

# MARITIME REPORTER AND ENGINEERING NEWS



**Spruance Class Destroyer (DD-971)  
Named For Hospital Corpsman  
Commissioned At Ingalls Shipyard**

(SEE PAGE 8)

**DECEMBER 1, 1977**

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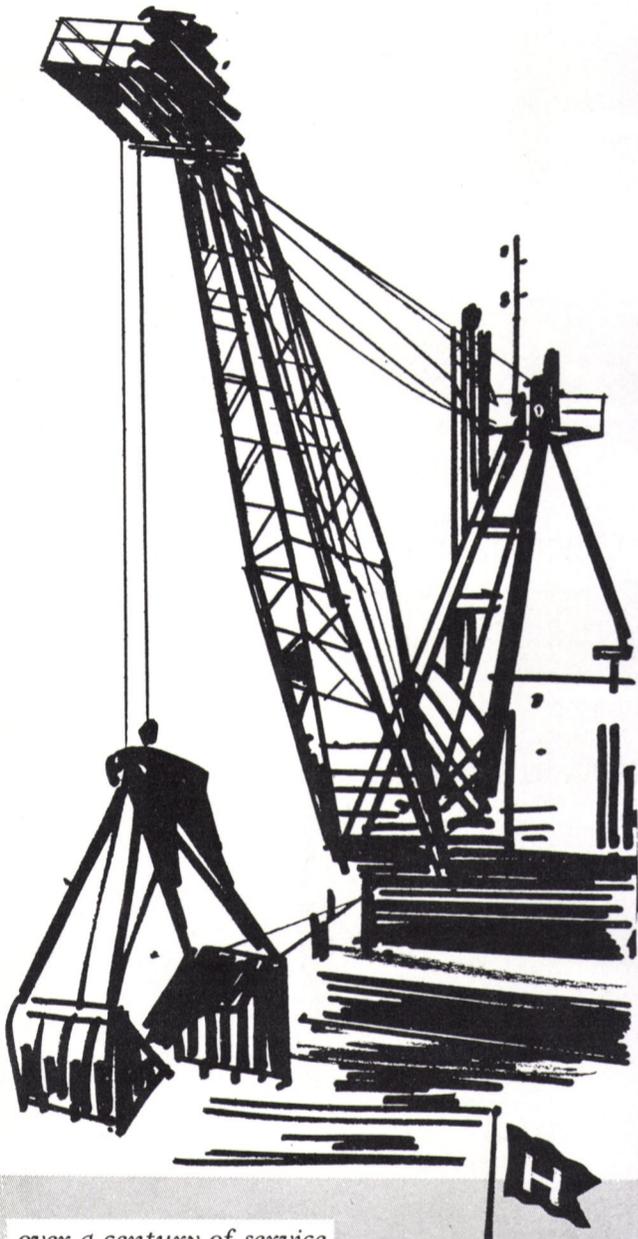
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## MarAd Approves Sale Of Tuna Boats To Foreign Companies

The Maritime Administration has conditionally approved applications filed by subsidiaries of Zapata Corporation, Houston, Texas, for the sale of eight U.S.-flag tuna boats to foreign companies and transfer of the boats to foreign registry and flag.

Three of the vessels would be sold to Pescamar De Centroamerica S.A., a Costa Rican corporation, and operated under Costa Rican registry and flag. They are the Jacqueline A, owned by West Indies Tuna, Inc.; the Anna Maria, owned by Anna Maria, Inc., and the Blue Pacific, owned by Blue Pacific, Inc.

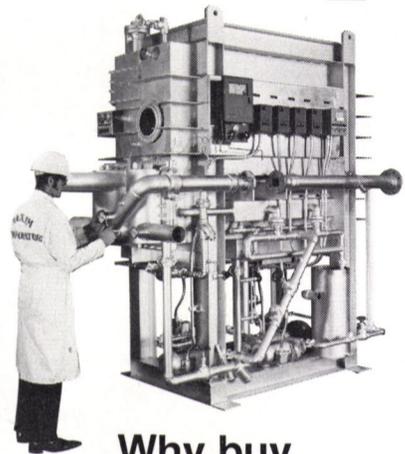
The other five vessels would be sold to Ocean Maid Foods Limited, a Canadian firm, and operated under Canadian registry and flag. They are the Calypso, owned by Calypso Tuna, Inc.; the Conquistador, owned by World Wide, Inc.; the City of Lisbon, owned by the City of Lisboa, Inc.; the Rosa Olivia, owned by Rosa Oliva, Inc., and the Mary Elizabeth, owned by Maria Elizabeth, Inc.

MarAd listed five essentially identical conditions for the sale and transfer of the vessels, all of which are purse-seiner types. All conditions must be approved by the sellers and buyers before the transfer orders and agreements become final.

One of the requirements is that the purchasers each post obligation bonds. The amounts of the bonds range from \$118,500 to \$150,000 for the eight vessels.

Another condition concerns the protection of marine mammals. The purchasers must agree to "conform to the requirements of present or future laws and regulations of the United States governing the protection of the marine mammals in the course of commercial fishing operations, including the Marine Mammal Protection Act, the Endangered Species Act, and the Inter-American Tropical Tuna Convention as implemented by the Tuna Conventions Act, in the same manner as if said vessel were within the jurisdiction of the United States, excepting any quota on the taking of said mammals which may be applicable by its terms to U.S. vessels."

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## Eisenbiegler And Rippy Named Presidents Of Two Sun Subsidiaries

Sun Trading & Marine Transport, Inc. (S.T.M.T.), 200 West Lancaster Avenue, Wayne, Pa. 19087, an operating unit of Sun Company, has named presidents of two of its subsidiaries.

**Frederick P. Eisenbiegler**, bulk ship product group vice president for Sun Shipbuilding & Dry Dock

Company — another Sun subsidiary — has been made president of Sun Transport, Inc. He also will hold the title of vice president and general manager of marine transport for S.T.M.T.

**David C. Rippy**, director of facilities and distribution for Sunmark Industries, also a Sun subsidiary, has been named president of a new S.T.M.T. subsidiary, Sunoco Terminals, Inc., and will also serve as S.T.M.T.'s vice pres-

ident and general manager of terminals.

Mr. Eisenbiegler succeeds **Richard W. Fetzner**, whose appointment as S.T.M.T. president was announced earlier.

S.T.M.T. is involved in the transport, trading, brokering, marketing and terminalling of crude oil, petroleum products and other commodities on a worldwide basis. It operates Sun Company's fleet of tankers.

Mr. Eisenbiegler is a 1946 graduate of Webb Institute with a Bachelor of Science degree in naval architecture and marine engineering.



Frederick P. Eisenbiegler

In 1974, he was elected vice president, Bulk Ship Product Group, for Sun Shipbuilding & Dry Dock Co., a Sun Company subsidiary. In this capacity, he was responsible for all aspects of Sun Ship's tanker program except for manufacturing. He held that post until being named to his present position.

Prior to joining Sun Ship, Mr. Eisenbiegler served in various sales and field engineering posts with General Electric from 1946 to 1974. His last post there was as Far East manager for gas turbine sales and applications, headquartered in Tokyo.

Mr. Eisenbiegler is a member of The Society of Naval Architects and Marine Engineers and is a registered professional engineer in the state of New York.

He served in the U.S. Navy in 1946.

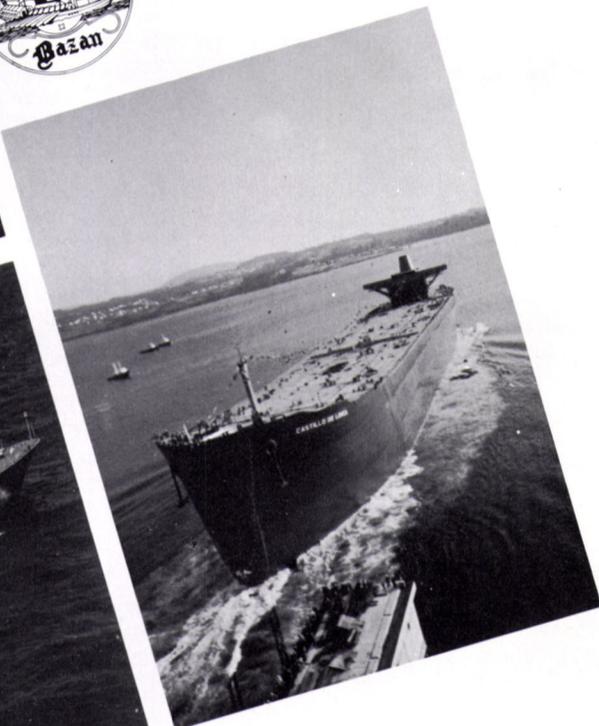
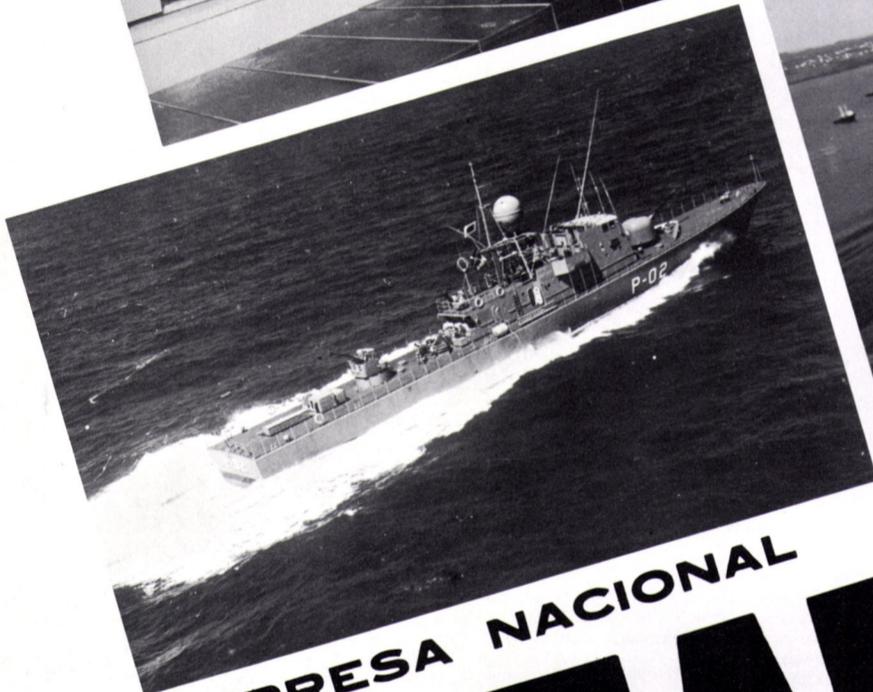
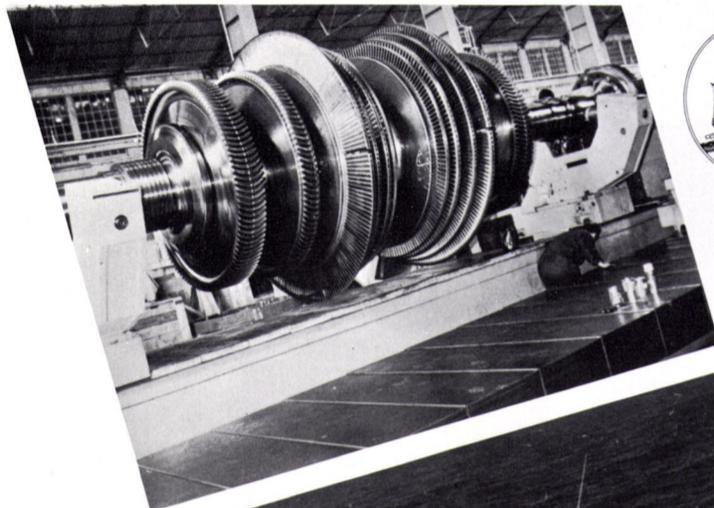
Mr. Rippy received a bachelor's degree in management in 1962 from the University of Tulsa and attended graduate school both there and at Indiana State University.

