Mail Line was delivered recently by Bethlehem Steel Corporation's San Francisco shipyard. The delivery of the Washington Mail to her owners marked the completion of one of the largest containership conversions ever accomplished in the United States.

The Washington Mail, now 669 feet long, was lengthened 105 feet through the installation of a new mid-body container cell section. The ship's container-carrying capacity was expanded from 211 twenty-foot units to 892 twenty-foot containers or combinations of 20 and 40 footers. The ship's deadweight was increased from 14,803 tons to about 20,000 tons.

The new 105-foot long mid-body section (top) is shown being floated into position during the conversion. This exacting maneuver occurred after the vessel had been cut in two and the bow section floated out into San Francisco Bay (bottom).

The J.J. Henry Co., Inc. prepared the conversion design and supervised the shipyard work for the owner. George G. Sharp, Inc. prepared the detailed construction plans for the shipyard.

In addition to the new mid-body, two new decks were added topside of the deckhouse and an 800-hp bow thruster was installed for improved maneuverability in close quarters.

Bethlehem's conversion of the Washington Mail and her two sisterships, the Japan Mail and Philippine Mail, is being carried out under a $25.5 million American Mail Line-U.S. Maritime Administration joint contract.

The original passenger quarters were rearranged during the conversion so that the spaces added by the additional decks in the house would be utilized. The all new air-conditioned luxury quarters for 12 passengers include spacious staterooms, an upper observation lounge, dining room, exercise room and library.

Another feature of the ship's conversion is the addition of a third turbo-generator, rated at 875 kw, to handle the increased loads and refrigerated containers. The vessel as a C-4 Mariner had only two 700-kw turbo-generators.

The wheelhouse was relocated on the highest of the two new decks to provide better visibility. Automated main-engine control from the bridge also has been provided. In order to strengthen the vessel to accommodate its greater length and to provide the maximum width for container holds, the conversion further entailed the installation of six foot wide, nine foot deep box girders on each side of the extended hull. The girders are 489 feet long, nearly three-fourths the length of the ship.

To provide added deck space for containers and room for the possible installation of loading cranes, a 70 foot long sponson was built along each side of the vessel at the bow and stern.

The Washington Mail entered the Bethlehem yard about nine months ago. The ship's new mid-body section was launched January 22, 1971. At that time, the vessel was placed stern-in on the yard's new 65,000-ton capacity floating dry dock and cut in two just forward of her deckhouse.

The bow was floated out into the bay while the ship's new mid-body was towed into the dock and welded to the stern portion of the vessel. Then, the bow was brought back into the dry dock and joined to the new mid-body, thus completing the ship's lengthening from 564 feet to 669 feet.

The new mid-body, built at Bethlehem's San Francisco yard, weighs 1,200 tons. In addition to container cells, it is fitted with wing tanks for fuel oil. A total of more than 4,000 tons of new steel was utilized to containerize the ship.

Conversion of her two sisterships is proceeding in the same manner, with the Japan Mail scheduled for delivery this month and the Philippine Mail early next year.

AML Planning

Robert E. Benedict, American Mail Line's president, recently announced plans involving the addition of a fourth C-6 containership, a near 60 percent increase in the number of yearly voyages and a dramatic change in the line's service pattern.

With the addition of a fourth converted Mariner-type ship to a full containership, American Mail Line will have embarked on a $45.8 million program. Of this amount, American Mail Line will spend $10.6 million for containers and $35.2 million for the conversions. The U.S. Government share for construction subsidies is $13.4 million.

The new operating plan calls for operating the containerships in an express service with weekly sailings between the Pacific Northwest and the Japanese ports of Yokohama, Kobe and Nagoya. The line's semi-container vessels will operate between the Pacific Northwest and Korea, Hong Kong, Vietnam, Singapore, Malaysia and Taiwan, with twice-monthly service. The remaining C-4 Mariners will be used on the company's extended area route to Southeast Asia and the Bay of Bengal.

World Dredging Conference To Hear 30 Technical Papers Nov. 30 - Dec. 3 In N.O.

The worldwide community of dredgers and dredge builders are making their plans to converge upon New Orleans November 30, 1971, for the Fourth World Dredging Conference (WODCON). An elaborate field trip has been planned for the first day with a tour of the Mississippi River dredging projects, past, present and future, on the river boat President. Luncheon buffet Louisiana-style, a Dixieland combo and a fully narrated tour of the river by a representative of the Port of New Orleans will make the river trip a valued event. That same evening there will be a cocktail reception hosted by the Gulf Coast Dredging Association, followed by a "Miniature Mardi Gras Ball" theater presentation by one of the leading theatrical groups in the city.

Following the first eventful day and evening, the conference will get down to business, with technical papers and industry exhibits beginning the morning of December 1 and running through the afternoon of December 3. All events will be held at the Jung Hotel Convention Center. Each day there will be formal speakers at the luncheons. The luncheon speakers will be: December 1—Lt.Gen. **F.J. Clarke,** Chief of Engineers, U.S. Army; December 2—**Patrick H. O'Neill,** president, International Mining Corp., and December 3—**A.L. Quinlan,** vice president and general manager, McNamara Marine.

There will be 30 technical papers presented on subjects ranging from pipeline hydraulics, pumps-designs and maintenance, dredge designs and operations, to ecological effects of dredging. Industry exhibits will be presented by a cross section of companies serving and active in the dredging industry. The Hall of The Americas of the Jung Hotel is expected to be filled with full-scale equipment and models depicting dredges, operations and the supporting equipment.

The sponsor of the WODCON IV is the WODCON Association, an international nonprofit organization representing the leading dredging contractors from over 20 countries, six foreign government dredging organizations, builders and engineering companies. It was formed in May 1967 at the occasion of the first WODCON meeting in the New York City Coliseum. Co-sponsors of WODCON IV include the World Dredging Association (WODA), which is a technical society of individuals involved in the dredging industry from over 35 countries, Texas A&M University and Oregon State University, who are helping with the technical paper program.

This year's chairman of the WODCON Association and for the conference is **O.M. Gautreaux,** president of Williams-McWilliams Co., headquartered in New Orleans and one of the oldest dredging firms in the United States. Chairman of the board of directors of both WODCON and WODA is **Bill Bauer,** internationally known as a leading figure and pioneer in the dredging industry. He is the founder of Bauer Dredging Company of Port Lavaca, Texas, which is now owned by the Texas Gas Transmission Co.

For more information on registration and participation in WODCON IV, contact WODCON, **M.J. Richardson,** Executive Secretary, P.O. Box 20810, Long Beach, Calif. 90801, telephone (213) 832-4291.

Alco Offers Brochure On Heavy Duty Marine Diesels

A 16-page brochure on heavy duty marine diesels is available from Alco Engines Division of White Industrial Power, Inc. The full-color brochure gives information on engines from 6 to 18 cylinders, offering from 550 to 3,960 hp. General specifications of the Alco 251 four-cycle engine, as well as its ratings and characteristics, are included in the brochure.

To obtain a copy of this brochure, write Alco Engines, 100 Orchard Street, Auburn, N.Y. 13021.

MOBIL GRANT TO KINGS POINT: The Mobil Foundation, Inc., has made an educational grant of $1,000 to the Kings Point Fund, Inc., for the benefit of the United States Merchant Marine Academy and its midshipmen. At informal ceremonies recently held in New York, Rear Adm. **Arthur B. Engel,** USCG (ret.), superintendent of the U.S. Merchant Marine Academy at Kings Point, N.Y., is shown accepting the $1,000 grant to the Academy from Mobil Oil Corporation, represented by **Henry J. Luck Jr.,** general manager of marine transportation. The picture of a Mobil tankship in the background was presented by the company to the Academy on the same occasion. The gift will be applied, according to fund officials, in areas of maritime education and undergraduates need not fully funded by Government training appropriations. For many years, the Fund has conducted annual giving drives to assist the Academy in these and other fields, including student loans, betterments to buildings, grounds and equipment, sail training, and extracurricular activities.

1971 Marine Technology Show Draws 2,800 Attendees— Next Conference Date Set

The 7th National Conference and Exposition of the Marine Technology Society attracted a record audience of 2,800 marine scientists, interested corporations, academicians, and professionals.

The major attraction of the three-day marine conference, the only one permanently held in Washington, was the Society's Exposition, featuring more than 100 prime U.S. and foreign marine, scientific, and manufacturing firms' wares and services.

Among the companies represented at the Exposition were General Dynamics, Neyrpic Canada Ltd., Ocean Recovery Systems, Inc., Seatech Corporation, U.S. Steel, Westinghouse Electric Corporation, Unisuit USA, NUSonics Corporation, ITT Cable Division, Hermes Electronics Ltd., and Humble Oil and Refining Company.

Delegates who toured the exhibit hall represented major buyers in marine engineering and science in the U.S. and Canada.

The Marine Technology Society is the interdisciplinary organization of 5,000 professionals engaged in marine and oceanic studies. MTS members study and develop the resources of the earth's watery environment with an eye toward feeding increasing populations and making the seas work for mankind.

MTS technical committees covered the entire spectrum of oceanic interests, including economics, agriculture, conservation, law, and fossil fuel requirements,

The Society has announced that next year's Conference and Exposition will be held at the Sheraton Park Hotel, September 10-13, 1972, in Washington, D.C.

Lockheed Promotes Robert N. Waters

Robert N. Waters, who has been executive vice president-administration of the Lockheed Shipbuilding & Construction Company, Seattle, has been promoted to assistant treasurer of Lockheed Aircraft Corporation, the parent Lockheed Corporation, in line to succeed treasurer **W. Neal Brown** on Mr. **Brown's** retirement next January.

An Idaho native, Mr. **Waters** grew up in Everett and was graduated from Whitman College in 1942. After service as a navigator with the Navy and several airlines, he returned to school in 1948 to earn a degree from Georgetown University.

Mr. **Waters** has worked for Lockheed since 1954 and went to Seattle in 1966 as project manager for the fast deployment logistics ship. He stepped up to administrative director of the shipyard in 1967 and to vice president-administration in 1968.

313,000-Dwt Is New Size Of Shell Tankers In Belfast

A revised order by Shell International Marine Limited makes four tankers contracted for with Belfast's Harland & Wolff shipyard the largest ever ordered in the United Kingdom.

Last April, Shell ordered five 256,000-ton tankers from the Northern Ireland shipyard. It was recently announced that four of the five ships are to be expanded to 313,000 tons. The four ships will have the same overall carrying capacity as the original five, and the fifth tanker will not be built.

The cost of the ships remains about the same—$180 million — and delivery will take place, as previously scheduled, during 1974 and 1975.

