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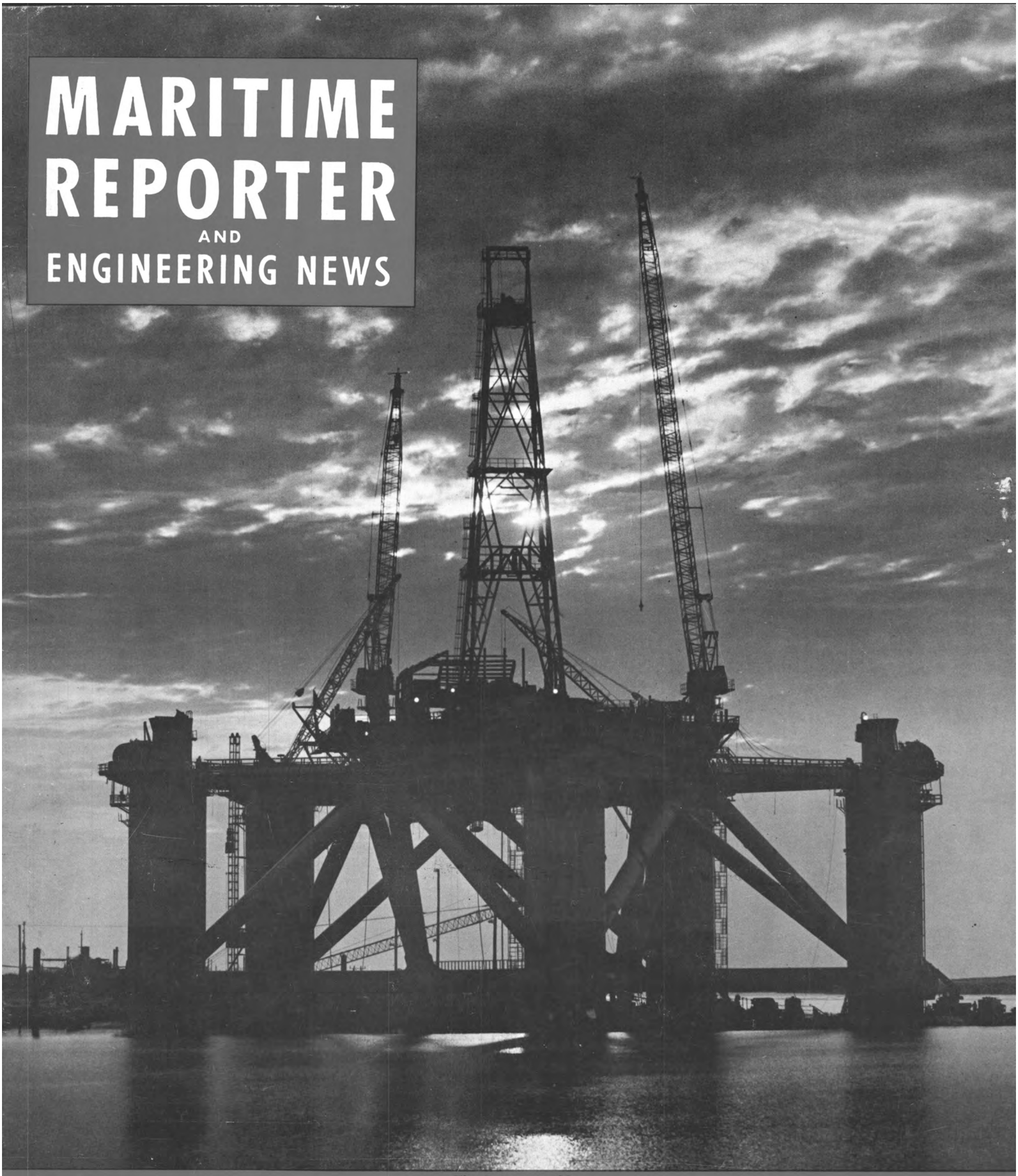
ENGINEERING NEWS



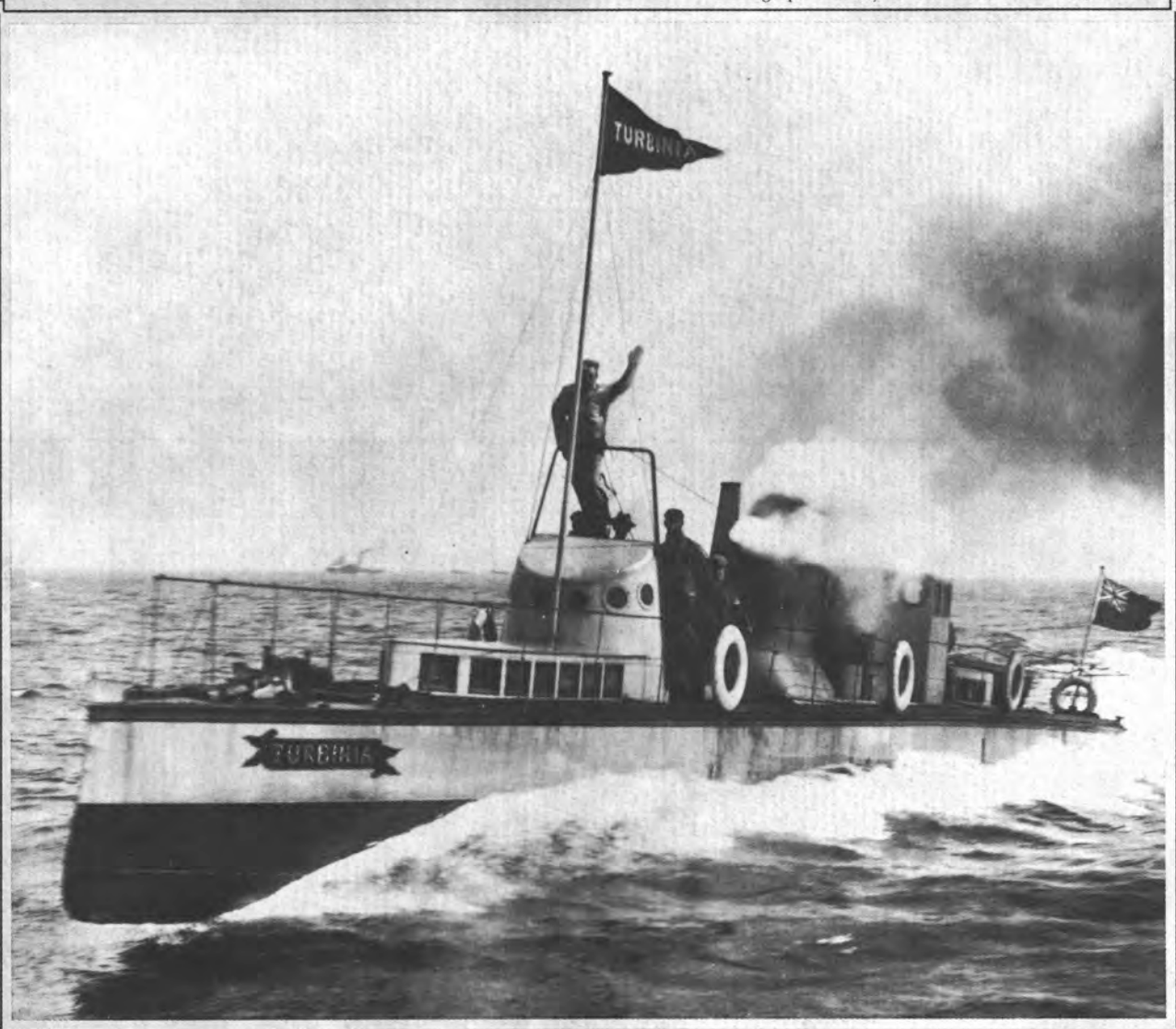
The Pentagone 82

First Offshore Drilling Platform Commissioned At Marathon's New Gulf Marine Division Shipyard

(SEE PAGE 9)

OCTOBER 1, 1973

Photograph courtesy of The Science Museum, London.



"What is it? Where did it come from?"

The year was 1897. The occasion, the naval review celebrating the DIAMOND JUBILEE OF QUEEN VICTORIA.

Suddenly there dashed out among the assembled ships a small craft scooting along at the then incredible speed of 34½ KNOTS.

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The "TURBINIA" was only 100 ft. long with a 9 ft. beam, and although it was a sensation, it was some time before Parsons could persuade commercial ship owners to take an interest in his invention.

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British Yards Report Record Orders For Second Quarter Of '73

United Kingdom shipbuilding statistics issued at the end of July show that tonnage contracted by the yards during the second quarter of the year was the highest yet recorded.

Orders secured totaled 106 merchant ships of 1,993,000 gross tons which, together with 64 ships of 1,293,000 gross tons in the first quarter, makes 170 merchant ships of 3,286,000 gross tons for the first six months of the year.

Ships for overseas registration accounted for 14.1 percent of the 1,000,000 compensated tonnage booked during the second quarter of this year.

Lockheed Shipbuilding Awarded $1.5 Million For Work On Tanker

A contract for drydocking work involving alterations and installations to the USNS Passumpsic, a tanker, was awarded Lockheed Shipbuilding and Construction Co., Seattle, Wash.

Amount of the fixed price contract awarded by the U.S. Navy's Military Sealift Command, Pacific, which has its headquarters at Oakland, Calif., is $1,496,552.

Africans Order Three Tuna Seiners From Tacoma Boat

Tacoma Boatbuilding Co., Inc., Tacoma, Wash., has been awarded an $11.5-million contract by Senegal, Africa, for the construction of three tuna seiners. The 170-foot boats will feature a new design that will give the vessels increased power from two engines through a single shaft.

Publication Available On Economics Of Big Ship Transportation

The National Academy of Engineering is releasing a new book on the economies of transportation due to the new, huge superships coming into service throughout the world. The book "Transportation and the Prospects for Improved Efficiency," by **Harry C. Brockel** of the Center for Great Lakes Studies at the University of Wisconsin, is available through the academy's printing and publishing office, 2101 Constitution Avenue, Washington, D.C. 20418.

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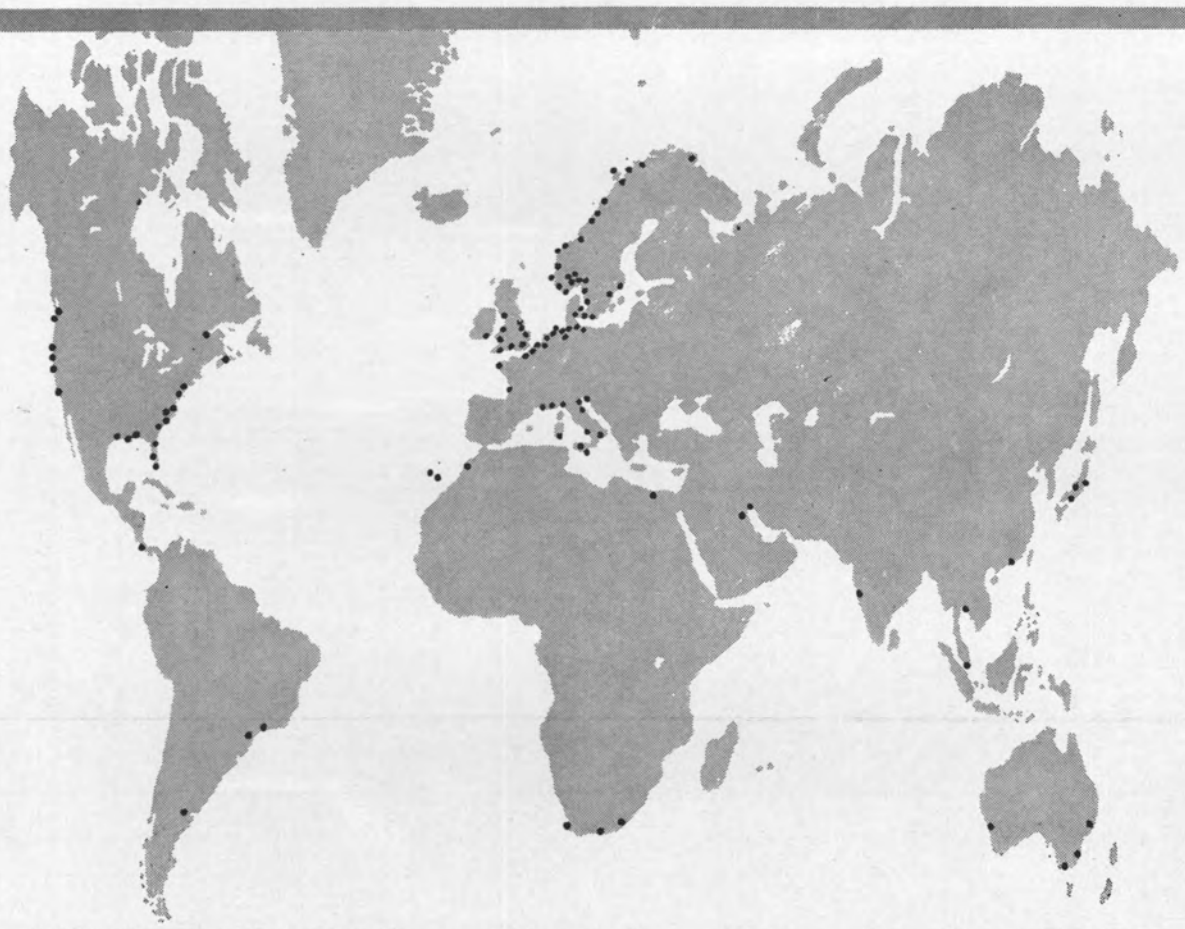

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General Electric Credit And Leasing Appoints J.L. Puckett

Jerry L. Puckett

Jerry L. Puckett has been appointed as a marine specialist salesman with the Houston, Texas, office of General Electric Credit and Leasing Corporation. Mr. **Puckett** has 10 years of experience with the company in marine financing, and has worked with General Electric Credit and Leasing in New Orleans, La., Dallas, Texas, and Seattle, Wash.

Waterman Seeks Subsidy To Build 4 77,500-Dwt OBOs

An application requesting Government funds to cover the proposed construction of four 77,500-dwt ore/bulk/oil carriers (OBOs) has been filed with the Maritime Subsidy Board by Waterman Marine Corporation.

The New York-based corporation said the company is now in negotiations on where and when the ships might be built.

A subsidiary of the company, Waterman Steamship Corp., also made a filing with the Subsidy Board for operating differential subsidies to cover up to 30 sailings annually between the United States and the Far East. The operating differential subsidies would apply to breakbulk vessels, which are eventually due to be replaced by the lighter-aboard-ship (LASH) vessels.

Waterman also asked that its ODS contract on Gulf to Far East sailings, due to expire in 1975, be replaced with a long-term ODS agreement.

$22,500,000 Order To Govan Shibuilders For Two Bulk Carriers

Britain's Govan Shipbuilders, the successor company to Upper Clyde Shipbuilders, has won an order of about $22,500,000 for two standard-design Cardiff-class bulk carriers.

The 26,000-ton vessels, ordered by the East Asiatic Company of Denmark, are due for delivery in 1975 and brings Govan's total order book to 15 ships worth about $150,000,000.

Earlier this year, the company joined forces with the World-Wide Shipbuilding Group of Hong Kong to establish a Far East agency for the sale of standard-design ships.

Contracts Signed For Giant Drydock Complex For Dubai

Vessels of up to 1,000,000 tons will be able to use a giant drydock complex scheduled to be built soon at Dubai on the Arabian Gulf at a cost of £90,000,000 (approximately $220,000,000).

Agreements for the construction of the complex, one of the world's largest, were signed in London on September 12 by representatives of the Dubai Dry Dock Company and Richard Costain and Taylor Woodrow, construction groups.

Providing berths for eight very large carriers (VLCCs) and drydock accommodation for million-ton tankers, the complex will cost Dubai an estimated £91,000,000. Besides repair and maintenance facilities, the scheme also embraces a 4,000 meter breakwater and necessary support buildings for engineering, stores, general service and administrative offices.

The project is in line with Dubai's policy of investing revenue from her oil resources in facilities for future commercial development —in this case the coming of the first million-ton oil tanker.

Consulting engineers for the project are Sir William Halcrow and Partners. Financial arrangements are being undertaken by the London merchant bankers Lazard Brothers and Company.

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COMMISSIONING—The Pentagone 82, a semi-submersible offshore drilling rig weighing more than 10,200 tons, during the recent commissioning ceremonies at the Gulf Marine Division shipyard of Marathon Manufacturing Company, located in Brownsville, Texas.

First From Its New Shipyard

Gulf Marine Division Of Marathon Commissions The Pentagone 82

PENTAGONE 82 COMMISSIONING OFFICIALS—On the platform at Brownsville, Texas, back row (from left), **John Austin III,** who issued the call to commissioning; **Gene M. Woodfin,** president, chief executive officer, Marathon Manufacturing Company; **Georges Barthe,** president, Forex Neptune; **Jack R. Hilder,** Gulf Marine Division, Marathon, and **Pierre Cordey,** Forex Neptune. Front row (from left), **Sylvie Langle,** flower girl; **Mrs. Hilder; Mme. Barthe,** ship sponsor, and **Mme. Cordey.**

The first offshore drilling platform to be built at the new Gulf Marine shipyard of Marathon Manufacturing Company was commissioned recently during colorful ceremonies held at this Port of Brownsville, Texas, shipyard. The huge semisubmersible rig, weighing more than 10,200 tons, was built for Sea and Land Drilling Contractors, Inc., who will operate it in the North Sea.

Christened, Pentagone 82, this semisubmersible platform is a sister-ship of Pentagone 81 which has operated in the North Sea for the past three years. Five other Pentagone platforms are currently under construction throughout the world for various owners. One of these units, Pentagone 84, is destined for Triton Industries, Inc.

This platform design has demonstrated exceptional qualities of seaworthiness, safety and drilling stability during the last unusually stormy winters in the North Sea.

Sea and Land Drilling Contractors, Inc., is a subsidiary of Schlumberger who also owns Triton Industries, Inc. Schlumberger first extended its activities into the drilling industry by acquiring partial ownership of Societe Forex, a French company specializing in drilling on land. Forex had created an offshore drilling company which was incorporated in France and named Neptune as a joint venture with another French drilling company. In 1970 Schlumberger acquired full interest in Neptune.

Pentagone 82 is 325 feet long, 338 feet wide and has an overall height of 317 feet. The machinery and deck levels are supported on five columns, each 31 feet in diameter. At the base of each column is a circular pontoon 70 feet in diameter and 23 feet high. The rig has been given the classification of B4 by Lloyd's Register of Shipping.

When being towed, the rig will have a draft of approximately 24 feet. In the drilling position, the draft is approximately 72 feet. The unit has its own propulsion system to assist when under tow.

The Pentagone platform was designed by the Institut Francais du Petrole and Societe de Forages en Mer Neptune of Paris, France.

The design criteria for the drilling rig is for 79-foot waves with a wave period of 15½ seconds and to withstand wind speeds of 138 miles per hour. The natural periods of the sea would produce a motion of a 20 second heave period and a roll and pitch period of 32.40 seconds.

The Pentagone 82 is designed to operate in water depths up to 660 feet.

The Pentagone 82

The main deck of the Pentagone 82 has an area of 25,030 square feet including the helicopter platform. All of the accommodations and machinery spaces are located under the main deck on two decks which are approximately the same size.

To assist during towing operations and for maneuvering while on the drilling site there are two 2,000-hp 120-inch fixed propellers, mounted in Kort nozzles, at the base of the after columns and one 750-hp 80-inch steerable propeller on the bow column. This system allows omni-directional propulsion assistance and develops a maximum thrust of 68 tons in the bow-aft direction.

When in operation the rig is moored by 10 lines, two from the top of each column. Each mooring consists of a mooring winch with 660,000 pounds holding capacity, 5,000 feet of 2¾-inch anchor line and a 30,000 pound anchor.

Mounted at the forward end of the main deck are two cranes, each having a lifting capacity of 20,000 pounds at a 125-foot radius. Mounted at the top of the two after columns are auxiliary cranes with a capacity of 6,600 pounds at 100 feet.

The main power plant consists of four diesel-electric, alternating-current generator sets with S-12-E-1-GW GM engines and G.E. A|C

(Continued on next page)

Pentagone 82—

(Continued from page 9)

generator. Each has a continuous rating of 1,500-hp/1050-kw, 480 volt at 60 cycles. GECO-Baylor static rectifiers supply direct-current for the draw works (three 1,000-hp electric motors), the rotary (one 800-hp electric motor), two mud pumps (two 800-hp electric motors each), and one auxiliary mud pump (one 350-hp electric motor). The emergency generator is rated at 250 kw, 480 volt and 60 cycles.

The draw works is an EMSCO model C-3 fitted with ELMAGGO 7838 auxiliary brake and a Crown "O" Matic protector. The rotary table is an independently driven EMSCO model T-3750. The derrick is an EMSCO 148 feet by 36 feet type with 1,150,000 pounds API capacity. The heave compensator is a VETCO hydraulic-motion compensator system having a 400,000 pound maximum string capacity and a 15-foot stroke.

There are two 1,600-hp triplex mud pumps, supercharged. Each pump is driven by two d-c electric motors. The auxiliary mud pump is rated at 375 hp and is of the duplex type. There are six Mission centrifugal mixing pumps for supercharging, transfer, degasser and desilter operations. There are five mud pits with a total capacity of 2,440 barrels.

For bulk mud and cement storage there are eight 1,645 cubic feet pressure tanks, each with weight indicator, three surge tanks equipped with weight indicators and BJ mud auto-mixer.

The cementing system consists of two Dowell GR. 10,000 psi W.P. pumps and two centrifugal mixing pumps.

The blowout prevention system consists of one 20¾-inch single ram plus single bag-type preventers of 2,000 psi c.w.p., 22-inch integrated marine riser, one 13⅝-inch double rams (10,000 psi c.w.p.) plus single-bag (5,000 psi c.w.p.) preventer, and a 16-inch integrated marine riser.

There are four 60,000 pounds, each, with a 40-foot stroke marine riser tensioners for 1½-inch wire and four 14,000 pounds, each, with a 30-foot stroke guide line tensioners for ¾-inch wire.

There are two BOP hydraulic control systems, providing 100 percent redundancy, with one 240-gallon accumulator unit with electric and air pumps and mixing tank and one 10,000 psi test system.

The rig is equipped with a Schlumberger electric logging unit.

An Aqua-Chem, Model S.300 SPE.E. sea-water distillation unit provides all fresh-water requirements.

The living quarters accommodate 74 people in fully air-conditioned spaces and is designed to take care of tropical and subarctic conditions.

The 6,461 square foot helicopter deck provides an unobstructed area for S.61 and Super Frelon helicopters. This landing pad is outfitted with nets, lights, a beacon and a 1,000-gallon releasable fuel tank.

The life-saving equipment consists of two 35-man life boats, six 6-man inflatable life rafts, ten 6-man rafts and four escape nets.

ONE OF FIVE—Each of the columns has a diameter of 31 feet 4 inches and a pontoon at the foot measuring 70 feet in diameter and 23 feet in height. It is 134 feet from the base of the pontoons to the main deck. The draft when under tow is 24 feet and during drilling operations the draft is 72 feet. The horizontal bracing tubes have a diameter of 8½ feet and a diagonal of 7¼ feet. The platform forms the upper tie.

Marathon Manufacturing Company

The Marathon Manufacturing Company is primarily a manufacturer of industrial metal products. The product mix of the company is diversified. In addition to mobile offshore-drilling platforms, it includes heavy off-highway equipment, service boats, towboats, chemical carriers, crane and deck barges, railroad tank and hopper cars, reinforcing bars, pre-engineered steel buildings and other products.

Marathon Manufacturing Company is the evolution of a company incorporated in 1959 under the Small Business Investment Act as Mid-Atlantic Small Business Investment Company — the third largest in the United States. The following year, the firm's name was changed to Business Funds, Inc., still retaining its license as an SBIC.

Prior to 1967, Business Funds' basic activities consisted of making investments in the equity capital and long-term debt securities to such concerns, and the financial administration of their investments, including consultancy and advisory services.

In July, 1967, Business Funds voluntarily withdrew its license to operate as a Small Business Investment Company, and a year later began a program of expansion and diversification. This program continues today.

In January, 1969, Business Funds, Inc. deregistered under the Investment Company Act of 1940 and became an operating company in the area of basic manufacturing. Also in 1969, the firm's name was changed to that of today—Marathon Manufacturing Company.

Marathon expanded in the marine field and obtained facilities and developed products in the ensuing years. The firm launched its first self-contained, self-elevating mobile offshore drilling platform in 1956. From this modest beginning, Marathon has become a world leader in the manufacture of these rigs with building facilities at Vicksburg, Miss.; Brownsville, Texas, Scotland and Singapore. In addition, support facilities for this production are maintained at Longview, Texas, and Vicksburg. A key to Marathon's pre-eminence in the offshore drilling platform business was its development of the dependable electro-mechanical elevating system.

Marathon entered the semi- submersible and drill-ship construction phases of offshore petroleum exploration in 1971.

To better support the increased demand of the world's petroleum industry in its continuing search for natural energy reserves, Marathon built a $25 million total capability shipyard at Brownsville, Texas, and acquired a world-famous shipyard at Clydebank, near Glasgow.

In 1971, the $25 million expansion program was launched at Marathon's Brownsville shipyard facility. The installation covers some 133 acres and includes a 2,500-foot frontage on the Brownsville Ship Channel with more acreage and frontage available for future expansion. With a work force of approximately 2,200 people, this facility excels in engineering and fabrication to manufacture and launch semi-submersible drilling platforms, workboats, tugs, supply vessels, chemical carriers and oth-

(Continued on next page)

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The Rucker Company	Tensioning System
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Hance Industries	Ventilation and Air-Conditioning Installation
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Rig-A-Lite Division of Esquire	Derrick and Deck Lighting
Metal Arts Division of Dixilyn	Elevators
Inter Equipment Co.—supplied by Peden Iron & Steel	Water Purification Unit

er seagoing vessels. The facility has more than a quarter-of-a-million square feet of covered working area and a 1,700 by 500 foot building and launching slip.