He joined Sunray DX Oil Company, Tulsa, Okla., in 1966, two years before its merger with Sun Oil Company. In 1969, he went to Waterloo, Iowa, and became the division manager of marketing administration. A year later, he went to St. Louis, Mo., and served as vice president of Monark Petroleum Company, a former Sun subsidiary.

He was named sales manager of the Pittsburgh, Pa., marketing region in 1972. Following a corporate reorganization, he was named director of facilities and distribution for the new Sunmark Industries, Sun's retail marketing company, in 1975. He held that post until being named to his present assignment.

## Tacoma Boat Awarded \$2.9-Million Contract

Tacoma Boatbuilding Company, Inc., Tacoma, Wash., is receiving a \$2,960,776 formally advertised firm fixed-price contract for 36-foot mini-armored-troop-carriers (Mini-ATC) with repair parts, data, and additional propulsion engines. The Naval Sea Systems Command is the contracting activity. (N00024-78-C-2350)



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**James S. Byrn  
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James S. Byrn

Genstar Limited, Montreal, Canada, has announced the appointment of **James S. Byrn** as president of Genstar Marine Limited, Vancouver, British Columbia. Mr. Byrn was formerly president and owner of Gulf of Georgia Towing Co. Ltd. of Vancouver, recently acquired by Genstar's Seaspan International Ltd., a division of Genstar Marine. In addition to Seaspan International, Canada's largest tug and barge organization, Genstar Marine Limited's operations include Vancouver Shipyards Co. Ltd., North Vancouver; McAllister Towing and Salvage Ltd., Montreal, and a partnership in Arctic Transportation Ltd.

Genstar Limited is a diversified operating company which manufactures cement, building materials, chemicals and fertilizers, and is engaged in housing, land development, commercial property development and management, construction, tug and barge transportation, shipbuilding and ship repairs, import-export of industrial minerals, and venture capital investment.

**Title XI Application  
Approved In Principle  
For Moody Offshore**

The Maritime Administration's Deputy Assistant Secretary **Robert R. Casey** has approved in principle the application by Moody Offshore, Inc. for a Title XI guarantee to aid in refinancing the construction of an oceangoing tug/supply vessel. The vessel, M/V Java Seal, was built by Rockport Yacht & Supply Company, Inc., Rockport, Texas, and delivered on May 14, 1976.

The 2,500-horsepower vessel measures 185 feet by 38 feet by 12 feet, and is rated at 263 gross tons. It is designed to carry provisions and construction materials to offshore drilling sites and to assist in rig movements. The estimated actual cost of the vessel, less depreciation, is approximately \$2.3 million.

The Java Seal will be operated by Sealcraft Operators, Inc., an affiliate of Moody Offshore. The application stated that the vessel can be used worldwide. Moody Offshore is owned by **Robert L. Moody** of Galveston, Texas.

**MarAd Contract Let  
For Development Of  
Standardized Carrier**

A \$281,203 contract for the Development of a Standardized U.S. Flag Dry Bulk Carrier has been awarded to M. Rosenblatt & Son, Inc., Naval Architects and Marine Engineers, 350 Broadway, New York, N.Y., by the Department of Commerce, Maritime Administration.

M. Rosenblatt & Son, Inc. has formed a team with H.P. Drewry

(Shipping Consultants) Ltd., London, England; Maryland Shipbuilding & Drydock Co., Baltimore, Md., and Sun Shipbuilding & Dry Dock Co., Chester, Pa.

The 10-month contract will provide a market analysis of dry bulk trades, a review of existing standard ship designs and the selection and adaptation of one or more designs to serve as a Standardized U.S. Flag Dry Bulk Carrier(s).

The contract, to be performed in two phases, will assess the requirements for a Standardized

U.S. Flag Dry Bulk Carrier by identifying cargo opportunities, analyzing the competitive environment, developing vessel performance requirements, identifying design alternatives, and selecting one or more designs. A second phase will provide preliminary design(s), an analysis of cost-cutting opportunities, and recommendations for research and development areas to further reduce construction costs and improve U.S.-flag operational competitiveness.

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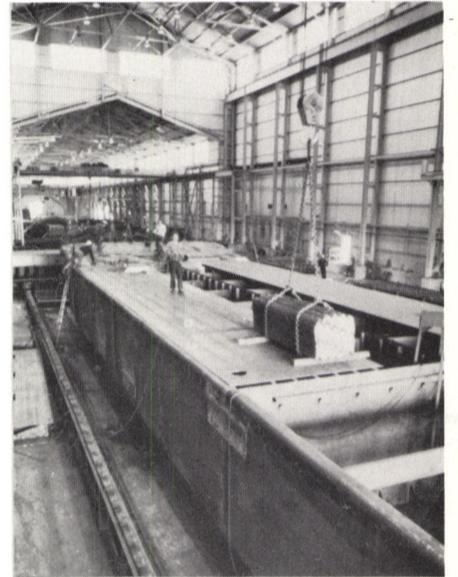
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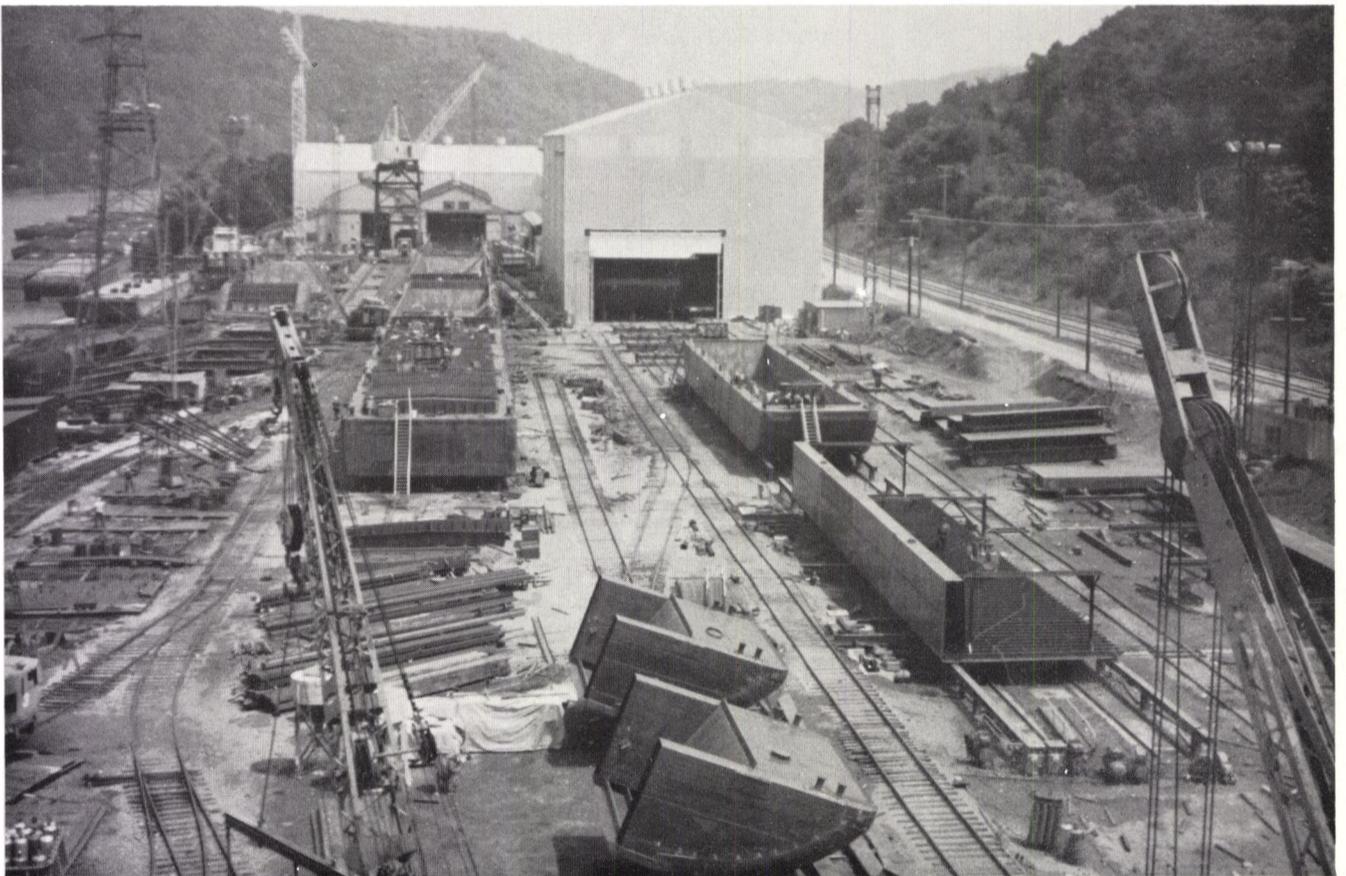
Inside, we now have an additional 90,000 square feet of towboat and barge production area for steel preparation, sub-assembly and erection. Outside, we have completely up-dated and increased yard erection facilities, in keeping with the improved and speeded production inside.

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## Navy Commissions Ninth Of 30 Destroyers Being Built By Ingalls Shipbuilding



USS David R. Ray, DD-971, is powered by gas turbine engines and maintains speeds in excess of 30 knots.

The ninth of the new Spruance class of 30 multi-mission destroyers, designed and being built by Ingalls Shipbuilding division of Litton Industries, Pascagoula, Miss., was commissioned by the Navy on Saturday, November 19.

The USS David R. Ray (DD-971), named in honor of a young hospital corpsman who was killed in Vietnam while treating wounded marines, officially became a part of the Navy's Pacific Fleet during the ceremony. The 563-foot, 7,800-ton ship is among the largest class of U.S. destroyers ever built. The ship is powered by four gas turbine engines and maintains speeds in excess of 30 knots.

Corpsman Ray, the son of Mr. and Mrs. David F. Ray of McMinnville, Tenn., was killed in 1969. Though seriously wounded when a large enemy force attacked his encampment, Corpsman Ray refused medical treatment and continued treating wounded marines. He was forced to battle two enemy soldiers, killing one and wounding the other, and then continued treating the wounded, while alternately fighting off the enemy. In a final act of heroism, Corpsman Ray saved the life of a marine he was treating by throwing himself on the man as an enemy grenade exploded close by. He was posthumously awarded the Medal of Honor, the nation's highest military award for heroism.

In addition to the first nine ships of the Spruance class which have been delivered to the Navy, Ingalls has launched 10 additional destroyers, and the remaining 11 are in various stages of completion. The Spruance ships now serving with the fleet have become well-known for their responsiveness, maneuverability, reliability, quiet operation and weapons accuracy.