"It means," said a company executive, "that Harland & Wolff is really in the big leagues of big shipbuilders. These ships are the largest on order for Shell anywhere in the world. Our new facilities can build the biggest ships afloat and this order proves it. It's a breakthrough."

Finding Oil And Gas Around Britain's Shores

Sir **David Barran,** chairman of The "Shell" Transport and Trading Company, speaking in Harrogate in Northern England, said that Britain's energy requirements were expanding at a rate which would call for the maximum effort by all concerned if they are to be satisfied.

Sir **David,** who was speaking to the Institute of Purchasing and Supply Conference, stated that the national fuel policy must henceforward take account of the new factors which had emerged since the White Paper of 1967. These were: (1) the proven availability of natural gas from the North Sea, and the prospective availability of indigenous oil from the North Sea and other parts of the continental shelf around the U.K. shores; (2) the certainty that the days of very cheap oil are over and that oil costs will continue to rise; and (3) the consequent improvement in the competitiveness of at least some of the country's coal reserves.

Wherever coal could be economically produced, it should be, having regard to the rising costs of imported oil. Every effort should be made to help nuclear energy to become more efficient and more economical, although Sir **David** did not think it could take over a much larger share of the energy burden before the 1980s. Moreover, all fuels should be burned in the most economical way to reduce waste.

"Future generations may well be appalled at the wanton improvidence with which we have squandered our energy resources in recent years," said Sir **David,** "unless we use the time we still have to mend our image for posterity."

Turning to the oil industry, Sir **David** said that the maximum effort should be made to develop oil and natural gas resources in U.K. waters, both in the interest of security of supply and to help the balance of payments.

"The North Sea is full of promise," he went on, "and there is a tremendous incentive for further work." But only a continous, difficult and costly drilling program can decide for certain what oil is there. "Depending on the success of current and future exploration, the North Sea may by 1980 be producing enough oil as well as gas to provide a significant proportion of the U.K.'s requirements. The importance of success on this scale would be considerable, not only in terms of the balance of payments but in helping to restrain the producing governments in the Middle East and elsewhere from unreasonable demands."

The national fuel policy should therefore give the utmost encouragement to the oil companies to get on with the job. "It would be tragic if future development of the North Sea's evident potential in hydrocarbons were to be hamstrung by idealogical objections and unrealistic protests about 'excessive profits.' All the industry is asking for is the rate for the job." The best way to ensure the highest possible level of future exploration activity for gas under the North Sea was for producers to know that they would get the competitive market value for that gas.

As far as oil was concerned, Sir **David** said that the present system of granting licenses provided no guarantee that exploration effort was optimized. There should be a bar on speculators who made a bid and then sat on their acreage in the expectation that in due course they would be able to farm out their blocks to a genuine operator who had worked hard and found something next door.

"North Sea exploration should not be treated as a lottery," said Sir **David.** "What the U.K. energy economy requires is oil, not rent—oil in the shortest possible time to improve the balance of payments and security of supply position. I believe that this objective would be better served if applicants were required to tender exploration work programs, supported by promissory notes as a guarantee of good faith."

"In these relatively deep and turbulent waters the successful search for oil will depend increasingly on know-how and the availability of advanced engineering. The physical challenge is probably greater than anywhere else in the world. It is no place for beginners, but for prospectors with the technology, zeal and financial muscle to back their intent."

FOR SALE
DRY DOCK

10,000 Long Ton 5 Sectional Wooden Floating Drydock —each section	**80'-2" ± long**
Overall length including aprons	**463'-5"**
Length over pontoons	**413'-5"**
Beam (max.)	**117'-0"**
Clearance—	
Top of wingwalls	**96'-10" ±**
Bottom of wingwalls	**85'-6" ±**
Depth—Top of wingwall to bottom of pontoon	**50'-2"**
Depth of pontoons—Center	**14'-8"**
Sides	**14'-2"**
Draft (max.)	**35'-0"**
No load—Mean	**6'-3"**

Pumping Equipment—
Twenty (20) 40 H.P. Fairbanks-Morse vertical propeller type—4 per Dock section—electrically operated—440 volts, 60 cycle, 3 phase.

Dock completely overhauled in 1964 including increasing depth of wingwalls by adding 5' steel extension on top and adding steel pinned hinges between sections.

Condition—Good

GENERAL DYNAMICS
Quincy Shipbuilding Division
97 EAST HOWARD STREET
QUINCY, MASSACHUSETTS 02169
Department 847
Telephone: (617) 471-4200 Ext. 4106

FOR SALE

CONTROL YOUR TOW IN LEAD BARGE FROM WHEELHOUSE:

White Gill Bow Thrust Unit—32" Series 1 V.S.T. Standard Rotation complete with electrical remote controls, with an **Amarillo Model 7 BL Right Angle Gear Drive** (3:1 reduction ratio, clockwise rotation facing input shaft and clockwise rotation facing output shaft, with internal oil pump for supplying oil to cooler mounted on engine)

NEW—UNUSED
Discounted Substantially

GULF ATLANTIC TOWING CORPORATION
P.O. Box 4908 Jacksonville, Florida 32201
Telephone (904) 355-4543

RARE OPPORTUNITY TO SAVE ON PURCHASE OF 2 Used KAMEWA

Controllable Pitch
Propeller Systems.

Designed for 1500 H.P.
Each at 240 R.P.M.
Stainless Steel.
Lloyds and ABS Class.

Available for Immediate Inspection
at St. Louis, Missouri.

NATIONAL MARINE SERVICE
INCORPORATED
1750 S. Brentwood Blvd. • St. Louis, Mo. 63144
Telephone (314) 968-2715

FOR SALE

150' Army Type LT Tug, 16-567 GM Diesel Engine with towing winch, ABS classed, Panamanian Flag, excellent condition. For information call 601-762-3172 or 205-478-3970.

400 KW TURBO-GENERATORS

Turbine:
G.E. DORV 618—440 PSI—457° Superheat

Gear:
S 193 Form A—10059/1200 RPM

Generator:
400 KW—120/240 V DC—Type MPC—1200 RPM

6 Available — Excellent Condition
Suitable for Upgrading to 600 KW

NICOLAI JOFFE CORPORATION
San Francisco Branch
445 Littlefield Avenue (P.O. Box 2445)
South San Francisco, Calif. 94080
Phone (415) 761-0993 TWX 910-371-7248

BLACKBURN
PATENT
ROLLER BUTTON

- UP TO 19 SQ. INCHES OF STEEL SHEAR AREA (TWICE THE AREA OF COMPETITIVE MODELS)
- UNIQUE HIGH LIFT ANGLE DESIGN
- REFILLABLE LUBRICATION RESERVOIR

- CORROSION RESISTANT ARMOLOY WEAR SURFACES
- HARDENED STEEL ROLLER BEARINGS
- WELDABLE ALL STEEL BASE

BLACKBURN MARINE EQUIPMENT CO.
6105 England Houston, Texas 77021 AC 713/747-8140

FOR SALE

TOWBOAT HULL
142' 10" x 43' 11"

Excellent Condition.

Includes many
below deck auxiliaries.

St. Louis Ship built 1951.

Suitable for rebuilding.

NATIONAL MARINE SERVICE
INCORPORATED
1750 S. Brentwood Blvd. • St. Louis, Mo. 63144
Telephone (314) 968-2715

Attention Shipyards!

Whirley Crane

For Immediate Sale!

Washington Iron Works

MODEL 28H – 120K

Excellent condition, priced right!

Contact: Jay Zidell for details.

ZIDELL EXPLORATIONS, INC.
3121 S.W. Moody Ave., Portland, Oregon 97201
Phone: 228-8691, Code 503 — Telex: 36-568

BARGES ON THE SPOT

FOR CHARTER
Steel Deck Barges

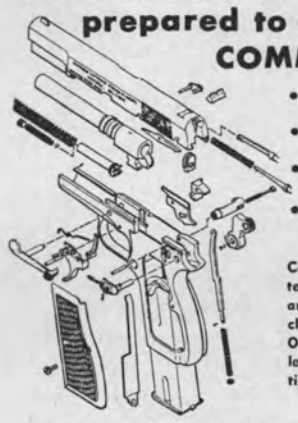
60' x 26'	120' x 32'	190' x 50'
100' x 28'	140' x 34'	195' x 35'
110' x 30'	150' x 34'	200' x 40'
110' x 40'	175' x 35'	269' x 50'

ALSO AVAILABLE:
Hopper—Offshore—Oil and Spud Barges

FOR SALE
110' x 30' x 7' Inland Deck Barge

McDONOUGH MARINE SERVICE
P. O. BOX 26206
NEW ORLEANS, LOUISIANA 70126/504-949-7586
BRANCH OFFICE: P. O. BOX 233 CHANNELVIEW, TEXAS 77530
PHONE HOUSTON 713-622-9977

TECHNICAL PUBLICATIONS
prepared to all MILITARY or COMMERCIAL SPECS



- Handbooks
- Parts Catalogs
- Training Manuals
- Provisioning Data

Complete operation, repair and maintenance manuals written, illustrated and printed for all types marine machinery, equipment and electronics. Our years of experience working with leading U.S. manufacturers saves you time and money.

call! **BENHOF INC.**
516/826-4618
2468 NORTH JERUSALEM ROAD
N.BELLMORE, NEW YORK 11710

RADAR— LORAN — RADIOS

Lease or purchase your equipment from the leader. All makes, new and reconditioned. Radars from $800, lorans $795, radios $165.

SEA-TRAC CORPORATION
114 HICKORY AVE., NEW ORLEANS, LA. 70123

MANUFACTURERS REPRESENTATIVES

Marine Electronics and Navigation Systems

We're seeking top-calibre representatives in the major sea ports of the world. Our exciting line consists of radar surveillance equipment (Aut-O-Watch) and satellite navigation and ship handling systems (Autonav). Products are sold through marine electronics dealers and in some cases on a direct basis. Unit sales range from $2,000 to $80,-000 per piece of equipment. Excellent commissions and training. Send qualifications, resume, other products handled, territory, etc. to Mr. Carl Shannon, Automated Marine International, 1652 Kaiser, Santa Ana, California 92627.

MARINE SUPERINTENDENT/INSPECTOR, age 40, resident in Belgium, University Degrees, Shipmaster Ocean going license, looking for permanent good paying position of responsibility in any European country with shipping or similar company. Experienced in operational and technical management, in shipbuilding supervision and ship's survey (both hull and machinery), and speaking main European languages. Will be free about January-February '72, sooner if absolutely necessary.