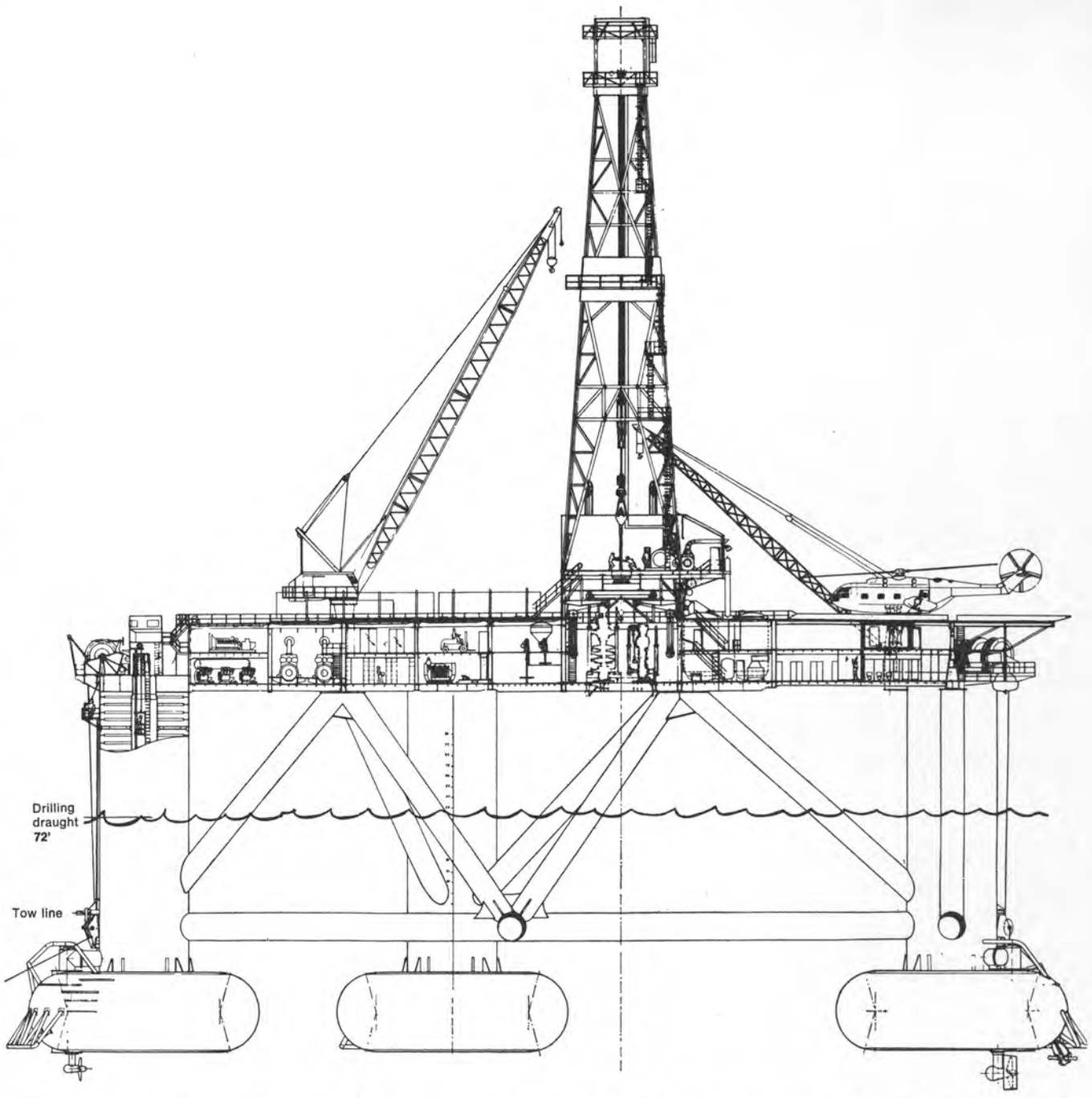
The latest addition to Marathon's marine capabilities is the former John Brown Shipyards on 61 acres of the River Clyde at Clydebank near Glasgow, Scotland. These shipyards were acquired in mid-1972 and immediately brought on stream to better service the petroleum industry's exploration of underwater reserves in the North Sea. Total reconstruction of the facilities, where the noted Queen Elizabeth liners were built, was undertaken concurrently with the start-up of construction on the first two offshore drilling platforms commissioned for the yard.

With expansion underway, the Marathon Scotland Shipyard will have the capability of constructing and fabricating several vessels and offshore platforms simultaneously. A fully equipped machine shop, steel-fabrication shop, hydraulic transfer and launch system and crane systems for ship construction will make the Marathon yard one of the most modern in the industry.

At the Marine Division, Vicksburg, Miss., Marathon manufactures mobile offshore-drilling platforms, operational in depths well beyond the limits of other bottom-supported equipment. Distinguishing features of these platforms are high mobility, self-contained design, self-elevating, open-truss legs and rugged hull construction, continuous bearing tank and mat development. The site includes 426,000 square feet of manufacturing area and 2,769 acres. Also manufactured here are other marine and heavy handling equipment, gear reductions and heavy forgings.

Marathon Shipbuilding is located on a 1,000-foot frontage at the Vicksburg Harbor Canal. Since it opened its doors in 1965, the yard has built towboats, offshore supply vessels, barges and work-over drilling rigs among other products. On its dry dock, the firm has repaired oceangoing vessels, towboats and a variety of floating equipment. The dry dock is 65 feet between wing walls and 130 feet in length. Strategically located adjacent to the Port of Vicksburg, Marathon Shipbuilding has lifting capabilities of up to 125 tons, which allows the yard to specialize in marine construction and fabrication.

Marathon Offshore PTE., Ltd. in the Republic of Singapore has completely new and modern facilities on 35 acres and a 2,370-foot deep-water frontage. With over 800 highly trained and experienced employees, this facility features covered, fully integrated fabrication areas as well as concrete launching facilities for self-elevating platforms and other vessels and marine equipment. The facility is equipped and manned to handle everything from the smallest repair or maintenance job to the construction of oceangoing vessels and floating stock.



PROFILE PLAN—This profile plan shows the rig in operating condition. The plan shows the Kort-nozzle-type fixed propellers, one on each stern pile, and the steerable propeller on the single bow pile. All work areas and quarters are within the platform.

THE SHIPYARD—The Gulf Marine Division is located on a 133-acre tract on the Brownsville, Texas ship channel. The facility has more than a quarter-of-a-million square feet of covered work area and a side-launch slip 1,700-feet long by 500-feet wide. The Pentagone 82 is to the left in the photo. This one facility of Marathon Manufacturing Company employs 2,000 workers.

New Subsidy Bids Boost MA's Backlog To Over $6 Billion

The Maritime Administration has received applications for subsidy to build nine tankers, bringing its already record backlog of subsidy bids up to nearly $6.4 billion and well over 100 ships.

Three of the latest applications cover the very large crude carriers (VLCCs) class. They were submitted by Bernuth, Lemcke Co., Inc., New York, N.Y. That company, which has a one-ship Liberian-flag operation (Bernuth Tankers Inc.), plus one active U.S.-flag company (Eppinger and Russell Co.), expects its 270,700 deadweight tonners to cost some $80 million each. No builder has been chosen. They will be time-chartered for carriage of petroleum products worldwide, the application said.

Subsidy for smaller tankers (two of 89,700 dwt each) is sought by Fuel Transport Inc., Rutherford, N.J., a new company formed by **Michael G. Mitchell** and **George Dafkalopoulos,** both of Penn Shipping Co. The ships, expected to cost $30 million each, were said to be intended to haul oil into the United States.

America Trading Transportation Co., a subsidiary of American Trading and Production Corp., asked for subsidy for two 89,000-dwt tankers to bring oil from Africa to U.S. Atlantic and Gulf ports. No cost estimate was given, but the applicant said the ships would be built by Maryland Shipbuilding and Drydock Co., Baltimore, Md.

Bernuth and Fuel Transport also indicated that operating subsidy would be asked for later.

An earlier applicant for construction subsidy for a 40,000-dwt lumber-phosphate carrier, National Shipping Corp., has advised the board it, too, will seek operating subsidy for its Canada-U.S. East Coast service.

The latest three applications brought MarAd's backlog to 12 of the under 100,000-dwt tankers, 33 of the VLCCs, 20 combination ore/bulk/oil (OBO) carriers, 25 liquefied natural gas carriers (LNGs), 10 tug-barges, 6 chemical carriers, 7 dry bulks, and 1 mini lighter-aboard-ship type.

Ralph Clack Named President Of Skagit

Ralph A. Clack

Ralph A. Clack has been appointed president and chief executive officer of the Skagit Corporation, Sedro-Woolley, Wash., a wholly owned subsidiary of The Bendix Corporation.

Mr. **Clack** succeeds **Murray Weingarten,** who had held the post for the last two years. The appointment was announced by **Donald S. Jones,** president of the Bendix Industrial Group. Skagit is a part of that group.

Mr. **Clack** was formerly president and general manager of the Lorain Division of the Koehring Company, Chattanooga, Tenn., a major producer of cranes and excavating equipment.

He joined Lorain in 1964 as a product manager, was named sales manager in 1966, and in 1968 became vice president of marketing. He was promoted to president and general manager in 1970.

Other positions Mr. **Clack** has held include vice president of operations for the O.R. Burden Construction Corp., Tulsa, Okla., from 1962 to 1964, and sales posts for the Euclid Division of General Motors Corp. and the Bucyrus-Erie Co.

Mr. **Clack** is a 1951 graduate of the Georgia Institute of Technology, Atlanta, where he earned a bachelor of science degree in civil engineering.

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Promotions And Management Changes Announced By Newport News Shipbuilding

A number of management changes, including promotions for four men and structural changes that consolidate certain functions and improve organization and communications through several echelons, were announced by **John P. Diesel,** president and chief executive officer of Newport News Shipbuilding, Newport News, Va.

It was also announced by Tenneco Inc., parent company of the shipyard, that **R.E. McGee,** president, has assumed the additional duties of chairman of the board of Newport News Shipbuilding. As board chairman, he replaces **L.C. Ackerman,** who recently resigned.

"These changes," Mr. **Diesel** said,, "are the final step in a reorganization program that was begun last year and carried out in several phases. The overall effect of the program is to strengthen our management controls and improve our reporting procedures."

Mr. **Diesel** pointed out that a main point of the reorganization program is a delegation of authority that had been centered in his office. "We will be delegating more authority at several levels to those we find capable of assuming the added responsibility," he said.

Mr. **Diesel** also announced that **John R. (Jack) Kane,** vice president in charge of engineering, is taking early retirement effective next January 1.

Promotions, effective September 1, went to the following:

L. Felix Bledsoe, chief design engineer in the machinery design division, becomes director of engineering and research, succeeding Mr. **Kane.**

David B. Benadof, director of management and technical services, becomes director of production control and material management.

John P. Moran, manager of facilities planning, becomes director of facilities, replacing **F.V. Daly,** who moves to the recently created commercial ships division to resolve complex welding problems anticipated in the construction of cryogenic containers.

Messers **Bledsoe, Benadof** and **Moran** will report to Mr. **Diesel.**

C. Wayne Hasty, manager of community affairs, becomes director of public relations. He replaces **Robert B. Terrell,** who will become a liaison man with Tenneco's Washington office and handle other matters related to state and Federal laws and regulations as they affect the shipyard.

A major aspect of the changes is a management realignment which streamlines the executive echelons by causing fewer people to report directly to the president.

"This improvement will conserve my time and bring about a more orderly and efficient method of decision-making and internal communications," Mr. **Diesel** said.

F. Hunter Creech, secretary and general counsel, acquires the additional assignment of community affairs director, and three of the positions previously reporting to Mr. **Diesel** will now be under Mr. **Creech.** Those involved in this change are **W.L. Robertson,** assistant to the chief executive officer, who will continue to work on special projects and also work in the field of marine insurance; **Y.B. Williams Jr.,** a member of the president's staff, who will handle community relations, and Mr. **Hasty,** the new director of public relations. Mr. **Terrell** will also report to Mr. **Creech.**

As a result of two other changes, **Harry Monroe Jr.,** director of production control and planning, will report to Mr. **Benadof,** and **D.B. Thomas,** director of employee development, will report to **D.T. Savas,** vice president in charge of personnel and industrial relations.

"I am pleased to announce that **Jack Kane** has agreed to stay on until the end of the year to help ease **Felix Bledsoe** into his new and demanding responsibilities," Mr. **Diesel** said.

Mr. **Kane** came to the shipyard in 1936, shortly after receiving his engineering degree from the University of Michigan. In 1940, he took a master's degree from the Massachusetts Institute of Technology.

He held a variety of engineering assignments, becoming assistant chief engineer in 1955, chief engineer in 1957, and director of engineering in 1966. Last January, he was named vice president in charge of engineering.

"We are fortunate to have a man like **Felix Bledsoe** with us," Mr. **Diesel** said. "He has long service and wide shipbuilding experience, and I am sure that his competence will serve him well in his new position."

Mr. **Bledsoe,** a 1940 graduate in mechanical engineering from the Alabama Polytechnic Institute, joined the shipyard that year and was assigned to the machine shop. He moved to the machinery design division in 1962 as assistant chief engineer, and four years later he was named chief engineer.

"Dave Benadof's new assignment is of special importance," Mr. **Diesel** said, "because it represents a consolidation of all the yard's material functions, including purchasing, transportation and material control, as well as production control. This consolidation will give us a more efficient flow of materials and a more systematic process from raw materials to finished product."

Mr. **Benadof** holds a bachelor of science degree from the University of Houston and a master's degree from Rice University. He joined Tenneco at Houston in 1960 and was with Tenneco Oil Company until 1968, when he moved to corporate computer systems as a staff advisor. He was transferred to the shipyard in January 1972 as director of management and technical services.

Mr. **Moran** took his civil engineering degree from Villanova University in 1960. He was with the U.S. Navy's facilities engineering command until 1965 and with the engineering consulting firm of Tippetts - Abbett - McCarthy - Stratton until 1971. He was a project manager with National Bulk Carriers, Inc. at the time he joined Newport News Shipbuilding last January. Mr. **Moran** also holds a master's degree in business administration from the City University of New York.

Mr. **Hasty** holds a bachelor's degree in journalism from Northwestern University, and in 1962 he received a master's degree in journalism, with a major in public relations, from Ohio University. He joined the shipyard in 1962, was appointed assistant advertising and publicity manager five years later, and became community affairs manager in 1969.

NKK Contracts To Build Two 360,000-Dwt Tankers For Esso

Contracts have been signed between Esso Tankers Inc., an affiliate of Exxon Corporation, and Nippon Kokan Kabashiki Kaisha, Japan, for the construction of two 360,000-dwt-type crude oil carriers.

The 45,000-hp turbine-driven tankers, which are scheduled to be constructed by NKK at its Tsu Shipyard, will be delivered in 1976 and will be used in Exxon's international tanker service.

Conference On LNGs To Be Held Oct. 23-24

A conference on ocean transportation of liquefied natural gas, covering vessel design and construction, financing, chartering, classification and safety will be held in London, October 23-24, according to the Shipbuilding & Shipping Record, sponsor of the event. Further details on the conference may be obtained from the publication at 33-39 Bowling Green Lane, London, EC1R One, England.

U.S. Freight Subsidiary Appoints Robinson Vice Pres. - Chartering

William B. Robinson

William B. Robinson has been appointed vice president-chartering of U.S. Freight Transport Development, Inc., ship brokerage subsidiary of United States Freight Company, according to an announcement by **G. Russell Moir,** chairman and chief executive of the parent, a holding company with diverse intermodal transportation-distribution interests.

Mr. **Robinson** joins USFTD from East West Chartering Company, New York, where he had been vice president since 1969. Previously, he had been New York broker for Algo Faros Shipping, Ltd., for two years. Mr. **Robinson** began his shipping career in 1953 with Kerr Steamship Company, New York, where he was chartering manager before joining Algo Faros in 1967.

A native of New York City, Mr. **Robinson** received his bachelor of arts degree from Manhattan College in 1951, following Army service in Korea, where he was pier supervisor at Pusan.

P.J. Collins Named Personnel Supervisor Cliffs' Marine Dept.

Peter J. Collins has been named marine personnel supervisor for The Cleveland-Cliffs Iron Company, Cleveland, Ohio, according to **Richard P. Eide**, manager, marine department.

A native Clevelander, Mr. **Collins** graduated from John Carroll University in 1968 with an A.B. degree in sociology. Following service with the U.S. Army where he attained the rank of first lieutenant, Mr. **Collins** joined Cliffs' marine department as marine personnel assistant in 1971.

65,000th Container Delivered To Sea-Land

Sea-Land Service, Inc. announced that it has accepted delivery of its 65,000th container, thereby increasing an inventory already the largest in the shipping industry. Delivery of the latest batch of containers climaxes a program in which during the last six months more than 10,000 units have been obtained by the line.

The Sea-Land fleet, consisting of 73 ships, has a total capacity of 21,000 thirty-five and forty-foot boxes.

Boeing Selects Litton's Amecom Div. To Build ESM System For Navy

Litton Industries' Amecom Division, College Park, Md., has been selected by the Naval Systems Division of Boeing Aerospace Company to build the electronic support measures (ESM) system for the U.S. Navy's two new Patrol Hydrofoil Missile (PHM) ships.

John Freitag, Amecom president, said the PHM ESM system will employ receiver/processing techniques that enable high probability of signal detection, precision bearing measurements, mission programmability, low false alarm rate and low system price.

The Amecom system will be derived from an existing receiver system design being produced for the Navy's E-2C aircraft. Mr. **Freitag** said the design of the E-2C system was established on a functionally modular basis so it could be scaled up or down in capability and price, depending on the required application. This would eliminate R&D cost for new applications and still afford state-of-the-art capability, according to Mr. **Freitag.**

Amecom is a major supplier to growing Government requirements for electronic warfare, and ships' electronic systems, radio navigation, radio communications and telecommunications systems.

First In New Series For Charlie Slater Launched At Halter Marine Fabricators

Red Beard is powered by 2 Stork FBHD engines rated at 1,200 metric bhp each at 900 rpm.

The supply vessel Red Beard was recently launched by Halter Marine Fabricators at Moss Point, Miss.

The 176-foot by 38-foot by 14-foot vessel is being built by Halter Marine for Euro-Pirates International, Inc. of New Orleans, La. It is the first in a series of vessels being built for **Charlie Slater,** better known as Champagne Charlie, a New Orleans hotel owner (French Quarter Inn).

The new vessel is powered by two Stork FBHD engines rated at 1,200 metric brake horsepower each at 900 rpm with a free running speed of 12 knots. She swings two stainless-steel four-bladed propellers, 90 inches in diameter, with two ABS-grade forged-steel propeller shafts, 8 inches in diameter.

The Red Beard is equipped with a bulk mud system comprised of four vertical tanks with a total capacity of 2,800 cubic feet of dry bulk mud.

She is also equipped with two M.W.M. engines driving 100-kw generators. The vessel is fitted with two 2,500-pound anchors with a total of 1,980 feet of 1⅛-inch high-strength chain.

The hydraulic steering system, furnished by Steering Systems, Inc., incorporates two steering stations—one in the pilothouse and one aft of the pilothouse.

In keeping with the Champagne Charlie tradition, all interior bulkheads, toilet fixtures, refrigeration, freezer, etc., are champagne yellow.

The Red Beard is completely air-conditioned and heated and is equipped with a built-in walk-in cooler and freezer.

She is equipped with a complete engine alarm system which allows monitoring of all engines while in operation from the pilothouse, and also from the engine room.

Certified by the American Bureau of Shipping for A-1 and Full Ocean Service, she is also certified by the U.S. Coast Guard.

Upon delivery, the Red Beard is scheduled to service the offshore oil and mineral industry off the coast of Brazil.

Appleton Machine Names Emery VP Marine Engineering

D.V. Emery

The promotion of **D.V. (Red) Emery** to vice president-marine engineering has been announced by **Jule J. Baudhuin,** vice president and general manager of the Appleton Marine Division of the Appleton Machine Company.

Mr. **Emery** has been the division's chief engineer since 1971, with responsibility for all areas of marine engineering. Prior to that, he spent over 13 years in the marine deck machinery field in an executive and engineering capacity.

Mr. **Emery** received his B.S. degree in mechanical engineering from Michigan Technological University in 1958. He is presently a member of the board of managers of the Alumni Association for the University, and is a member of The Society of Naval Architects and Marine Engineers, the American Welding Society, and the American Society for Testing and Materials.

The Marine Division of Appleton Machine Company, Appleton, Wis., markets a complete line of marine deck auxiliary equipment such as mooring winches, capstans, cranes, fairleads and related products.

C-E Appoints Edward M. Norman To Managerial Post

Combustion Engineering, Inc., Windsor, Conn., has appointed **Edward M. Norman** manager, shop-assembled boiler sales. Based in Windsor, Mr. **Norman** will report to **Harold Massey Jr.,** director, sales and marketing for C-E Industrial Boiler Operations, a unit of the C-E Industrial Group.

With C-E since 1935, Mr. **Norman** will be responsible for all home office sales support functions for the full-range of C-E shop-assembled boilers. He has held a number of positions in sales and estimating, most recently as manager, special products and environmental control systems estimating.

DredgeMasters Int'l Names T.L. Broadrick —Opens New Plant

Thomas L. Broadrick

DredgeMasters International, Nashville, Tenn., has announced that it has now occupied its new plant facility in Nashville. Simultaneously, **Don R. King,** executive vice president and general manager, announced the appointment of **Thomas L. (Lem) Broadrick** to the position of production superintendent.

The company will use this new facility as manufacturing headquarters for its planned worldwide manufacturing and service operations. DMI has developed a new concept of portable dredge design, which, according to Mr. **King,** is expected to revolutionize the industry. "Our new design and manufacturing plan will enable us to manufacture complete dredges at various strategic locations through the world, utilizing main machinery modules manufactured in the Nashville plant. This plan will bring the finished product closer to the user, saving thousands of dollars in unnecessary freight and other charges he has heretofore been forced to pay." The new plant will also build complete dredges for the U.S. domestic market and dredge parts, accessories and support equipment for the world market.

Mr. **Broadrick** has over 15 years of experience in manufacturing and was previously production manager for American Marine and Machinery Company, a leading dredge manufacturer.

DMI maintains its general offices at 311 Plus Park Boulevard, Nashville, Tenn. The company is a division of Koch Engineering Company, Inc., Wichita, Kan.

Marathon LeTourneau Gets $13.5 Million Order From Fluor Drilling

Marathon LeTourneau Offshore Inc., a subsidiary of Marathon Manufacturing Co., has received an order for a drilling rig from Fluor Drilling Services, Inc., a unit of Fluor Corp., Los Angeles, Calif. The rig will be used in the Gulf of Mexico and will be capable of drilling up to 30,000 feet in depths of 350 feet. Scheduled for completion in 1974, the rig will be built at Marathon's Vicksburg, Miss., yard at a cost of $13.5 million.

RCA Receives Navy Contract For Automatic Test System

A project to develop an evaluation and acquisition process for the selection of automatic test equipment (ATE) will be performed by RCA for the U.S. Navy.

The process, designed to evaluate ATE applicable to a wide range of Navy electronic and mechanical systems on board ships and aircraft and at shore stations, will be made by the RCA Aerospace Systems Division, Burlington, Mass. The division is a major producer of automatic test equipment and automatic monitoring and control systems for military and commercial applications.

Stanley S. Kolodkin, division vice president and general manager, said the study would include development of a data bank to retain and retrieve ATE descriptive information.

"This bank will provide the basis for selecting the most effective ATE system for each individual testing application. The selection criteria will be based on performance effectiveness and economic feasibility," Mr. **Kolodkin** added.

The six-month $75,000 contract was received from the U.S. Navy Electronics Laboratory Center, San Diego, Calif.

Marine Section, NSC Meeting In Chicago October 29-30-31

The Marine Section of the National Safety Council will conduct three days of meetings at Chicago's LaSalle Hotel, beginning Monday, October 29, at the 61st annual National Congress, sponsored by the National Safety Council.

There will be one half-day session each on stevedoring, shipbuilding and repairing, ship operations, barge and towing, and a one-day session on the U.S. Coast Guard.

On Monday morning, chairman **Albert R. Alff,** safety director of Nacirema Operating Co. (NYC), and co-chairman **Albert W. Cash,** safety director of International Terminal Operating Co. (NYC), will oversee meetings devoted to stevedoring safety. **James J. Dickman,** president of New York Shipping Association, Inc., (NYC), will discuss the association's role in "longshoring" safety. Capt. **C.H. Waring**, manager of the Accident Prevention Bureau at Lykes Bros. Steamship Co., Inc., New Orleans, La., will discuss "A Human Link —The Stevedoring Safety Supervisor." "OSHA Ahead" is the topic of the Honorable **John H. Stender,** Assistant Labor Secretary for OSHA.

Monday afternoon's shipbuilding and ship repairing session will be chaired by **James R. O'Donnell,** maritime safety consultant, New Orleans, La., and co-chaired by **John W. Sansing,** general manager, Mainstream Shipyards & Supply, Greenville, Miss. "Safety and Production" will be discussed by **Sigmund A. Solares,** production systems manager, Avondale Shipyards, Inc., New Orleans. Dr. **Clifton O. Istre Jr.**, department of otolaryngology, Tulane University Medical School, New Orleans, will discuss "Safety and Industrial Noise." "The Marine Chemist and Shipyard Safety" is the subject of **George A. Hale,** Marine Inspection Engineers, Gas Testing-Consulting-Hull & Cargo Surveyors, Skokie, Ill. During the reception, Best Paper awards will be presented by the Section's general chairman Capt. **Hewlett R. Bishop,** president, National Cargo Bureau, Inc., (NYC); **Bruno J. Augenti,** president, Marine Index Bureau, Inc., (NYC); and Rear Adm. **William A. Jenkins,** Chief, Office of Operations, USCG, Washington, D.C.

The annual breakfast business meeting to be held on Tuesday morning will be presided over by Captain **Bishop.** The agenda includes election of 1973-74 Section officers, and reports of the chairman and the standing committees.

The U.S. Coast Guard session will be chaired by Admiral **Jenkins,** Chief Officer of Operations, Washington, D.C. During the meeting, Comdr. **Ralph C. Hill,** Chief of Vessel Traffic Systems Branch, Washington, D.C., will discuss "Increased Safety Through Vessel Traffic Systems." Developments in vessel operational safety is the topic of Lt. Comdr. **Kenneth Wadman,** Chief, Rules of the Road Branch, U.S. Coast Guard, Washington, D.C. Capt. **Clyde T. Lusk Jr.** Assistant Chief, Merchant Vessel Inspection Division, U.S. Coast Guard, Washington, D.C., will discuss the Marine Casualty Review.

The Tuesday afternoon meeting will be chaired by Capt. **R.J. Anderson,** manager, loss prevention, Prudential-Grace Lines, Inc., New York, and co-chaired by **Robert Kratzert,** manager, vessel personnel and service, Oglebay Norton Co., Columbia Transportation Division, Cleveland, Ohio. **Mark Brauer**, research assistant, department of industrial engineering, Texas A & M University, will examine a "Safe System for Reduction of Tanker Cleaning Hazards and Pollution." Marine safety will be viewed by chief engineer **James Eustice,** S/S Frank Purnell, Columbia Transportation Division, Oglebay Norton Co., Oglebay, Cleveland,, Ohio. Contrasting marine with aviation safety will be **Donald J. Schumacher,** senior transportation advisor, logistics department, Exxon Corp., New York, N.Y.

Barge and towing topics will be aired on Wednesday morning under the guidance of chairman **John Kern,** vice president, A.L. Simms Brothers Towing Co., Inc., Mobile,

Ala., and co-chairman **Arthur C. Gelwicks,** safety director, The Ohio River Co., Point Pleasant, W. Va. "Inland Waterways Safety and Environmental Protection," is the subject of **McVey F. Ward,** southern regional representative, The American Waterways Operators, Inc., New Orleans. "Deck Cadet Safety Training" will be discussed by **William Fassler,** safety director, Chotin Transportation Inc., New Orleans. **Anthony Accardo Jr.,** safety director, The American Commercial Barge Lines, will speak on "The Smart Duck Award."

A joint Wednesday luncheon, held with The Propeller Club of The Port of Chicago, will feature an address by the Chairman of the Federal Maritime Commission, Washington, D.C., the Honorable **Helen D. Bentley,** who will discuss the Commission's interest in marine safety. Presiding will be **C.P. Ryman,** the club's president.

Overseas Shipholding Reports 33% Rise In Six Months Earnings

Overseas Shipholding Group, Inc., New York, N.Y., a major bulk shipping company, has reported earnings of $9,494,000 for the six months ended June 30, 1973, up 33 percent from $7,117,000, before an extraordinary credit of $308,000, for the first half of 1972.

Per share income rose 26 percent to $1.46, from $1.16, before an extraordinary credit equivalent to $.05 per share, in the first half of 1972. There were 6,500,331 shares outstanding in the first half of 1973, compared with 6,125,331 in the first half of 1972.