The David R. Ray is primarily an antisubmarine weapon system, but the ship can also be assigned to bombard shore positions, support amphibious assaults, escort military and merchant ship convoys, perform surveillance and tracking of hostile surface ships,

establish blockades and undertake search and rescue operations.

For global operations, the new destroyers are capable of navigation by satellites. Using data transmitted continually from the Navy Navigation Satellite System, a shipboard computer automatically solves worldwide navigation problems to an extremely accurate degree, 24 hours a day, regardless of weather.

Armament on the ship consists of two 5-inch/54 caliber guns, an antisubmarine rocket launching group, torpedo tubes and anti-submarine helicopters.

Comdr. Edward B. Baker Jr., a native of Detroit, Mich., was named commander of the ship at the commissioning ceremony. The principal speaker was U.S. Senator Jim Sasser (D-Tenn.). Others participating in the ceremony included Leonard Erb, vice president of Litton Industries, and president of Ingalls Shipbuilding; Rear Adm. Roy F. Hoffman, Commandant, Sixth Naval District; and Capt. William E. McGarrah, supervisor of shipbuilding, Pascagoula.

## Financial Aid Sought To Build Three Vessels Totaling \$9 Million

The Maritime Administration has received applications from three associated partnerships to aid in financing the construction of three 4,800-shaft-horsepower ocean tug/supply vessels. They will be capable of towing drilling rigs from one drilling site to another, and of carrying water, fuel, oil, bulk and deck cargo. The dimensions of each vessel will be 195 feet by 40 feet by 16 feet.

The applicants are Ocean Marine Services Partnership No. 3, No. 4 and No. 5, all of 4350 South Wayside, Houston, Texas. The general partners in each of the three partnerships are Ocean Tarpon, Inc.-1977; Ocean Fin, Inc.-1977; and Ocean Bonita, Inc.-1977.

The proposed builder of the three ships is American Marine

Corp., New Orleans, La. The estimated cost of the vessels is approximately \$3 million each. They are scheduled for delivery in February, May and July 1979, respectively.

## Two Tug/Supply Vessels Costing Over \$5 Million To Be Built By Halter

The U.S. Department of Commerce, Maritime Administration, has announced that the Assistant Secretary has approved in principle the application by Acadian Polar Marine, Ltd., Suite 1515, 225 Baronne Street, New Orleans, La., for a Title XI guarantee to aid in financing the construction of two 4,200-horsepower tug/supply vessels.

The vessels are identical and will measure approximately 216 feet in overall length, 44 feet abeam, and 16 feet in depth. They will be built by Halter Marine Services, Inc. of New Orleans.

The owner plans to operate the vessels in the Gulf of Mexico,

Caribbean, and Atlantic Ocean in support of the oil and gas exploration and production industry. They will be used to transport personnel and dry and liquid cargoes to and from offshore facilities and to perform ocean towing chores.

The estimated actual cost of the vessels is about \$2.6 million each. The estimated delivery dates are June 12, 1978, and August 7, 1978.

## Naval Architecture School Proposed For New Orleans University

The Louisiana Shipbuilding and Repair Association has endorsed a proposal from The Propeller Club of New Orleans to establish a school of naval architecture at the University of New Orleans and a model testing basin in the New Orleans area.

Rear Adm. W.H. Livingston, USN (ret.), president of the association, said that all 24 Louisiana shipyards in the organization are "solidly behind this project."

## Bethlehem Steel Sparrows Point Lays Keel For \$78-Million Farrell Lines Containership



Norman S. Smith of Bethlehem Steel and Thomas J. Sartor Jr. of Farrell Lines stand in front of first keel section for a containership for Farrell, just after it was laid on the ways at Bethlehem's Sparrows Point Yard. Mr. Smith is general superintendent of the yard, and Mr. Sartor is marine superintendent of Farrell Lines.

Bethlehem Steel Corporation laid the keel for a 27,340-deadweight-ton containership for Farrell Lines at its Sparrows Point, Baltimore, Md., shipyard on November 9, and for the first time in more than five years began to build a ship on the inclined ways.

The 1,200-foot-long building basin, completed in 1971, which has been used recently for all shipbuilding at the yard, already contains a Farrell Lines vessel under construction, as well as a bow section for a tanker being built at Newport News. There would not be space for another ship.

Thus, this second Farrell Lines vessel will be launched by sliding down the ways next summer, a spectacle not seen at the yard since the launching of a containership in December 1973.

The Farrell vessels are being constructed at an estimated cost of \$78.3 million each, with a Maritime Administration construction differential subsidy of \$39.8 million.

The ships will be 813-feet 3-inches overall, 769 feet between perpendiculars, with a molded beam of 90 feet. Their design sea speed will be 22.5 knots. Their turbines are rated at 28,500 shaft horsepower.

Each vessel will be capable of carrying, at the 33-foot draft, 1,708 containers, of which 768 may be refrigerated. Space is provided for unitized cargo, and tanks will carry 3,100 barrels of liquid cargo.

When completed, the vessels will go into service for Farrell Lines between U.S. ports on the Atlantic and Gulf Coasts and Australia and New Zealand.

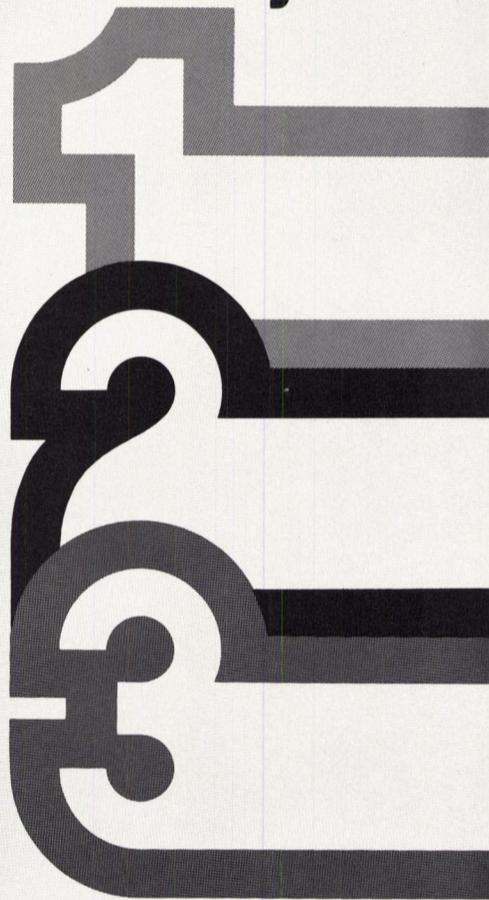


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## SNAME Completes Boiler Safety Report

In response to an increasing number of serious marine steam boiler casualties, a panel of The Society of Naval Architects and Marine Engineers' Ships' Machinery Committee has completed a guide for anyone involved in operating this equipment, which is a compilation of significant published safety practices. It is in

the form of a Technical and Research Report, with the title "Considerations for the Prevention of Furnace Explosions and Superheater Damage in Merchant Ship Boilers During Light-off."

The intention of the report is to provide guidance in the form of general recommendations to all marine boiler design and operating engineers. Although much of the material is not new, this is the first time that it has ap-

peared together in a single publication.

This report, prepared by Panel M-26 (Boiler Operations), contains sections dealing with boiler design, fuel burning and combustion control systems, and it discusses operation and maintenance.

Areas of specific considerations include air supply, fuel supply, atomization and ignition systems. Initial, as well as routine operations are reviewed, and an ap-

pendix on superheater protection during the critical time of ignition is included.

T&R Bulletin R-23 (Considerations for the Prevention of Furnace Explosions and Superheater Damage During Light-off) is available from the Society at \$6 per copy if payment accompanies the order. Society member price is \$4. For additional information, write to the Publications Department at The Society of Naval Architects and Marine Engineers, One World Trade Center, Suite 1369, New York, N.Y. 10048.

## Raytheon Names Millard Commercial Marine Marketing Manager



Capt. John R. Millard

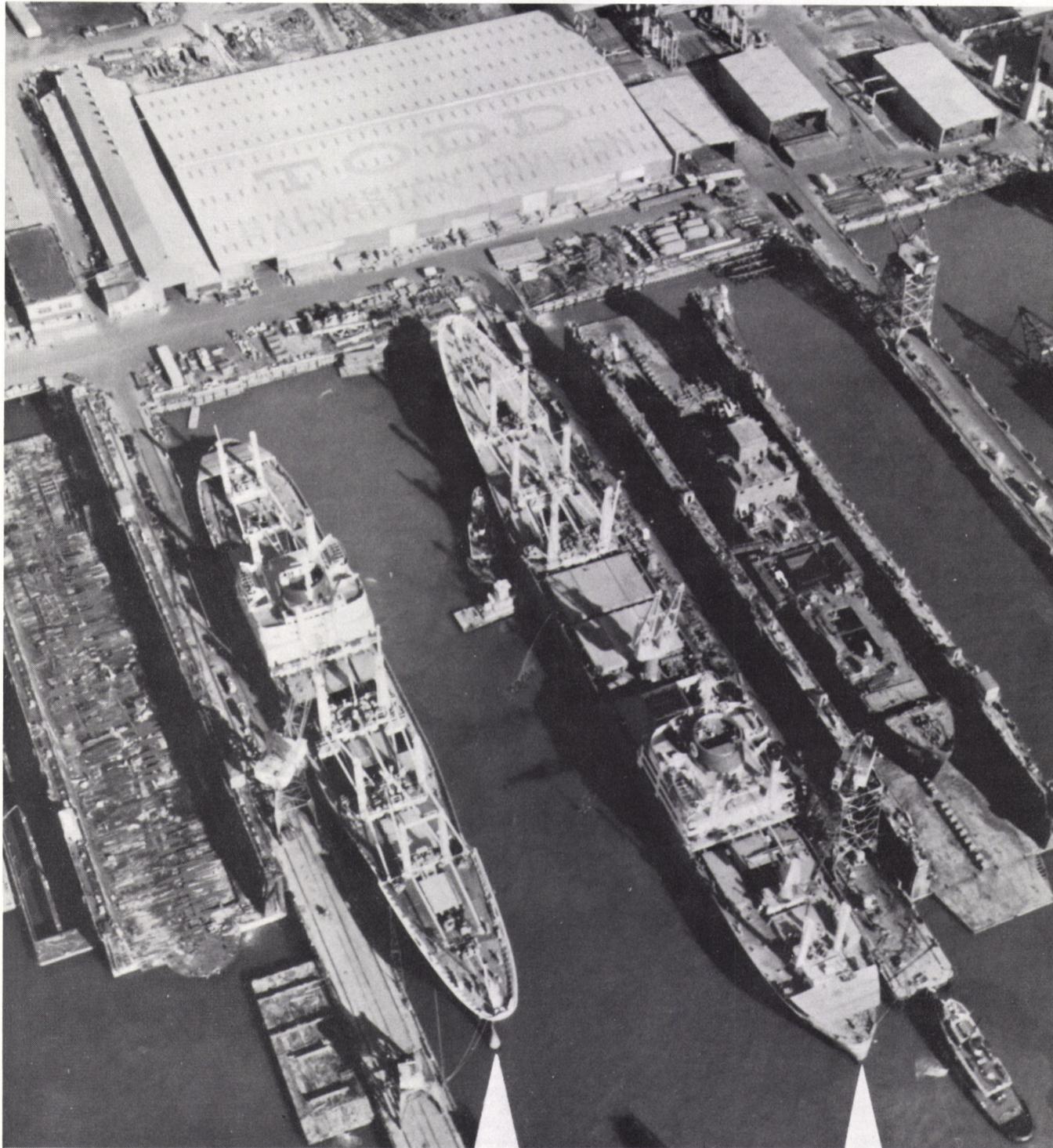
**John R. Millard**, who has directed marketing activities at Raytheon Marine Company since 1973, has been named to manage an aggressive new marketing program aimed at increasing Raytheon's business in the commercial marine electronics markets.