Box 1002 Maritime Reporter/Engineering News
107 East 31 Street New York, N.Y. 10016

ZIDELL EXPLORATIONS, INC.

(503) 228-8691
3121 S.W. Moody
Portland, Ore. 97201
Telex: 36-701

MARINE EQUIPMENT VALUES

AXIAL FLOW FANS

Rebuilt Guaranteed LaDel, STURTE-VANT etc.

In 440 AC, in 115 DC, and in 230 DC, and i nsizes 1 HP through 20 HP. Completely reconditioned.

EXAMPLE LISTING:

Size A¼	**Size A3**	**Size A8**
Size A½	**Size A4**	**Size A10**
Size A1	**Size A5**	**Size A12**
Size A2	**Size A6**	**Size A16**

SPERRY GYRO COMPASSES

SPERRY MARK 14, Model 1 Gyro Compasses, used, good, complete with Master Compass, with Binnacle, Amplifier panel, control panel, carbon pile voltage regulator, motor generator set, alarm panel, and repeaters with mounts.

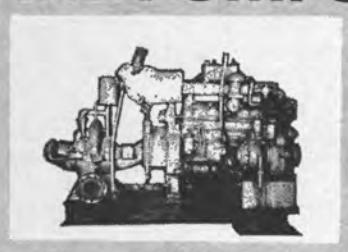
MARINE DIESEL ENGINES

GM 12-567A

6—GENERAL MOTORS Diesel Engines —Model 12-567A, 900 HP, 744 RPM, 3 port, 3 starboard, each complete with Falk Reverse Reduction Gear, 2.48:1 ratio.

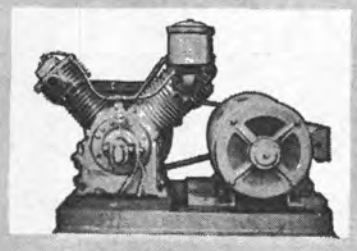
3—COOPER-BESSEMER Diesel Engines . . . Model L S-8-DR, 1300 HP, 277 RPM, direct reversing, turbo charged.

FIRE PUMPS



2—BUDA, Model 6-LD-468, Diesel Engines, 6 cylinders, 100 BHP, Marine, Gardner-Denver. centrifugal Pumps, Bronze, horizontally split case, 100 GPM, 280' head, 6" suction and 5" discharge.

AIR COMPRESSORS



2—GARDNER-DENVER, 150 CFM, 125 PSI, Class WB, Size 7x5¾x5, with Diehl Motors, 45 HP, 230 Volts DC, 870 RPM, 167 Amperes.

1—INGERSOLL-RAND, Size 5x5x4x 4, 50 CFM, 150 PSI, with G.E. Motor, 20 HP, 440/3/60.

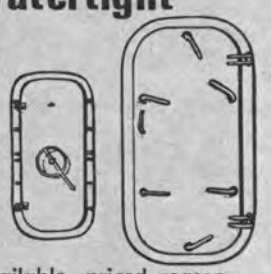
2—INGERSOLL-RAND, Size 4x1½x 3½, 10 CFM, 60 PSI, with Diehl Motor, 7½ HP, 120 Volts DC.

2—WESTINGHOUSE AIR BRAKE Steam, Size 11x11x12, approximately 60 CFM at 100 PSI.

1—INGERSOLL-RAND, Model 40B, 155 CFM, 110 PSI, 870 RPM, with 40 HP Motor, 230 DC.

1—WORTHINGTON, 20 CFH, 3000 PSI, 4 stage, 585 RPM, with Worthington Steam Turbine, 47 HP, 5502 RPM.

Steel Watertight DOORS



Used, Good Condition, Trimmed Frames.

Many sizes available, priced reasonable. Some Typical Prices shown below. Please Inquire for other sizes.

26"x48"-4 Dogs-$60.00 ea.
26"x57"-6 Dogs-$80.00 ea.
26"x60"-4 Dogs, 6 Dogs-$86.00 ea.
26"x66"-6 Dogs, 8 Dogs-$100.00 ea.
26"x66"-Q.A. Type-$175.00 ea.

CARGO HOISTER BLOCKS

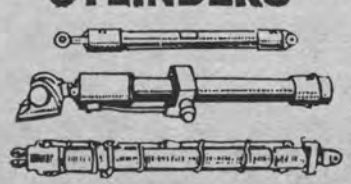
5 ton rated, Steel, as removed from surplus ships. Manufactured by: Young, Draper, etc., 12" & 14" sizes.

$34.50 ea. **39.50 each with pull test certificates**

Electro - Mechanical STEERING GEAR

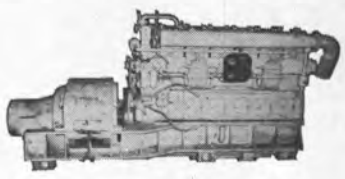
1—SPERRY No. 2, 5 HP, 230 Volts DC, complete with Steering Winch, Controller Panel, Ballast Resistor, Electro-Mechanical Steering Stand —with Steering Wheel (with Pull-out Knob).

HYDRAULIC CYLINDERS



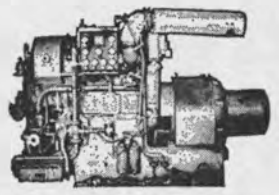
Bore	Overall Stroke	Rod Diameter	retracted length	Action
10"	12"	3.75"	45½"	double
10"	26"	3.75"	58½"	single
2"	8"	1½"	20"	double
2.5"	15"	1.12"	25½"	double
3"	8"	1.37"	15½"	double
6"	8'	4"	144"	double
13"	9'7"	5½"	14'	double

MARINE DIESEL GENERATORS



40—COOPER-BESSEMER, Marine . . . Model FSN 6, 6 cylinders, 375 HP, 900 RPM with General Electric generators, 250 KW 440/3/60.

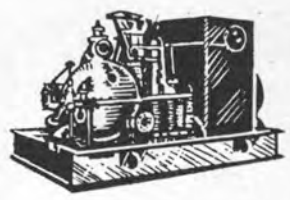
6—SUPERIOR Diesel Engines . . . Model GBD8 Marine, 150 HP, 1200 RPM, 8 cylinder, with Delco Generators, 100 KW, 120/240 DC.



1—GENERAL MOTORS, Model 3-268 A, Marine, 150 HP, 1200 RPM, 3 cylinder, with Westinghouse Generators, 100 KW, 450/3/60.

3—GENERAL MOTORS, Model 3-268 A, Marine, 150 HP, 1200 RPM, 3 cylinders, with Allis-Chalmers Generators, 100 KW, 120/240 DC.

TURBINE GENERATORS



1—GENERAL ELECTRIC, 525 PSI, with G.E. Generator, 250 KW, 440/3/60.

1—GENERAL ELECTRIC, with G.E. Generator, 350 KW, 440/3/60.

2—DeLAVAL, 360 HP, 440 PSI, 740°, with Crocker-Wheeler Generators, 250 KW, 240/120 DC, 1200 RPM.

1—WORTHINGTON, 225 PSI, 397°F, 6510 RPM, with Westinghouse Generator, 150 KW, 120 DC, 1250 Amperes.

6—WESTINGHOUSE, 200 PSI, with Westinghouse Generators, 60 KW, 120 DC.

4—ALLIS-CHALMERS, 440 PSI, 740°, with Allis-Chalmers Generators, 300 KW, 240/240 DC.

FALK REDUCTION GEARS

6—FALK Reverse Reduction Gears, 3 port, 3 starboard, as used with GM 12-567A Engines on LST vessels, ratio 2.48:1 ahead, 2.52:1 astern.

STERN ANCHOR WINCHES

3—ALMON A. JOHNSON Stern Anchor Winches as removed from LST vessels, line pull rating 100,000 pounds at 10 FPM in low gear, complete with Contractor Panels, Resistors, and Master Switches.

***DON'T MISS* ZIDELL'S 3-PAGE SPREAD**
...in Alternate Issues of the *Maritime Reporter!*

Contact: Ralph Ingram...ZIDELL Explorations, Inc...Phone: 503 / 228-8691...Telex: 36-701

TURBINES

ROTORS DIAPHRAGMS
GOVERNORS REDUCTION GEARS
MISC. PARTS

With A.B.S. Certificates

G.E. DORV 325	525 KW
G.E. DORV 325	300 KW
G.E. DS 60	300 KW
Worthington	300 KW
De Laval	300 KW
Hendy (Terry Design)	300 KW
Westinghouse (Victory type)	300 KW
Westinghouse	250 KW
Worthington	150 KW
Westinghouse CA 20	100 HP
G.E. Main Turbine Rotor T2	6000 HP
G.E. HP & LP Turbine C2	6000 HP
G.E. HP & LP Turbine	8500 HP
Westinghouse Turbine & Gear C4, C3 Some AP3	8500 HP

Complete Inventory List Free Upon Request

NICOLAI JOFFE CORPORATION
San Francisco Branch
P. O. Box 2445 445 Littlefield Ave.
South San Francisco, California
Phone (415) 761-0993 TWX 910-371-7248

USED ANCHOR CHAIN
15 Shots 2¾" Cast
Steel Stud Link—$70.00 per Ton
IVERSEN CONSTRUCTION COMPANY
P.O. BOX 6415, SAN JOSE, CALIF. 95125
Telephone (408) 227-0853

SOLD Through your CHANDLER

99.99+% pure **ZINC** For Cathodic Protection

Meets Military Spec. Mil-A-18001 (ships)
Anodes • Bars • Circles • Rings • Rods IN STOCK

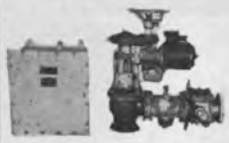
SMITH and McCRORKEN, Inc.
153 Franklin St. Dept. MR
New York 13, N. Y.
Call WA 5-2171
FOR FAST DELIVERY

UNUSED ALUMINUM BILGE EDUCTORS

4" Hose thread—suction; 2½" hose thread—discharge.

$129.50 EACH

THE BOSTON METALS COMPANY
313 E. Baltimore St. Baltimore, Md. 21202
539-1900 (301) 355-5050



AUTOMATIC SPRINKLER VALVES

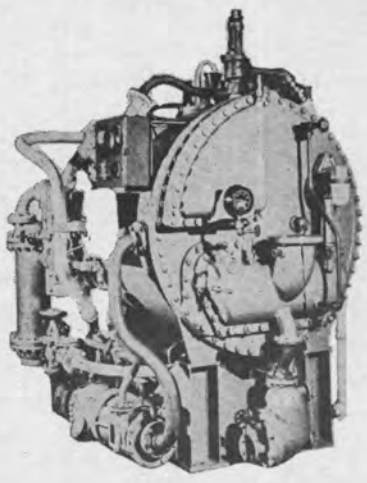
4" Bronze — 150 lbs.—Jenkins. Motor operated Fire Sprinkler Valve—with Ward Leonard reversing magnetic controller — 0.25 HP—440/3/60—1.7 amps.