Revenues were $54,197,000 in the first half of 1973, compared with $38,893,000 in the corresponding 1972 period. In the first half of 1972, several of the company's U.S.-flag vessels lacked employment for varying periods.

OSG's operating fleet totals 38 tankers and dry bulk carriers, aggregating in excess of 1.8-million deadweight tons.

By early 1978, when the last of 22 new ships now on order is scheduled to be delivered, OSG's fleet will total over 5-million deadweight tons, including ten 50 percent owned and six 60 percent owned vessels. Approximately two-thirds of the more than 3.2-million deadweight tons on order have already been chartered long-term.

Campbell Marine Names Petrasich General Manager

Louis Petrasich

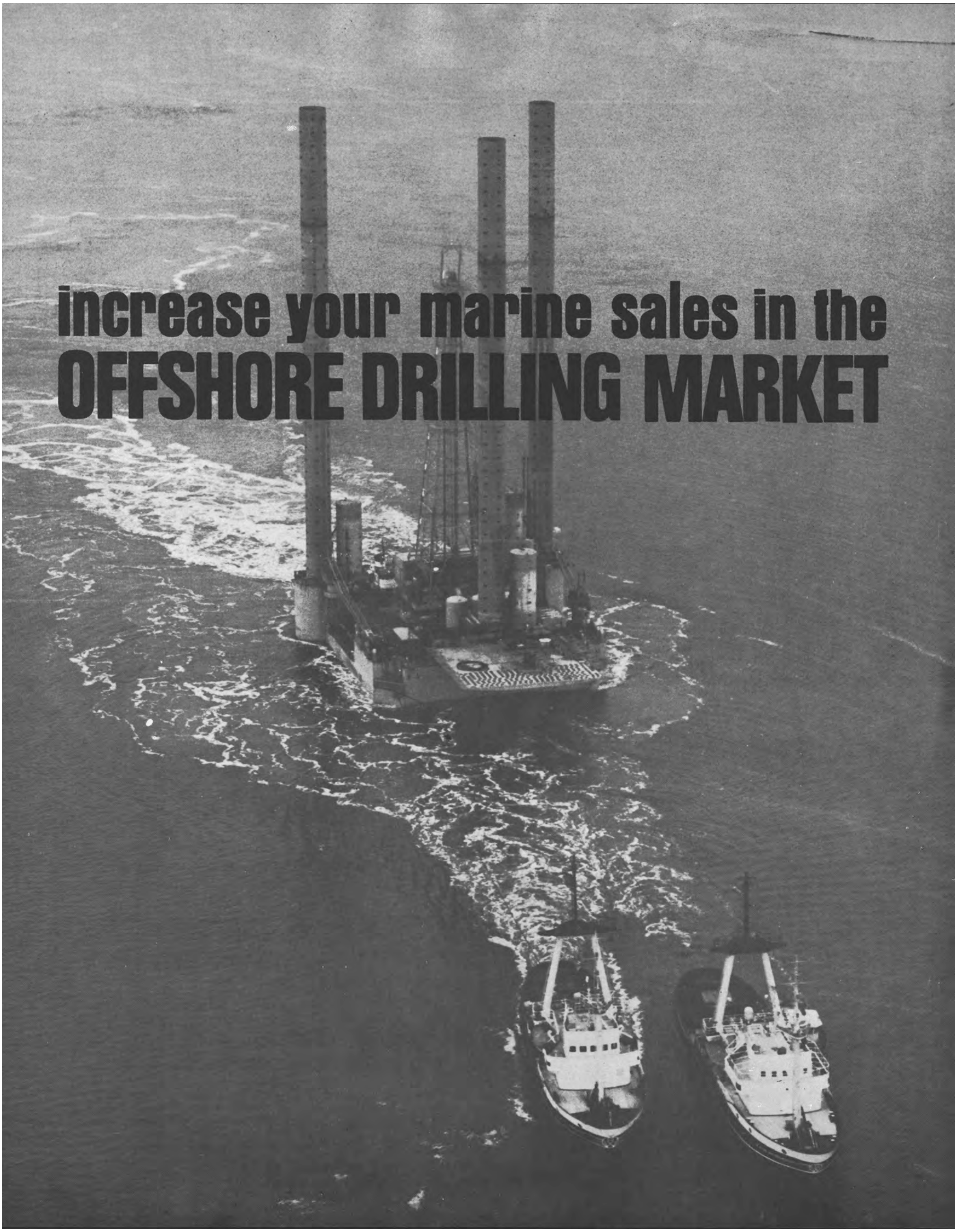
Campbell Industries, San Diego, Calif., has announced the appointment of **Louis Petrasich** as general manager of the company's Campbell Marine Division.

"We are happy to have a man with Louis's background and experience in this important position," **George J. Soares,** Campbell president, said in making the announcement, "and that importance is growing, with the division's employment currently above 1,000."

Mr. **Petrasich** came to Campbell from the San Pedro area, where he was vice president and general manager of California Shipbuilding and Drydock. Prior to his work there, he was associated with several shipbuilding and repair concerns, including Harbor Boat, Wilmington Boat Works, and Bethlehem Steel.

At Bethlehem's Terminal Island facility, Mr. **Petrasich** served as chief loftsman, and later as chief planner during World War II Navy destroyer production and ship repair. Before the war years, he spent his time in boatbuilding, commercial fishing, and other marine-related industries.

The new general manager is a member of The Society of Naval Architects and Marine Engineers and serves on the board of directors of the Western Shipbuilding Association.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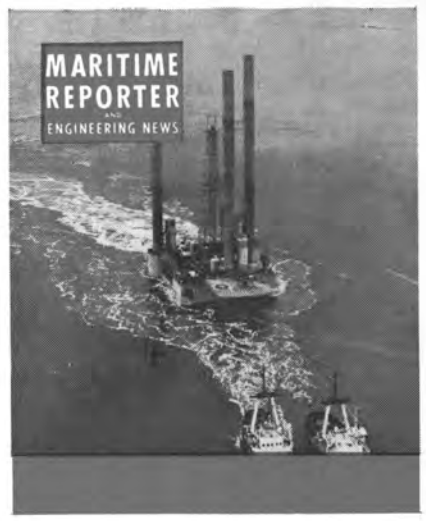

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Financing Set For Hovermarine HM.2 Production Facility

Hovermarine Corporation, Pittsburgh, Pa., has announced agreement in principle for financing its new manufacturing facility in Titusville, Fla. The new plant will have a production capacity of 24 commercial surface effect ships a year.

Hovermarine is a Pittsburgh-based manufacturer of the HM.2 Hoverferry, a 60-passenger craft in use in commuter and mass transportation applications around the world.

Under the financing plan, the city of Titusville will issue industrial development revenue obligations covering the cost of real estate, improvements, buildings and special tooling. Hovermarine will occupy the premises under a lease purchase agreement with the city.

William A. Zebedee, Hovermarine chairman, also announced that the company has arranged for sale of all of the obligations to Pittsburgh National Bank under a seven-year repayment agreement.

Hovermarine's facility is under construction on land adjacent to Thompson Trawlers, Inc., from whom the land is being purchased. Earlier, Hovermarine and Thompson Trawlers announced an agreement in principle regarding joint aspects of the Hovermarine program to begin manufacture of the HM.2 Hoverferry in the United States.

For the past few months, Hovermarine has occupied space within the Thompson Trawlers complex to construct special tooling necessary for production of the fiberglass hull of the HM.2 surface effect ships.

Work on the initial set and on a second set of special tooling has been completed. Each set will allow construction of 12 of the HM.2 surface effect craft annually.

The new shipbuilding facility will contain some 20,000 square feet of manufacturing area. Initial occupancy is planned for this month, with full production scheduled within 30 days.

Brazilian Yard Offers New Design For Ship

Companhia Comercil e Navegacao (CCN) of Rio de Janeiro, the Brazilian shipyard, is to offer on the market a new design of ship called the Prinasa 26-15, according to London sources.

The vessel is a 26,500-dwt bulk carrier which has been designed through computer techniques by the Senner, the Spanish marine consultants and naval architects, in association with CCN's own design company Prinasa.

CCN's chairman **Paulo Ferraz** said: "Our market research indicates that there is a large demand for an economical vessel of this tonnage and design. The first ship can be delivered in 1976, and we are confident of winning many orders for it both at home and overseas."

Mr. **Ferraz** continued: "I believe the Prinasa 26-15 can provide us with the same kind of series production which we have successfully achieved with the SD-14 and our redesigned version of the SD-15, the Prinasa 121."

The Prinasa 26-15 has five holds, and its design can be adapted to carry 513 twenty-foot containers.

ARCO CONTRIBUTES TO WEBB: Samuel S. Morse, right, presents the 1973 Atlantic Richfield contribution in support of Webb Institute of Naval Architecture to Webb president **William A. Brockett** in the Livingston Library on the Webb campus at Glen Cove, L.I., New York. Mr. **Morse,** chief naval architect-marine transportation, Atlantic Richfield, is a 1933 graduate of Webb.

Study Of Hull Stresses Published By SNAME

Three companion publications presenting the results of a four-year study of the wave climate of the Great Lakes and the Associated hull stresses in the bulk ore carriers which ply them are now available. The data included in these publications should prove extremely valuable to organizations designing building or operating ships for the Great Lakes or the Gulf of St. Lawrence, as well as offshore drilling contractors and rig owners, construction-equipment contractors and others serving the offshore petroleum industry.

In 1965, The Society of Naval Architects and Marine Engineers in cooperation with Government, regulatory, and industry organizations in the United States and Canada implemented an extensive program to analyze the Great Lakes and Gulf of St. Lawrence wave climate and the forces induced by these waves acting upon large bulk carriers up to 1,000 feet in length. Wave and sea-state records were obtained using moored and ship-launched remote indicating buoys, wave staffs and gauges, ship observations and weather stations. At the same time, four Great Lakes bulk ore carriers were instrumented to measure the hull stresses which are simultaneously induced by these waves. This four-year program was reported in T&R Bulletins 2-17, "Wave Climate Study, Great Lakes and Gulf of St. Lawrence," and 2-18, "Seaway Stresses Observed Aboard Great Lakes Bulk Ore Carrier Edward L. Ryerson (1965-1968)." In addition, to evaluate the progress achieved in the first four years of the program, the Society sponsored a symposium in the summer of 1971 at which 13 technical papers were presented, discussed, and published in Symposium Report S-2, "Hull Stresses in Bulk Carriers in the Great Lakes and Gulf of St. Lawrence Wave Environment."

The wave climate study, coordinated by Task Group HS-1-1 (Great Lakes Waves) of the Society's Technical and Research Program, was exceptionally thorough and complete with some 18,000 usable wave records collected from recording stations at 14 various locations in the Great Lakes and the Gulf of St. Lawrence during 1965, 1966, and 1967. Each record represented a 20-minute observation period and is presented in tabular form in Bulletin 2-17 showing the date and time of each record, the significant wave heights (from direct spectral analysis), frequencies at which the peaks of the displacement spectra occurred, periods corresponding to peak frequencies, and other parameters representing wave steepness and slope. An explanation of the analysis procedure is also included.

While the wave study was in progress, Task Group HS-1-2 (Wave Loads-Great Lakes Vessels), sought to relate wave-induced stresses in a typical modern ore carrier operation on the Great Lakes with measured wave and weather data. They accomplished this objective by instrumenting the 730-foot STR. Edward L. Ryerson, at that time one of the largest vessels navigation regulations would permit on the Lakes. The program of stress measurement uncovered the unique phenomenon referred to as "springing stresses" believed to be a result of hull excitation at the fundamental (two noded) frequency of the hull. T&R Bulletin 2-18 describes in some detail the characteristics of the vessel, the instrumentation system, the tests made to verify the quality of the data, and a review of the stress and wave data acquired and analyzed over the four operating seasons, 1965-1968.

Increasing the allowable length of these vessels to 1,000 feet, due to the enlarging of the locks at Sault Ste. Marie and the continued interest in the newly uncovered phenomenon of springing, encouraged further research into hull stress characteristics. Model studies of hull bending moments were performed at Davidson Laboratory and plans outlined for the instrumentation of the 1,000-foot bulk ore carrier, M/V Stewart J. Cort. The results of this ongoing research and the various interpretations of the wave climate and Ryerson studies were presented at the symposium held in Ottawa, Canada, during the summer of 1971. The complete program of 13 technical papers along with the discussion and comments they generated at the time of presentation are all included in T&R Symposium Report S-2 "Hull Stresses in Bulk Carriers in the Great Lakes and Gulf of St. Lawrence Wave Environment." The topics discussed include, among others, historical background of Great Lakes vessels, wave climate analysis and observations, bulk carrier model bending moment experiments, analysis of springing stresses, the Great Lakes Load Lines strength standards and freeboard requirements for Great Lakes bulk ore carriers.

Significantly, the results of this research endeavor as outlined in the 475-page Symposium Report helped to justify a substantial reduction in the Great Lakes winter seasonal freeboard permitting some large bulk ore carriers to carry approximately another extra thousand tons of cargo during the winter season. This certainly represents a substantial direct viable return on an investment in applied research.

The research work reported above is continuing with the instrumentation of both the 1,000-foot M/V Stewart J. Cort and the 806-foot STR. Charles M. Beeghly, along with a ship model test program to measure the springing bending moment response of a 1,000-foot ore ship. Supplemental publications will be available following the analysis of the additional data being obtained.

These three Society publications represent a compendium of Great Lakes bulk ore carrier hull and wave climate research and are available through The Society of Naval Architects and Marine Engineers, 74 Trinity Place, New York, N.Y. 10006, as follows:

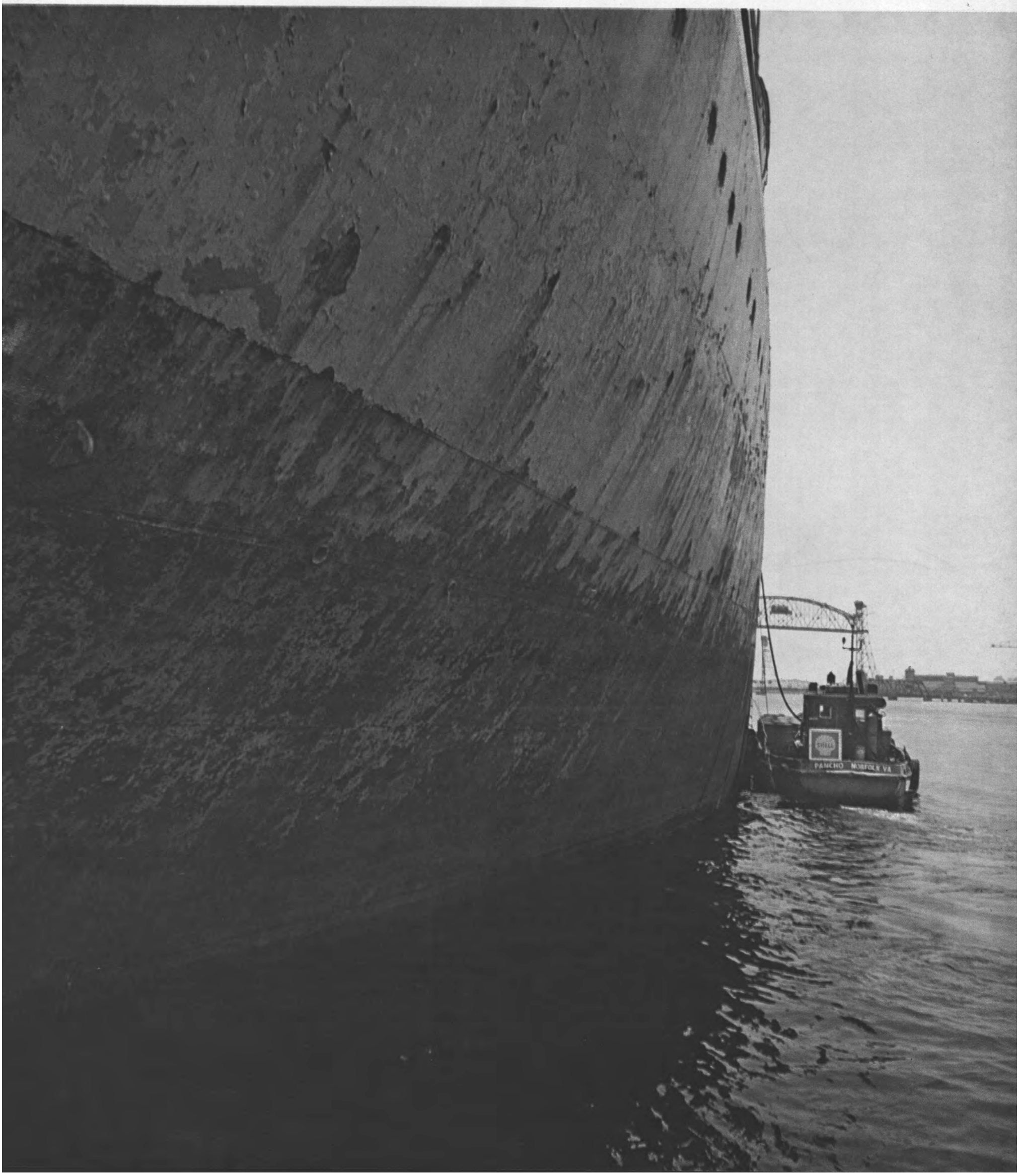
2-17 "Wave Climate Study, Great Lakes and Gulf of St. Lawrence," at a price of $9 each. Members may obtain a copy for $6.

2-18 "Seaway Stresses Observed Aboard Great Lakes Bulk Ore Carrier Edward L. Ryerson (1965-1968)," at a price of $9 each. Members may obtain a copy for $6.

S-2 "Hull Stresses in Bulk Carriers in the Great Lakes and Gulf of St. Lawrence Wave Environment," at a price of $30 each. Members may obtain a copy for $20.

All prices include postage, if payment is received with order, via third class mail in the United States and as "Printed Matter" in all other countries. Shipments will be insured or sent air mail at additional cost if requested.

Now you can take on 4,000 gals./hr.



# of Shell lubricants at Hampton Roads.

—or 4,800 gals./hr. at Portland, Maine, or 4,400 gals./hr. at New York City. Altogether, Shell offers speedy, cost-saving bulk lube delivery at 13 major ports on the East, West and Gulf Coasts.

Motorships are saving time and costs with bulk oil delivery service offered by Shell's Agent, Marine Oil Services, Inc., Anders Williams Company, Norfolk, Virginia.

This firm uses two tank boats—one holds 13,500 gallons, the other 19,500 gallons, to service ships in Hampton Roads. Each boat is divided into two compartments and can deliver up to 4,000 gallons of Shell Lubricants per hour to ships' tanks.

Advantages to ship owners

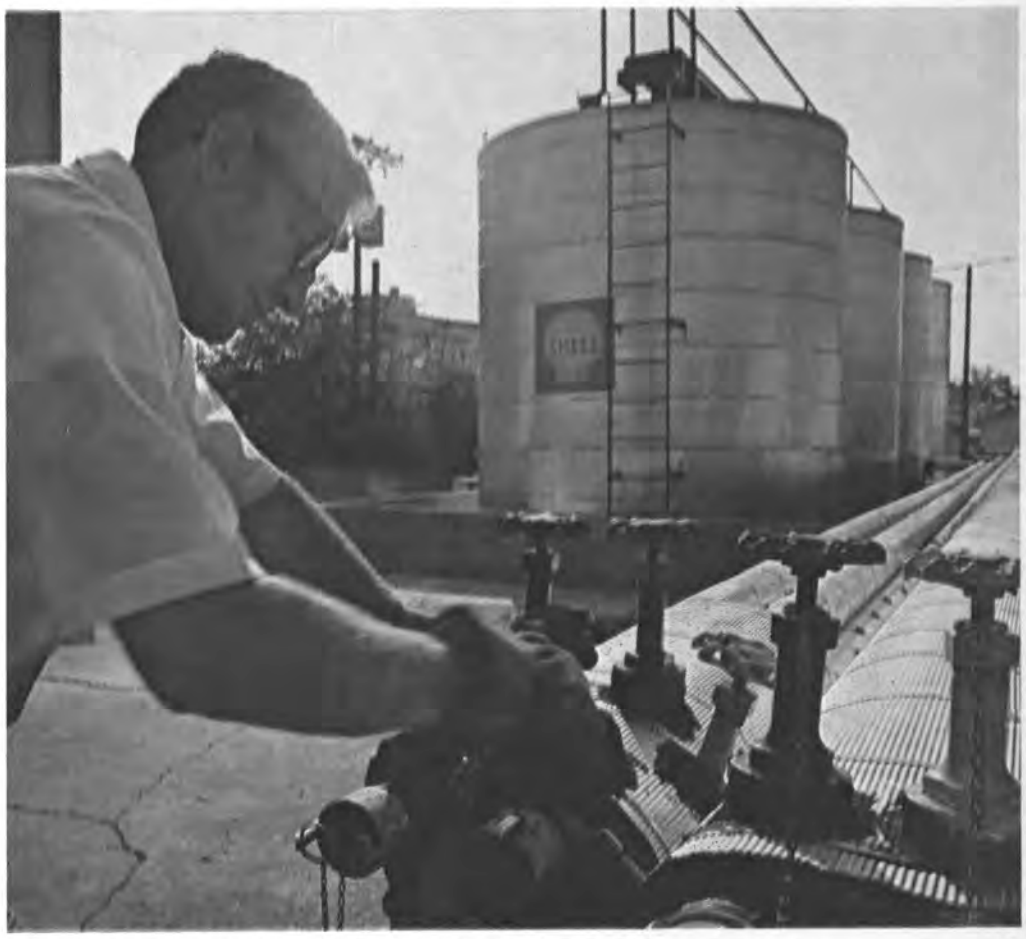
With this speedy tank-to-tank delivery system, there is less chance of product contamination, and only minimum assistance is needed from ship crews. In addition, there is no interference with cargo operations. Delivery is faster and less hazardous than with drums. Still, both of the tank boats frequently carry drums on deck, in addition to full tanks below, to fill smaller orders.

Use of Shell MELINA® Oil increasing

Demand for multi-purpose MELINA Oil is increasing for both slow speed crosshead-type diesels—including Sulzer, MAN, B & W, Gotaverken, Fiat, Stork—and medium and high speed trunk piston engines. MELINA Oil protects engine parts against wear and corrosion, and resists oxidation over a long service life. MELINA also satisfies the requirements of other shipboard equipment such as gear transmissions, variable pitch propellers, steering gear, turbochargers and air compressors.

Shell Representative, John Barnett, discusses some of the advantages of MELINA Oil with Chief Engineer, Demetrios Kalisporis. MELINA Oil neutralizes acids that straight mineral oils cannot.

◀ Marine Oil Services' tank boat, Pancho, pumps Shell MELINA Oil into the Greek tanker, Captain Xilas. Pancho's pumps can deliver 4,000 gals./hr. from her 19,500-gallon tanks. This fast, clean delivery speeds ship turnaround time.



E. J. Wheeler, Manager of Marine Oil Services, Inc., opens an outlet valve so that ALEXIA Oil can be pumped at 55 gals./minute into a waiting tank boat. Four insulated 10,000 gallon storage tanks hold Shell lubricants at a constant 120°F., permitting fast flow in any season.

Marine Oil Services also offers TALPA® Oil, a specially refined straight mineral oil, for engines not requiring additive type lubricants. And Shell ALEXIA® Oil is in demand for engines with separate cylinder lubrication because of its anti-wear and acid-neutralizing properties.

Start saving with the speed and economy of bulk delivery of Shell lubricants at Seattle, Portland, Oregon; San Francisco, Oakland, Los Angeles, Houston, Galveston, Texas City, New Orleans, Hampton Roads, Philadelphia, New York and Portland, Maine. Call your nearest Shell Transportation Sales Office listed below:

New York, N.Y., (212) 262-7310;
Baltimore, Md., (301) 821-5905;
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New Orleans, La., (504) 588-4942;
San Mateo, Calif., (415) 574-5300.
Shell Commercial Marketing,
One Shell Plaza, Houston, Texas 77002.

Shell Products Perform

SHELL

Dollars For U.S. Shipbuilding 'Stay Here'

Paul Hall, president, Seafarers International Union (SIU), in a radio broadcast, made a strong appeal for passage of legislation to reserve certain percentages of oil imports for transport by U.S.-flag, U.S.-built tankers, with this rationale:

"Unfortunately, we have not maintained the strong ocean transportation system which was ours at the end of World War II. At that time, we possessed the greatest merchant fleet and the most productive shipbuilding capability the world had ever known. Twenty-three years ago, the U.S.-flag merchant marine carried nearly 40 percent of our waterborne commerce. Today, we carry less than 6 percent. From about 1,300 ships then, we have declined to only slightly more than 500 today.

"In facing up to the energy crisis, we must also understand that massive quantities of fuel must be brought to our nation by water. The United States, with 6 percent of the world's population, now consumes 33 percent of its energy and is the world's leading importer of oil. Last year, we imported 27 percent of the oil we used, and the percentage of all our oil imports is expected to rise to 33 to 35 percent by the end of this year. By 1980, more than one-half of our energy needs must be filled from foreign sources.

"All of us know the precarious position of the American dollar in the international money market. We have experienced consistent balance-of-payments deficits.

"A major contributing factor to this deficit is our lack of U.S.-flag tankers. In 1972, the balance-of-payments deficit caused by the use of foreign-flag tankers to carry U.S. oil imports amounted to more than $500 million. In 1973, we look for this foreign-tanker-caused deficit to exceed $600 million. By 1980, using Department of Interior oil import projections, and given no improvement in our own tanker capability, we look for the foreign-tanker-caused deficit to jump to more than $2.5 billion.

"To put it another way, our single largest commercial balance-of-payments deficit item is the cost we pay for foreign oil. The second largest commercial balance-of-payments deficit item soon will be the amount we pay for bringing this oil to our shores in foreign-flag ships. The second of these items is controllable, and we must set about controlling it at once by achieving our own U.S.-flag oil-carrying capability.

"The only way the balance-of-payments deficit which is attributable to the importation of foreign oil can be reduced is through the use of our own ships to carry the oil and, of course, doing whatever has to be done to reverse the growing trend to depend upon foreign refineries. Other economic benefits would result from greater tax revenue and reduced dollar inflation and instability.

"An additional long-term benefit of the development of a U.S. tanker fleet would be to reduce the environmental hazards posed by the threat of oil spills resulting from marine accidents. Safety standards imposed on U.S. tankers are far more rigid than those required under most foreign flags.

"More than one-half of the foreign vessels which carry 95 percent of our oil imports are registered under the Liberian and Panamanian 'flags of convenience.' Incidentally, the major American oil companies operate 365 of these foreign-built and foreign-manned vessels. By contrast with the casual regulation and low crew and safety standards imposed under these foreign registries, the American tankers that would be used as a result of this legislation are the most tightly regulated and best-manned in the world.

"The American labor movement —concerned as it is with jobs . . . with the viability of the U.S. economy . . . and the national security— has recognized the double jeopardy our nation faces in its reliance on foreign nations for both fuel and for the ships on which it is carried.

"From the standpoint of national security, the employment of U.S.-flag vessels to carry a significant portion of our oil imports would assure America that even if some shipping and oil-producing nations or interests act to deny us of either or both their oil and the tankers to carry it, we will still have a major U.S. capability on which to rely to carry oil from friendly nations. To the degree on which to rely to carry oil from friendly nations; to the degree that we are to develop our own U.S.-flag fleet, to that same degree we make it more difficult for foreign interests to coerce the United States in the world political arena.