As marketing manager for commercial marine products, **Captain Millard** will be responsible for all domestic and Canadian sales and marketing of Raytheon's new line of American-made 12- and 16-inch radars, improved commercial versions of the company's Fathometer® depth sounders, and several new navigation aids still to be introduced by the electronics manufacturer.

A long-time veteran of the marine industry, **Captain Millard** is a graduate of Pace College and the New York State Merchant Marine Academy, and sailed for more than 10 years in the U.S. merchant marine as third, second, and chief officer and as master.

Since then, **Captain Millard** has held various marketing positions with Oluf Mikkelsen Co., a New York-based marine distributor; Evinrude Motors; OMC Boats, and Johnson Motors. Prior to joining Raytheon, he was vice president of marketing for Boatel Co., and was president of Saltair Miami, Inc.

**Captain Millard** will head up a nationwide sales organization from Raytheon Marine Company headquarters in Manchester, N.H. One of his first projects has been the establishment of a New York sales and product display facility. Located at 17 Battery Place, New York City, the showroom features operating radar and electronic navigation products for customer demonstration.



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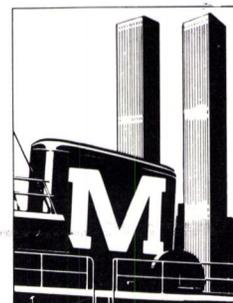
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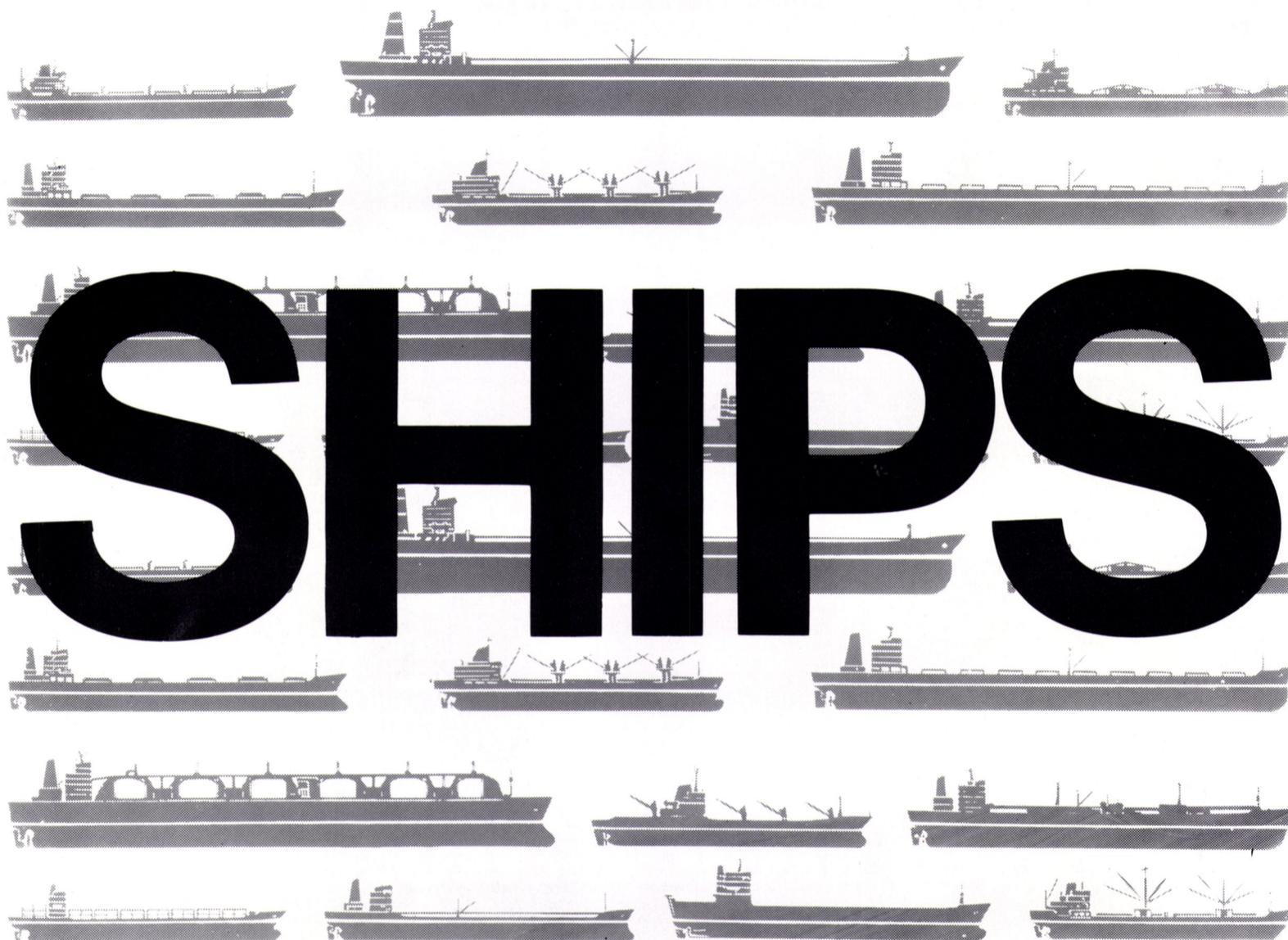
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## Charles Murphy Receives Halert C. Shepherd Award For Merchant Marine Safety

Rear Adm. Charles P. Murphy, USCG (ret.), general manager, ship construction, Sea-Land Service, Inc., has been named recipient of the second annual Halert C. Shepherd Award for achievement in marine safety.



Robert T. Young (left) presents the second annual Halert C. Shepherd Award for achievement in merchant marine safety to Rear Adm. Charles P. Murphy, USCG (ret.).

The award was established by the American Institute of Merchant Shipping in honor of the late Rear Adm. Halert C. Shepherd, who served in the United States Coast Guard as Chief, Office of Merchant Marine Safety, and was internationally acclaimed for his work in the field. The award is administered by the American Bureau of Shipping, and was presented to Rear Admiral Murphy by ABS chairman Robert T. Young at the Bureau's annual Board of Managers dinner held at the New York Yacht Club on November 9.

The award cited Rear Admiral Murphy as "a leader, administrator, delegate, and spokesman (who) has shown a widely respected lifelong concern for and dedication to merchant marine safety."

A graduate of the Webb Institute of Naval Architecture, Rear Admiral Murphy joined the Bureau of Marine Inspection and Navigation in 1935, and became Chief of the Hull Technical Section in 1939. The Bureau's functions were transferred to the United States Coast Guard in 1942 and Rear Admiral Murphy advanced there to Chief, Merchant Marine Technical Division, and subsequently, Chief, Office of Merchant Marine Safety.

During his Coast Guard career, Rear Admiral Murphy represented the United States in various international maritime safety forums. He was a member of the U.S. delegation at the Conference on the Safety of Life at Sea in 1948 and 1960, when he also served as U.S. spokesman on the Nuclear Power Committee. Between 1959 and 1970, he attended numerous meetings of bodies of the Inter-Governmental Maritime Consultative Organization (IMCO), including sessions of the Maritime Safety Committee, Council and Assembly. In 1968 and 1969, he was elected chairman of the IMCO Maritime Safety Committee. In 1969, he also served as chairman of the U.S. delegation to the International Conference on Tonnage Measurement of Ships.

In 1968, the Secretary of Transportation awarded Rear Admiral Murphy the Legion of Merit for performance as Chief, Office of

Merchant Marine Safety. In 1970, the Secretary again recognized Rear Admiral Murphy's performance with a Gold Star in lieu of a second Legion of Merit. Rear Admiral Murphy was also cited by the Department of State in 1970 in a Tribute of Appreciation.

Rear Admiral Murphy retired from the Coast Guard in 1970 and joined Sea-Land Service, Inc. as manager, ship construction, Europe, during the building program of the eight SL-7 containerships. He subsequently was appointed to the position of director, technical relations, and recently to his present position of general manager, ship construction.

Rear Admiral Murphy has served as chairman of the Ship Structure Committee, and is a member of the Technical Committee of the American Bureau of Shipping. He is

the author of "Lifesaving Equipment and Aids to Navigation," a chapter in the book, Design and Construction of Steel Merchant Ships.

The Rear Admiral Halert C. Shepherd Award consists of a Steuben crystal eagle, a citation, and leather presentation book.

## Boyd, Weir & Sewell, Inc. Appoints Martin And Wright

A.D. Jonker, vice president of Boyd, Weir & Sewell, Inc., steamship agents and shipbrokers, 17 Battery Place, New York, N.Y. 10004, has announced the appointment of Peter Martin as assistant line manager of their Bank Line Department.

Richard Wright has taken the position of account manager for the Knutsen and Itapacific Lines services.

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**Hongkong United Dockyards Ltd, Hunghom, Kowloon, Hongkong**

**Program Outlined  
For Annual Conference  
On Marine Coatings**

The program for the 18th Annual Marine Coatings Conference has been announced by chairman **Ernest W. Skiles**, The Carboline Co. The three-day conference, scheduled March 22-24, 1978, at the Del Monte Hyatt House, Monterey, Calif., is sponsored annu-

ally by the Marine Coatings Committee of the National Paint and Coatings Association. Attendees represent end-users of marine paints, including shipbuilders and operators, coatings manufacturers, their raw material suppliers, and government officials.

Program co-chairmen **Leon Birnbaum**, International Paint Co., Inc., and **David T. Bloodgood**, Bethlehem Steel Corp., will serve as moderators for the seven tech-

nical sessions which will include 20 presentations. The registration fee of \$75 includes a bound copy of all presentations, a banquet, and coffee breaks daily. Spouses are encouraged to attend, and a special program is planned for them. Spouses registration is \$25. Hotel reservation and conference registration forms will be available by writing: Marine Coatings Conference, National Paint and Coatings Association, 1500 Rhode

Island Avenue, N.W., Washington, D.C. 20005.

The program outline for the conference is as follows:

**Wednesday, March 22, 1978**— Session I: "Surface Preparation and Quality Control"; Presentations: Surface Preparation and Profile; Abrasives; Chemical Cleaning; Quality Control. Session II: "Corrosion Control for the Offshore Industry."

**Thursday, March 23, 1978**— Session III: "Anti-Fouling Coatings"; Presentations: State of the Art Report; Economics of Anti-Fouling Paints. Session IV: "Disposal of Wastes"; Presentations: Drydock Operations—Navy and Industry; Regulatory Activities—EPA. Session V: "LNG Carriers"; Presentations by Owner and Builder on Corrosion Control.