THE BOSTON METALS COMPANY
313 E. Baltimore St. Baltimore, Md. 21202
539-1900 (301) 355-5050

EVAPORATOR PRICES

E-V-A-P-O-R-A-T-E

L.P. EVAPORATORS



Lowest Price Ever
Best Condition

JUST REMOVED FROM U. S. NAVY SHIPS
Mission "San Rafael" and Mission "Santa Cruz"

2 L.P. Bethlehem evaporators—bronze—with all pumps and controls. Automatic feed water control—salinity indicator cells. Always kept in top shape.

$11,750.00

1 AQUA CHEM 8000 GAL/DAY FLASH EVAPORATOR All pumps—salinity indicator cells. **$9850.00**

ALL ARE OFFERED RECONDITIONED AND TESTED TO A.B.S.

THE BOSTON METALS COMPANY

313 E. Baltimore St., Baltimore, Md. 21202 — Phone: (301) 539-1900 or 355-5050

M.G. SETS

5 KW — 120/1/60 A.C. — UNUSED
10 HP 115 VDC TO 5 KW 120 VOLTS
SINGLE PHASE AC

INPUT: 10 HP—115 volts DC — 78 amps — 1800 RPM.
OUTPUT: 5 KW—115 volts single phase A.C. 4-bearing —with 10 HP 115 volt D.C. magnetic starter.

FIRST TIME IN A LONG TIME THAT 5 KW UNITS ARE ON THE MARKET

STAR 3.5 KW MG SETS

INPUT: 7.5 H.P.—230 volts DC—27.5 amps—1800 R.P.M.
OUTPUT: 3.75 KW—120 volts 60 cycle—single phase—62.5 amps—0.5 P.F. Weight 1250 lbs.

NEW 0.25 KVA M.G. SET
BY SAFETY CAR
HEATING & LIGHTING CO.

INPUT: 0.65 HP—115 volts D.C.—4.6 amps—1800 R.P.M.
OUTPUT: 0.25 KVA 115/1/60—1800 RPM—2.7 amps—0.8 PF

$89.50 F.O.B.

THE BOSTON METALS COMPANY
313 E. Baltimore St. Baltimore, Md. 21202
539-1900 (301) 355-5050

New Watertight Doors

IMMEDIATE DELIVERY

6-Dog right and left hand hinged steel doors — with frames. Built and tested to A.B.S. specifications.

SIZES:
26" x 48" 26" x 57"
26" x 60" 26" x 66"
30" x 60"

THE BOSTON METALS COMPANY
313 E. Baltimore St. Baltimore, Md. 21202
539-1900 (301) 355-5050

— FOR SALE —

(2) T2 MISSION TANKER HULLS
FOR USE AS DRILL BARGE, DRILL RIG,
OIL STORAGE, MOORING DEVICE
OR OTHER NON-TRANSPORTATION SERVICE

MISSION SAN RAFAEL Located Beaumont, Tex.
MISSION SANTA CRUZ Located Baltimore, Md.

OAL 523'; Beam 68'0"; depth moulded 39'3"; deadweight tons 16,286; cargo tank capacity 141,286 barrels.

Contact: Harold B. Chait, Exec. V.P.

THE BOSTON METALS COMPANY
313 E. Baltimore St. Baltimore, Md. 21202
539-1900 (301) 355-5050

Link Belt Small Boat Winch

GEAR BOX: Link Belt—size DM-30—68 RPM output—ratio 25.63:1. MOTOR: Westinghouse type CS—style 7C4894—frame 225Y — class 1 — 2 HP—1720 RPM — 220/440/60/3—5.6/2.8 amps. With push button starter and magnetic controller. Wt. 320 lbs—duty 800 lbs @ 68 FPM.

$347.50

THE BOSTON METALS COMPANY
313 E. Baltimore St. Baltimore, Md. 21202
539-1900 (301) 355-5050

The Yellow Page

A CLASSIFIED DIRECTORY FROM NATIONAL METAL

691 NEW DOCK STREET, TERMINAL ISLAND, CALIFORNIA 90731 AREA CODE (213) 775-3321 • TELEX: TWX 213-548-0990

PERSONAL

★ Troubled? Desperate for ready-to-use replacement items? Call Jeff Feder ★
* * * **(213) 775-3321.** * * *

DIESEL GENERATORS

FAIRBANKS MORSE 1360 KW, 13800 Volts AC, 720 RPM with Fairbanks Morse Motor.

FAIRBANKS MORSE 560 KW, with 2400 Volts AC, 720 RPM Alternator. (COMPLETELY RECONDITIONED).

WESTINGHOUSE 250 KW, 240 Volts DC, 400 RPM with Cooper Bessemer Type J55 Diesel Engine.

WESTINGHOUSE 250 KW, 450 Volts AC, 900 RPM with Cooper Bessemer Diesel.

CROCKER WHEELER, 100 KW, 450 Volts AC, 1200 RPM with Superior Diesel Motor.

GENERAL ELECTRIC 100 KW, 450 Volts AC, 1200 RPM with General Motors Motor.

DELCO 60 KW, 450 Volts AC, 1200 RPM with General Motors 6-71 Engine. We have two of these. Make a package offer.

CENTURY 50 KW, 250 Volts DC, 1150 RPM with Cummings Diesel Motor.

ALSO 15 KW, 50 KW, 100 KW, 250 KW. Louis Allis, General Electric, Westinghouse, Crocker Wheeler, Century, General Motors. Call for details.

TURBO GENERATOR SETS FROM T-2, C-2, C-3, C-4, S-4 AND NAVY VESSELS

GENERAL ELECTRIC 400 KW, 450 Volts AC, 1200 RPM, Type DSN-55 Turbine, 6 stage, 9977 RPM, 525/575 Lbs. Steam Pressure.

GENERAL ELECTRIC 300 KW, DC, 120/240 Volts, 1200 RPM, 1250 Amps, Type MPC, Model 24G869, 3 Wire, Compound Wound. TURBINES: Type DS 60-25, 5636 RPM, 440 PSI, 40°F. REDUCTION GEARS: Ratio 5636/1200 RPM. COMPLETELY REBUILT. ABS CERTIFIED.

WESTINGHOUSE 200 KW, 450 Volts AC, 1200 RPM, DE Type 412 Turbine, 9989 RPM, Steam Pressure 410 Lbs.

ALSO 60 KW, 250 KW, 300 KW. Crocker Wheeler, DeLaval, Westinghouse Triple DC Generators, Allis Chalmers, Worthington, etc.

TURBINE ROTORS

FOR SALE. Excellent selection in excellent condition: T-2 MAIN FOR GENERAL ELECTRIC AND WESTINGHOUSE. 5400 KW. VICTORY SHIP MAIN TURBINE ROTOR CODE NN-4, C-2 LP AND ASTERN, T-2 ELLIOTT 6000 HP, C-3 GENERAL ELECTRIC LP AHEAD AND ASTERN. Call (213) 775-3321. Ask for Jeff. Complete Line.

STEAM PUMPS

SPECIAL. Ready to use selection for Ballast and Bilge, Lube Oil Service, Boiler Feed, Auxiliary Feed, Ballast and Fire, General Service, F.O. Transfer, Cargo Stripping, F.O. Service Standby.

UNION STEAM: 9 x 9 x 12, 9 x 9 x 17.

WORTHINGTON: 5 x 2¾ x 6, 6 x 2¾ x 6, 7 x 9 x 12, 9 x 7 x 18, 10 x 11 x 18, 11 x 7 x 18, 11 x 7 x 24, 14 x 14 x 12.

WORTHINGTON SIMPLEX: 8½ x 5¼ x 15, 10 x 7 x 10, 10 x 7 x 24, 12 x 8 x 24, 14 x 9 x 24.

WORTHINGTON DUPLEX: 10 x 7 x 10, 10 x 11 x 12, 10 x 7 x 24.

ALSO WILSON SNYDER 10 x 7 x 24, and WORTHINGTON SIMPLEX 8½ x 5¼ x 15.

TURBINE GENERATORS FOR T-2

(COMPLETELY RECONDITIONED).

* * * * * **PRICED TO SELL!** * * * * *

General Electric 6000 HP, Type TSM 80 Form HL, 2400 Volts. Three phase, 60 cycles. Serial Number 5690714.

STEERING UNIT PUMPS Hele-Shaw Pump, Westinghouse Motor Type CS 440 Volt, Size JLP12, RPM 850, Pressure 1000, 35 HP 880 RPM, 49 Amps, 3 Phase 60 Cyl.

TOPPING WINCHES Lakeshore Type T Model 5D Single Speed, General Electric 5 HP, Model 5AR254960, 440/3/60, 1100 RPM.

CARGO WINCHES Single Drum, Single Speed, General Electric, COM-1830-AEY, 230 Volt DC Motor.

GENERATOR SETS for C4 Winches as above. General Electric, 440 Volt AC/230 Volt DC, G.E. Model 6PC2096A1, Motor Type K, Frame 405S, 1770 RPM

FUEL OIL PUMPS Quimby Pump, Size 2½, RPM 1150, GPM 15, Press 325, General Electric, Model 5KF364PP1, 440 Volt 7½/3¾ HP, 1160/580 RPM

C-4 S1A TURBINE Bethlehem 17,500 SHP Low Pressure, Complete Falk Reduction Gear, 17,500 Shaft HP, 102 RPM Output, Complete with spares.

GENERAL ELECTRIC Rebuilt Starter Boxes, 440 Volts, From 2 HP to 50 HP

MAIN CONDENSATE PUMPS Ingersoll Rand, Type 2 VHM, 180 GPM, Westinghouse Motor, 440 Volts 25 HP, 1750 RPM 32-5 Amps

* * T-2 NEW - UNUSED * *

General Electric, 6000 HP, AC Motor New-unused, Type TSM-HL-80, Synchronous Type, 2300 Volts, 60 Cycles, 3 Phase, 1160 Amps 90 RPM

C-2 SB1 BRONZE PROPELLER

C-2 SBI RUDDERS

5, 10 AND 30 TON BOOMS

C-2 SAJ1 RUDDERS

C-3 RUDDER Reconditioned with ABS Certificate. Ingalls Hull #267.