"The AFL-CIO has called on Congress to carry this situation by requiring that a portion of this vital energy be carried on American-flag, American-built and American-manned ships. Legislation to accomplish this crucial objective is now pending in both houses of Congress—and merits the support of all Americans. Congressional enactment of this proposal would provide benefits that would go beyond the security aspects of making sure that our supply of oil is not interrupted by a lack of transportation.

"It would mean tens of thousands of jobs for American men and women who would produce the materials and build the ships. Jobs for steelworkers, pipefitters, carpenters . . . jobs for welders, sheet metal workers and laborers . . . jobs for office workers, electronic technicians, painters and electricians . . . and for seafaring workers.

"It would mean more tax revenue for our nation . . . and our states . . . and our communities. The taxes would come from the profits of the builders and the operators of the ships. And they would come from the wages of those thousands and thousands of citizens who would find job opportunities in rebuilding and manning the American merchant marine.

"It would mean that our national balance-of-payments situation would be improved. Money spent building ships in American yards stays here. It would mean greater stability for the dollar. And 71 cents of every dollar spent in shipping goods on American-flag ships remain in our economy.

"While the energy crisis and our ocean transportation capability are areas which require our attention, they are but examples of a basic problem facing all Americans in this rapidly changing world. In our desire to help our less endowed world neighbors, we have made it more advantageous for U.S. companies to develop their foreign facilities at the expense of the American economy and the American workmen. It is time that all of us join in taking a good look at our current tax and trade laws to make sure that American workers and the rest of our nation will not be shortchanged in the future."

deMariano To Direct Port Operations At Port Everglades, Fla.

Paul deMariano has been appointed director of port operations for the Port Everglades Authority.

Prior to joining the staff at Hollywood-Fort Lauderdale, Fla., Mr. **deMariano** was associated with the Massachusetts Port Authority as deputy director of community affairs.

A native of Massachusetts and a 1968 graduate of the University of Massachusetts at Amherst, he served with Massport continuously since his graduation in June of that year. From 1972 until last March he was superintendent of vessel operations at the Castle Island Terminal.

In his new position at Port Everglades, Mr. **deMariano** directs and controls the activities of the Harbormaster, Maintenance and Security-Firefighter Divisions.

Newport News Ship Names Lina Director Technical Services

John A. Lina has been named director of administrative and technical services of Newport News Shipbuilding, Newport News, Va., according to an announcement by **W.F. Wilson,** senior vice president of the Tenneco company.

Mr. **Lina** is replacing **David B. Benadof,** who was recently promoted to director of production control and material management. Mr. **Lina** will be responsible for three shipyard divisions—management systems services, technical systems services, and office services—and will report to Mr. **Wilson.**

A native of St. Louis, Mo., Mr. **Lina** was awarded a B.S. degree in civil engineering from the University of Missouri in 1963, and joined the hull technical department at Newport News Shipbuilding as a design engineer that same year.

Upon receiving a master of business administration degree in 1969 from the College of William and Mary, he transferred to the company's budgets and profit analysis planning department as supervisor of operating budgets. In 1970, he again transferred to the shipyard's cost accounting systems and analysis department, and in 1971 was named department manager.

He was named manager of the management computer systems and procedures department in June 1972, and in March 1973 was promoted to director of the management systems services division.

Mr. **Lina** is a member of the American Society of Civil Engineers, and has served on the board of directors of United Community Services and the Peninsula Association for Retarded Children.

Diamond M Drilling Names Gene Cole To New Orleans Post

Don E. McMahon, president and chief executive officer of Diamond M Drilling Company, has announced the opening of sales offices in the Pere Marquette Building, New Orleans, La. At the same time, he reported the appointment of **E.B. (Gene) Cole** as manager of the new office.

Mr. **Cole** was most recently managing director of Diamond M Perfuracoes, Ltda., Salvador, Brazil, a Diamond M Drilling Company subsidiary. A native of Rochester, N.Y. and a World War II U.S. Navy veteran, Mr. **Cole** joined Diamond M Drilling Company in 1965.

The Houston, Texas-based Diamond M Drilling Company and its subsidiaries now own 20 marine drilling rigs. A new semisubmersible rig now under construction at Alabama Dry Dock & Shipbuilding Co., Mobile, Ala., will be added to this fleet and is scheduled to begin work this month.

Sohio Appoints John T. Jacobson Marine Manager

John T. Jacobson has been manager of marine transportation in the supply and distribution department of The Standard Oil Co. (Ohio).

Reporting to Mr. **Jacobson** in this newly created position will be **K.E. Lundquist,** marine operation specialist, and **D.A. Snively,** marine scheduling and control assistant.

In making the announcement, **Frank E. Mosier,** Sohio vice president of supply and distribution, said the reorganization recognizes the rapidly increasing scope and importance of marine transportation as Sohio works to provide necessary marine capabilities to transport crude oil for its refineries, and as it plans for and develops vessel requirements to move Alaskan crude.

A 1959 graduate of the University of Minnesota with a degree in chemical engineering, Mr. **Jacobson** has been with Sohio since 1960 in its Vistron Corporation subsidiary, beginning as process engineer at the Lima, Ohio, acrylonitrile plant and moving through engineering and supply positions to manager of supply and distribution for chemicals, and later for plastics. His most recent assignment has been manager of custom sales in the fabricated plastics division.

First Of Two Deepwater Rigs For Waage Christened At Avondale Shipyards

Waage Drill I prior to christening. The drill rig is in the submerged position.

The christening of the Waage Drill I, the first of two identical self-propelled semisubmersible deepwater drilling rigs, was recently held at Avondale Shipyards, Inc., Belle Chasse Assembly Area, New Orleans, La.

Principals of the christening were **Finn J. Stephansen-Smith,** principal speaker; **Edwin Hartzman,** president of Avondale Shipyards, Inc.; acting as godmother (in Norway the sponsor is referred to as the godmother) was **Mrs. Finn J. Stephansen-Smith;** her matron of honor was **Mrs. Ole Bertel,** wife of the partner of Waage Drilling Company. The Rev. **Oddvar Michalsen,** pastor, Norwegian Seaman's Church in Houston, Texas, gave the invocation.

Avondale Shipyards, Inc. is the first yard to deliver a self-propelled drilling unit to a Norwegian owner. K/S Waage Drilling A/S and Company was founded in 1971, the Hagb. Waage Group being the principal partners. Other partners are Custos A/S, Blehr and Tenwig, Inge Steensland A/S and Ole J. Bertel.

The Hagb. Waage Group is a major Norwegian shipping company with long traditions in worldwide shipping. The group currently has a sailing fleet of more than one million dwt and a new building program of approximately 1.6 million dwt. The second unit, Waage Drill II, is scheduled for delivery in the first quarter of 1974.

The Hagb. Waage Group is also major partners in K/S Oslo Drilling A/S and Company of Oslo. Other partners in K/S Oslo Drilling A/S and Company are Wilhelmsen, Oslo, Home Oil, and Bo Balley Industries, both of Canada. A drilling unit of the same design is presently being constructed in Norway. Waage Drill I is assigned to drill in the North Sea area for Hamilton Brothers Inc. of Denver, Colo. The drill units Waage Drill I and Waage Drill II will be operated by a joint venture of Santa Fe International Services Inc., Orange, Calif., and K/S Waage Drilling A/S and Company.

Principals of the christening shown left to right: **Edwin Hartzman,** president, Avondale Shipyards; **Mrs. Gerd Stephansen-Smith,** godmother, and **Finn J. Stephansen-Smith,** shipowner, Hagb. Waage.

The Waage Drill I is a column-stabilized drilling unit of the ocean voyager class, designed by Ocean Drilling and Exploration Company, being built for K/S Waage Drilling A/S and Company.

The overall length of the new rig is 300 feet, with a beam of 293 feet. The height to the top of the main deck is 128 feet. Draft under way is 25 feet, and drilling position is 70 feet.

Two 4,000 plus-shp engines comprise the propulsion system on the Waage Drill I, which incorporates the latest all-weather quarters for 80 men.

The Waage Drill I is equipped with nine-foot stainless propellers and Kort nozzles. It is also equipped with mooring for 600 feet of water by using eight 3,600 feet of three-inch stud-linked chains, each with 30,000-pound Danforth anchors and 20,000-pound backup anchors.

Avondale Shipyards, the largest industrial employer in Louisiana, is a wholly owned subsidiary of the Ogden Corporation of New York which operates in the major market areas of metals, transportation, food products, leisure, real estate development, and investments, reporting sales of $1.073 billion in 1972.

Esterline/Auxitrol Names J.H. Chillas Marketing Manager

James H. Chillas

Esterline/Auxitrol/USA, Costa Mesa, Calif., unit of Esterline Corporation, has appointed **James H. Chillas** as marketing manager.

Esterline/Auxitrol/USA manufactures and markets proprietary liquid level control instrumentation for the worldwide tanker fleet and for land-based facilities.

Mr. **Chillas** joins Esterline/Auxitrol/USA from Rheem Fluid Systems, where he served as national sales manager.

A graduate of Grinnell College, Mr. **Chillas** resides in Woodland Hills, Calif.

AWO Distributes New Edition Of 'Big Load Afloat'

The American Waterways Operators, Inc., Washington, D.C., has begun distribution of a new, revised edition of AWO's comprehensive book on the barge and towing industry.

The first copies were distributed to the AWO board of directors at their fall quarterly meeting in Philadelphia, Pa., September 19-20, 1973. Copies will then go automatically to all AWO representatives and alternate representatives, and to fill the hundreds of requests on file in the Washington office from schools, libraries, Government agencies, press media, and others.

The new edition of "Big Load Afloat," a project of the AWO public relations committee, is the up-to-the-minute story of the barge and towing industry; the story of why this industry moves 16 percent of U.S. domestic commerce at the lowest cost of any mode of transportation.

The 164-page illustrated book is loaded with photographs, charts, maps and informative text that will give any reader a fascinating adventure into an ever-growing industry.

An entire new section, "Waterway Economics," covers every aspect of the economics of waterway transportation. There are several new chapters covering such subjects as safety, environment, ocean barging, and other aspects of the barge and towing industry.

"Big Load Afloat" is available from The American Waterways Operators, Inc., 1250 Connecticut Avenue, Washington, D.C. 20036. It is free of charge to AWO members, subscribers to AWO publication services, and recipients of the Press and Association Edition of the AWO Weekly Letter. Single copies are available without charge to students of transportation and civic and educational groups. To all others, hard cover copies are available at $7.50 per copy, and soft cover copies at $4.50 per copy.

Fisher Controls Issues Brochure On Valve Computer Programming

A computer program that cuts valve sizing and noise prediction efforts by 80 percent is described in a brochure available from Fisher Controls Company, Marshalltown, Iowa.

The eight-page illustrated literature describes operation and benefits of the program which calculates the size and type of control valve needed for a given application, predicts the noise that valve will generate, and prints out noise-abatement equipment alternatives that can reduce operating noise levels.

For a complimentary copy of "Fisher Cuts Hidden Costs of Control Valves," write Fisher Controls Company, Marshalltown, Iowa 50158.

DIESEL GENERATOR SETS

1

350 KW DIESEL GENERATOR SET

350 KW—120/240 volts DC—600 RPM—compound wound G.E. generator with switchgear. ENGINE: Ingersoll-Rand—heavy-duty type S—505 HP—10½x12—reconditioned to ABS.

2

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.

3

EMERGENCY GENERATOR SUPERIOR 75KW 120/240 VOLT D.C. DIESEL GENERATOR SET

With switchgear. ENGINE: Radiator cooled Superior GBD-8—6 cylinder—1200 RPM GENERATOR: Electric Machinery Co.—120/240 volts DC—316 amps—1200 RPM—stab. shunt.

4

UNUSED 10 KW SUPERIOR DIESEL GENERATOR SET

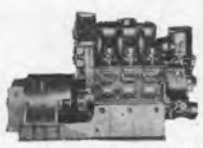
GENERATOR: Delco 10 KW — 120 VDC — 83.3 amps—1200 RPM. ENGINE: Superior diesel—2 cyl.—4½x5¾ — 15 HP — heat exchanger cooled.

5

500 KW— 120/240 VOLT DC DIESEL GENERATOR SET EQUAL TO NEW

GENERATOR: Allis Chalmers—Compound wound. Has Class "A" insulation. Output 500 KW—120/240 volts DC—2080 amperes—720 RPM—drip-proof—self-cooling. Ambient 50°C—temperature rise 40°C. ENGINE: Model GM 8-278—2-cycle—Vee type—8½"x10½"—air starting—720 RPM. Complete with switchgear. Condition very good. Stilll aboard naval vessel. Has Ross shell & tube type lube oil & raw coolers—temp. control valve—shock mounts.

6



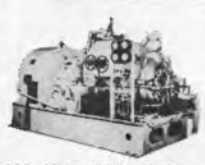
300 KW DIESEL GENERATOR SET

ENGINE: G.M. 6-278—6-cylinder—2 cycle—8¾"x10½"—750 RPM—with oil and water Ross Shell and Tube Heat Exchangers, instrument panel, pyrometer, etc. Vibro Isolators.

GENERATOR: G.E. 300 KW—120/240 volts DC—1250 amps—shunt wound—continuous overload rating 375 KW—2 hours—55° Weight of unit approximately 26,000 pounds. Complete with shock mounts. Unit 13' 2" long, 64" wide, 8' high.

TURBO GENERATOR SETS

7



400 KW WESTINGHOUSE TURBO GEN SETS FOR BETH. SPARROWS PT. HULLS 400 TO 4500; QUINCY HULLS 1600

400 KW (500 KVA)—80% PF—1200 RPM—450/3/60. TURBINE: 585 lbs—840°TT—28½" vacuum—9018 RPM—serial 10A4462-3 & 10A4462-4. GEAR: 9018/1200 RPM. A.C. GENERATOR: 500 KVA—400 KW—450 volts—641 amps—80%PF—3 phase 60 cycle—1200 RPM—CR 40°—excitation amps 41—excitation voltage 120. Instruction book 5442. Switchgear available.

8

UNUSED 300 KW—240 VOLT DC WESTINGHOUSE LOW-PRESSURE TURBO-GENERATOR SET

GENERATOR: 300 KW—240 VDC—1250 amps—1200 RPM. GEAR: 5286/1200—frame 6x15—serial 10A-2612-4. TURBINE: Frame C-325—225 PSI—397° TF—5286 RPM—Serial 10-A-2611-4. Wt. 16,700 lbs. —complete in original factory crate.

9

LOW-PRESSURE UNUSED 300 KW G.E. 120/240 VOLT DC TURBO-GENERATOR SET

GENERATOR: 300 KW—120/240 VDC—1250 amps—1200 RPM. REDUCTION GEAR: 8.344:1 — 10012/1200 RPM—type S-182. TURBINE: DOR418N—449 H.P.—10012 RPM—working pressure 180/220 PSIG.

10

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 operate 615 PSI—850°TT.

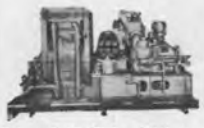
11

1250 KW G.E. 10-STAGE TURBO GENERATOR SET

TURBINE: 525—615 PSI—850°TT—7938 RPM—10-stage—type FSN. GEAR: Single helix—7938/3600. GENERATOR: 1250 KW—450/3/60/3600—.80 PF—type ATB with surface air cooler. Overload 25%— 2 hours—1563 KW.

6 EQUAL-TO-NEW LATE TYPE 500 KW SHIPS SERVICE TURBO GENERATORS

12



1962—DeLaval. Very little use. Completely preserved with rotors and diaphragms crated separately. TURBINE: DeLaval —585 PSI — 840°TT—6-stage—6391 RPM—class CD — Also suitable 440 lbs.—740°TT—25" vac. GEAR: 6391/1200 RPM. GENERATOR: Allis-Chalmers—450/3/60. Totally enclosed, with static exciter and voltage regulator system. Weight 17,665 lbs. Complete with latest dead front switch gear. Also available are the condensers, circulating and condenser pumps. All very up-to-date, compact construction. Turbines will easily handle 600 KW if up-grading is desired.

13

AP2 VICTORY WORTHINGTON-MOORE CROCKER-WHEELER 300 KW UNIT

TURBINE: 440 PSI—740°TT—28½" vacuum—type S4 — 5-stage — 6097 RPM — serial 7547 & 7548. GEAR: 6097/1200. GENERATOR: 300 KW—120/240 volts DC—1250 amps—compound wound—973643—999759. Armature flange 8½"; B.C. 7"—12 holes. ALSO NEW ARMATURES IN STOCK & 300 KW SHUNT ARMATURES.

UNUSED C-4 CROCKER-WHEELER 500 KW GENERATOR ENDS ONLY 120/240 VOLTS D.C.—1200 R.P.M.

14

FORMERLY USED WITH WORTHINGTON-MOORE TURBINES & GEARS

Upgraded by U.S. Navy—rewound in glass. Generator Frame and Armature—Marine 500 KW type 3-1200—dripproof enclosure—base mount. Modified from Crocker-Wheeler generator frame 152HD — 240/120 volts DC — 2083/521 amps — 1200 RPM. Ambient temperatures 50°C. APPLICATION: For C-4-SA1; C4-SA-3; T-AP-134 vessels, using Worthington-Moore Turbine—Form S-6 and generator Form 14 x 10. No pedestal bearing.

15

WESTINGHOUSE 400 KW TURBO-GEN 835 LBS — 840°TT

Newport News Hulls 480—541 Esso ships. TURBINE: Westinghouse 835 lbs/840°TT—9018 RPM—6-stage —instruction book 1430-C1—serial 5A-7090-7 & 8. GEAR: 9018/1200 RPM. GENERATOR: Westinghouse 400 KW—440/3/60/1200 RPM—rewound field—instruction book 5442. EXCITER: 5.5 KW.

TWO 538 KW WESTINGHOUSE T-2 AUX. GENERATORS (COMPLETE)

16

TURBINE: 538 KW @ 5010 RPM—438 PSIG—750°TT—28½" vacuum. GEAR: 5010/1200 RPM. A.C. GENERATOR: 400 KW 450/3/60/1200—0.8 PF. DC EXCITER: 32.5 KW—120 volts (variable voltage)—shunt—4-pole—DC excitation 5 KW. ALWAYS WELL MAINTAINED BY MAJOR OIL CO.

TURBINES & ROTORS

MAIN PROPULSION

17

BETH. CLASS—13,600 H.P.

Sparrows Point & Quincy 1600 hulls. H.P. turbine casing only. Excellent blading & labyrinth packing.

KNOWN 'ROUND THE WORLD

THE BOS

313 E. BALTI

Main Office: (30

18

H.P. & L.P. COUPLINGS

1 Set—for Beth Class 13,600 HP 4400 hulls and Quincy 1600 hulls.

G.E. 6690 HP @ 7062 RPM HIGH PRESSURE 8-STAGE TURBINE

19

835 lbs—840°TT—#83341—originally built for Esso Christobol—Newport News.

T-2 TURBINES & ROTORS

20

COMPLETE WESTINGHOUSE T-2 MAIN TURBINE—UNSHROUDED 6600 HP—435 PSI—750°F 28" VACUUM—3720 RPM

Instruction book IB-8345—type D—serial No. 5A-2124-6—unshrouded. Unit complete with all packing, stationary blading, linkage, governors, diaphragms, nozzles, etc. WILL SELL ROTOR SEPARATELY OR COMPLETE TURBINE CASING & ROTOR. Always well maintained by major oil company.

2 COMPLETE T-2 G.E. TURBINES

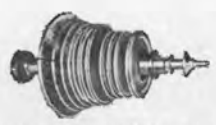
21

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

ROTOR WILL INTERCHANGE WITH ELLIOTT MAIN TURBINE

Will Sell Rotors Separately

22



T2-SE-A1 MAIN PROPULSION ROTOR — G.E.

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

23

T-2 TANKER UNUSED—4 UNITS AVAILABLE

AUX. G.E. TURBO GEN. ROTORS

DORV — 325M — 5645 RPM — for 525 KW G.E.

VICTORY SHIP TURBINES & ROTORS

24

8500 H.P. 8-STAGE TURBINES FOR LARGE VICTORY SHIPS

L.P. – 3509 RPM
H.P. – 6159 RPM

LP Serial #77943—HP Serial #77942—Interchanges Ingalls C-3—Class 442 & Sun C-4 vessels—U.S. Navy Victory "Liberty".

LP Serial #72272—HP Serial #72271—Interchanges Ingalls C-3—10 boxes of spares.

LP Serial #62042—HP Serial #62043—GEI 16263—Ridgeway Victory.

WRITE OR PHONE FOR DETAILED INFORMATION AND PRICES

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

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

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

26 **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

27

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.

28

G.E. 8500 H.P. REDUCTON GEAR FOR LARGE AP3 VICTORY & C3

MD-48A—8500 HP—6159/3509/763/85 RPM.

29 **ALSO 6000 H.P. VICTORY AP2 REDUCTION GEAR**

Westinghouse 4A-1640.

PUMPS

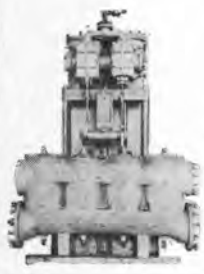
30

CARGO STRIPPING PUMPS

BRONZE T2 TANKER STRIPPING PUMPS

14x14x12—700 GPM at 100 lbs. Same pump available in steel for fuel oil transfer, etc.

31



WORTHINGTON 16"x14"x18" VERTICAL DUPLEX STRIPPING PUMP

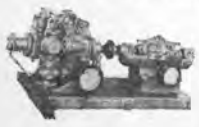
1400 GPM @ 110 PSI—suction lift 11.5 ft.—steam back pressure 15 lbs. Suction 14" — discharge 10"—steam 2½" — exhaust 4". Overall width 6'8"—overall height 9'11½" — depth 3'9½"—wt. approx. 10,000 lbs.

32

UNUSED DELAVAL IMO ROTARY PUMP

175 GPM—35 PSIG—10 HP—120 volts DC—1750 RPM—serial E-8619—frame 324 VY—76 amps—mfg. by Electro Dynamics. With magnetic control. Excellent condition.

33 **NEW TURBINE DRIVEN FIRE AND GENERAL SERVICE PUMP**



Allis-Chalmers 6 x 5 pump, type SKH—1200 GPM—125 PSI—3500 RPM. Coppos turbine type TF-22-2½ — 3500 RPM. 273#—50° superheat.

34

DAYTON-DAWD 2-STAGE FIRE AND BILGE PUMP

Vertical 2-stage type TDV-10—20 HP—20 GPM @ 184'—3" discharge—4" suction—1775 RPM—Maumee Sun. Motor: 120 volts DC—20 HP—1775 RPM.

BOILER FEED PUMPS

Suitable for Navy and Merchant Vessels

35

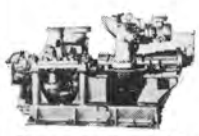
COFFIN TYPE CG-4A FEED PUMP

2 Available—very little use. Maximum 325 GPM—1760' head or 750 lbs Steam inlet 575 lbs. — 540°TT — exhaust 20 lbs. — speed 760 RPM.

36 **UNUSED DD445 CLASS WORTHINGTON TURBINE-DRIVEN FEED PUMP**

Worthington — drawing SL5043—425 GPM—1675' total dynamic head—5000 RPM 3-stage — double suction. Flanged 4½" inlet—4" outlet. Powered by Sturtevant steam turbine—282 HP—590 PSI. For Fletcher DD-445 Class Destroyers.

37



BUFFALO SIZE 4 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"x4"—built for USN DD destroyers. DD 445 Class Fletcher.

38

WORTHINGTON 3-STAGE UNUSED BOILER FEED PUMP

PUMP: 5" Worthington—460 GPM @ 750 PSI—5000 RPM—305 HP—steam flow 8052/hr—26.4 lbs HP hr. TURBINE: Sturtevant C-22—type 21—575# dry saturated steam—15 lb. back pressure—259°F water temperature—15 lbs/inch suction pressure.

39 **INGERSOLL-RAND BRONZE CARGO PUMP**

10GT—4500 GPM at 125 lbs.—2-stage—size 14x12.

40

C-25 CARGO PUMP TURBINE SPARE GEARS

One set of gears available for Westinghouse C-25 Cargo Pump Turbine.

MISCELLANEOUS

DOUBLE REDUCTION GEARS for Diesel Drive

41

3200 HP DOUBLE INPUT SINGLE OUTPUT DIESEL REDUCTION GEARS 20 DEGREE OFFSET

Farrell-Birmingham — 3200 SHP. REDUCTION GEAR: 1.81:1—handles two 1600 HP diesels @ 720 RPM. With hydraulic couplings & Fawick clutch. Port and starboard. Gear output 400 RPM. Suitable for dredge pumps. Non-reversing. OK for 38D8-⅛ engine.

42 **2:67:1 RATIO DOUBLE IN-LINE GEARS**

Farrell-Birmingham 3200 HP non-reversing — from seaplane tenders. Ratio 1.867:1. Complete with hydraulic couplings, etc. Will handle two 38D8-⅛ FM diesels. Has Fawick clutch.

43 **2100 HP DOUBLE INPUT SINGLE OUTPUT GEARS—3:435:1 RATIO**

Farrell-Birmingham — heavy duty — originally built for 2 heavy-duty direct-reversing engines —300 RPM—1050 HP each. Ratio 3.435:1.

44 **SINGLE ENGINE REDUCTION GEAR**

Farrell-Birmingham — non-reversing—1600 HP at 2.4909:1. With hydraulic couplings.

45 **ANCHOR WINDLASS**

Hyde 2-11/16"—12x14—100 PSI—steam—54,100 lbs.

46

SHARPLESS LUBE & DIESEL OIL PURIFIERS

Type M-34-W22-UM—15,000 RPM. BOWL MOTOR: 2 HP—230 volts DC—8.5 amps—3450 RPM—250 to 300 GPH. Originally built for C-1-A diesel vessels.

47

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

20" Ex. inlet—⅝" CU-NI tubes—with or without air ejector.

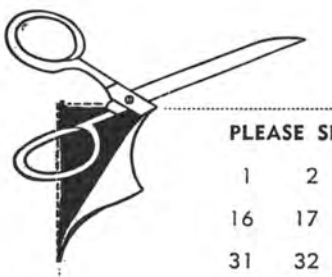
48

UNUSED 70 HP McKIERNAN-TERRY WINDLASSES

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.

INQUIRE FOR ALL OTHER ITEMS

Forced draft blowers, reduction gear parts, bilge and ballast pumps, main circulators, general service pumps, F.O. transfer pumps, lube oil service, standby feed pumps, condensate pumps, aux. circulating pumps, feed water heaters, wash water pumps, etc.