**Friday, March 24, 1978**— Session VI: "Projects to Help the Marine Industry"; Presentations: National Shipbuilding Research Program; Report of SNAME 0-23 Panel; ASTM Activities. Session VII: "Shipbuilding and Maintenance Coatings Specifications"; Presentations by Naval Architect; Owner/Operator; and Shipbuilder.

# The Innovators

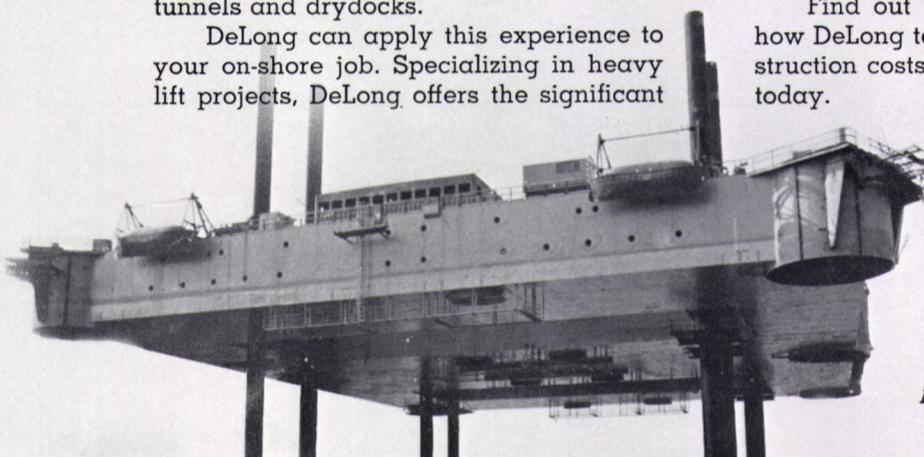
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cost reduction of fabricating structures at ground level... then raising and positioning to final elevation requirements. We have, for example, successfully lifted and positioned a 5200-ton superstructure, 1000 feet long, 356 feet wide and 25 feet high, to its specified height of 100 feet.

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**Acadian Polar Marine, Ltd.  
Receives Title XI Approval  
For 2 Tug/Supply Vessels**

Acadian Polar Marine, Ltd., Suite 1515, 225 Barrone Street, New Orleans, La., has had its application for a Title XI guarantee approved in principle by the Maritime Administration. The application was for aid in financing the construction of two 4,200-hp tug/supply vessels, 216 feet in length, with a beam of 44 feet and a depth of 16 feet. Each of the vessels is estimated to cost about \$2.6 million. The delivery dates are June and August 1978. The vessels will be used to transport personnel and dry and liquid cargoes to and from offshore facilities, and to perform ocean towing in the Gulf of Mexico, Caribbean, and Atlantic Ocean.

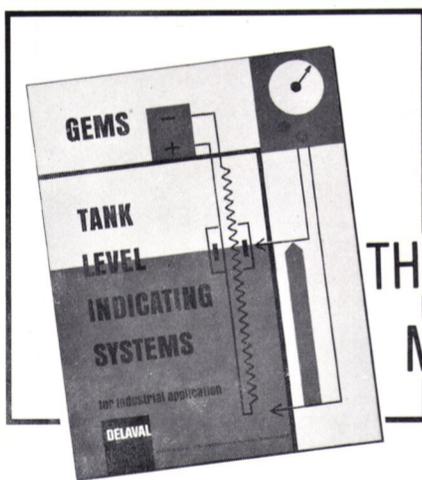
**Bulletin Describes  
New Twin Disc  
Marine Transmissions**

Twin Disc, Incorporated has announced two new marine transmissions for high-speed diesel engines in 365 to 620-hp range.

The new Twin Disc Model MG-518 Marine Transmission will handle up to 490 hp @ 1,800 rpm, continuous workboat rating. This unit is offered in ratios 4.06:1, 4.48:1, 5.07:1, 5.92:1 and 6.48:1.

The new Model MG-520 Marine Transmission is designed for continuous workboat ratings up to 620 hp @ 1,800 rpm and 415 hp @ 1,200 rpm. Ratios include 4.49:1, 5.00:1, 6.11:1 and 7.00:1.

For more information on the new MG-518 and MG-520, write **Louis A. Peccarelli**, Twin Disc, Incorporated, Racine, Wis. 53403.



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## State Boat Awards Contract To Blount For Offshore Supply Boats

Blount Marine Corporation of Warren, R.I., has announced that it has been awarded a contract for the construction of two 150-foot offshore oil-supply boats. The contract includes options for two more identical vessels.

The vessels are being built for the State Boat Corporation of Houston, Texas, and will bring to 10 the number of oil-supply craft built by Blount for the Texas firm over a three-year period.



The above photo shows the presentation of a picture of the El Paso Mariner to Luther H. Blount (left), president of Blount Marine Corporation, by John W. Boylston (middle), marine manager of El Paso Marine Company, and Warren G. Leback (right), vice president of El Paso Marine Company. The presentation was made at a luncheon after the recent launching of two vessels, the El Paso Mariner and the El Paso Sailor. The El Paso Mariner is a 65-foot twin-screw tug. The El Paso Sailor is an 82-foot twin-screw supply vessel. Both vessels will service LNG carriers unloading at the Cove Point, Md., LNG terminal.

## Hitachi Zosen Receives Order From Mexico For Two Multipurpose Ships

Hitachi Zosen has received an order from Transportation Maritima Mexicana, S.A. (TMM) of Mexico to build two 18,930-dwt multipurpose cargo carriers.

The contract was signed in Mexico by Enrique Rojas G. of TMM and S. Asano, director of Hitachi Zosen.

TMM, set up in 1955, is a Mexican organization. With a total of 33 ships aggregating 260,000 deadweight tons, the company is the sole Mexican international shipping company having regular line service to Japan.

The contracted ships, the first order ever placed with a Japanese shipbuilder, are high performance multipurpose cargo carriers, and each is equipped with a 180-ton heavy derrick. Both ships are capable of carrying a total of 816 containers.

## MarAd Releases Two-Volume Report Prepared By DeLaval

The Maritime Administration has released a two-volume technical report which provides a comprehensive engineering and economic analysis of various improvements that can be applied to conventional two-heater steam turbine propulsion machinery sys-

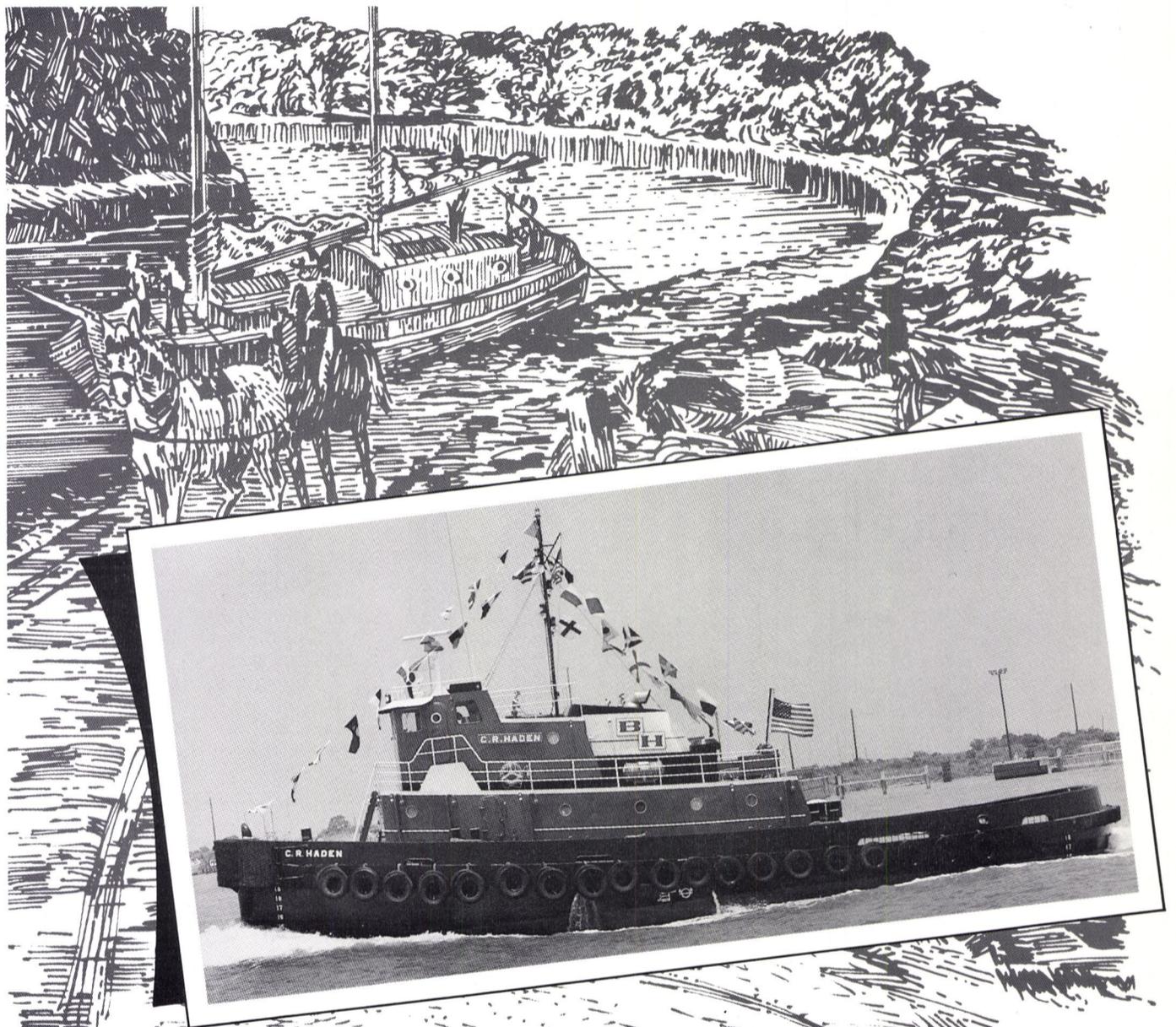
tems to improve overall specific fuel consumption.

Cycle/machinery improvements are evaluated for both retrofitting into existing ships and for use in new construction. Stack coolers, fluid regenerative air heaters, condensate-cooled lube oil coolers, cascading bleeds, and two-row/one-row turbines are all evaluated.

The report, entitled "Improvements in Non-Reheat Steam Propulsion Retrofit and New Con-

struction," was prepared by the DeLaval Turbine Company, Trenton, N.J., under a contract with the Maritime Administration.

Copies of the report are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, Va. 22161. The order numbers and prices for the report are: Volume 1—Final Report, PB-273052/AS, \$8; Volume 2—Appendix, PB-273053/AS, \$10.50.



# We're making history again.

Bay-Houston announces the **C. R. Haden**, a brand new 3,200 horsepower tug with power to spare for towing, maneuvering and docking the largest vessels using Texas Gulf ports. Twin screws with Kort nozzles assure quick response to tow conditions in open harbors, narrow channels or turning basins.

We've come a long way since 1880 when Captain W. D. Haden's towpath operation along upper Galveston Bay made us the first harbor towing company in the Houston area.

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HARBOR AND COASTWISE TOWING  
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## Oceanographic Services Buys Allen Weather Corp.

The facilities and staff of the Washington, D.C.-based Allen Weather Corp. were recently acquired by Oceanographic Services, Inc. (OSI).