CARGO WINCHES Nine pair, Single Drum, Single Speed, General Electric, COM-1830-AEY, 230 Volt DC Motor

CONDENSATE PUMP Warren Main, Type 4-2CVP-10 325 GPM, 50 RPM, 180 Foot TDH, Vertical with 25 HP, 440/3/60 Motor

SUPERHEATER HEADERS For Port-Boiler, CE Type V2M (two each) For Starboard-Boiler, CE Type V2M (two each)

BOILER HEADERS For Port-Boiler, CE Type V2M (three each) For Starboard-Boiler (three each)

ANCHOR WINDLASS

Manufactured by Webster Brinkley Co.
Model WNE-5 Vertical Type 23/16" Die Lock Chain. Two Wildcats. Two Capstans
Electric Powered 75 HP 230 Volt DC Motor with controls and motor brakes
Capstans designed for 10" circumference rope 90 FPM under load of 20,000 lbs.
Each wildcat and capstan can be operated simultaneously or separately
Electrical and Mechanical spares included

CIRCULATING PUMPS Warren Main, Type 24 MFP, 18,000 GPM, 690 RPM, 16 Foot TDH, Vertical with 150/38 HP 440/3/60 Motor with Spare Parts

VENTILATOR AND FORCED DRAFT BLOWERS. Axial Flow and Centrifugal. Sturtevant, Ladel, etc. AC 44 OV and DC 23 OV, 1,000 CFM to 16,000 CFM. Also 14,000 CFM Westinghouse, Turbine Driven.

BUSINESS OPPORTUNITY

National Metal has thousands of marine items originating from T-2, S-4, C-1, C-2, C-3, and C-4 vessels. Most have been completely reconditioned, many are ABS certified, all have been carefully inspected to assure their serviceability.

* *

★ **CALL NOW FOR FAST SOLUTIONS TO YOUR REPLACEMENT NEEDS.** ★

* *

National Metal AND STEEL CORP.

691 New Dock Street, Terminal Island, California 90731
Area Code (213) 775-3321 • Telex: TWX 213-548-0990

BUYERS DIRECTORY

AIR CONDITIONING AND REFRIGERATION—REPAIR & INSTALLATION
Bailey Refrigeration Co., Inc., 74 Sullivan St., Brooklyn, N.Y. 11231
Carrier Air Conditioning Co., Carrier Parkway, Syracuse, N.Y 13201
Union Carbide Corp., Linde Div., 270 Park Ave., N.Y., N.Y. 10017

ANCHORS AND ANCHOR CHAINS
Baldt Anchor Chain & Forge, P.O. Box 350, Chester, Pa. 19016
Lockstadt Co., Inc., 179 West 5th St., Bayonne, N.J. 07002

BEARINGS
BJ Marine Bearings, a Borg-Warner Industry, P.O Box 2709, Terminal Annex, Los Angeles, Calif. 90054
Glacier Metal Co. Ltd., Alperton, Wembley, Middlesex, England.
Johnson Rubber Co., Marine Division, Middlefield, Ohio 44062
Lucian Q. Moffitt, Inc., P.O. Box 1415, Akron, Ohio 44309
Waukesha Bearings Corp., P.O. Box 798, Waukesha, Wis. 53186

BOILERS
Babcock & Wilcox Co., 161 E. 42nd Street, New York, N.Y. 10017
Combustion Engineering, Inc., Windsor, Connecticut 06095

BOW THRUSTERS
Bird Johnson Co., 883 Main St., Walpole, Mass. 02081
Murray & Tregurtha, Inc., 2 Hancock St., Quincy, Mass. 02171

BUNKERING SERVICE
Gulf Oil Trading Co., 1290 Ave. of the Americas, N.Y., N.Y. 10019
Independent Petroleum Supply Co., 1345 Ave. of Americas, New York, N.Y. 10019
Refineria Panama, S. A. 277 Park Ave., New York, N.Y. 10017
The West Indies Oil Co., Ltd., St. John's Antigua, W. I.

BURNERS—Oil
Todd Products, Div. of Todd Shipyards Corp., Brooklyn, N.Y. 11231

CABLE ELECTRIC MARINE
Anixter-Harbor, Inc., 1050 Aladdin, San Leandro, Calif. 94577
Anixter-Netherands, Utrecht Gebouw, Coolsingel 75, Rotterdam 3002, Netherlands
Anixter-New York, 300 Executive Blvd., Elmsford, N.Y. 10523
Anixter-New Orleans, 315 Notre Dame, New Orleans, La. 70130
L. F. Gaubert & Co., 700 So. Broad St., New Orleans, La. 70150

CLUTCHES, GEARS & BRAKES
Amarillo Gear Co., 517 No. Polk St., Amarillo, Texas 79105
Eaton Corp., Industrial Drive Division, 9919 Clinton Rd., Cleveland, Ohio 44111
Wichita Clutch Co., Inc., Wichita Falls, Texas 76307

COATINGS—Protective
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144
Devoe & Raynolds Co., Inc., Subsidiary Celanese Coatings Co., 414 Wilson Ave., Newark, N.J. 07105
Enjay Chemical Company, 60 West 49th St., New York, N.Y. 10020
Farboil Company, 90 West St., N.Y., N.Y. 10006
Patterson-Sargent, P.O. Box 494, New Brunswick, N. J.
Spee-Flo Co., 4631 Winfield Rd., Houston, Texas 77039

CONTAINERS—CONTAINER HANDLING SYSTEMS
Ameron Corrosion Control Div., Brea, Calif. 92621
Lighter Aboard Ship, Inc., 225 Baronne St., New Oreans, La. 70112
Paceco, Div. Fruehauf Corp., 2350 Blanding Ave., Alameda, Calif. 94501
Star Iron & Steel Co., 326 Alexander Ave., Tacoma, Wash. 98421

CONTAINER LASHINGS & COMPONENTS
American Engineered Products Co., Box 74, McKees Rocks, Pa. 15136
W. W. Patterson Co., 830 Brocket St., Pittsburgh, Pa. 15233

CONTROL SYSTEMS
Galbraith-Pilot Marine Corp., 600 Fourth Ave., Brooklyn, N.Y. 11215
General Electric Industry Control Dept., Salem, Virginia
Henschel Corporation, 14 Cedar St., Amesbury, Mass. 01913
Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.

CORROSION CONTROL
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144
Radiator Specialty Co., 1400 Independence Blvd., Charlotte, N.C. 28205

CRANES—HOISTS—DERRICKS—WHIRLEYS
ASEA Marine, Rep. in U.S.A. by Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Conrad-Stork, Div. Stork-Werkspoor, P.O. Box 134, Haarlem, Holland
Hoffman Rigging & Crane Service, 560 Cortlandt St., Belleville, N.J. 07109
Kocks Pittsburgh Corp., Four Gateway Center, Pittsburgh, Pa. 15222
M.A.N. Maschinenfabrik Augsburg-Nurnberg AG, Werk Augsburg, West Germany
Paceco, Div. Fruehauf Corp., 2350 Blanding Ave., Alameda, Calif. 94501
Star Iron & Steel Co., 326 Alexander Ave., Tacoma, Wash. 98401

DECK COVERS (METAL)
Lockstad Co., Inc., 179 W. 5th Street, Bayonne, New Jersey 07002
Marine Moisture Control Co., 449 Sheridan Blvd., Inwood, N.Y. 11696

DECK MACHINERY—Cargo Handling Equipment
ASEA Marine, Rep. in U.S.A. by Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Fukushima, Ltd., 4 Yonbon-Cho, Chiyoda-Ku, Tokyo, Japan. (U.S. Rep. Alfred Conhagen, Inc., 172 Lyndhurst Ave., Staten Island, N.Y. 10305)
Garrett Corp., 9851 Sepulveda Blvd., Los Angeles, Calif. 90009
Markey Machinery Co., Inc., 79 S. Horton St., Seattle, Wash. 98134
Nashville Bridge Co., P.O. Box 239, Nashville, Tenn. 37202
Pacific Pipe Co., 49 Fremont St., San Francisco, Calif. 94080
Red Fox Machine & Supply Co., P.O. Drawer 640, New Iberia, La. 70560
A. G. Weser, Seebeckwerft, 2850 Bremerhaven 1, Germany
Western Gear Corp., Heavy Machinery Div., Everett, Wash. 98201

DIESEL ACCESSORIES
Golten Marine Co., Inc., 160 Van Brunt St., Brooklyn, N.Y. 11231
Kiene Diesel Accessories, Inc., P.O. Box 216, Franklin Park, Ill. 60131
A.G. Schoonmaker, Box 757, Sausalito, Calif. 95965
United Filtration Corp., 9600 John St., Santa Fe Springs, Calif. 90670

DIESEL ENGINES
Alco Engine Div., White Industrial Power, Inc., 100 Orchard St., Auburn, N.Y. 13021
Bruce GM Diesel, Inc., 180 Route #17 S. at Interstate 80, Lodi, N.J. 07644
Caterpillar Tractor Co., Industrial Div., 100 N.E. Adams St., Peoria, Ill. 61602
Colt Industries Inc., Power Systems Div., Beloit, Wisc. 53511
Electro-Motive Division General Motors, La Grange, Illinois 60525
Fiat, Turin, Italy, U.S.A. 375 Park Ave., New York, N.Y. 10022
Golten Marine Co., Inc., 160 Van Brunt St., Brooklyn, N.Y. 11231
M.A.N. Maschinenfabrik Augsburg-Nurnberg AG, Werk Augsburg, West Germany.
H. O. Penn Machinery Co., 1561 Stewart Ave., Westbury, N.Y. 11590

DIESEL ENGINE MUFFLERS
Marine Products & Engrg. Co., 20 Vesey St., New York, N.Y. 10007

DOORS—Watertight—Bulkhead
Overbeke-Kain Co., 209 Aurora Rd., Bedford, Ohio 44014
Pioneer Industries, 401 Washington Ave., Carlstadt, N.J. 07072
Walz & Krenzer, Inc., 20 Vesey St., New York, N.Y. 10007

ELECTRICAL EQUIPMENT
Arnessen Electric Co., Inc., 335 Bond St., Brooklyn, N.Y.
Galbraith-Pilot Marine Corp., 600 4th Ave., Brooklyn, N.Y. 11215
L. F. Gaubert & Co., 700 So. Broad St., New Orleans, La. 70150
Marine Industrial Products Co., 195 Paterson Ave., Little Falls, N.J. 07424
Merrin Electric, 162 Chambers St., New York, N.Y. 10007
Oceanic Electrical Mfg. Co., Inc., 159 Perry Street, N.Y. 10014
Pauluhn Electric Mfg. Co. Inc., P.O. Box 12805, Houston, Tex. 77017

EVAPORATORS
Bethlehem Steel Corp., Shipbuilding, 25 B'way, N.Y., N.Y. 10004
Mechanical Equipment Co., Inc., 851 Carondelet St., New Orleans, La. 70130

FITTINGS & HARDWARE
Nashville Bridge Co., P.O. Box 239, Nashville, Tenn. 37202
Robvon Backing Ring Co., 675 Garden St., Elizabeth, N.J. 07207

FLOATING EQUIPMENT—Steel—Aluminum Pontoons
Dravo Corporation, Neville Island, Pittsburgh 25, Pa.