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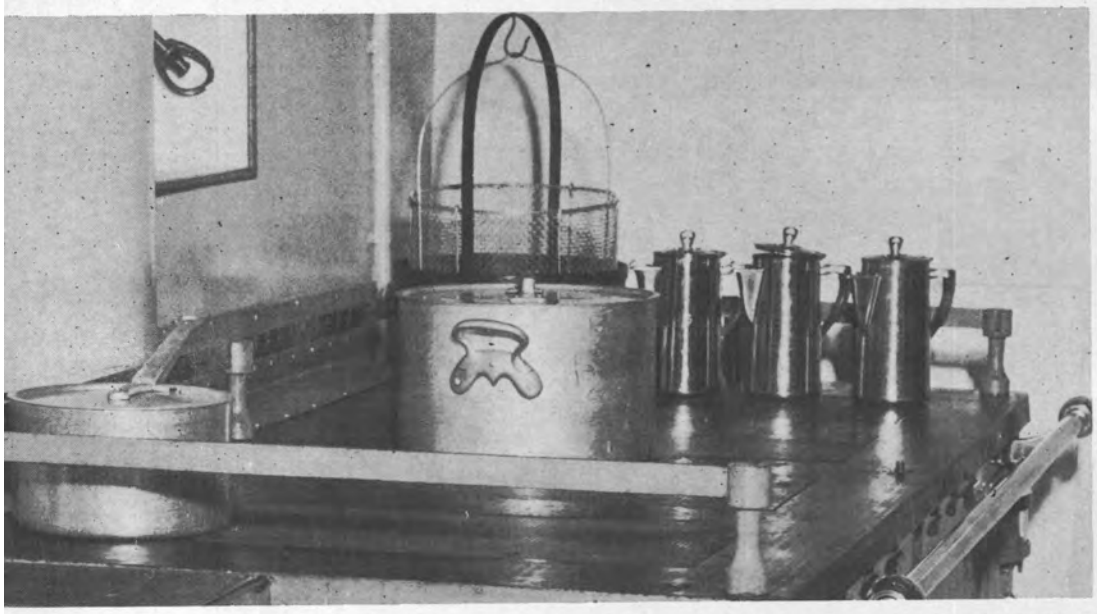

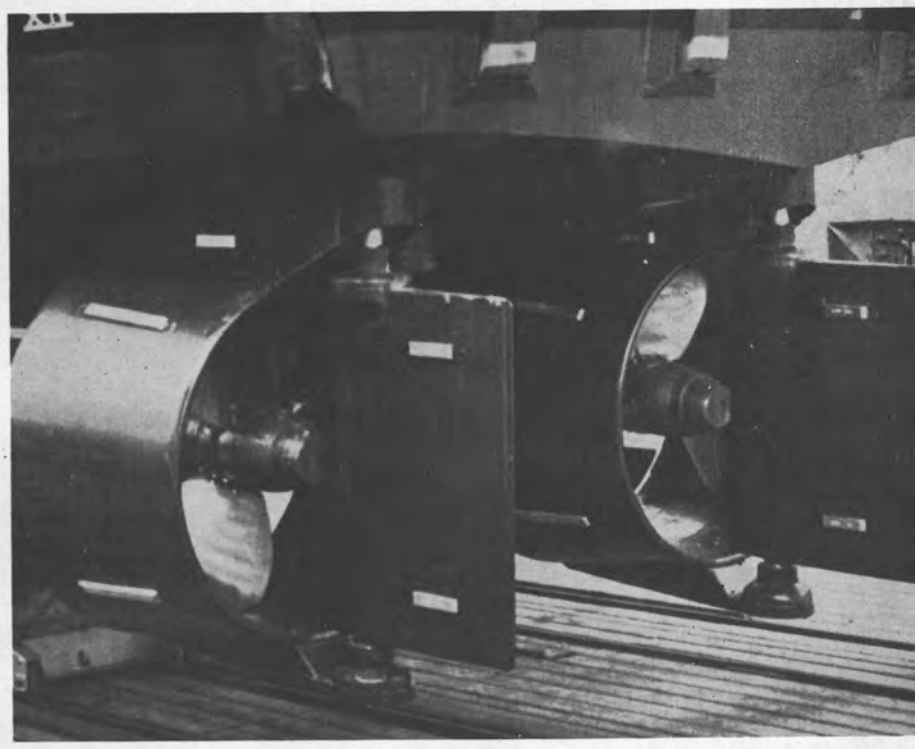

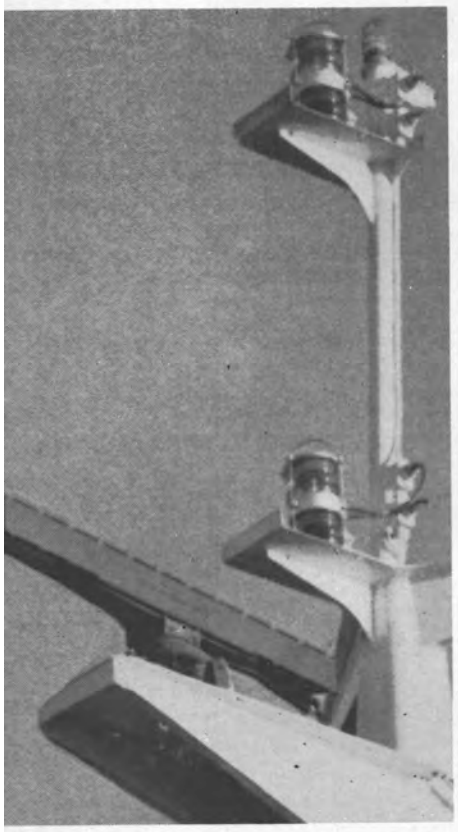

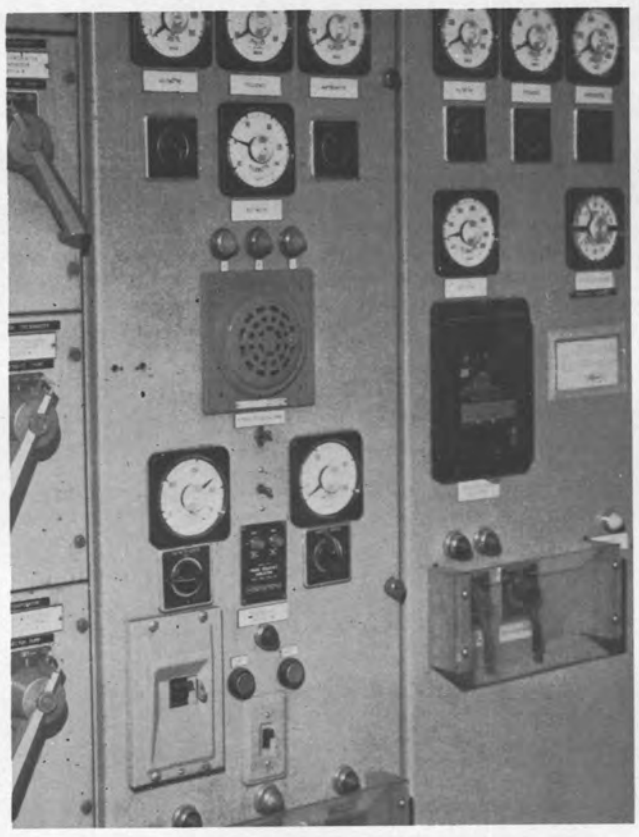

You've picked your propulsion power...

...now what about ship's service, refrigeration, bow thrusters, winches, pumping and cargo handling?

You don't need to think about it long. Because you can get all the dependable auxiliary and emergency power you need from Caterpillar.

Cat Diesel Engines and Electric Sets offer a wide range of reliable auxiliary power. Power that's proven itself in years of use, in a variety of assignments. With durability built in, part by part.

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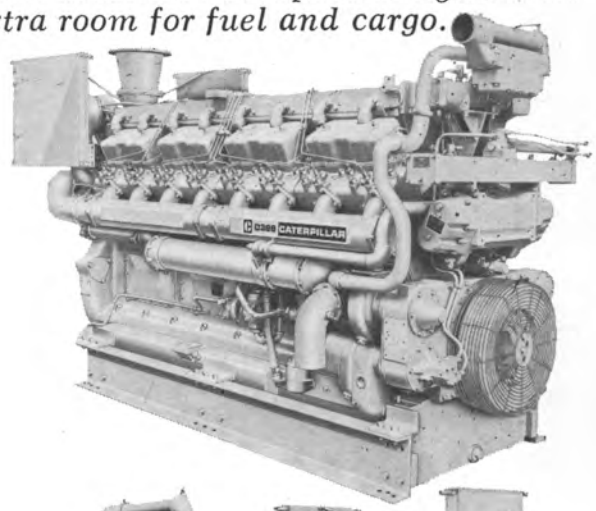
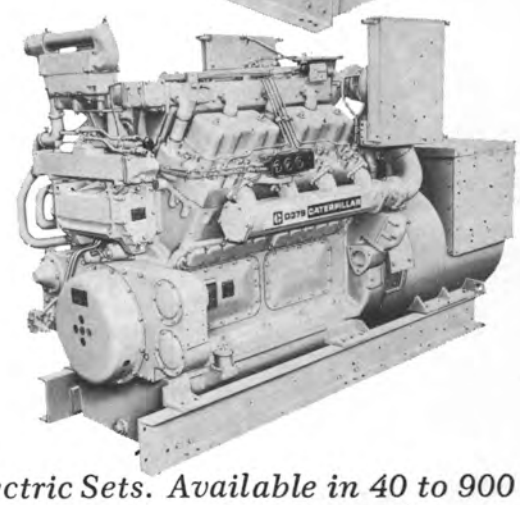
Your Caterpillar Dealer is an experienced power consultant. And his service goes far beyond the sale to give you the best return on your engine investment. You get fast, complete parts and service assistance from Cat Dealers — worldwide. You get parts interchangeability that enables you to keep inventories at cost-saving levels.

Discuss your auxiliary power needs — new or replacement — with your Naval Architect or nearby Cat Dealer. Ask about Society approvals, too.

Cat-built Diesels. Range from 85 to 1125 continuous HP. Compact design allows extra room for fuel and cargo.





Cat Electric Sets. Available in 40 to 900 KW configurations. Handle auxiliary and emergency needs above or below deck.

CATERPILLAR

Ogden's Avondale Shipyards Signs To Build Three More LNGs For El Paso Subsidiaries

Ogden Corporation's subsidiary, Avondale Shipyards, Inc., New Orleans, La., has signed contracts totaling $322.5 million to construct three additional 125,000-cubic-meter liquid natural gas (LNG) carriers for subsidiaries of El Paso Natural Gas Co., it was announced by **Ralph E. Ablon,** Ogden chairman.

The vessels are scheduled for delivery beginning in 1978 and would follow three identical vessels being constructed by Avondale for other El Paso subsidiaries under contracts finalized in June 1973.

El Paso and others will seek necessary U.S. Maritime Administration action, Federal Power Commission approval, and certain other governmental approvals and necessary financing for El Paso's second Algerian liquefied natural gas project. Either El Paso or Avondale may withdraw from the new contracts unless these matters are favorably resolved by March 1974.

Each of the new ships will be over 900 feet long and will carry natural gas which has been cooled to form a liquid by reducing its temperature to —260° F. When returned to its gaseous state, each cargo will occupy space equal to 600 times the liquid form in shipment.

Mr. **Ablon** stressed that the doubling of the original LNG order reinforces his view that the market is strong for U.S.-built vessels of this class operated with U.S. crews.

In addition to its natural gas operation, El Paso is engaged in such diverse activities as petrochemicals, plastics, synthetic fibers, textiles, insurance, wire fabrication, oil production, land development and copper mining.

Ogden Corporation, which operates in the major market areas of metals, transportation, food products, leisure, real estate development, and investments, reported sales of $1.073 billion in 1972.

McAllister Brothers Leases Tugboat Berthing Area From South Jersey Port Corporation

With the tugboat Reid McAllister in the background, **Anthony J. McAllister Jr.,** vice president of McAllister Brothers, Inc., signs five-year lease to berth the firm's vessels at South Jersey Port Corporation's Broadway Terminal in Camden. Awaiting his turn with the pen is **Robert L. Pettegrew,** executive director of the state port agency.

McAllister Brothers, Inc., whose tugboats have been plying the Delaware River for decades, signed a five-year lease to berth its vessels at South Jersey Port Corporation's Broadway Terminal in Camden.

A McAllister spokesman, **Alcide S. Mann,** said the firm's lighter, which houses workshops and office space, will be moored at the head of the wet slip adjacent to the old covered shipways on the former New York Shipbuilding Corp. property. The lighter is an ex-Navy berthing barge.

McAllister operates 10 vessels in the port, including the powerful Teresa McAllister, which is especially outfitted with flanking rudders and Kort nozzle for increased maneuverability and power. For the last five years, the firm had leased city-owned property at the foot of Spruce Street.

Robert L. Pettegrew, executive director of the port corporation, said the state agency was most happy that the covered wet slip could be utilized by McAllister Brothers. The lease agreement covers 44,590 square feet, or the south portion of the wet slip, and another 11,040 square feet of parking area at the head of the slip.

McAllister Brothers, headquartered in New York, is 109 years old. But McAllister Brothers, Delaware, which operates in the port in Camden, N..J, was organized in 1951 and acquired the P.F. Martin Co. which had operated in the port about 60 years.

In addition to New York City and Philadelphia, Pa., McAllister Brothers, Inc. also serves the ports of Norfolk, Va., and San Juan, Puerto Rico.

Maryland Shipbuilding Awarded $10.4-Million Barge Contract

Maryland Shipbuilding and Drydock Company has been awarded a $10.4-million contract by Intercoastal Bulk Carriers, Inc. of California, to build a 25,000-dwt barge (part of an integrated tug-barge system). Designed to haul rice and lumber from California to Puerto Rico, the 626-foot-long barge is scheduled for delivery in December 1974. The tug is being built in Louisiana.

THE BIG ONES ARE COMING

from Bethlehem-Beaumont

Dwarfing everything for miles around are the two massive semi-submersible drilling rigs shown under construction at pierside in our Beaumont, Texas, yard. On the right is the newly commissioned Zephyr I, being built for the joint-venture partners, A. P. Møller/Dearborn-Storm Corporation. It is capable of drilling to 25,000 ft in the North Sea. A sister semi, the Zephyr II, is also on order at Beaumont.

On the left is the Pacesetter I, being built for the Western Company of North America. Shown ready to receive its upper platform, this rig will be capable of working in water depths to 600 ft and beyond.

Nearly ready for launching from the ways at the left is the starboard lower hull of the Zapata SS-3000, being built for Zapata Marine Drilling, Inc. The completed port hull lies waiting at the pier above. Based on Bethlehem's BethDrill rig design, this huge semi will support a variable load of 6,250 short tons, and will be able to drill safely and economically in 1,000 ft waters.

Other big semis and jack-up rigs are also on order or under construction here at Beaumont.

In addition to its design and construction work for the offshore industry, Beaumont handles conversions, as well as repair and service work on all types of vessels. As with all Bethlehem repair yards, Beaumont's emergency, 'round the clock services are only a cable away.

BETHLEHEM STEEL

Shipbuilding

Dry Docks 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.

Oceanic Superpowers —Japan And Russia

Norman Polmar, U.S. editor of Jane's Fighting Ships, and **Ken W. Sayers,** writer with Lulejian & Associates, in Sea Power magazine (August issue), concludes that Japan and Russia "will be America's competitors at sea in the coming decades" with not only bright competence, but with "a high degree of Government support and coordination." They write:

"During the coming decades an increased thrust to the sea can be anticipated from virtually all nations of the world, and most particularly from the two countries which may well become oceanic superpowers, Japan and the Soviet Union. Their increasing use of the sea for military, commercial, and political endeavors will, in many respects, be in direct competition to the interests of the United States, especially in non-military areas. Ships flying the Japanese and Soviet flags will compete for political and economic influence and new marketplaces in the world's key resource regions . . .

"In both nations there are dedicated and coordinated efforts to develop virtually all aspects of maritime activity. It is somewhat ironic that these two nations, particularly, today offer the most serious political-economic competition to the United States at sea. Japan is now, in many respects, the firmest ally the United States has in modern Asia; the Soviet Union is primarily a land power. However, both Japan and the Soviet Union have the elements (or suitable substitutions, in the case of the Soviet Union) necessary to be great sea powers. Equally as important, each nation has the desire to become a great sea power . . .

"Today, as President **Nixon** has many times enunciated, the United States is now passing from the 'postwar' era of Cold War confrontation to a new 'era of negotiation.' Similarly, Japan has undergone a total rehabilitation. Virtually no physical vestiges remain of the World War II destruction to that nation. Instead, the Japanese merchant marine is today one of the world's largest, with one of the fastest rates of growth; the Japanese fishing industry is second in the world in terms of total catch, and Japan is leading the world in aquaculture; and the Japanese shipbuilding industry is the world's largest, in both quantity and size as well as in its mastery of numerous technological capabilities . . .

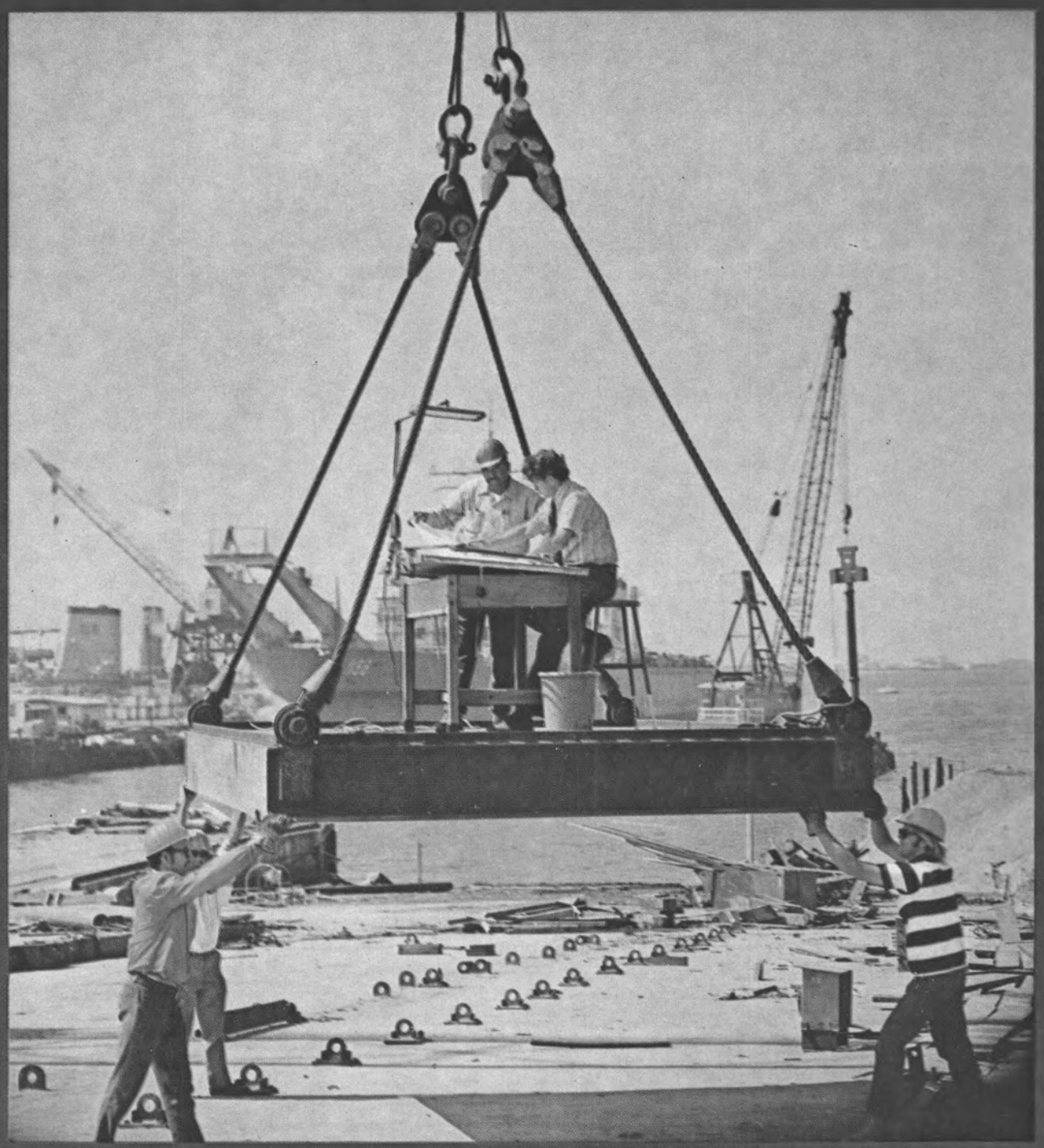
"The continuing Soviet thrust to the sea obviously has the support of and is coordinated at the very highest levels of the Soviet Government. In both the Soviet military and governmental organizations there appears to be 'machinery' in existence at the ministry level to foster and support the USSR's maritime options. All Soviet ship construction, military as well as commercial, for example, is under a single Ministry of Shipbuilding Production which is responsible for all building yards of any significant size as well as for related research and development programs . . .

"The two . . . oceanic superpowers — Japan and the Soviet Union—will be America's competitors at sea in the coming decades. Both nations are highly competent on the sea, and both are dedicated to being first. They also both enjoy a high degree of Government support and coordination.

". . . This last factor may be the most important of all. The United States, like its competitors, possesses superior technology, a large and prosperous population, and significant geographic advantages (as well as certain disadvantages). The decisive factors, therefore, likely will be the national character of the American people and the attitude of the Government toward sea power — two intangibles, both of which, it must be reluctantly conceded, have sometimes fallen somewhat short of the mark."

Cunard Names Bahna Chief Executive, N.A.

Cunard recently announced that **Ralph M. Bahna** has been named as chief executive in North America for the 133-year-old English company. Mr. **Bahna,** who formerly held the title of senior vice president, North America, was also named to the boards of directors of Cunard Line, Ltd., and Cunard-Trafalgar Hotels and Resorts.



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Call it what you will—togetherness, teamwork, or just plain efficiency—the close relationship between design and construction, made possible by our new concept of production drawings, should rank high when selecting a shipbuilder. Design skills without production expertise, and vice versa, are of no value. NASSCO offers you both. . . . . Our engineers have produced an impressive variety of designs including OBO's and tankers, while our skilled workers working in almost perfect weather build superior ships.

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Bethlehem Beaumont Names Three To New Management Positions

Ralph A. Leaf, general manager of the Bethlehem Steel Corporation's Beaumont, Texas, shipyard, has announced three appointments to new management positions at the Beaumont shipyard.

William T. Faucett will become assistant general manager of the facility, and **Paul W. Pritchard** and **Richard E. Blackinton** were appointed assistants to the general manager.

Mr. **Faucett,** a native of Beaumont, first began work in the shipbuilding business in 1940. He attended Lamar University and joined the Beaumont shipyard as a senior draftsman in June 1947. About a year later, he was transferred to the estimating department, and he became chief estimator in May 1960.

In January 1971, Mr. **Faucett** was promoted to assistant to the general manager, the position he held until this latest appointment.

He is a member of The Society of Naval Architects and Marine Engineers, and the American Management Association.

In 1969, Mr. **Faucett** negotiated contracts abroad during the preliminary phases of establishing the Bethlehem Singapore Private Limited shipyard in Singapore.

Mr. **Pritchard** was born in Chester, Pa. He was graduated from Duke University with a degree in mechanical engineering in 1955 and joined Bethlehem Steel as a member of that year's management training program.

From 1955 to 1963, Mr. **Pritchard** worked as an engineer at the corporation's plant in Bethlehem, Pa., and then was assigned to home office steel operations department's planning and coordination work for the new plant at Burns Harbor, Ind. In 1967, he was transferred to the engineering department at the home office.

Mr. **Pritchard** joined the Beaumont shipyard in April 1971 as the plant engineer, and later that year became project manager, working in contract management.

Mr. **Blackinton,** a native of Barrington, R.I., was graduated from the University of Rhode Island with a bachelor's degree in civil engineering in 1951.

He joined Bethlehem Steel as a member of the 1951 management training program, was assigned to Hoboken, N.J., shipyard, and also worked at the corporation's former Brooklyn 56th Street shipyard.

In 1957, Mr. **Blackinton** became assistant to the construction engineer in the shipbuilding department, and eight years later became technical assistant to the vice president, shipbuilding.

In 1966, he became ship superintendent at the Hoboken shipyard, and later that year was transferred to the San Francisco shipyard as assistant superintendent.

Mr. **Blackinton** first joined the Beaumont shipyard as general superintendent in 1969, became plant engineer in 1971, and methods engineer in 1972.

He is a member of The Society of Naval Architects and Marine Engineers, The Propeller Club, and is a licensed professional engineer in New York.

Overseas Shipholding Takes Delivery Of 264,900-Dwt Tanker

Overseas Shipholding Group, Inc. (OSG), a major bulk shipping company, has taken delivery of a new 50-percent-owned 264,900-deadweight-ton tanker which immediately entered service under a long-term charter.

Named the Eastern Lion, the vessel is the second of eight very large crude carriers scheduled to join OSG's international fleet, all of which have been chartered long-term. This latest delivery raises the company's current operating fleet to 39 vessels aggregating 2,076,150 deadweight tons.

By early 1978, when the last of 21 ships now on order is scheduled to be delivered, OSG's fleet will total over five million deadweight tons, including ten 50-percent-owned and six 60-percent-owned-vessels. Over 70 percent of the approximately three million deadweight tons on order has already been chartered for terms of five years or longer from delivery.

Falk Appoints O'Hare Sales Vice President

Don R. O'Hare

Don R. O'Hare has been appointed vice president sales manager by The Falk Corporation, subsidiary of Sundstrand Corporation, Milwaukee, Wis. 53201. Falk is a leading worldwide producer of industrial and marine gear drives and shaft couplings.

Mr. **O'Hare,** now responsible for all sales of the company's broad line of gear drives and shaft couplings, will report to vice president sales and marketing, **Sandy G. Falk.**

An engineering graduate of the University of Minnesota and a World II Navy veteran, Mr. **O'Hare** joined Falk in 1950 as a sales trainee. He was assigned as sales representative in the Philadelphia territory in 1951, and was promoted to manager there in 1955. In 1957, he was transferred to the Chicago office, where he became district manager in 1959. He was appointed sales manager on January 1, 1972.

M.I.T.-B.U. Group To Develop Legal Guide For Sea Mining

A Massachusetts Institute of Technology-Boston University group, headed by Assoc. Prof. **Michael S. Baram** of M.I.T., has received a $61,000 grant from the National Science Foundation's RANN (Research Applied to National Needs) program to develop the legal and regulatory framework for marine mining and resource extraction in the coastal zone.

A lawyer and a member of the department of civil engineering, Professor **Baram** will head the project team which includes co-principal investigator Prof. **David A. Rice** of the Boston University School of Law, a law student to be selected, and **William W. Lee,** an M.I.T. graduate student in civil engineering from Claremont, Calif.

The study will focus on hard mineral resources which have been determined to lie in the U.S. coastal zone, the growing industrial demand and technological capability for extraction, and the environmental and social impacts which are expected to accompany extraction.

The project team will review the principal substantive laws of the coastal states covering mineral extraction activities, and the Federal regulations and authorities which affect state, local and private actions within the coastal zone.

The objective of the project is to determine methods of regulation, and the appropriate legal framework to ensure proper social management for the application of new mineral extraction techniques.

Factors to be considered in subsequent stages of the project include citizen participation and essential monitoring and enforcement methods.

"Conflicts between public and private interests, and between Federal, state and local authorities are expected to be significant features of the study," Professor **Baram** said.

"In most states there is no coherent regulatory program for resource management in the coastal zone. Furthermore, the principle of harmonization of differing state approaches must be developed to ensure regional and national interests."

Both Professors **Baram** and **Rice** have been active in environmental law developments, and have served in several advisory capacities on technology assessment, coastal zone problems and other environmental issues.

Koreans To Build Nine More Shipyards

Early in 1973, Korea's President **Park Chung Hee** declared the "start of an era for emphasizing of heavy and chemical industries." Already several major projects in these basic industries are on the drawing boards.

Among the heavy industries receiving special attention in Korea's expansion plans is shipbuilding. By 1980, according to Government projections, the industry will supply 10 percent of Korea's total export target of $10 billion.

At an export promotion conference, President **Park** directed the cabinet to render greater effort to shipbuilding. He ordered that more domestic vessels be used in Korea's export trade, noting that freight charges consume a large portion of the country's export earnings.