OSI, headquartered at 135 East Ortega Street, Santa Barbara, Calif., is a leader in the fields of applied meteorology, oceanography, and related instrumentation systems design and installation.

In addition to serving as the primary center for company research programs and instrumentation systems development, the headquarters will function as the meteorological and ship routing center for the Pacific and Far East. **Vincent C. McDermott**, operations manager of Allen Weather, will be initially responsible for operation of the ship routing center at OSI.

**Wayne G. Winston** has been appointed manager of Allen Weather. The Washington, D.C. office will continue to serve as the forecast center for ship routing and

other meteorological services for the Great Lakes, Atlantic Ocean, and Gulf of Mexico eastward to the Middle East. Anticipated staff additions and a link to the company computer facility in Santa Barbara are expected to enhance the capabilities of the Allen group. Both facilities will be operated on an around-the-clock basis.

## G.E. To Manufacture Heating Systems For Frigates At Bath Iron

General Electric Company's Aviation Service Operation has been awarded a contract by Bath Iron Works to Manufacture the heating system for the U.S. Navy's U.S.S. Perry-class Guided Missile Frigates (FFG).

The contract, valued at approximately \$500,000, covers the heating systems for five frigates, with a firm option for three additional ships, predicated on continued Government funding. U.S. Navy plans call for 76 Perry-class frigates.

## SNAME Philadelphia Section Hears Paper On New Flexible Shipbuilding And Ship Repair Facility



Eugene Schorsch points to a ship being built in two halves on a table miniature of Sun's "flat slab" building area. Shown left to right, are: **K. Gyswyt**, secretary-treasurer, Philadelphia Section; **G. Swensson**, vice chairman, Philadelphia Section; **R. Galloway**, executive vice president, Sun Ship, author; **F.W. Beltz Jr.**, chairman, Philadelphia Section; **Mr. Schorsch**, vice president, Sun Ship, author; **R. Barnhart**, Sun Ship, coordinator, and **M. Willis**, Sun Ship, author.

The Philadelphia, Pa., Section of The Society of Naval Architects and Marine Engineers held its October meeting at the Airport Holiday Inn in Essington. Seventy members and guests attended the technical session to hear a paper entitled "New Flexible Shipbuilding and Ship Repair Facility," presented by co-authors **R. Galloway**, **E. Schorsch**, and **M. Willis**.

The authors outlined the history of the development of Sun Shipbuilding & Dry Dock Co. since its inception in Chester, Pa., in 1916, and described in some detail the design and construction of the new building fa-

cility and its supporting equipment.

This new facility, which has a capability of constructing ships of 400,000 dwt, consists of a "flat slab" building area, and a large floating drydock equipped with a sophisticated tide and ballast control system. The ships are built in halves on the slab and transferred horizontally to the drydock for joining. A detailed model of the plant was on display at the meeting.

Following the paper presentation, the members and guests were invited to join in a conducted tour of Sun Ship, for a first-hand view of the installation.

## Planning Research Receives \$1,460,000 Contract From USCG

Planning Research Corporation (PRC), 1850 K Street N.W., International Square, Washington, D.C. 20006, has been awarded a \$1,460,000, five-year cost-plus-fixed-fee contract by the U.S. Coast Guard for Marine Safety Systems Analysis. The work will be performed by PRC Systems Services Company in McLean, Va.

PRC will develop a comprehensive risk management methodology to assure safety and protection of the marine environment. Emphasis will be devoted to the solutions of specific problems faced by the Coast Guard in its regulatory and enforcement activities associated with commercial vessels operating in the United States ports, harbors and waterways.

PRC is the world's largest diversified professional services organization serving government, business and industry, primarily

in the areas of planning, engineering and architecture, information services and management consulting.

## Philadelphia Resins Announces Reassignments

Philadelphia Resins Corporation, long-time manufacturers of Chockfast and other resin and cable products for marine and industrial use, has announced the following reassignments of their key personnel: **Philip J. Girvin**—manager of resin products; **A. Simeon Whitehill**—manager of rope and cable products; **Nancy Heck**—international sales manager; **Richard E. Dearborn**—U.S. sales manager of Resin and Cable Divisions; **Patricia Clungeon**—office manager and sales coordinator.

Philadelphia Resins Corporation, headquartered at 20 Commerce Drive, Montgomeryville, Pa. 18936, has worldwide distributorship of its very complete product line.

## Blast Cleaning Equipment



## Clemco Flo-Flor® the major breakthrough in blast room recovery systems

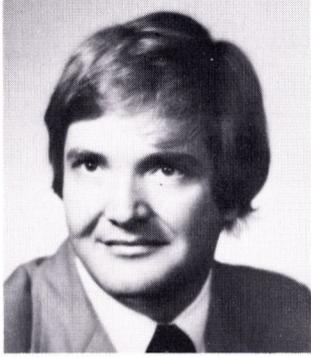
As this cam revolves, it generates the distinctive abrasive recovery action of the Clemco Flo-Flor. This action is the basic principle applied by Clemco engineers in developing the System over 7 years ago. To date, well over 130 installations have proved the complete reliability of Flo-Flor automatic abrasive recovery. Low in profile, Flo-Flor is easily maintained; uses little energy. Its modular design permits many cost-saving configurations. Write for specifics about this System and other ways Clemco can serve your blast room needs.

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## The Crosby Group Names Craig Sales Manager



William R. Craig

William R. Craig has been named sales manager of The Crosby Group, announced Dick Sked, vice president of sales at Crosby.

Mr. Craig will be responsible for all domestic sales for The Crosby Group.

Mr. Craig previously held a management position at a steel service center in Tulsa, Okla., where he was responsible for sales and engineering.

A native of Oklahoma, he holds a B.S. degree in management from the University of Tulsa.

The Crosby Group, a division of American Hoist and Derrick Co., is a Tulsa-based manufacturer of wire rope fittings, blocks, accessories, and chain. Crosby has several plants and warehouses throughout the U.S., Canada, Mexico, and Europe.

## ARCTEC Canada Limited Opens Testing Facility And Ice Towing Basin

Transport Minister Otto Lang "piloted" an icebreaker through a frozen channel recently to officially open ARCTEC Canada Limited's new Canadian headquarters.

It was a simulated, yet extremely realistic "maiden voyage" in ARCTEC's new ice tank, a sophisticated testing facility to determine the effects of ice on marine structures and vessels. The "Cold Regions Marine Research and Engineering Laboratory" is the first privately owned laboratory in Canada devoted exclusively to ice technology, and one of only four in the world.

The new 14,000-square-foot facility features a synthetic ice towing basin measuring 60 by 20 feet, as well as a saline ice towing basin 100 feet long and 16 feet wide. The facility is also equipped with scientific cold rooms and a hydraulics laboratory.

ARCTEC Canada president Roderick Y. Edwards Jr. says his firm has developed a system of creating synthetic ice which "is as good as the real thing." The invention is the brainchild of Dr. Bernard Michel of Laval University, one of ARCTEC's founders. The ARCTEC process uses a chemical material that models the full-scale properties of ice in

model scale. "The process involves the mixture of chemical compounds that are a trade secret," said Mr. Edwards.

The synthetic ice concept already has a proven track record. It has been used to test the effects of ice on offshore structures for several major oil companies.

Saline ice is frozen from salt water by an ARCTEC-patented cryogenic freezing process. This

fast freezing produces a controllable crystal structure that allows scaling the strength of the ice sheet in similitude with its thickness. This technique will be a first for Canada.

The opening of ARCTEC's Ottawa facility completes its consolidation from three locations. Activity will now be centered in the national capital. "Ottawa is a growing center of Canadian

technological research and development. Our work involves a great deal of liaison with the National Research Council and the Ministry of Transport. It will also allow us to better serve our government clients," concluded Mr. Edwards.

The new ice tank is located at the headquarters of ARCTEC Canada Limited, 311 Legget Drive, Kanata, Ontario K2K 1Z8.

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Marathon LeTourneau-developed heavy lift cranes serve the offshore industry, marine construction and dockside operations with proven superiority of more than seven million hours in all kinds of hostile environments.



## Marine Equipment Suppliers Apply For Title XI To Build Self-Propelled Pipelay Ship

Marine Equipment Suppliers, Inc., 601 Jefferson Street, Suite 3600, Houston, Texas, has applied for a Title XI guarantee to aid in financing the construction of a self-propelled, reel pipelay ship. The ship, to be named Apache, is expected to begin work in the Gulf of Mexico, and later may be employed in the North Sea.

The Apache is designed to lay steel pipe from 4 to 16 inches in diameter in pre-welded, continuous lengths from 7 to 50 miles long. It will participate principally in two different markets: laying flowlines asso-

ciated with subsea completed wells and laying "standard" pipelines.

The vessel will have an overall length of 389 feet and a molded breadth of 70 feet. It will be driven by twin-screws and powered by a pair of diesel engines totaling 7,200 horsepower (hp). The ship will be able to cruise at 12.5 knots and will have a range of 5,000 miles. Four 900-hp thrusters — two at the bow and two astern — will position the vessel during pipelaying and retrieval operations.

During pipelaying operations, the Apache will tie up at a coastal base where pre-welded strings of pipe are wound onto the reel and joined together. When loaded, it will sail to the designated site and unreel the pipe off the stern at speeds of 1.5 to 2 knots.

## INTEROCEAN MANAGEMENT EQUIPS TANKER FLEET WITH KRUPP ATLAS RADARS! **ATLAS 6500 BCA**



ATLAS 16 in. Radar Display on Bridge of S/S Maryland

After extensive tests and evaluations of Krupp ATLAS 16 inch radars on the U.S. flag tankers S/S ALLEGIANCE (34,800 DWT) and S/S MARYLAND (264,000 DWT), Interocean Management Corp., Philadelphia, decided to install ATLAS radars on a fleet wide retrofit program. On several of their U.S. flag vessels which went into service only last year, the radar equipment originally supplied was replaced by ATLAS radars. The ATLAS radars were supplied through Electro-Nav, Inc., New York.

Because of their proven reliability, Interocean Management Corporation selected the ATLAS 16 inch radars with Basic Collision Avoidance features, types ATLAS 6500 BCA (3 cm, X-Band) and ATLAS 6500 S BCA (10 cm, S-Band). These radars feature:

- Automatic target detection at preset ranges with Dual Guard Zones
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For full collision avoidance capability, the ATLAS radars can be interfaced with Iotron, Sperry, or other collision avoidance systems. Full interswitching of the transmitters is available.