GALLEY RANGES
S. Blickman, Inc., 536 Gregory Ave., Weehawken, N.J. 07087
Elisha Webb & Son Co., 136 So. Front St., Philadelphia, Pa. 19105

HEATERS—Ship
Todd Products, Div. of Todd Shipyards Corp., Brooklyn, N.Y. 11231

HULL CLEANING & BLASTING
Key Engineering, 12502 Woodthorpe Lane, Houston, Texas 77024
Trident Marine, 533 East 24th St., Brooklyn, N.Y. 11210
Vacu-Blast Corp., Box 885, Belmont, Calif. 94002

HYDRAULICS
Bird Johnson Co., 883 Main St., Walpole, Mass. 02081
Bond Hydraulic Equip. Service, Inc., 117 Monroe St., Hoboken, N.J 07030
Universal Hydraulics, Div. of Ohio Brass Co., 4500 Beidler Road, Willoughby, Ohio 44094
Vickers, M&O Div., Troy, Mich. 48084

INSULATION—Marine
Bailey Carpenter & Insulation Co., Inc., 74 Sullivan St., Bklyn, N.Y. 11231

LININGS
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144

MACHINERY MONITORS
IRD Mechanalysis, Inc., 6150 Huntley Rd., Columbus, Ohio 43229

MARINE DRIVES—GEARS
Philadelphia Gear Corp., Schuylkill Expressway, King of Prussia, Pa. 19406
Western Gear Corp., Industrial Products Div., P.O. Box 126, Belmont, Calif. 94003

MARINE NAVIGATION EQUIPMENT & AIDS
American Hydromoth Co., 55 Brixton Rd., Garden City, N.Y. 11530
Edo Western Corp., 2645 So. 2nd St., W. Salt Lake City, Utah 84115
Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913
ITT Decca Marine, Inc., 386 Park Ave. South, New York, N.Y. 10016
Marquardt Corp., 16555 Saticoy St., Van Nuys, Calif. 91406
National Marine Service, 1750 So. Brentwood Blvd., St. Louis, Mo
Radiomarine Corp., 20 Bridge Avenue, Red Bank, N.J. 07701
RCA Service Co., A Division of RCA, Marine Communications and Navigation Equipment Service, Bldg. CHIC-225, Camden, N.J. 08101
Sperry Marine Systems Div., Charlottesville, Va. 22901, Division of Sperry Rand Corp.
Star Lifeline, Ltd., 1148 W. 15th St., No. Vancouver, B.C., Canada
Tracor, Inc., 6500 Tracor Lane, Austin, Texas 78721

MARINE EQUIPMENT
Adsco Div., 34 Milburn St., Buffalo, N.Y. 14212
Nicolai Joffe Corp., P.O. Box 2445, 445 Littlefield Ave., So. San Francisco, Calif. 94080
Kearfott Marine (Div. of The Singer Co.) 21 West St., New York, N.Y. 10006
Merrin Electric, 162 Chambers St., New York, N.Y. 10007
Metritape, Inc., 77 Commonwealth Ave., West Concord, Mass. 01742
Stow Mfg. Co., 225 Shear St., Binghamton, N.Y. 13902
Vokes Filter Div., (Cardwell Machine Co.), Cardwell and Castlewood Rd., Richmond, Va. 23221

MARINE FURNITURE
Bailey Joiner Co., 115 King Street, Brooklyn, N.Y. 11231

MARINE INSURANCE
Adams & Porter, Cotton Exchange Bldg., Houston, Texas

MARINE PROPULSION
Buehler Corp., 9000 Precision Drive, Indianapolis, Ind. 46236
Combustion Engineering, Inc., Windsor, Connecticut 06095
General Electric Co., Marine Turbine & Gear Dept., Lynn, Mass. 01910
General Electric Co., Gas Turbine Dept., Schenectady, N.Y. 12305
Murray & Tregurtha, Inc., 2 Hancock St., Quincy, Mass. 02171
Port Electric Turbine Div., 155-157 Perry St., New York, N.Y. 10014
Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Western Gear Corp., Precision Products Div., P.O. Box 190, Lynwood, Calif. 90262

MARINE RADIO COMMUNICATIONS EQUIPMENT
Collins Radio Co., M/S 407-321, Dallas, Texas 75207
Communication Associates, Inc., 200 McKay Road, Huntington Station, N.Y. 11746
Electro-Nav, Inc., 555 Fifth Ave., New York, N.Y. 10017
Hose McCann Telephone Co., Inc., 524 W. 23rd St., N.Y. 10011
ITT Decca Marine, Inc., 386 Park Ave. South, New York, N.Y. 10016
Radiomarine Corp., 20 Bridge Avenue, Red Bank, N.J. 07701
Raytheon Co. Marine Products, 676 Island Pond Rd., Manchester, N.H. 03103
RCA Service Co., A Division of RCA, Marine Communications and Navigation Equipment Service, Bldg. CHIC-225, Camden, N.J. 08101
RF Communications, Inc., 1676 University Ave., Rochester, N.Y. 14610

NAVAL ARCHITECTS AND MARINE ENGINEERS
J. L. Bludworth, 4030 Wynne St., Houston, Texas
Breit Engrg. Inc., 441 Gravier St., New Orleans, La. 70130
Coast Engineering Co., 711 W. 21st St., Norfolk, Va. 23517
Crandall Dry Dock Engrs., Inc., 238 Main St., Cambridge, Mass. 02142
Cushing & Nordstrom, 50 Trinity Place, New York, N.Y. 10006
Arthur D. Darden, Inc., 1040 International Trade Mart, New Orleans, La. 70130
Sharp DeLong, 29 Broadway, New York, N.Y. 10006
Design Associates, Inc., 3308 Tulane Ave., New Orleans, La. 70119
Designers & Planners, Inc., 114 Fifth Ave., New York, N.Y. 10011
M. Mack Earle, 103 Mellor Ave., Baltimore, Md. 21228
Christopher J. Foster, 14 Vanderventer Ave., Port Washington, N.Y. 11050
Friede and Goldman, Inc., 225 Baronne St., New Orleans, La. 70112
Gibbs & Cox, Inc., 21 West St., New York, N.Y. 10005
John W. Gilbert Associates, Inc., 58 Commercial Wharf, Boston, Mass. 02110
Morris Guralnick, Associates, Inc., 583 Market St., San Francisco, Calif. 94105
J. J. Henry Co., Inc., 90 West St., New York, 10006
L. K. Homyer, Box 408, Corona Del Mar, California 92625
Hydranautics, 6338 Lindmar Dr., P.O. Box 1068, Goleta, Calif. 93017
C. T. Iloriucci & Associates, Tourism Pier #3, San Juan, Porto Rico 00902
James S. Krogen, 1460 Brickwell Ave., Miami, Fla. 33131
Littleton Research and Engrg. Corp., 95 Russell St., Littleton, Mass. 01460
Robert H. Macy, P.O. Box 758, Pascagoula, Miss. 39567
Marine Consultants & Designers, Inc., 308 Investment Insurance Bldg., Corner E. 6th St. & Rockwell Ave., Cleveland, Ohio 44114
Marine Design Inc., 1180 Ave. of Americas, N.Y., N.Y. 10036
Marine Design Associates, P.O. Box 2674, Palm Beach, Florida
Marine Mining & Engrg., Inc., P.O. Box 5032, Concord, Calif. 94520
Maritech, Inc., 38 Union Sq., Somerville, Mass. 02143
Rudolph F. Matzer & Associates, Inc., 13891 Atlantic Blvd., Jacksonville, Fla. 32225
John J. McMullen Associates, Inc., 110 Wall St., N.Y., N.Y. 10005
George E. Meese, 194 Acton Rd., Annapolis, Md. 21403
Metritape, Inc., 77 Commonwealth Ave., West Concord, Mass. 01742
Robert Moore Corp., 350 Main St., Port Washington, N.Y. 11050
Gunnar Nelson, 195 Paterson Ave., Little Falls, N.J. 07424
Nickum & Spaulding Associates, Inc., 71 Columbia St., Seattle, Wash. 98104
Ocean-Oil International Engrg. Corp., P.O. Box 6173, New Orleans, La. 70114
Pearlson Engineering Co., Inc., 8970 S.W. 87th Ct., Miami, Florida 33156
Potter & McArthur, Inc., 253 Northern Ave., Boston, Mass.
M. Rosenblatt & Son, Inc., 350 Broadway, New York, N.Y. 10013 and 657 Mission St., San Francisco, Calif.
George G. Sharp, Inc., 100 Church St., New York, N.Y. 10007
T. W. Spaetgens, 156 West 8th Ave., Vancouver 10, Canada

R. A. Stearn, Inc., 100 Iowa St., Sturgeon Bay, Wisc. 54235
Richard R. Taubler, 44 Court St., Brooklyn, N.Y. 11201
H. M. Tiedemann & Co., Inc., 74 Trinity Pl., New York, N.Y. 10006

OIL PURIFIERS—Repair
Peck Equipment Co., 3500 Elm Avenue, Portsmouth, Virginia 23704

OILS—Marine—Additives
Esso International Inc., 15 West 51 St., New York, N.Y. 10019
Ethyl Corp. Marine Div. Perolin Co., New York, N.Y. 10001
Gulf Oil Trading Co., 1290 Ave. of Americas, New York, N.Y. 10019
Humble Oil & Refining Co., Humble Building, Houston, Texas 77002
Mobil Oil Corp., 26 Broadway, New York, N.Y. 10004
Refinería Panama, S. A., 277 Park Ave., New York, N.Y. 10017
Shell Oil Co., 1 Shell Plaza, Houston, Texas 77002
Texaco, Inc., 135 E. 42nd St., New York, N.Y. 10017

PAINT—Marine—Protective Coatings
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144
Devoe & Raynolds Co., Inc., Subsidiary Celanese Coatings Co., 414 Wilson Ave., Newark, N.J. 07105
Enjay Chemical Co., 60 West 49th St., New York, N.Y. 10020
Farboil Company, 90 West St., New York, N.Y. 10006
International Paint Co., 21 West St., New York, N.Y. 10006
Mobil Chemical Company, Metuchen, N.J. 08840
Patterson-Sargent, P.O. Box 494, New Brunswick, N. J.
Woolsey Marine Industries Inc., 201 E. 42nd St., New York, N.Y. 10017

PETROLEUM SUPPLIES
Independent Petroleum Supply Co., 1345 Ave. of Americas, New York, N.Y. 10019
Refinería Panama, S. A. 277 Park Ave., New York, N.Y. 10017
Shell Oil Co., 1 Shell Plaza, Houston, Texas 77002
Texaco, Inc., 135 E. 42nd St., New York, N.Y. 10017
The West Indies Oil Co., Ltd., St. John's, Antigua, W. I.