Plans for the shipbuilding industry prepared by the Heavy and Chemical Industrial Promotion Committee, call for the construction of nine more shipyards on Koje-do, an island some 25 miles southeast of Pusan.

The new shipyards will encompass an area of 402 square kilometers. Five of the yards will be capable of building vessels of one million deadweight tons; two will handle up to 100,000 dwt and two will specialize in building deepsea fishing boats of up to 6,000 dwt.

In addition to new yards, the existing shipyards of Hyundai Shipbuilding and Heavy Industries in Ulsan and the Pusan shipyard of the Korea Shipbuilding and Engineering Corp., will expand their capacities.

With the expansion completed, Korea will have lifted its shipbuilding capacity to 4,450,000 gross tons, and will be able to handle up to an estimated $2 billion in export tonnage.

To support the shipbuilding industry, the Government will start an intensive program for training technicians and engineers.

The Korean Government has been conducting a campaign to enlist international cooperation on behalf of its shipbuilding industry. On his recent European tour, Premier **Kim Jong-pil** enlisted commitments from Belgium and Spain for their cooperation. Economic Planning Minister **Tae Wan-son** has received favorable reaction from the World Bank for cooperation in Korean shipbuilding.

U.S. And Japanese Companies Form Univenture Shipping

The formation of Univenture Shipping Corporation of Monrovia, Liberia, was jointly announced by **M. Kosugi,** general manager of the Distribution Management Division, C. Itoh & Co., Ltd., Tokyo; **Y. Ebiko,** director of Kawasaki Kisen Kaisha, Ltd., Tokyo; and **Nils O. Seim,** president and chairman of the board of Motorships, Inc., Englewood Cliffs, N.J.

Univenture has ordered an automobile carrier from Kurushima Dock Yard Co., Ltd., for delivery November 1974. The ship will have a capacity of 4,200 Japanese cars and a service speed of 20 knots. All cars will be driven on and off the ship. The vessel will be employed in the Japan/U.S. Gulf and East Coast trade. Kawasaki is one of Japan's major shipowning and operating companies; C. Itoh, one of Japan's major trading companies; and Motorships, Inc. is a U.S. shipping agency firm that has specialized in handling automobiles since its founding 15 years ago. Messrs. **Kosugi, Ebiko** and **Seim** will act as board members for Univenture. **Udo Reif,** executive vice president of Motorships, Inc., has been appointed president of the new shipowning company.

Univenture is believed to be the first joint venture between Japanese and United States companies in the shipping field.

Chester, Blackburn Names Two Managers

Chester, Blackburn & Roder announced the appointments of **John Powers** as its outward traffic manager and of **Fred Dralle** as inward traffic manager. In their new posts, both men who have been with the firm since 1969, will be in charge of East Coast operations of Atlantic Lines Ltd., Atlantic Brazil Lines, and the New York affairs of Pan American Mail Line and Atlantic Lines, Mr. **Powers** for outward operations, and Mr. **Dralle** for inward operations.

4,000-Ton Girder For World's Largest Gantry Crane Delivered To Kockums Yard

The 607-foot girder hung over both ends of a floating dock for the trip from Copenhagen to Malmoe.

A 4,000-ton girder, 607 feet long, to be installed as the main element of the world's largest gantry crane, has been delivered to Kockums Shipyard in Malmoe, Sweden.

Set end on end, the girder would tower 47 feet above the Washington Monument. The beam will be lifted over 44 stories into the air to become the main element of the "Goliath" crane.

The new colossus, due to be put into operation next March, will have a lift capability of 1,500 tons—and under some circumstances, 1,600 tons—as against the 800-ton maximum of the present Kockums gantry crane.

The gigantic machinery for raising, transporting, and lowering vast weights will be utilized by Kockums to meet the world demand for increasingly larger oil tankers. Kockums, largest shipbuilder in Sweden, is currently turning out 255,000-ton tankers (VLCCs), and has orders for a new series of 355,000 tons.

The massive crane will have an overall height of 446 feet, a lifting height of 344 feet, and a breadth of 571 feet between its railtracks. When emplaced on its pinions overhead, the huge beam will be outfitted with the housing and auxiliary equipment needed to convert the 4,000-ton girder into a 7,000-ton crane.

The key girder has been two years in the making, requiring the coordinated efforts of major contractors in Germany, Denmark, and Sweden.

Delivery of the monstrous girder was made from Copenhagen to Malmoe on a floating dock towed by four tugs across the Oresund Strait. Tight timing was involved in the operation, since delivery of the beam had to be made immediately after the undocking of the 255,000-ton Sea Scout, a tanker being built by Kockums for the Salen Shipping Co. The girder will have to be lifted in place overhead this month to make way for Kockums' next tanker in production.

When completed, the Goliath crane and auxiliary machinery and facilities will have cost $27,000,000.

Holland Manufacturer Of Marine Inerting Equipment Establishes Subsidiary In U.S.

Smit Ovens Nijmegen B.V. of Holland has recently established a subsidiary, Smit Nymegen Corporation, 688 Boston Post Road, Marlboro, Mass. 01752, to sell, manufacture and service marine inerting and N_2 generating equipment for U.S.-built LNG tankers, bulk and crude carriers.

Paul W. Roos, the president of the new corporation, states that the equipment qualifies for Maritime Administration subsidized shipbuilding contracts.

The parent company is a major supplier of marine inerting equipment in Europe and has been awarded the contract for generators on the first three El Paso LNG tankers, now under construction in France.

Ingalls Ship Awards $1.2-Million Contract To Carver Pump Co.

Carver Pump Company, Muscatine, Iowa 52761, announced that it has been awarded a $1,200,000 contract from the Ingalls Shipbuilding Company, division of Litton Industries. Carver will supply pumps for 18 different shipboard services for the U.S. Navy's new class of amphibious assault ship (LHA). The ships were designed by Ingalls to transport and land a Marine battalion landing team and support equipment. The LHA is as large as a World War II aircraft carrier.

Carver Pump Company manufactures a complete line of horizontal end suction, vertical, split case, sewage, trash and self prime pumps in all the alloys. They also manufacture pumps of special design to contract, such as silent run pumps, extremely low NPSH pumps, high head fueling pumps, etc.

Sea-Land Service Expanding Facilities In Southern Ports

Two new Portainer® cranes are currently going into operation for Sea-Land Service, Inc.'s container terminals—one at the Port of New Orleans, La., and one at the Port of Jacksonville, Fla.

Built by Paceco, a division of Fruehauf Corporation, Alameda, Calif., the cranes have a 30-long-ton capacity and are Sea-Land's second Paceco cranes in each of the ports.

The new crane for the Port of New Orleans was erected in record time, just six weeks after start of erection, at Sea-Land's France Road Terminal. Normally, erection of these huge cranes requires two to three months.

The new crane for the Port of Jacksonville joins the first Portainer, which was installed in this Sea-Land container terminal in 1966. It was one of the first Portainers to be bought by Sea-Land.

Patterson-Sargent Appoints D.J. Milazzo

Patterson-Sargent/Vita-Var, a Textron division, North Brunswick, N.J., has announced the appointment of **Dominick J. Milazzo** as product manager of industrial coatings. Formerly assistant technical director, Mr. **Milazzo** will assume the overall responsibility for the industrial sales department, Industrial Laboratory and Plant Production in North Brunswick.

Mr. **Milazzo,** who received his degree in chemical engineering at the College of the City of New York, has been in the paint industry for 25 years. He has been associated with Patterson-Sargent/Vita-Var for 10 years.

SNAME N.Y. Section Honors Past Chairmen

Shown above during the first meeting of the new season, left to right: Dr. **Walter M. Maclean,** head, department of engineering, U.S. Merchant Marine Academy, Kings Point, N.Y.; **Robert P. Fulton,** secretary-treasurer of the New York Metropolitan Section; **Robert G. Mende,** national secretary of SNAME; **John P. Casey,** author; **Donald B. Carpenter,** chairman of the Section, and **Thomas J. Sartor Jr.,** vice chairman.

The first meeting for the 1973-74 season of the New York Metropolitan Section of The Society of Naval Architects and Marine Engineers was held on September 6 at the U.S. Coast Guard Officers' Club, Governors Island, N.Y. This meeting honored the past chairmen of the Section and was officially designated as "Past Chairman's Night."

At the technical session, which was preceded by a social hour and dinner, a paper was presented entitled "Steam Propulsion Economically Viable for Powers as Low as 12,000 Shp," by **John P. Casey,** engineer, Marine Propulsion Systems Planning, Marine Turbine and Gear Products Department, General Electric Company, Lynn, Mass.

In the introduction to this paper, the author states that increasingly higher propulsion power has been required to meet the needs of the worldwide shipbuilding industry during the past decade and steam has consistently met those needs by having plants and equipment designed and available on a schedule consistent with industry requirements. During this period, the powering of ships below 15,000 shaft horsepower has been taken over exclusively by the diesel engine, more recently by the medium speed-geared variety.

The author presents a concept of a 12,000-shp steam propulsion plant based on modern concepts for consideration as a viable alternative to the diesel plant. The paper includes an economic evaluation of functionally equivalent steam and diesel plants to demonstrate the claimed viability of the proposed steam plant.

Past chairmen of the New York Metropolitan Section, honored at the meeting, are: (standing, left to right), **Everett A. Catlin,** Babcock & Wilcox Co.; **Robert G. Mende,** national secretary, SNAME; **Norman R. Farmer,** George G. Sharp, Inc.; **Rudolph Schoen III,** Babcock & Wilcox Co., **Robert P. Giblon,** George G. Sharp, Inc.; **Warren Signell,** J.J. Henry Co., Inc.; **William C. Freeman,** Combustion Engineering, Inc.; (seated, left to right), **Lester Rosenblatt,** M. Rosenblatt & Son, Inc.; **Charles A. Narwicz,** United States Lines, Inc., Container Division; **Charles W. Wilson,** Babcock & Wilcox, Inc.; Capt. **L.S. McCready,** National Maritime Research Center, USMMA, Kings Point, N.Y., and **Eugene D. Story,** Marine Management Systems, Inc.

General Electric Appoints Honsberger

Charles K. Honsberger

Charles K. Honsberger has been appointed to the position of overseas manufacturing associate liaison for General Electric's Marine Turbine and Gear Products Department, Lynn, Mass., according to **Robert H. Kiefer,** manager of export marine sales.

In his new position, Mr. **Honsberger** is responsible for coordinating the manufacture of marine propulsion machinery with the department's overseas manufacturing associates located throughout the free world. General Electric Company is a leading supplier of marine steam turbines and gears for ship propulsion applications.

A native of New York State, he holds a bachelor's degree from Middlebury College and is currently a part-time student at Northeastern University's Graduate School of Business Administration. Mr. **Honsberger** served in the U.S. Navy as an electronics technician.

Since joining General Electric Company in 1968, he has held the post of production control supervisor of marine gear manufacturing, and was most recently a product service specialist, responsible for installation, warranty, administration, and customer service for industrial gears.

OSE Announces New Management Personnel

Ocean Science and Engineering, Inc. (OSE), Long Beach, Calif., has completed an important operational restructuring with the appointment of new management personnel in three major areas of responsibility, according to a recent announcement by **William H. Glennon,** president.

The company has named **J. Roger Norton** as vice president of finance. Formerly manager of corporate financial policies and procedures for Dynasciences Corporation, Mr. **Norton** also previously served for 11 years as controller of Products Research and Chemical Corporation, Mr. **Glennon** said.

Edward R. Lawlor, for five years an operating division general manager for Omark Industries, has been appointed a vice president of OSE and general manager of the company's Engineering and Ship Operations. Prior to joining Omark Industries, Mr. **Lawlor** was vice president of marketing for Western Precipitation Company, following affiliations with both Bethlehem Shipbuilding Company and Petroleum Piping and Engineering Company.

Mr. **Glennon** commented that, with Mr. **Lawlor's** assumption of operating responsibilities for OSE, Dr. **Jack McLelland,** executive vice president, would resume his former functions in the development and review of engineering concepts, market development and long-range planning. "Dr. **McLelland** is particularly suited for this responsibility, having participated in many of the company's early and recent developments," Mr. **Glennon** observed. "He has many friends in the field of ocean engineering and can translate future industry needs into potential OSE programs."

The new general manager of OSE's wholly owned subsidiary, California Shipbuilding and Dry Dock Company, is **Raymond W. Berry,** who has been associated with that operation since 1964. Noting that Mr. **Berry** retired as a lieutenant commander after a 30-year career with the U.S. Navy, Mr. **Glennon** said that "this background, together with his years in the shipyard, will enable him to make a significant contribution in his new position."

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Executive Tells Seminar LNG Cargo Is One Of Safest Forms Of Energy To Transport

"With proper training of personnel, liquefied natural gas (LNG) is one of the safest of all energy forms to transport," said **Daniel E. Withers,** president of Houston, Texas-based Arctic Tanker Group, Inc.

A recent Hazardous Cargo Seminar held at the Maritime Institute of Technology and Graduate Studies in Baltimore, Md., examined properties of liquefied natural gas and discussed procedures which can be used to insure the safety of personnel and cargo.

Mr. **Withers** told seminar attendees that LNG is far safer to handle than gasoline, and presented a film showing that LNG fires can be successfully controlled using conventional fire-fighting methods. The film, which was prepared to train personnel who may encounter LNG in an emergency situation, showed the Portland, Ore., Fire Department releasing LNG onto the ground at varying rates and at various distances from a source of ignition, then extinguishing the fires. The film's tests mainly involved the reaction of vapor-air mixtures to direction by hose streams, although other areas of LNG behavior were noted.

LNG will not ignite until it has heated from its liquid temperature of -260° F vaporized and come into direct contact with a flame, at which time its slow flame propagation rate makes it easy to control. Also, LNG in its liquid state is not explosive. In all of the film's test cases, LNG fires were controlled and/or extinguished with water or dry chemicals.

Firemen found that by placing water streams midpoint between an LNG leak and a flame, they can increase the dispersion rate of the gas into the air while directing it away from the flame. One water stream warms the LNG, causing vaporation, while another water stream controls the direction of the gas.

The film's experiments showed that conventional dry chemical extinguishers will put out an LNG fire without the need to increase vaporization, and disperse the LNG into the air. A 250-1 expansion detergent foam commonly used in fire fighting was found to retard vaporization of the liquid which would prevent the gas from reaching an igniter, but the foam would not extinguish an LNG fire.

Direct LNG contact froze and cracked some materials such as a fireman's glove and boot, but had no real effect on a fire hose. Frost-burn is a potential hazard if personnel come into direct contact with LNG.

Firemen experimented with several methods of eliminating a pool of LNG. The most practical method is to spray it with water to increase vaporization and dispersion. However, personnel must cautiously control the direction of the LNG, as the film showed that an igniter above the LNG level will ignite rising LNG at a further distance than an igniter at grade.

Other experiments showed that discharging LNG on top of or into a pool of water were unfeasible ways to eliminate the liquid. LNG discharged onto water resulted in a gradual formation of ice and an unstable white solid. When pumped into a pool of water, LNG underwent initial rapid vaporization, followed by violent eruptions as ice formed, then broke from vapor pressure.

The Portland Fire Department's tests showed that in directing the gas, the hose size is a variable: a small hose has marginal value, while a large hose provides effective control.

Persons working with LNG who understand its potential behavior under hazardous conditions such as fire should find it relatively easy to control. Its slow propagation rate, low explosive potential and its ability to be contained by conventional means, remove some of the dangers ordinarily associated with chemical and energy transportation.

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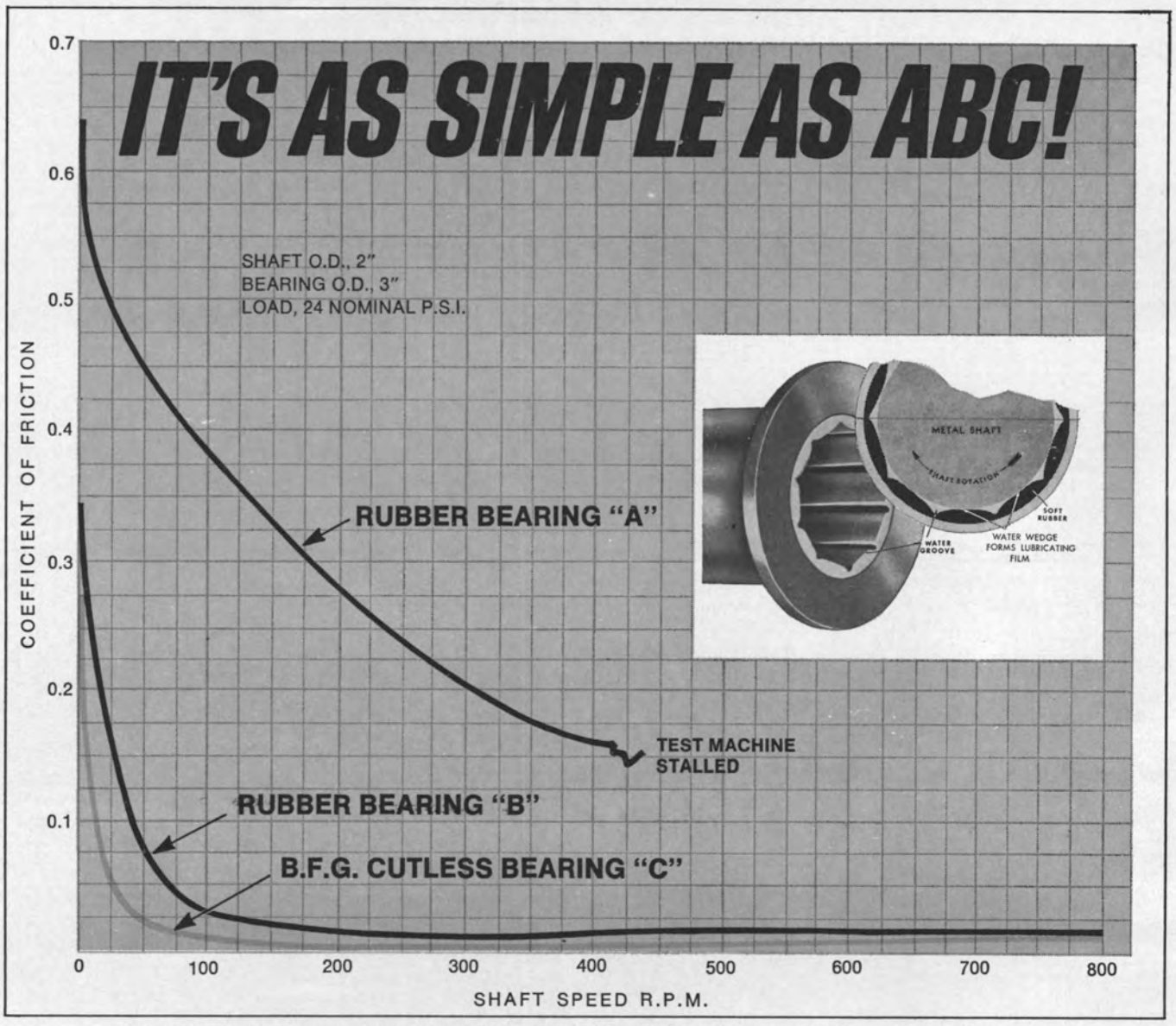

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Dravo Corp. Names Cornelis van Mook To Engineering Works Div.

Cornelis van Mook

Cornelis van Mook has been named assistant chief engineer in the marine engineering department of Dravo Corporation's Engineering Works Division.

Formerly principal naval architect in the department, Mr. **van Mook** will supervise and coordinate its design and detailing activities. A graduate of Massachusetts Institute of Technology in naval architecture and marine engineering, he joined the division as a senior design engineer in 1964.

Born in Holland and brought up in Indonesia, Mr. **van Mook** is a member of The Society of Naval Architects and Marine Engineers and a registered professional engineer in Pennsylvania.

Dravo's Engineering Works Division designs and builds inland and coastal waterway marine equipment, heavy bulk materials handling equipment and other specialized heavy machinery.

Sanko Steamship Names Charles Nisi

The Sanko Steamship Co., Ltd. has announced that **Charles F. Nisi** has joined their organization as manager of their New York office.

Among his responsibilities will be personal supervision of all of Sanko's vessels in the United States and Canadian Great Lakes, St. Lawrence River, U.S. East Coast and U.S. Gulf ports.

Sanko Steamship also announced that the company is moving its offices from 19 Rector Street to 26 Broadway (27th floor), New York, N.Y. 10004.

Lufkin Industries Promotes Ben Queen

Lufkin Industries, Inc., Lufkin, Texas, has announced the promotion of **Ben Queen** to the post of sales manager of the Machinery Division.

Mr. **Queen** was made acting sales manager upon the retirement of **Cooper Richards** in June. Mr. **Queen** was transferred to the Lufkin office last fall to become assistant sales manager after being with the company in Tulsa as district sales manager of the Machinery Division.

Lufkin Industries' Machinery Division manufactures oil field pumping units and industrial and marine gears.

Star Iron Delivers Six Straddle Carriers To Consolidated Marine

Star Iron & Steel Co., Tacoma, Wash., has completed delivery of six Star straddle carriers to the Consolidated Marine, Inc. terminal at San Pedro, Port of Los Angeles, Calif. The new straddle carriers join a 40-ton capacity Starporter dockside container crane at the same facility. Both types of equipment are part of the Starsystem line of container handling equipment.

CMI's straddle carriers are the first delivered by Star with the new cab configuration. It is mounted at the top of the left front leg for optimum visibility. The driver faces the center of the machine for a view of the spreader system and load. The new cab will now be standard on all Star straddle carriers to be manufactured. They are fully approved by all relevant Federal and state safety authorities.

The straddle carriers have a 30-ton capacity and can stack 40-foot containers three-high. Hoist speeds are in excess of 40 fpm. Travel speed is 15 mph. The load may be lowered while the machine is traveling.

The fully automatic telescopic spreader can handle 20-foot and 40-foot containers with modifications to handle 24-foot and 35-foot containers.

Bethlehem Shipbuilding Names James H. Morris To U.S.A. John C. Estes To Singapore

James H. Morris

John C. Estes

After more than three years as vice president and general manager of Bethlehem Singapore Private Limited, a Singapore shipyard, **James H. Morris** will return to the United States as special assistant to **Walter F. Williams,** vice president of Bethlehem Steel Corporation's shipbuilding department, according to an announcement by Mr. **Williams.**

John C. Estes will succeed Mr. **Morris** as vice president and general manager of the Singapore facility, said Mr. **Williams.** Mr. **Estes** is currently assistant to the general manager of Bethlehem Steel's shipyard in Beaumont, Texas.

Both appointments are effective October 1.

Mr. **Morris,** a native of Boston, Mass., was graduated from the Lowell Institute of Engineering, Massachusetts Institute of Technology, in 1936. He began his career with Bethlehem Steel in 1931 at its former Quincy, Mass., shipyard and moved to Sparrows Point, Md., shipyard in 1940.

There, he became manager in 1956 and general manager in 1960. Seven years later, he became assistant to the vice president in charge of shipbuilding and became head of the Singapore yard in July 1970, where he was responsible for construction of the yard and start of its operations.

Mr. **Morris** is a member of The Society of Naval Architects and Marine Engineers and serves on the executive committee of the Singapore Association of Shipbuilders and Repairers.

A native of Birmingham, Ala., Mr. **Estes** received a bachelor of science degree in mechanical engineering from the University of Texas in 1946. He served in the U.S. Navy from November 1943 to June 1946 and again from February 1952 to December 1953, attaining the rank of lieutenant.

After starting his career in shipbuilding in 1946, Mr. **Estes** joined Bethlehem Steel in 1949 at the Beaumont shipyard as a design engineer. In December 1953, he returned to the yard from the Navy, became assistant chief of design in 1954, and chief of design in 1958. About one and a half years later he became chief engineer, and in November 1971 he was named assistant to general manager at the Beaumont facility, the position he held until his assignment to Singapore.

Mr. **Estes** is a member of The Society of Naval Architects and Marine Engineers, American Society of Mechanical Engineers, and is a professional engineer in Texas. In Beaumont, Mr. **Estes** is a member of the Chamber of Commerce, the Young Men's Business League, and was a solicitor for the United Appeals.

Twelve Papers To Be Read At SNAME Annual Meeting

Phillip Eisenberg, president of The Society of Naval Architects and Marine Engineers, has announced that the 81st Annual Meeting of the Society will be held at The New York Hilton in New York City on November 15-17, 1973.

The annual meeting of the council will be held on Wednesday, November 14.

The president will give his annual address at the Awards Luncheon to be held in the Grand Ballroom of the hotel on Thursday, November 15.

Simultaneous technical sessions will be held November 16 and 17, at which 12 papers will be presented covering a wide range of subjects of vital interest to all affiliated with the marine industry.

The annual business session will be held at 4 p.m. on Thursday, November 15.

The annual banquet will be held in the Grand Ballroom of the New York Hilton on Friday evening, November 16, with president **Eisenberg** presiding. The program will feature presentation of the prestigious Vice Admiral "Jerry" Land Medal "For Outstanding Accomplishment in the Marine Field," and the David W. Taylor Medal "For Notable Achievement in Naval Architecture and Marine Engineering."

A ladies bruncheon and a program of entertainment will be held in the Warwick Room of The Warwick Hotel on Friday, November 16, starting at 10:30 a.m.

On Saturday afternoon, the members will tour the Sea-Land Service, Inc. container terminal at Port Elizabeth, N.J.

The Society's annual dinner-dance, in the Grand Ballroom of The New York Hilton on Saturday evening, November 17, will conclude the 1973 annual meeting.

SNAME's approximately 10,000 members represent a broad range of interest in the worldwide marine field.

Japanese Firm To Build/Market Levingston-Designed Class III Jack-Up Drilling Unit In Japan

Mitsui Ocean Development & Engineering Co. Ltd. (MODEC) signed a licensing agreement with Levingston Shipbuilding Company of Orange, Texas, to market and build the Levingston-designed Class III Jackup Drilling Unit in Japan.

The announcement was made by **John C. McDonald Jr.,** Levingston board chairman.

MODEC executives present for the signing were **Jiro Nozu,** managing director; **Ryosuke Arichi,** manager, project development; **Hirayoshi Hamazaki,** assistant manager of technical department; **Eizo Tanaka,** assistant manager, technical department; **Mr. McDonald; H.M. (Bob) Jones,** vice president, administration, and **Clarence Levingston,** chief engineer-research, represented Levingston Shipbuilding.

The Levingston Class III jack-up is triangular in shape, has three legs, and incorporates a jacking system designed by Armco Steel's Machinery and Equipment Division. Two of the units, both built in Orange, are in operation at the present in the Gulf of Mexico.

Kockums Receives Orders For Six 355,000-Ton Tankers; Now Has Backlog Of 19 VLCCs

Orders for six more 355,000-ton oil tankers have been received by Kockums Shipyard, Malmo, Sweden, during the first six months of 1973 as a result of the continued world demand for very large crude carriers (VLCC's).

The tanker orders placed with Kockums during January-June 1973 equalled the number of orders received by the shipyard during all of 1972.

As a result, Kockums' backlog of orders includes seven 255,000-ton and twelve 355,000-ton turbine tankers, with a total value of $980,000,000.

Overall sales of the parent company, Kockums Mekaniska Verkstads AB, for both shipyard and industrial operations, rose over the first half of 1973 to $122,000,000, as against $109,700,000 for the same period in 1972.

However, due to dollar devaluation and world currency fluctuations, overall profits were lower than anticipated.