Mast with ATLAS S-Band & X-Band Antennas



Interocean Management Corporation Tanker S/S Maryland



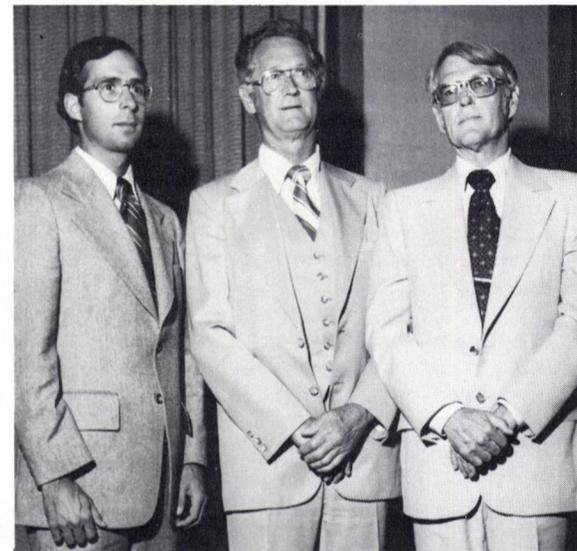
KRUPP INTERNATIONAL, INC.  
**KRUPP ATLAS-ELEKTRONIK** DIVISION  
P. O. BOX 58218, HOUSTON, TEXAS 77058 (713) 488-0784

**YES!** I WOULD LIKE MORE  
INFORMATION PLEASE!  
**ATLAS 6500 BCA**

NAME \_\_\_\_\_ TITLE \_\_\_\_\_  
COMPANY \_\_\_\_\_ PHONE \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_  
TYPE OF VESSEL(S) \_\_\_\_\_

The construction of the vessel will be performed by Todd Shipyards Corporation at its Galveston, Texas, yard. The estimated actual cost is about \$34 million. Marine Equipment Suppliers, Inc. is a wholly owned subsidiary of Santa Fe International Corporation, Orange, Calif.

## Strict Liability And Its Impact On Marine Field Discussed By SNAME No. Calif. Section



Pictured during the meeting, left to right: Peter Fisher, Matson Navigation, Papers Committee chairman; Earle V. Maynard, author, and Murray Montgomery, Matson Navigation, chairman.

Earle V. Maynard presented a brief paper entitled "Strict Liability, Its Impact on the Marine Field" at a recent dinner meeting of the Northern California Section of The Society of Naval Architects and Marine Engineers.

Mr. Maynard outlined the potential problems over recent court interpretations of the concept of "strict liability." He concluded that since the marine market was a peripheral area of interest by the insurance community that extremely high premiums or unavailability for "product" type coverage may be anticipated.



Incoming officers shown, left to right: King-Tau Liu, Herbert Engineering, Executive Committee; Roger Kline, David J. Seymour Ltd., secretary/treasurer; Murray Montgomery, Matson Navigation, chairman, and David Pritchard, Chevron Shipping, vice chairman.

Additionally, at this meeting, incoming officers were presented as follows: Murray Montgomery, Matson Navigation, was named chairman; David Pritchard, Chevron Shipping, is vice chairman; Roger Kline, David J. Seymour Ltd., was named secretary-treasurer; Peter Fisher, Matson Navigation, is Papers Committee chairman, and King-Tau Liu, Herbert Engineering, was elected to the Executive Committee.

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Delta Marine Supply Corporation, 2701 Tchoupitoulas Street, New Orleans, Louisiana 70130, (504) 899-6353

## SNAME Pacific Northwest Section Holds Annual Meeting At Harrison Hot Springs, B.C.



Principals shown above during the Pacific Northwest Section meeting, left to right: **Doug Hendrix**, past chairman of the Section; **Dr. R.F. Hooley**, professor, structural engineering, University of British Columbia; **Robert T. Young**, national president of SNAME; the Honorable **Jack Davis**, Minister of Energy, Transport and Communications, Government of British Columbia; **Paul Zankich**, vice chairman, Seattle Area, and **Gerald Talbot**, chairman, Pacific Northwest Section.

The annual meeting of the Pacific Northwest Section of The Society of Naval Architects and Marine Engineers held at "The Harrison," Harrison Hot Springs, British Columbia, Canada, the weekend of October 7-9, was attended by more than 130 members and guests.

The Section was honored to host **Robert T. Young**, national president of the Society, **Mrs. Young**, and the guest speaker at the banquet, the Honorable **Jack Davis**, Provincial Minister of Energy Transport and Communications.

A buffet/dinner-dance and talent show on Friday evening was enjoyed by all. Door prizes were presented, and the talent show was successfully run by the master of ceremonies, **Elijah Horner**, vice chairman of the British Columbia Area Section.

On Saturday, the Executive Committee conducted a business meeting over a 7 a.m. breakfast. Saturday morning's technical session was conducted by the Pacific Northwest Section chairman, who welcomed the Society's national president, **Mr. Young**. **Mr. Young's** opening remarks were mainly concerned with the difficulty experienced across the continent in obtaining and training ships crew, especially engineering staff. He stated that the majority of recent marine mishaps were caused by the inexperience of the vessel's personnel, and hoped that this would be remedied by a future program with incentives to attract the right people for a particular crew position. Furthermore, he concluded that a study carried out by a prominent environmental research group indicates the vast majority of the oil polluting the oceans was there through natural causes, such as oil seepage, and that oil tankers were responsible for only 3 percent of the total



**Dr. R.F. Hooley** (left) receiving a certificate of appreciation from **Robert T. Young**.

spills, of which about one-half of 1 percent were structurally related.

**Mr. Talbot** introduced **Dr. Roy F. Hooley**, P. Eng., professor, structural engineering, University of British Columbia, who made an excellent presentation of his technical paper entitled "Ship Vibrations." **Dr. Hooley** discussed and offered solutions to objectionable hull vibrations set up by wave action or, particularly, pulsating machinery and collision impact, both vertical and lateral, which deform the hull to a greater or lesser extent, depending on the type of vessel. He pointed out that in the case of a ship under design, calculations must be accurate and conservative to achieve relatively vibration-free results. In the case of an existing vessel that has a vibration problem or a vessel that is about to be altered, actual measurements can remove much of the uncertainty and allow a simpler and more accurate calculation. Alleviation of vibration problems was discussed, particularly with respect to tankers, freighters, ferries, and trimarans, with emphasis on the

fact that a knowledge of the natural frequencies is necessary to guard against the extreme amplitude of vibrations resulting from resonance.

Summarizing, in most cases it is necessary to have a mathematical model of the ship that will predict mode shapes and frequencies. If the structural form of the vessel is simple and the beam analogy is applicable, the model can be simple, but as the structural complexity of the vessel grows, the size of the model must grow until a full finite element analysis is required. The properties of this model can then be changed to predict an efficient way of reducing vibrations. If the ship has already been built, field measurements can be taken and the model changed to duplicate them, allowing its use with greater confidence to predict the future behavior of a modified vessel.

**Dr. Hooley** illustrated his lecture with the use of blackboard, slides, and some very effective, simple, models. Discussers were **Paul H. Diehl**, **Robert B. Grant**, and **Clair W. Wakefield**.

The meeting was attended by 76 members and guests.

A copy of the paper is available from the Section librarian.

With the men busy at the technical session, the wives attended a sherry party in the hospitality suite. Saturday afternoon's recreational activities consisted of a golf tournament, curling bonspiel and bridge, with prizes presented by their respective organizers.

A banquet and dance was held in "Caesar's Forum," preceded by a congenial reception and cocktail hour. The Society president, **Mr. Young**, addressed the dinner meeting and presented a certificate of appreciation to **Dr. Hooley**.

The guest speaker, the Honorable **Jack Davis**, welcomed the members from the United States, and delivered a timely speech directed toward the impact of the energy crisis on the marine industry. **Mr. Davis** outlined the background of events and philosophies leading to international recognition of the general principle of the 200-mile coastal limit. The zones created within the limits come under national jurisdiction as resource management zones, including fishing and mineral exploitation, both on the seabed and under it. Thus Canada, with the second longest coastline in the world, has an enormous responsibility to effectively manage this huge area. Great opportunities exist in both Canada and the United States, particularly for offshore oil and gas exploration and development.

**Mr. Davis** stressed that marine transportation of crude petroleum is generally the cheapest means of moving oil, with the notable exception of certain pipelines, and that more than 50 percent of ocean tonnage is devoted to oil. Thus, the impact of worldwide

demands for energy will necessarily be reflected in activity in the marine industry. On the West Coast, energy requirements in mid-continent will result in the construction of pipelines, and the effect of these projects, as well as the movement of oil from overseas to West Coast ports to feed into some of these pipelines, will be increased activity in the marine industry.

**Mr. Davis** concluded on a thoughtful note by stating that the members of the engineering profession are aware of environmental consequences of their work and, in general, respond positively to provide safeguards.

A china teacup and saucer were presented to each of the ladies, and door prizes were drawn, followed by an enjoyable evening of dancing.

### New Single Point Monitoring Salinity Control System

Marine Electric RPD, Inc., has announced a new addition to the Galbraith-Pilot Marine line of Salinity Indicators.

The single point monitoring salinity control system, the Sea Watch Seven, is a compact and complete solid-state salinity indicating and alarm system designed to measure and control the magnitude of impurities in treated water systems by monitoring the quantity of salts and chlorides dissolved in water to and from evaporators and saline water conversion plants; boiler feed and condensate systems; reactor water cooling systems and steam plants; chemical and food processing plants, and freshwater-cooled diesel engines.

Offering excellent accuracy, the Sea Watch Seven Salinity Control System features an all solid-state design with an internal voltage regulator for correction of wide power line voltage fluctuations. High salinity alarm points are preset with a knob to a calibrated alarm dial. A built-in temperature compensation circuit permits accurate readings over the full scale.

The control panel of the Sea Watch Seven includes a power-on indicator lamp, high-salinity alarm indicator, power input off-on control, alarm-setting dial, and a wide-face meter for easy reading.

The meter precisely indicates the salinity content of the water at all times via a remotely installed sensor cell. A six-foot three-wire conductor is included with the sensor cell unit for direct or indirect connection to the control panel.

Complete specifications may be obtained by writing to **Harry Parke**, Marine Electric RPD, Inc., 166 National Road, Edison, N.J. 08817.

## Worthington Announces Management Positions In Marketing And Sales

Everett L. Case, vice president of marketing for the Process and Gas Division of Worthington Compressors, Inc., has announced senior management positions on his marketing and sales staff.



William H. Vedder

Named to the marketing staff are Daniel J. Schiffhauer, director of marketing for process compressors and the company's line of reciprocating and centrifugal air compressors; Landis G. Kroh, director of marketing for gas field compressors; William H. Vedder, marine and government compressor marketing manager, and Eugene A. Pickert, manager of marketing administration.



Frederick O. Snyder

Appointed to key sales positions and their headquarters are Frederick O. Snyder, manager of marine and government compressor sales and Eastern regional sales manager for process compressors, Philadelphia, Pa.; Robert T. Thomas, Western regional sales manager for process compressors, Houston, Texas, and John H. Carpenter, sales manager for gas field compressors in the United States and Canada, Houston.

## Danforth 40-Page 1978 Catalog Available

Just off the press is Danforth's new 1978 catalog, which is available to both the trade and consumers free upon request.

Consisting of 40 pages, the new edition illustrates and describes the complete Danforth line in detail. Among the products covered are Danforth's full range of Hi-Tensile®, Standard®, Sure-Ring®, Utility and Shipmaster anchors. Constellation®, Corsair®, and Lodestar® compasses are also described in detail, including a new

line of 4-inch Constellations. Other product groups include horns, cabin lights, searchlights, spreader lights, davits, electronic wind and water instruments, weather instruments, automatic pilots, a combination hailer/listener/horn/foghorn/intercom, and other products.

Free copies are available from Warren Lindsay, Danforth, 500 Riverside Industrial Parkway, Portland, Maine 04103.

## Savannah Machine And Shipyard Company Names Steven Silverman

David H. Green, executive vice president of Savannah Machine and Shipyard Company, has announced that Steven Silverman has been transferred from the shipyard Production Department to the position of estimator.