PLASTICS—Marine Applications
Ameron Corrosion Control Div., Brea, Calif. 92621
Hubeva Marine Plastics, Inc., 390 Hamilton Ave., Bklyn, N.Y. 11231
Philadelphia Resins Co., 20 Commerce Dr., Montgomeryville, Pa. 18936
Rotocast Plastic Products, Inc., 6700 N.W. 36th Ave., Miami, Florida 33147

POLLUTION CONTROL
Enjay Chemical Co., 60 West 49th St., New York, N.Y. 10020
Uniroyal, Inc., 10 Eagle St., Providence, R.I. 02901

PORTS
Port of Galveston, P.O. Box 328, Galveston, Texas
Jacksonville Port Authority, 2701 Tallyrand Ave., Jacksonville, Fla.

PROPELLERS: NEW AND RECONDITIONED
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans La. 70150
Bethlehem Steel Corp., Shipbuilding, 25 Broadway, N.Y., N.Y. 10004
Bird-Johnson Co., 883 Main Street, Walpole, Mass. 02081
Coolidge Propeller Co., 1608 Fairview Ave. E., Seattle, Wash. 98102
Federal Propellers, 1501 Buchanan Ave. S.W., Grand Rapids, Mich. 49502
Ferguson Propeller, 1132 Clinton St., Hoboken, N.J. 07030

PUMPS
Coffin Turbo Pump/FMC Corp., 326 So. Dean St., Englewood, N.J. 07631
Colt Industries, Inc., Fairbanks Morse Pump & Electric Div., 3601 Kansas Ave., Kansas City, Kansas 66110
Goulds Pumps, Seneca Falls, N.Y. 13148
Houttin-Pompen N. V. Sophialaan 4, Utrecht, Holland
Worthington Corporation, Harrison, New Jersey 07029

RATCHETS
American Engineered Products Co., Box 74, McKees Rocks, Pa. 15136
W. W. Patterson Co., 830 Brocket St., Pittsburgh, Pa. 15233

REFRIGERATION—Refrigerant Valves
Bailey Refrigeration Co., Inc., 74 Sullivan St., Brooklyn, N.Y. 11231
York Corp., Grantley Road, York, Pa. 17405

ROPE—Manila—Nylon—Hawsers—Wire
American Mfg. Co., Inc., Noble & West Sts., Brooklyn, N.Y. 11222
Cating Rope Co., 309 Genesee St., Auburn, N.Y. 13022
Columbian Rope Co., 309 Genesee St., Auburn, N.Y. 13022
Du Pont Co., Room 31H1, Wilmington, Delaware 19898
Jackson Rope Corp., 9th & Oley, Reading, Pa. 19604
Samson Cordage Works, 470 Atlantic Ave., Boston, Mass. 02210
Tubbs Cordage Company, P.O. Box 709, Orange, Calif. 92669
Wall Rope Works, Inc., Beverly, N. J. 08010

RUBBER PRODUCTS—Dock Fenders, Hose, Life Preservers
Hughes Bros., Inc., 17 Battery Pl., New York, N.Y. 10004
Schuyler's Engineered Products Co., Box 87, Staten Island, N.Y.
Yokohama Rubber Co. Ltd., P.O. Box 46, Shiba, Tokyo 105, Japan

RUDDER ANGLE INDICATORS
Electric Tachometer Corp., 68th & Upland Sts., Phila., Pa. 19142
Galbraith-Pilot Marine Corp., 600 Fourth Ave., Brooklyn, N.Y. 11215
Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913
Hose McCann Telephone Co., Inc., 524 W. 23rd St., N.Y. 10011
Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.

SCAFFOLDING
Patent Scaffolding Co., 11-11 - 34th Ave., Long Island City, N.Y. 11106

SEALS
Syntron, Div. FMC Corp., 398 Lexington Ave., Homer City, Pa. 15748

SEARCHLIGHTS
Snelson Oilfield Lighting Co., 1201 E. Doggett St., Fort Worth, Texas 76104

SEWAGE DISPOSAL
Seapax, Inc., 3645 Warrensville Center Rd., Cleveland, Ohio 44122

SHAFT REVOLUTION INDICATOR EQUIP.
Electric Tachometer Corp., 68th & Upland Sts., Phila., Pa. 19142
Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913

SHIPBREAKING—Salvage
The Boston Metals Co., 313 E. Baltimore St., Baltimore, Md. 21202
National Metal & Steel Corp., 1251 New Dock St., Terminal Island, Cal. 90731
Northern Metal Co., Minor & Bleigh Sts., Philadelphia, Pa. 19136
Zidell Explorations, Inc., 3121 S. W. Moody St., Portland, Ore. 97201

SHIP BROKERS
Hughes Bros., Inc., 17 Battery Pl., New York, N.Y. 10004
Mowbray's Tug and Barge Sales Corp., 21 West St., N.Y., N.Y. 10006
Oaksmith Boat Sales, Inc., Fisherman's Terminal, Seattle, Wash. 98119

SHIPBUILDING STEEL
Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh, Pa. 15219
Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042
Bethlehem Steel Corp., 25 Broadway, New York, N.Y. 10004
Huntington Alloy Products, Div. International Nickel Co., Inc., Huntington, W. Va. 25720
International Nickel Co., 1 New York Plaza, New York, N.Y. 10004
United States Steel Corp., P.O. Box 86, Pittsburgh, Pa. 15230

SHIPBUILDING—Repairs, Maintenance, Drydocking
Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042
Astilleros Espanoles, S.A. Zurbano, 70, Madrid 10, Spain
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans La. 70150
Beliard Murdoch S. A., Kattendijkdok Westkaai 21, Antwerp, Belgium
Bethlehem Steel Corp., Shipbuilding, 25 Broadway, N.Y., N.Y. 10004
Blount Marine Corp., P.O. Box 360, Warren, Rhode Island 02885
Brodogradiliste "SPLIT", P.O. Box 107, Split, Yugoslavia
Conrad Industries, P.O. Box 790, Morgan City, La. 70380
Dillingham Corp., P.O. Box 3288, Honolulu, Hawaii 96801
Dravo Corporation, Neville Island, Pittsburgh 25, Pa.
Equitable Equipment Co., Inc., P.O. Box 8001, New Orleans, La. 70122
General Dynamics, Electric Boat Division, 99M Eastern Point Road, Groton, Conn. 06340
General Dynamics, Quincy Division, Quincy, Mass. 02169
Gotaverken American Corp., 39 Broadway, New York, N.Y. 10006
Grafton Boat Co., Inc., Grafton, Ill. 62037
Groignard Shipyards, P.O. Box 829 Colbert, Marseilles, France
Gunderson Bros. Engrg. Corp., 4700 N.W. Front St., Portland, Oregon 97208
Halter Marine Services, Inc., Route 6, Box 287H, New Orleans, La. 70126
Havre de Grace, Havre de Grace, Md.
Hillman Barge & Construction Co., Grant Bldg., Pittsburgh 19, Pa.
Hongkong & Whampoa Dock Co. Ltd., Kowloon Docks, Hong Kong
Industrial Steel & Mach. Works, Inc., P.O. Box 2217, Gulfport, Miss. 39501
Ishikawajima-Harima Heavy Industries Co., Ltd., 15 William St., New York, N.Y. 10005
Jacksonville Shipyards, 644 E. Bay St., Jacksonville, Fla. 32203
Jeffboat, Inc., Jeffersonville, Ind. 47130
Kawasaki Dockyard Co., 8 Kaigon-dori, Ikuta-ku, Kobe, Japan
Kelso Marine, Inc., P.O. Box 268, Galveston, Texas 77550
Kockums Malmo, Fack, Malmo, Sweden
Levingston Shipbuilding Co., P.O. Box 968, Orange, Texas 77630
LISNAVE, P.O. Box 2138, Lisbon, Portugual
Litton Industries, 9920 W. Jefferson Blvd., Culver City, Calif. 90230
Lockheed Shipbuilding and Construction Co., 2929 16th Avenue, S.W., Seattle, Wash. 98134
Maryland Shipbuilding & Drydock, P.O. Box 537, Baltimore, Md. 21203
Matton Shipyard Co., Inc., P.O. Box 428, Cohoes, New York 12047
Mitsui Shipbuilding & Engrg. Co. Ltd., 6-4, Tsukiji 5-chome, Chuo-ku, Tokyo, Japan
Mitsubishi Heavy Industries, Ltd., 5-1 Marunouchi 2-chome, Chiyoda-ku, Tokyo, Japan
Nashville Bridge Co., P.O. Box 239, Nashville, Tenn. 37202
National Steel & Shipbuilding Corp., San Diego, Calif. 92112
Newport News Shipbuilding and Dry Dock Co., Newport News, Va.
Northwest Marine Iron Works., P.O. Box 3109, Swan Island, Portland, Oregon 97208
Nuclear Service & Construction Co., Inc., 9296 Warwick Blvd., Newport News, Va. 23607
O.A.R.N. (officine Allestimento e Riparazioni Navi) Genoa, Italy
Paceco, Div. Fruehauf Corp., 2350 Blanding Ave., Alameda, Calif. 94501
Perth Amboy Dry Dock Co., Perth Amboy, N.J. 08862
St. Louis Shipbuilding—Federal Barge, Inc., 611 East Marceau, St. Louis, Mo. 63111
Sasebo Heavy Industries Co., Ltd., New Ohtemachi Bldg., Chiyoda-ku, Tokyo, Japan
Sembawang Shipyard (Pte) Ltd., P.O. Box 3, Sembawang, P.O. Singapore, 27
Star Shipyards, Ltd., 61 Duncan St., New Westminster, Vancouver, B.C., Canada
Sumitomo Shipbuilding & Machy. Co., Ltd. 2-1 Ohtemachi 2-chome, Chiyoda-ku, Tokyo, Japan
Teledyne Sewart Seacraft, P.O. Box 108, Berwick, La. 70342
Todd Shipyards Corp., 1 State St. Plaza, New York, N.Y. 10004

SHIP MODEL BASIN
Hydronautics, Incorporated, Laurel, Maryland 20810

SHIP ROUTING
Weather Routing, Inc., 90 Broad Street, New York, N.Y. 10004

SHIP STABILIZERS
Maritech, Inc., 38 Union Sq., Somerville, Mass. 02143
John J. McMullen Associates, Inc., 110 Wall St., N.Y., N.Y. 10005
Sperry Marine Systems Div., Charlottesville, Va. 22901, Division of Sperry Rand Corp.