The industrial group of Kockums—operating in seven countries including the United States—reversed its trend of the past several years and showed a profit for the first half of 1973.

USCG's Oil Cleanup Machine Built By Lockheed (Sunnyvale) Successfully Completes Tests

A large version of the Lockheed Clean Sweep has completed tests in a huge tank near Richland, Wash. The inflatable pontoons and revolving 4-foot-diameter by 13½-foot-long paddle wheel of the air-transportable machine are oil soaked as it floats in the 200-foot by 400-foot tank at Battelle Northwest.

A device that could help protect U.S. coast lines and beaches from offshore oil spills has successfully completed tests at Battelle Northwest Laboratory, Richland, Wash.

Built for the U.S. Coast Guard Research & Development organization by Lockheed Missiles & Space Co., Sunnyvale, Calif., the prototype oil-recovery device is an adaptation of Lockheed's patented Clean Sweep oil-water separator. The device was shipped from Sunnyvale to Richland aboard a Coast Guard C-130 Hercules aircraft.

The Coast Guard version of Clean Sweep recovered approximately 750 gallons of oil per minute in the Battelle tests, with less than 10 percent water content. The tests covered oil recovery on calm water and on simulated waves to a height of one and a half feet, and tow speeds from zero to two knots.

Coast Guard specifications call for the device to work effectively in seas with average waves of five feet, random waves up to 10 feet, in a two-knot current, and in winds up to 20 knots. The device will be tested for these conditions.

Program manager **Lloyd C. Trimble** said the successful tests were the first major hurdle for the device. Next tests are expected to be on San Francisco Bay to test the stability and durability of the six-ton prototype.

The Coast Guard unit is designed for fast deployment to an accident site. A pair of the devices is designed to be carried to an airport near a spill on a C-130 and be towed to the site by vessels as small as the Coast Guard's 95-foot cutters.

The recovery unit will be moored within a barrier system that contains the spill. Oil recovered by the unit will be pumped to suitable portable storage facilities. When full, the stowage containers will be towed to the nearest port for emptying.

The Coast Guard unit's disc-drum is mounted crosswise between four inflatable pontoons that are connected to the aluminum hull. Within the hull are housed the diesel engine that powers the disc-drum, the oil pump, the air pump for the pontoons, and the electrical system. For safety purposes, each inflated pontoon has a backup inside that is inflated simultaneously.

Crewmen can operate the recovery system from on board or from the Coast Guard support vessel, using an umbilical line which is also part of the system, Mr. **Trimble** said. The equipment includes 300 feet of 10-inch-diameter hose, and a manifold which is placed aboard the support vessel. In operation, oil from the unit passes through the hose to the manifold on the support vessel, which then routes the oil into the storage receptacle.

The commercial Clean Sweep is being used in petroleum production, refineries, petrochemical plants, oil cleanup operations, and in transportation industry maintenance yards.

Offered in two-foot-diameter by four-foot-long and four-foot-diameter by seven-foot-long dimensions, Clean Sweep resembles the paddle wheel of an old-fashioned riverboat. A series of parallel metal discs is connected around their outer edges by metal vanes. As the disc-drum rotates in a slick, the vanes draw oil and water inside, where the oil adheres to the discs. Stationary wiper blades, mounted vertically between each pair of discs, wipe oil from the discs and direct it into the slotted axle at the center of the discs and then the oil is pumped to storage.

MMS System Streamlines CONOCO Tanker Operations

Ocean tanker scheduling and monitoring by Continental Oil Company (CONOCO) will soon be streamlined through the installation of a newly developed computerized Voyage Reporting System designed by Marine Management Systems, Inc. (MMS).

Eugene D. Story, president of MMS, said his company designed the system to enable marine operators to replace long-used manual paper-work methods with efficient computer systems capable of providing up-to-the-minute vessel status reports on a worldwide basis. Based in Stamford, Conn., MMS designs and implements computer systems exclusively for the international marine industry.

Mr. **Story** pointed out that the type of information used in vessel status reports is vital in problem-evaluation and decision-making, particularly during periods of world energy shortages and intensive tanker utilization.

He said the MMS contract with CONOCO marks the petroleum industry's first application of the new system for ocean tanker fleet status reporting. It will be employed by CONOCO's subsidiary, World Wide Transport Inc., which operates 30 vessels transporting oil and oil products from Middle Eastern and North African ports to refineries in Italy, the United Kingdom, and the United States.

Initially, the system will be installed at CONOCO's headquarters offices in Stamford, and at their Eastern Hemisphere offices in London, England. An input/output terminal at each location, Mr. **Story** explained, will be used to feed data pertaining to ship movements and performance to a central computer located in the Midwestern United States.

Both offices will also be able to retrieve instantly, in print-out form, a complete up-to-the-minute report reflecting the latest position of every active company vessel. In addition, historical data—unloading time and fuel consumption of vessels of various sizes, for instance—will also be available.

Plans call for extension of the system this fall to include company operations in Italy. Additional installations are planned for next year.

The MMS system—believed to be the only system of its kind that is commercially available—utilizes the G.E. Worldwide Information Services Network, the heart of which is a giant (Mark III) computer located in Cleveland, Ohio. Overseas access is via the communications satellite.

Zapata Corporation Appoints C.N. Seger And K.W. Waldorf

Christian N. Seger

Kenneth W. Waldorf

Christian N. Seger has been named vice president-marketing of Zapata Marine Service, Inc., a Houston, Texas-based subsidiary of Zapata Corporation. He had been vice president of Zapata Development Corporation since January 1972.

Mr. **Seger** will be responsible for the worldwide sales and marketing efforts of Zapata Marine, its subsidiaries and affiliates. Zapata Marine operates a fleet of 37 vessels which carry crews, equipment and supplies to offshore drilling rigs on locations, and which tow rigs on local moves. The company currently has 10 new tug/supply vessels under construction.

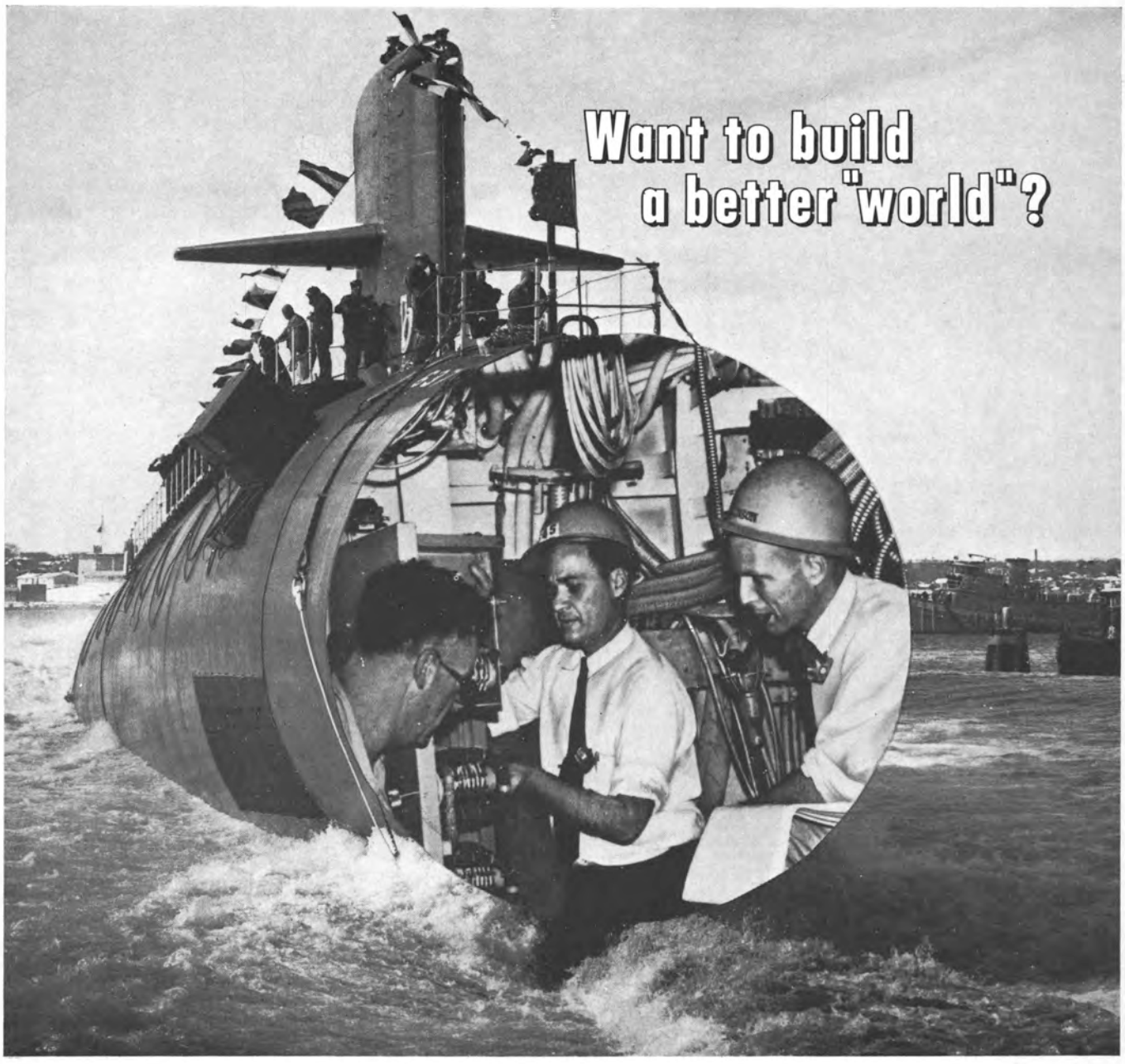
In addition to his marketing management responsibilities at Zapata Development, Mr. **Seger's** background in the field includes responsibility of development of marketing, advertising and public relations programs at Cameron Iron Works, Inc., Houston, and real estate acquisition and marketing with Shindler/Cummins, Inc., Houston.

Mr. **Seger** is a veteran of the U.S. Navy, where he served as a diving and demolitions officer. He holds an M.B.A. degree in marketing from Columbia University, and a bachelor of Arts degree from Yale University.

In another appointment, **Kenneth W. Waldorf** was named manager of planning and financial analysis for Zapata Corporation. He will be responsible for the company's operational auditing, new project analysis and long-range planning.

Before joining Zapata, Mr. **Waldorf** was associated with Exxon Company U.S.A. for four years in various marine planning and operations activities. Most recently, he served as engineering manager, directing the group responsible for the design and construction of both tankers and inland marine equipment. Previously, he served for six years in the U.S. Navy as a submarine officer.

Mr. **Waldorf** has a bachelor of science degree from the U.S. Naval Academy, and an M.B.A. degree from the University of California at Berkeley.



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Chemical Fingerprints Identify Vessels Responsible For Spills

Scientists at the famed Woods Hole Oceanographic Institution, Woods Hole, Mass., are developing a precise method for identifying which ship has polluted the ocean with oil.

Using a gas chromatograph, they are learning to take chemical "fingerprints" of individual batches of crude petroleum and petroleum products. By comparing the fingerprint of spilled oil to the fingerprints of oil from suspected sources, they can trace the spill to the particular ship, storage tank, underwater pipeline or offshore oil well that is responsible for the spill.

Dr. **Oliver Zafiriou**, a research scientist at the Oceanographic Institution in Woods Hole, has worked extensively on the development of oil-fingerprinting, using a gas chromatograph manufactured by Varian Associates. He recently described his techniques in a paper in "Analytical Chemistry."

Petroleum and its products—such as gasoline, fuel oil and jet fuel—are mixtures that may contain dozens of different hydrocarbons. The complexity of these mixtures makes them hard to analyze; but it also provides the basis for precise identification of particular sources— or even particular batches—of oil.

Because so many different hydrocarbons are involved, it is virtually impossible for the oil from two different sources to be precisely identical in composition. Crude petroleum from one well will contain more of certain hydrocarbons and less of others than petroleum from a neighboring well. Fuel oil from one refinery will not be exactly like oil from another refinery. Even successive batches of oil from the same refinery will be slightly different from each other in their hydrocarbon composition.

Detecting such subtle differences requires a very sensitive analytical method. The Varian gas chromatograph that Dr. **Zafiriou** uses at Woods Hole is one of the most precise analytical instruments ever developed for this kind of work.

An oil sample is vaporized as it enters the chromatograph, and the vapor then passes into a tube of absorptive material. As they move through this material, different hydrocarbon substances in the sample are retained for different periods of time before they emerge from the other end of the tube.

This is the key to identifying each substance —measuring its "retention time" in the tube.

As each substance emerges from the chromatograph tube, it is sensed by a detector, which sends a signal to a recorder. The recorder immediately draws a peak on a paper chart, thus registering the retention time of that substance.

By comparing each observed retention time to a list of known retention times for known hydrocarbons, each hydrocarbon in the original sample can be identified.

More importantly, the gas chromatograph also shows how much of each hydrocarbon was contained in the sample. The size of the peak drawn by the recorder precisely indicates the quantity of the hydrocarbon corresponding to that peak.

The completed fingerprint of the sample, then, is a series of peaks that tell which substances, and how much of each, were in the original sample. An oil spill can be traced by comparing its fingerprint to the fingerprints of oil from suspected sources, until a match is found.

Using this technique, Dr. **Zafiriou** was able to distinguish many different types of crude petroleum and fuel oils gathered in the harbors at Portland, Maine, and New York City.

Dr. **Zafiriou** also tackled the fingerprinting and tracing of oil spills that have lain exposed to the sea, the sun and the air for a considerable period of time.

This is an important practical problem: An oil spill may not be discovered or sampled until several days after it occurs. During that time, the composition of the oil may change significantly, as certain hydrocarbons evaporate and others undergo chemical change. For this reason, scientists and Government officials who are interested in tracing spills are seeking methods that will be valid for "weathered" spills as well as for fresh ones.

Dr. **Zafiriou** took 35 samples of oil from 17 different sources and subjected them to artificial weathering-conditions that would simulate the effect of sun and air on a spill at sea. Even after this weathering, gas-chromatographic fingerprints of these samples permitted them to be matched to their original sources with a high degree of accuracy.

Concluding his article in "Analytical Chemistry," Dr. **Zafiriou** points out that his techniques can be further refined through more research. But, he observes, gas chromatography even now offers a practical method for pinpointing the source of an oil spill. He believes that it is feasible for scientists to begin building up libraries of the gas-chromatographic fingerprints of crude petroleum and its products, to be used in tracing actual oil spills and leaks.

Varian Associates, headquartered at 611 Hansen Way, Palo Alto, Calif. 94303, is a leading manufacturer of analytical instruments and computing equipment used in science, medicine, engineering and industry.

Ten Tankers To Be Equipped With Sperry Bridge Systems

Ship sets of the most advanced integrated bridge systems will grace the deckhouses of 10 OBO vessels and tankers of up to the 258,-000-ton class being built in Italy for the Lolli-Ghetti Group. Delivery of the multifunctional equipment by Sperry Marine Systems will begin in 1974 to Italcantieri and Breda Shipyards.

The Lolli-Ghetti Group's multimillion-dollar contract with Sperry Marine Systems is part of their program to increase efficiency of ship performance, improve safety, and protect their considerable capital investment.

Sperry Marine Systems' computer-aided package performs the functions of navigation and collision avoidance, docking steering, as well as stress and stability prediction. These Lolli-Ghetti Group OBO vessels and tankers will have the capability of tracking up to 20 targets simultaneously and displaying collision avoidance data in graphic form. This unique system identifies collision avoidance maneuvers without trial headings. The system also displays regular radar data.

The Integrated Navigation System will compute and continuously display latitude, longitude set and drift, course-made-good, rhumb-line sailing, and other data. Inputs to it will be made from the Omega receiver, speed log and compass. Celestial fixes and other position fixes can be inputted by manual keyboard. Outputs will be by TTY teletypewriter printouts. The Sperry Doppler Sonar Docking and Navigation System increases accuracy of navigation by obtaining speed over-the-ground as well as assisting in docking, mooring, and anchor-drop maneuvers. The Tanker Stress Predictor employs the system digital computer for calculating factors such as hull longitudinal strength, trim, stability, draft, displacement, and deadweight. This enables optimum loading and maintains vessel trim under varying sea conditions. In the future, the same data can be relayed automatically over the international communication links to a shore-based system.

Heading references will be two MK 37 gyro-compasses with repeaters. A dual course and rudder angle recorder is also outfitted in the wheelhouse. Ship's deepwater speed will be delivered by the SRD301 Doppler Speed Log, which does not require a protrusion below the hull. Position will be sensed by the Sperry Omega Receiver.

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The Lolli-Ghetti Group's multimillion-dollar contract with Sperry Marine Systems is part of their program to increase efficiency of ship performance, improve safety, and protect their considerable capital investment.

Sperry Marine Systems' computer-aided package performs the functions of navigation and collision avoidance, docking steering, as well as stress and stability prediction. These Lolli-Ghetti Group OBO vessels and tankers will have the capability of tracking up to 20 targets simultaneously and displaying collision avoidance data in graphic form. This unique system identifies collision avoidance maneuvers without trial headings. The system also displays regular radar data.

The Integrated Navigation System will compute and continuously display latitude, longitude set and drift, course-made-good, rhumb-line sailing, and other data. Inputs to it will be made from the Omega receiver, speed log and compass. Celestial fixes and other position fixes can be inputted by manual keyboard. Outputs will be by TTY teletypewriter printouts. The Sperry Doppler Sonar Docking and Navigation System increases accuracy of navigation by obtaining speed over-the-ground as well as assisting in docking, mooring, and anchor-drop maneuvers. The Tanker Stress Predictor employs the system digital computer for calculating factors such as hull longitudinal strength, trim, stability, draft, displacement, and deadweight. This enables optimum loading and maintains vessel trim under varying sea conditions. In the future, the same data can be relayed automatically over the international communication links to a shore-based system.

Heading references will be two MK 37 gyro-compasses with repeaters. A dual course and rudder angle recorder is also outfitted in the wheelhouse. Ship's deepwater speed will be delivered by the SRD301 Doppler Speed Log, which does not require a protrusion below the hull. Position will be sensed by the Sperry Omega Receiver.

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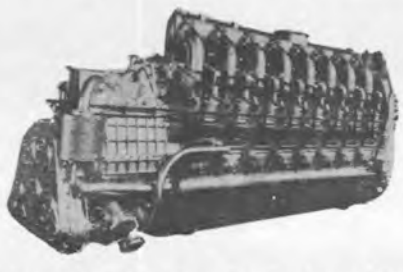
G.M. 16-278A 1700 H.P. DIESEL ENGINES



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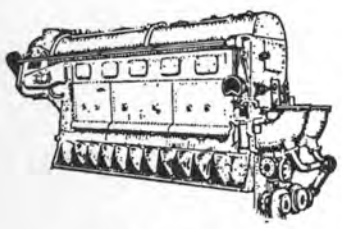
SEE OUR 2-PAGE SPREAD IN ALTERNATE ISSUES OF M.R.

MARINE DIESEL ENGINES

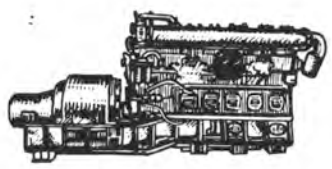


MATCHED PAIR . . . FAIRBANKS-MORSE Model 38D8-⅛ — 1 Port; 1 Starboard. Used condition, 1800 HP, 800 RPM, 2 cycle, 8½″ bore, 10″ stroke, Air Start.. Complete with Westinghouse Reduction Gears, 2.216:1 ratio —with Hydraulic Coupling.

MARINE DIESEL GENERATORS

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

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



4—GENERAL MOTORS, Model 3-268A, marine, 150 BHP, 1200 RPM, 3 cylinders, with 100 KW Generators, 450/3/60.

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

Many other units in stock

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A.C.

2—1500 KW, GENERAL ELECTRIC Turbines: Type FN4-FN30, Steam 525 PSIG. 8145 RPM, with G.E. Generators, 1500 KW, 450/3/60.

4—1250 KW, GENERAL ELECTRIC Turbines: Type FSN, 525 PSI, 7938 RPM. Generators: 1250 KW, 450/3/60, 3600 RPM, Type ABT2.

4—600 KW, GENERAL ELECTRIC Turbines: Type FN3-FN20, Steam 525/565 PSIG, 10033 RPM, with G.E. Generators, 600 KW, 450/3/60.

8—750 KW, GENERAL ELECTRIC Turbines: Type FN3-FN24, 525 PSI, 10,033 RPM. Generators: 750 KW, 450/3/60, 1200 RPM, Type ATI.

2—500 KW, GENERAL ELECTRIC Turbines: Type FN3-FN20, steam 375/425 PSI, 6 Stage, 9987 RPM. Generators: 500 KW, 450/3/60, 1200 RPM, Type ATI.

D.C.

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

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

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

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

ALLIS-CHALMERS, 440 PSI, 740°F, 300 KW, 120/240/DC.

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

JOSHUA HENDY, 300 PSI, 550°F, with Westinghouse Generator, 300 KW, 120/240 DC.

WORTHINGTON, Form S4, 440 PSI, 740°F to a Westinghouse Generator, 250 KW, 440/3/60, and to a 90 KW, 120 DC.

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LaDel, Sturtevant, etc.

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

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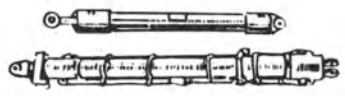
Size A¼	Size A3	Size A8
Size A½	Size A4	Size A10
Size A1	Size A5	Size A12
Size A2	Size A6	Size A16

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″	double
2″	8″	1½″	20″	double
2.5″	15″	1.12″	25½″	double
3″	8″	1.37″	15½″	double
6″	8″	4″	144″	double

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

$44.50 ea. **$49.50 each with pull test certificates**

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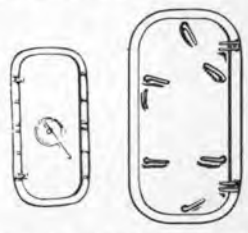

Used, Good Condition, Trimmed Frames.

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

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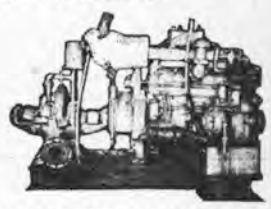
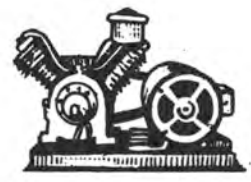
26″x66″-Q.A. Type—**$175.00 ea.**

FIRE PUMPS



2—BUDA, Model 6-LD-468, Diesel Engines, 6 cylinders, 100 BHP, Marine, Gardner-Denver, centrifugal Pumps, Bronze, horizontally split case, 1000 GPM, 280′ head, 6″ suction and 5″ discharge.



AIR COMPRESSORS

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

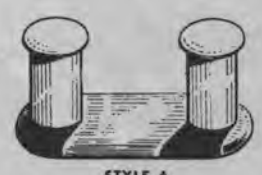
3—INGERSOLL - RAND, Size 5x5x4x4, 50 CFM, 150 PSI, with G.E. Motor, 20 HP, 440/3/60.

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.

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

DOUBLE BITS



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Specify quantity size and style required for fast quotation.

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Designed and Manufactured by ZIDELL EXPLORATIONS INC.

Model Design
$1350 each

Prices are F.O.B. Portland, Ore.

To Give You These Features: One size fairlead with universal type sheave to accommodate wire rope sizes 1″ up to and including 2″. Self Aligning, Swivel Type Head Dependable and Ruggedly built to perform consistently year after year with minimum maintenance.

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30,000 CFM
AXIAL FANS

Made by Joy Manufacturing Co.—A30A4W6. MOTOR: 25/14 HP—440/3/60—36-20.4 amps—1200/1900 RPM.

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115 VOLTS DC
4000 CFM/5000 CFM/6000 CFM/10,000 CFM/12,000 CFM

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Unused 2000 CFM 20AF —mfg. by Joy—0.75 HP motor—3450 RPM—3.4 amps—0.5" static—15" ID—17" flange

ALSO
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SIZE	NET WT.
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26"x66"	320 lbs.
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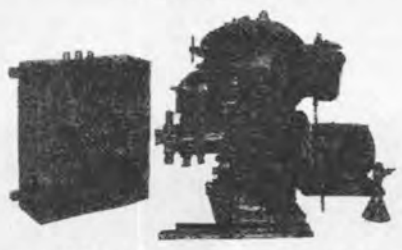

DeLaval—600 G.P.M.—type B-1529C-60—with 3 H.P. 440/3/60 Motor. Mfg. by German DeLaval. Spare parts available.

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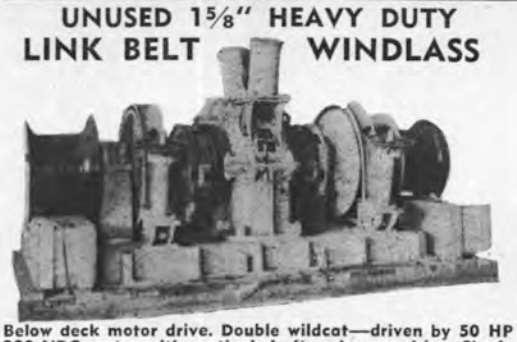

Below deck motor drive. Double wildcat—driven by 50 HP 230 VDC motor with vertical shaft and worm drive. Single speed—handles 7000 lb anchors and 60 fathoms of 1⅝" chain at 7 fathoms per minute. Wildcat centers 56". Complete with all controls and warping features. Total weight 27,500 lbs. With spares.

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APPROX. ½ KW
110/1/60 M.G. SET
NEW—UNUSED

INPUT: 115 VDC—6.1 amps—3600 RPM. AC OUTPUT: 425 watts—4.55 amps—110/1/60. Ball bearing. 13⅞" long—7 9/16" wide—10½" high. Has radio noise supression filter. Net wt. 58 lbs—83 lbs packed for shipping.

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INPUT: Motor 25 HP — 120 VDC — 156 amps — 1800 RPM —flange-coupled to output generator.

OUTPUT: 10 KW generator — 120 volts 60 cycle single phase —108 amps — 0.80 PF — with direct-connected 125 volt 8 amp exciter. Motor starter by Cutler-Hammer. AC generator has voltmeter and ammeter. Bassler voltage regulator.

RECONDITIONED CONTINENTAL 2 KW—220 D.C. TO 120/1/60 A.C.

INPUT: 5 HP—230 VDC—20 amps. **OUTPUT:** 2.5 KVA —2 KW—120/1/60 AC—0.8 PF—1800 RPM—21 amps. With controls. 38" long—15" wide—480 lbs.

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For U.S. Naval Vessels—type CT-HNS-3. For merchant vessels —type CTHS. Size 2". Typical serial 241-423. For immediate delivery.

$495

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1200 KW—525 Volt DC DIESEL SET
Completely Self-Contained on Railroad Flat Car—Ex-Navy Emergency Unit

GENERATOR: Allis-Chalmers — 525 VDC — 2290 amps—750 RPM—self-ventilating—horizontally split casing. DIESEL: G.M. 16-278A—8¾ x 10½—1700 BHP—720 RPM. Unit includes control panel & switches—excitation sets—aux. lighting generator driven by GM 2-71 2-cyl. 4½ x 5 engine at 1200 RPM. Generator is 120 VDC. Also included are silencers and mufflers.