STEAM GENERATING EQUIPMENT
Combustion Engineering, Inc., Windsor, Connecticut 06095

STEVEDORING
Luckenbach Steamship Co., 120 Wall Street, New York, N.Y. 10005
M. J. Rudolph Corp., 8 Sackett St., Brooklyn, N.Y. 11231

SWITCHBOARDS
Hose McCann Telephone Co., Inc., 524 West 23 St., N.Y., N.Y. 10011

TOWING—Lighterage, Transportation, Barge Chartering
Bay-Houston Towing Co., 805 World Trade Bldg., Houston, Texas 77002
Curtis Bay Towing Co., Mercantile Bldg., Baltimore, Md. 21202
Henry Gillen's Sons Lighterage, West End Ave., Oyster Bay, N.Y. 11771
James Hughes, Inc., 17 Battery Pl., New York, N.Y. 10004
Jackson Marine Corp., P.O. Box 1087, Aransas Pass, Texas 78336
McAllister Bros., Inc., 17 Battery Pl., New York, N.Y. 10004
McDonough Marine Service, P.O. Box 26206, New Orleans, La.
Moran Towing & Transportation Co., Inc., 17 Battery Place, New York, N.Y. 10004
L. Smit & Co., 11 Broadway, New York, N.Y. 10004
Suderman & Young Towing Co., 329 World Trade Center, Houston, Texas 77002
Tidewater Marine Service, Inc., 3308 Tylane Ave., New Orleans, La. 70119
M. & J. Tracy, Inc., 1 Broadway, New York, N.Y. 10004
Turecamo Coastal and Harbor Towing Corp., 1752 Shore Parkway, Brooklyn, N.Y. 11214

VALVES AND FITTINGS—Hydraulic—Safety Flanges
Bettis Corp., 3100 Fall at Grand Blvd., Houston, Texas 77021
Hubeva Marine Plastics-Lining, 435 Hamilton Ave., Brooklyn, N.Y. 11231
Marine Moisture Control Co., 449 Sheridan Blvd., Inwood, N.Y. 11696
Mechanical Marine Co., Inc., 900 Fairmount Ave., Elizabeth, N.J. 07207

WIRE ROPE
Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042
Bethlehem Steel Corp., Bethlehem, Pa. 18018
United States Steel Corp., P.O. Box 86, Pittsburgh, Pa. 15230

ZINC
Smith & McCrorken, 153 Franklin St., New York, N.Y. 10013

Star karricon out performs them all.

40-Ton Container and General Cargo Crane with Extra Back Reach and Load Handling with Apron Luffed—South Carolina State Ports.

40-Ton Container and General Cargo Crane with Horizontally Extendable and Retractable Boom.

30-Ton Ship or Barge Mounted Container and General Cargo Crane.

33.5-Ton Fixed Tower Luffing Boom Container and General Cargo Crane and Handling System for Feeder Port Facility.

Star Karricon is manufactured and sold in the U. S. by Star Iron & Steel Co., producers of Starporter container, bulk and general handling systems for over 55 years.

Performance records for Star Karricon in European and United Kingdom ports have proved its leadership as the most efficient straddle carrier around. It boasts an unbelievably fast average container handling cycle of 2½ minutes at a distance of 500 yards. For minimum ship turnaround time and maximum profitability, its got to be Star Karricon. Here's why:

High Speed Operation. Two-speed hydrostatic drive provides high speed acceleration and travel over long distances. Fast hoist speed with precise inching control shortens pickup and lift movements.

Great Maneuverability. Will clear and stack containers three high. Adjustable telescopic spreader handles all size containers—even when they're twisted, on uneven ground or in close quarters.

Easy Maintenance & Repairs. Full access to all service areas. No extra equipment needed. Hoist and drive motors are replaceable with modular units.

Maximum Driver Control. Four wheel steering, drive and braking give maximum safety and minimum container damage. Operator's cab has full visibility.

Excellent Versatility. Easily adaptable to a large variety of industrial applications, especially abnormally long loads such as steel coils, beams and timber.

For immediate action call or write.

STAR IRON & STEEL CO.

326 Alexander Avenue/Tacoma, Washington 98421 Telephone (Area Code 206) 627-9131 Telex No. 327 453

East Coast Representative: Robert Moore Corporation/350 Main Street, Port Washington, N.Y. (zip code 11050) (Area Code 516) 883-7660

Southeastern Representative: John Blake Engineering & Sales Co./P.O. Box 99, Picayune, Miss. (zip code 39466) (Area Code 601) 798-7895

"When that storm hit, I thought I'd lost my tow for sure —any other rope would have parted."

When the McAllister Towing Company first decided to use new blue-tinted Super 707 nylon rope, they didn't know what was in store for them. Captain Frank Bradley was to make a routine trip hauling two heavily laden mud dumpers. Out at sea, a sudden storm caught the captain and his tow. The load put on the Super 707 rope was so great that the heavy-duty-steel thimble was bent. Yet the line held. And everybody and everything got back safely.

The large lines of Super 707 nylon now available are the strongest ever made per unit of weight. In a recent test, the breaking strength of a 3-inch-diameter rope of Super 707 exceeded the Military Spec (MIL-R-17343-D) for nylon by *twenty tons*—although it contained less nylon than permitted by that spec.

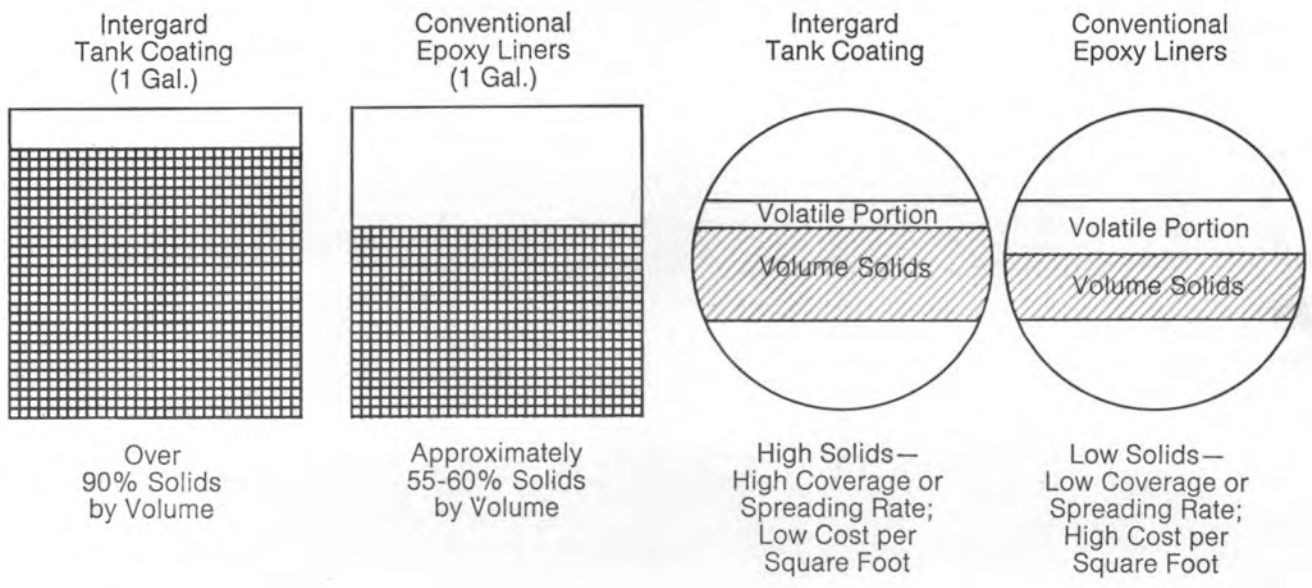
And what that means to you is a tougher, more reliable rope. A longer-lasting rope—with greater resistance to abrasion.

So get Super 707 nylon rope. It's the tough one—tinted blue so you'll know it. For more information, write: Du Pont Company, Room 31H1, Wilmington, Delaware 19898.

DU PONT
REG U.S. PAT OFF

Intergard® Tank Coating Systems can save you as much as 35% in material costs.

Their high-volume solids are the reason why.



These illustrations tell the story. Using the volume solids of a coating is now widely accepted as the only meaningful method which will give a true estimate of the material costs on a square foot basis. And when you approach your jobs this way, you'll see why Intergard Tank Coatings can mean significant savings.

But there are a number of other reasons you should use them, too.

Intergard Tank Coatings are unique. Applied at over 90% solids, they provide maximum corrosion prevention in tanks, cargo holds, bilges and ballast tanks. They are characterized by terminal epoxy groupings which combine with the tank coating reactor to form a continuous coating of extreme durability, hardness and high gloss. This results in a porcelain-like finish so smooth and compact that most cargoes will not adhere, so only a minimum amount of clean-up and lay-up time is necessary before taking on the next cargo.

Intergard Tank Coatings, in addition to being approved for sophisticated cargo/ballast service, are also approved for potable water tanks and meet the requirements of other regulatory bodies for the carriage of edible products.

Intergard Tank Coatings are extremely economical to apply as only two coats are needed and special primers are not required since one coat acts as the priming coat for the other. Any voids or holidays are easily detected by color difference between the two coats.

Intergard Tank Coatings offer excellent adhesion to a variety of surfaces and unsurpassed tenacity to sand-blasted steel and most shop primers. They also provide high chemical and petroleum resistance, superior acid and alkaline resistance, excellent abrasion resistance, both fresh and salt water resistance, heat resistance and superior retained flexibility characteristics. An advantage in maintenance can also be realized because Intergard Tank Coatings can be readily butter-worthed or cleaned with a variety of detergents without danger of softening or damaging the coatings.

So for savings of 35% or more in material costs and for a top quality job, contact our nearest office for complete details on Intergard Tank Coating Systems, today.

International Red Hand® Marine Coatings™

A Division of International Paint Company, Inc.

World's Largest Marine Paint Makers 21 West St., New York/S. Linden Ave., S. San Francisco/3915 Louisa St., New Orleans