ALL MOUNTED ON FLATCAR WITH STANDARD TRUCKS AND WHEELS—56½" GAUGE

Has air, water and oil tanks — starting air compressor—all on same car and interconnected. Entire unit was fabricated by Navy for Navy Yard use. Total weight 120,000 lbs. Shipping Dimensions: 40' long—9'4" wide—15' high. Car has steel wheels and can be certified to go over the road. **UNIT CAN BE EASILY REMOVED FROM FLATCAR AND PLACED ON VESSEL.**

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RPC Division, Midland-Ross Corp., P.O. Box 490, Roxboro, N.C. 27573

CONTAINER LASHINGS & COMPONENTS
American Engineered Products, P.O. Box 74 Nichol Ave., McKees Rock, Pa. 15136
W. W. Patterson Co., 830 Brocket St., Pittsburgh, Pa. 15233

CONTROL SYSTEMS
Frederick Cowan & Co., Inc., 120 Terminal Drive, Plainview, L.I. New York 11803
Galbraith-Pilot Marine Corp., 600 Fourth Ave., Brooklyn, N.Y. 11215
Henschel Corporation, 14 Cedar St., Amesbury, Mass. 01913
Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.
WABCO Fluid Power Division, 1953 Mercer Road, Lexington, Kentucky 40505

CORROSION CONTROL
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144

CRANES—HOISTS—DERRICKS—WHIRLEYS
ASEA Marine, Rep. in U.S.A. by Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Houston Systems Mfg. Co., P.O. Box 14551, Houston, Texas 77021
M.A.N. Maschinenfabrik Augsburg-Nurnberg AG, Werk Augsburg, West Germany
Paceco, Div. Fruehauf Corp., 2350 Blanding Ave., Alameda, Calif. 94501

CRANE LOAD INDICATORS
W.C. Dillon & Co., 14620 Keswick St., Van Nuys, Calif. 91407
Mark Products, Inc., 10507 Kinghurst Dr., Houston, Texas 77072
Trans-Sonics, Inc., P.O. Box 326, Lexington, Mass. 02173

DECK COVERS (METAL)
Marine Moisture Control Co., 449 Sheridan Blvd., Inwood, N.Y. 11696
Mechanical Marine Co., 900 Fairmount Ave., Elizabeth, N.J. 07027

DECK MACHINERY
Appleton Machine Co., P.O. Box 2265, Iron Mountain, Mich. 49801.
ASEA Marine, Rep. in U.S.A. by Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Markey Machinery Co., Inc., 79 S. Horton St., Seattle, Wash. 98134
A. G. Weser, Seebeckwerft, 2850 Bremerhaven 1, Germany

DIESEL ACCESSORIES
A.G. Schoonmaker, Box 757, Sausalito, Calif. 95965

DIESEL ENGINES
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
De Laval Turbine Inc., Engine & Compressor Div., 550 85th Ave., Oakland, Calif. 94621
Electro-Motive Division General Motors, La Grange, Illinois 60525
M.A.N. Maschinenfabrik Augsburg-Nurnberg AG, Werk Augsburg, West Germany.
H.O. Penn Machinery Co., Inc., 1561 Stewart Ave., Westbury, N.Y. 11590
Waukesha Motor Co., 1000 W. St. Paul Ave., Waukesha, Wis. 53186

DIESEL ENGINE MUFFLERS
Marine Products & Engrg. Co., 20 Vesey St., New York, N.Y. 10007

DOCK BUILDERS
GHH Sterkrade Ferrostaal Overseas Corp., 17 Battery Place, New York, N.Y. 10004

DOORS—Watertight—Bulkhead
Overbeke-Kain Co., 20905 Aurora Rd., Cleveland, Ohio 44146
Walz & Krenzer, Inc., 20 Vesey St., New York, N.Y. 10007

ELECTRICAL EQUIPMENT
AMP Special Industries, P.O. Box 1776, Paoli, Pa. 19301
Arnessen Electric Co., Inc., 335 Bond St., Brooklyn, N.Y.
Brown and Ross of New Jersey Incorporated, 370 Paterson Plank Road, Carlstadt, N.J. 07072
Galbraith-Pilot Marine Corp., 166 National Rd., Edison, N.J. 08817
Harvard Murlin Div., P.O. Box 302, Quakertown, Pa. 18951
Merrin Electric, 162 Chambers St., New York, N.Y. 10007
Oceanic Electrical Mfg. Co., Inc., 159 Perry Street, N.Y. 10014

EVAPORATORS
Bethlehem Steel Corp., Shipbuilding, 25 B'way, N.Y., N.Y. 10004
Riley-Beaird, Inc., Maxim Evaporator Profit Center, P.O. Box 1115, Shreveport, Louisiana 71130

FAIRLEADS
Appleton Machine Co., P.O. Box 2265, Iron Mountain, Mich. 49801.

FENDERING SYSTEMS—Dock & Vessel
BJ Marine Products, subsidiary of Borg-Warner, P.O. Box 2709, Terminal Annex, Los Angeles, Calif. 90054
Hughes Bros., Inc., 17 Battery Place, New York, N.Y. 10004

FITTINGS & HARDWARE
AMP Special Industries, P.O. Box 1776, Paoli, Pa. 19301
Robyon Backing Ring Co., 675 Garden St., Elizabeth, N.J. 07207

FLOATING EQUIPMENT—Steel—Aluminum Pontoons
Dravo Corporation, Neville Island, Pittsburgh 25, Pa.

GAS ALARM SYSTEMS
Lisnave, P.O. Box 2138, Lisboa 3, Portugal
Riken Keiki Fine Instrument Co., Ltd., 2-7-6 Azusawa Itabashi-ku, Tokyo, Japan

HEATERS & COOLERS
Way-Wolff Associates, Inc., 45-10 Vernon Blvd., Long Island City, N.Y. 11101

INSULATION—Marine
Bailey Carpenter & Insulation Co., Inc., 74 Sullivan St., Brooklyn, N.Y. 11231

LIGHTS—Emergency, Search & Navigation
Snelson Oilfield Lighting Co., P.O. Box 1284, Fort Worth, Texas 76101

LNG SHIP DESIGN AND LICENSING
PDM/GAZ Transport, 919 Third Ave., New York, N.Y. 10022

LNG TANKAGE
Gazocean U.S.A. Inc., 125 High St., Boston, Mass. 02110
LGA—Liquid Gas Anlagen Union GmbH, c/o Ferrostaal Overseas Corp., 17 Battery Place, New York, N.Y. 10004
Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa. 15225

LININGS
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144

MARINE BLOCKS & RIGGING
Crosby Group, Box 3128, Tulsa, Okla. 74101

MARINE DRIVES—GEARS
Hoffert-Lowe, Inc., 108 Ridge Road, North Arlington, N.J. 07032
Philadelphia Gear Corp., Schuylkill Expressway, King of Prussia, Pa. 19406

MARINE EQUIPMENT
Comet Marine Supply Corp., 157 Perry St., New York, N.Y. 10014
Homelite Corporation, 70 Riverdale Ave., Port Chester, N.Y. 10573
ITT Henze Service, P.O. Box 1745, Mobile, Ala. 36610
Kearfott Marine Products, 780 South 3rd Ave., Mt. Vernon, N.Y. 10550
Nicolai Joffe Corp., P.O. Box 2445, 445 Littlefield Ave., So. San Francisco, Calif. 94080
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
Waukesha Bearings Corp., P.O. Box 798, Waukesha, Wis. 53186

MARINE FURNITURE
Bailey Joiner Co., 115 King Street, Brooklyn, N.Y. 11231

MARINE INSURANCE
Adams & Porter, 1819 St. James Place, Houston, Texas 77027
Midland Insurance Co., One State St. Plaza, New York, N.Y. 10004
R.B. Jones Corp., 301 West 11th St., Kansas City, Mo. 64105

MARINE PROPULSION
Babcock & Wilcox Co., 161 East 42nd Street, New York, N.Y. 10017
Combustion Engineering, Inc., Windsor, Connecticut 06095
Jacuzzi Bros., Inc., 11511 New Benton Highway, Little Rock, Ark. 72204
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
Tech Systems, Inc., 405 Watertown Rd., Thomaston, Conn. 06787
Turbo Power & Marine Systems, Subsidiary of United Aircraft Corp., 1690 New Britain Ave., Farmington, Conn. 06032

MARINE SURVEYORS
Schmahl and Schmahl, Inc., 1209 S.E. Third Ave., Fort Lauderdale, Fla. 33316

MARITIME FINANCING—Leasing
General Electric Credit Corp., 4 Corporate Drive, White Plains, N.Y. 10604
Rhode Island Hospital Trust National Bank, 15 Westminster Street, Providence, R.I. 02903

NAVAL ARCHITECTS AND MARINE ENGINEERS
American Standards Testing Bureau, Inc., 40 Water Street, New York, N.Y. 10004
J. L. Bludworth, 4030 Wynne St., Houston, Texas
Breit Engrg. Inc., 441 Gravier St., New Orleans, La. 70130
James G. Bronson Associates, 166 Altamont Ave., Tarrytown, N.Y. 10591
Childs Engineering Corp., Box 333, Medfield, Mass. 02052
Coast Engineering Co., 711 W. 21st St., Norfolk, Va. 23517
Crandall Dry Dock Engrs., Inc., 238 Main St., Cambridge, Mass. 02142
Francis B. Crocco, Inc., Box 1411, San Juan, Puerto Rico
C.R. Cushing & Co., Inc., One World Trade Center, New York, N.Y. 10048
Arthur D. Darden, Inc., 1040 International Trade Mart, New Orleans, La. 70130
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., 40 Rector Street, New York, N.Y. 10006
John W. Gilbert Associates, Inc., 58 Commercial Wharf, Boston, Mass. 02110
Morris Gurainick, Associates, Inc., 583 Market St., San Francisco, Calif. 94105
J. J. Henry Co., Inc., 90 West St., New York. 10006
Hydranautics, 6338 Lindmar Dr., P.O. Box 1068, Goleta, Calif. 93017
C.T. Ilariucci & Associates, Tourism Pier #3, San Juan, P.R. 00902
Jantzen Engineering Co., 15 Charles Plaza, Baltimore, Md. 21201
James S. Krogen, 2500 S. Dixie Hwy., Miami, Fla. 33133
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
Rudolph F. Matzer & Associates, Inc., 13891 Atlantic Blvd., Jacksonville, Fla. 32225
John J. McMullen Associates, Inc., 1 World Trade Center, New York, N.Y. 10048
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
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
S.L. Petchul, Inc., 8-D So. New River Drive East, Ft. Lauderdale, Fla. 33301
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, 50 Court St., Brooklyn, N.Y. 11201
H. M. Tiedemann & Co., Inc., 74 Trinity Pl., New York, N.Y. 10006
Whitman, Requardt & Associates, 1304 St. Paul St., Baltimore, Md. 21202
Yankee Shipwrights, P.O. Box 35251, Minneapolis, Minn. 55435

NAVIGATION & COMMUNICATIONS EQUIPMENT
American Hydromath Co., 55 Brixton Rd., Garden City, N.Y. 11530
Communication Associates, Inc., 200 McKay Road, Huntington Station, N.Y. 11746
Edo Western Corporation, 2645 South 2nd West, Salt Lake City, Utah 84115
Electro-Nav, Inc., 501 Fifth Ave., New York, N.Y. 10017
F&M Systems Co., P.O. Box 20778, 2525 Walnut Hill Lane, Dallas, Texas 75220
Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913
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
ITT Mackay Marine, 2912 Wake Forest Road, Raleigh, N.C. 27611
Lorain Electronics Corp., 2307 Leavitt Road, Lorain, Ohio 44052
Magnavox Navigation Systems, 2829 Maricopa St., Torrance, Cal. 90503

Radiomarine Corp., 20 Bridge Avenue, Red Bank, N.J. 07701
Raytheon Co. Marine Products, 676 Island Pond Rd., Manchester, N.H. 03103
Raytheon Co., Submarine Signal Div., P.O. Box 360, Portsmouth, R.I. 02871
Sperry Marine Systems Div., Charlottesville, Va. 22901, Division of Sperry Rand Corp.
Standard Communications Corp., 639 N. Marine Ave., Wilmington, Calif. 90744
Teledyne Hastings Raydist, P.O. Box 1275, Hampton, Va. 23361
Tracor, Inc., 6500 Tracor Lane, Austin, Texas 78721
The Waterways Co., 3512 Metairie Hts. Rd., New Orleans, La. 70002

OILS—Marine—Additives
Exxon Company, U.S.A., P.O. Box 2180, Houston, Texas 77001
Exxon International Company, 1251 Avenue of the Americas, New York, N.Y. 10020
Gulf Oil Trading Co., 1290 Ave. of Americas, New York, N.Y. 10019
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
International Paint Co., 21 West St., New York, N.Y. 10006
Patterson-Sargent, P.O. Box 494, New Brunswick, N. J.
Transocean Marine Paint Association, P.O. Box 456, Delftseplein 37, Rotterdam, Holland

PETROLEUM SUPPLIES
Independent Petroleum Supply Co., 1345 Ave. of Americas, New York, N.Y. 10019
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.

PIPE—Cargo Oil
Kubota, Ltd., 22, Funade-cho 2-chome, Naniwa-Ku, Osaka, Japan

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

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
Coolidge Propellers, 1601 Fairview Ave. East, Seattle, Wash. 98102
Escher Wyss Gmbh, P.O. Box 798, Ravensburg, Germany
Federal Propellers, 1501 Buchanan Ave. S.W., Grand Rapids, Mich. 49502

PUMPS
Colt Industries, Inc., Fairbanks Morse Pump & Electric Div., 3601 Kansas Ave., Kansas City, Kansas 66110
Houttuin-Pompen N. V. Sophialaan 4, Utrecht, Holland
Jacuzzi Bros., Inc., 11511 New Benton Highway, Little Rock, Arkansas 72204

RATCHETS
W. W. Patterson Co., 830 Brocket St., Pittsburgh, Pa. 15233

REFRIGERATION—Refrigerant Valves
Bailey Refrigeration Co., Inc., 74 Sullivan St., Brooklyn, N.Y. 11231

ROPE—Manila—Nylon—Hawsers—Wire
American Mfg. Co., Inc., Noble & West Sts., Brooklyn, N.Y. 11222
Du Pont Co., Room 31H1, Wilmington, Delaware 19898
Jackson Rope Corp., 9th & Oley, Reading, Pa. 19604
Wall Rope Works, Inc., Beverly, N. J. 08010

RUDDER ANGLE INDICATORS
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.

SANDBLASTING EQUIPMENT
Pauli & Griffin Co., 826 Folsom St., San Francisco, Calif. 94107

SCAFFOLD BOARDS
Howmet Corporaton, Southern Extrusions Division, P.O. Box 40, Magnolia, Arkansas 71753

SEWAGE DISPOSAL
Babcock & Wilcox Co., 161 East 42nd Street, New York, N.Y. 10017
Jered Industries, Inc., 1300 S. Coolidge Rd., Birmingham, Mich. 48008
Koehler-Dayton, Inc., P.O. Box 309, New Britain, Conn. 06050

SHAFT REVOLUTION INDICATOR EQUIP.
Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913

SHIPBOARD VENTILATION
Coppus Engineering Corp., P.O. Box 457, Worcester, Mass. 01613
TANK S.A.P.P. Inc., 330 Madison Avenue, New York, N.Y. 10017 and 1020 Springfield Avenue, Mountainside, N.J. 07092

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
Zidell Explorations, Inc., 3121 S. W. Moody St., Portland, Ore. 97201

SHIP BROKERS
Agemar, P.O. Box 1465, Maracaibo, Venezuela
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
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

SHIPBUILDING—Repairs, Maintenance, Drydocking
Astilleros Espanoles, S.A. Zurbano, 70, Madrid 10, Spain
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans La. 70150
Beliard, Crighton & Cie, P.O. Box 2074, Route des Docks, 59, Dunkirk, France
Beliard Murdoch S. A., Kattendijkdok Westkaai 21, Antwerp, Belgium
Bertram Marine, Division of Whittaker, 3663 N.W. 21 Street, Miami, Fla. 33142.
Bethlehem Steel Corp., Shipbuilding, 25 Broadway, N.Y., N.Y. 10004
Bludworth Shipyard, Inc., Box 5426, Cypress St., Brady Island, Houston, Texas 77012
Carrington Slipways Pty. Ltd., Tomago, N.S.W. 2322, Australia
Conrad Industries, P.O. Box 790, Morgan City, La. 70380
Curacao Drydock, Inc., P.O. Box 153, Willemstad, Curacao, N.A.
Devcon Corporation, Endicott Street, Danvers, Mass. 01923
Dillingham Shipyard, Pier 41, P.O. Box 3288, Honolulu, Hawaii 96801
Dravo Corporation, Neville Island, Pittsburgh 25, Pa.
Empresa Nacional Bazon, 65 Castellana, Madrid 1, Spain
Equipment Systems, Inc., A Microdot Co., P.O. Box 95, Port Deposit, Md. 21904
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
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
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
Keppel Shipyard (Private) Ltd., P.O. Box 2169, Singapore
Kockums Mekaniska Verkstads AB, Malmo 1, Sweden
Litton Industries, 9920 W. Jefferson Blvd., Culver City, Calif. 90230
Lockheed Shipbuilding and Construction Co., 2929 16th Avenue, S.W., Seattle, Wash. 98134
Marathon Manufacturing Company
Marathon LeTourneau Offshore Company, 1700 Marathon Building, 600 Jefferson, Houston, Texas 77002
Marathon LeTourneau Gulf Marine Division, P.O. Box 3189, Brownsville, Texas 78520
Marathon LeTourneau Marine Division, LeTourneau Rural Station, Vicksburg, Mississippi 39180
Marathon LeTourneau Offshore Pte., Ltd., P.O. Box 83, Taman Jurong Post Office, Singapore 22, Singapore
Marathon Shipbuilding Company, P.O. Box 870, Vicksburg, Miss. 39180
Marathon Shipbuilding Company (U.K.) Ltd., Clydebank Bunbartonshire, G81-1YB, Scotland
Marine & Rail Equipment Division/FMC Corp., 4700 N.W. Front Ave., Portland, Oregon 97208
Maryland Shipbuilding & Drydock, P.O. Box 537, Baltimore, Md. 21203
Matton Shipyard Co., Inc., P.O. Box 428, Cohoes, New York 12047
Mercantile Marine Engineering & Graving Docks Co., N.V., Antwerp, Belgium
Mitsui Shipbuilding & Engrg. Co. Ltd., 6-4, Tsukiji 5-chome, Chuo-ku, Tokyo, Japan
Monark Boat Co., P.O. Box 210, Monticello, Ark. 71655
National Steel & Shipbuilding Corp., San Diego, Calif. 92112
Newport News Shipbuilding and Dry Dock Co., Newport News, Va.
Newport Ship Yard, Inc., 379 Thames St., Newport, R.I. 02840.
Northwest Marine Iron Works., P.O. Box 3109, Swan Island, Portland, Oregon 97208
Odense Steel Shipyard Ltd., P.O. Box 176, DK-5100 Odense, Denmark
Paceco, Div. Fruehauf Corp., 2350 Blanding Ave., Alameda, Calif. 94501
Pearlson Engineering Co., P.O. Box 8, Kendall Branch, Miami, Fla. 33156
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
Savannah Machine & Shipyard Co., P.O. Box 787, Savannah, Ga. 31402
Sembawang Shipyard (Pte) Ltd., P.O. Box 3, Sembawang, P.O. Singapore, 27
Service Machine & Shipbuilding Corp., Box 1578, Morgan City, La. 70380
Slocum Iron Works, Inc., P.O. Box 2506, 1752 Telegraph Road, Mobile, Ala. 36601
Sumitomo Shipbuilding & Machy. Co., Ltd. 2-1 Ohtemachi 2-chome, Chiyoda-ku, Tokyo, Japan
Todd Shipyards Corp., 1 State St. Plaza, New York, N.Y. 10004
Tracor/Mas, Inc., P.O. Box 13107, Port Everglades, Fla. 33316
Vancouver Shipyards Co., Ltd., 50 Pemberton Ave., North Vancouver, B. C., Canada

SHIP MODEL BASIN
Hydronautics, Incorporated, Laurel, Maryland 20810

SHIP ROUTING
Weather Routing, Inc., 90 Broad Street, New York, N.Y. 10004

SHIP STABILIZERS
Jered Industries, Inc., 1300 S. Coolidge Rd., Birmingham, Mich. 48008
John J. McMullen Associates, Inc., 1 World Trade Center, New York, N.Y. 10048
Sperry Marine Systems Div., Charlottesville, Va. 22901, Division of Sperry Rand Corp.

STEAM GENERATING EQUIPMENT
Babcock & Wilcox Co., 161 East 42nd Street, New York, N.Y. 10017
Combustion Engineering, Inc., Windsor, Connecticut 06095

STEERING SYSTEMS
Wm. E. Hough Co., 1125 P N.W. 45th St.. Seattle, Wash. 98107

SWITCHBOARDS
Hose McCann Telephone Co., Inc., 524 West 23 St., N.Y., N.Y. 10011

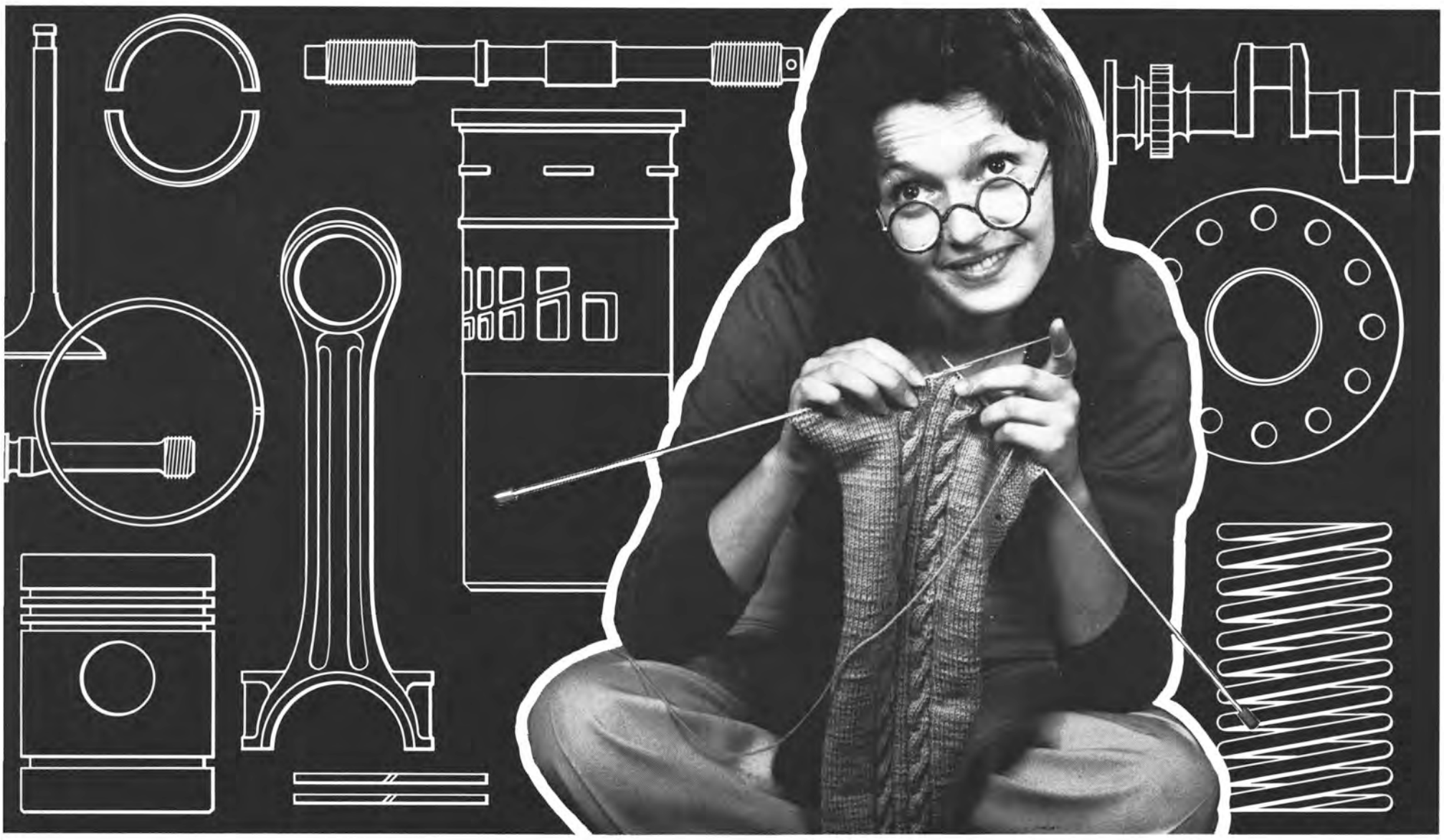
TOWING—Vessel Chartering, Lighterage, Salvage, etc.
Bay-Houston Towing Co., 805 World Trade Bldg., Houston, Texas 77002
Curtis Bay Towing Co., Mercantile Bldg., Baltimore, Md. 21202
Henry Gillen's Sons Lighterage, West End Ave., Oyster Bay, N.Y. 11771
James Hughes, Inc., 17 Battery Pl., New York, N.Y. 10004
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., One World Trade Center, Suite 5335, New York, N.Y. 10048
Puerto Rico Lighterage Co., P.O. Box 1072, San Juan, P.R. 00902
State Boat Corporation, 3701 Kirby Drive, Houston, Texas 77006
Suderman & Young Towing Co., 329 World Trade Center, Houston, Texas 77002
Turecamo Coastal and Harbor Towing Corp., 1752 Shore Parkway, Brooklyn, N.Y. 11214

VALVES AND FITTINGS—Hydraulic—Safety Flanges
Dover Corp. / Norris Division, P.O. Box 1739, Tulsa, Okla. 74101.
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., 900 Fairmount Ave., Elizabeth, N.J. 07027

WIRE ROPE
Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042
Bethlehem Steel Corp., Bethlehem, Pa. 18016

ZINC
Smith & McCrorken, 153 Franklin St., New York, N.Y. 10013

M.A.N. spares are better than patchwork



If you require Diesel engine spare parts, don't try and save at the wrong end. Instead, consider the consequences and obtain your parts from the engine builder.
Any alternative will be out of place since copied spare parts fail to ensure satisfactory engine performance. Wherever M.A.N. engines are built, the spare parts are produced with them. Only this can ensure that the materials used are checked and tested and that design improvements are always incorporated.
This assures a long and satisfactory service life. By using original spares, you avoid risks. M.A.N. spares are guaranteed. Anything less is not.

M·A·N
AUGSBURG (W. GERMANY)

491e

After three years service only 300 sq. ft. of over 1,500,000 needed a minor touchup

Three years ago one of the world's largest ships, the 312,000 DWT Universe Japan was corrosion-protected with Amercoat and Dimetcote coatings from topside to bottom.

While in Singapore recently during repairs, this huge investment was inspected to determine how well its original coatings were holding up against corrosive attack.

What was found after three years of hard service?

Her steel decks (coated with Dimetcote 3 inorganic zinc coating) were still in excellent shape.

Her superstructure (coated with Dimetcote 3 plus Amercoat topcoats) was in the same top flight condition.

More outstanding, her anti-fouling which had not had a refresher coat in two years showed only a few spots of dried algae, otherwise it was clean. No loss of speed. No extra fuel required.

What this means to the Universe Japan's owners as well as the charterer, Gulf Oil Corporation, is obvious. Overall, only 300 square feet of over 1,500,000 needed a minor touchup. Their ship could return to service quickly. A great deal of money was saved.

What this means to you is that you too can depend on Amercoat and Dimetcote to economically protect your investment. No matter what its size or tonnage.

Why not call a knowledgeable Ameron Marine Specialist. You'll find him wherever you build or sail.

Ameron

CORROSION CONTROL DIVISION

(Formerly Amercoat Corporation)

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