Mr. Silverman has served Savannah Machine and Shipyard

Company as a ship superintendent. He received a Bachelor of Engineering (Marine and Mechanical) degree from the New York Maritime College at Fort Schuyler, N.Y. He also holds a license as a third assistant engineer.

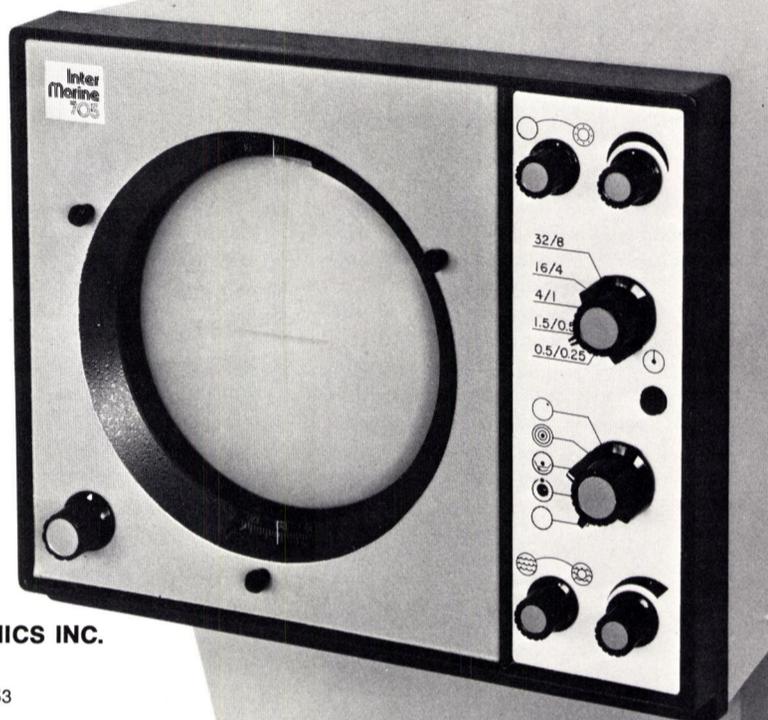
Mr. Silverman had been employed with the Military Sealift Command as a ship surveyor and worked in various shipyards handling drydocking and repairs.

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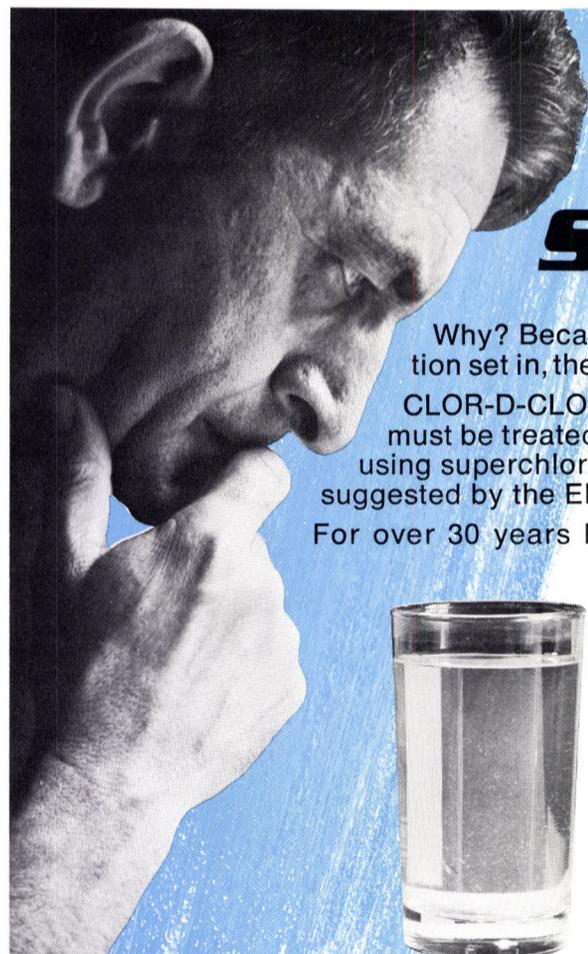
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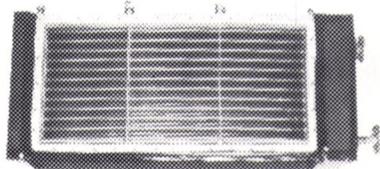


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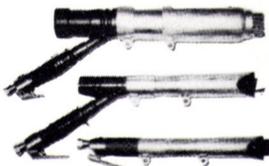
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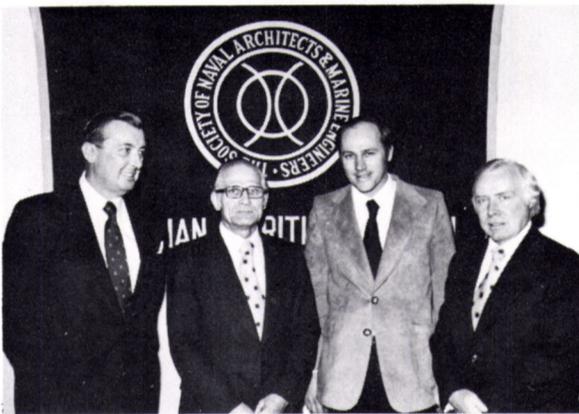
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### Canadian Maritime Section Hears Paper On Cable Laying

The first meeting for the 1977-78 season of the Canadian Maritime Section of The Society of Naval Architects and Marine Engineers was held at the Wandlyn Motel in Saint John, New Brunswick, on October 25, 1977.

Ken Bevan introduced the guest speaker for the evening, Ernest J. McFadzen, president of Atlantic Marine Diving Co., Ltd., who spoke on "Cable Laying."



Shown at the Wandlyn Motor Inn, left to right: Russell G. Maguire, Section secretary; Ernest J. McFadzen, speaker; Erich Hinze, Section chairman, and Ken Bevan, Section representative.

Included in the presentation was a film on laying an industrial power cable between Prince Edward Island and New Brunswick.

The film illustrated the many undersea operations required in laying cables.

Questions from the floor were ably answered by Mr. McFadzen, which greatly enhanced the presentation.

The meeting was chaired by Erich Hinze, who welcomed the members and guests.

### Rapifax Supplies U.S. Lines With Shipping Industry's First High-Speed Facsimile System

Rapifax Corporation has supplied United States Lines with nine Rapifax 100 units domestically, and seven overseas, creating the first high-speed facsimile system for the transmission of stowage information in the intermodal transport industry. This gives United States Lines the capability to electronically "mail" a letter-sized document virtually anywhere in the world in less than a minute, over ordinary, voice-grade telephone lines.

Rapifax Corporation, a world leader in high-speed facsimile transmission equipment, has moved its corporate headquarters to a new building at Seven Kingsbridge Road, Fairfield, N.J. 07006, across the street from its present location. Housed in the new facility will be Rapifax Corporation's complete administrative, marketing, and executive staff.

Rapifax Corporation has sales and service centers throughout the United States. The company's major product, the Rapifax 100 high-speed facsimile system, can electronically "mail" a document to any place in the world in as little as 35 seconds. For further information, contact Gary Winkler, Marketing Support Manager, Rapifax Corporation, Seven Kingsbridge Road, Fairfield, N.J. 07006. Telephone (201) 575-6010.



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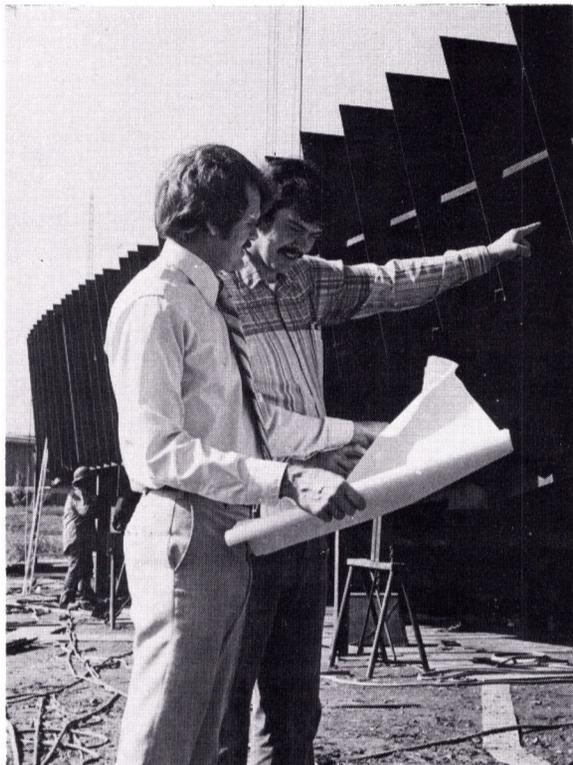
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## Mississippi Marine Begins Offshore Boat Construction

Mississippi Marine Towboat Corporation, Greenville, Miss., an established builder of inland river towboats and barges, has begun constructing boats for the offshore industry.

Currently under construction is a 112-foot-long by 26-foot-beam offshore utility boat. The vessel was designed by the naval architectural and marine engineering firm of van Bentem & Associates Inc., Ocean Springs, Miss. The hull depth is 11 feet 2 inches, and is to be powered by a pair of 16V71 Detroit Diesel engines with MG 527 Twin Disc reduction gears and two 4-71 50-kw generators.



Mississippi Marine Towboat Corporation naval architect **Joe Janoush** (right) points out progress on the firm's first offshore boat to MMTC president **John Nichols**. The 112-foot-long vessel is scheduled for completion in early 1978. Mr. **Nichols** says that construction on a second offshore utility boat will begin next month at the firm's Lake Ferguson shipyard on the Mississippi River at Greenville, Miss.

MMTC's yard, located on the slack-water harbor at Greenville, is equipped to handle boats of this size and larger. Equipment includes a 2,500-ton drydock measuring 218 feet by 68 feet, a 200-foot wet dock, three 200-foot construction ways, a 35-ton floating crane, a 35-ton mobile crane, a 10-ton mobile crane, a 10-ton overhead crane, and a 200-foot by 70-foot enclosed fabrication shop equipped with a 10-ton crane.

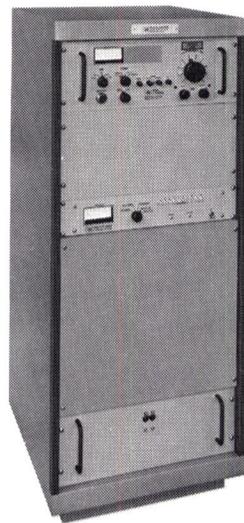
MMTC's president **John Nichols** gave this reason for diversification: "When you're an established builder of inland river towboats and barges, it's a natural step to build for the offshore market, especially when you have the equipment and staff to handle the job."

Mississippi Marine has already produced 10 towboats in the 4,000-5,600-hp class since 1969, in addition to numerous smaller towboats (in the 2,200 and 800-hp class). They have also built drydocks, tank barges, deck barges and floating crane barges as well.

In anticipation of the continued demand for offshore vessels such as the 112-foot utility boat currently under construction, MMTC will lay out the keel for a second such boat at the end of this year.

For additional information on the yard operations, write to **John Nichols**, Mississippi Marine Towboat Corporation, P.O. Box 539, Greenville, Miss. 38701.

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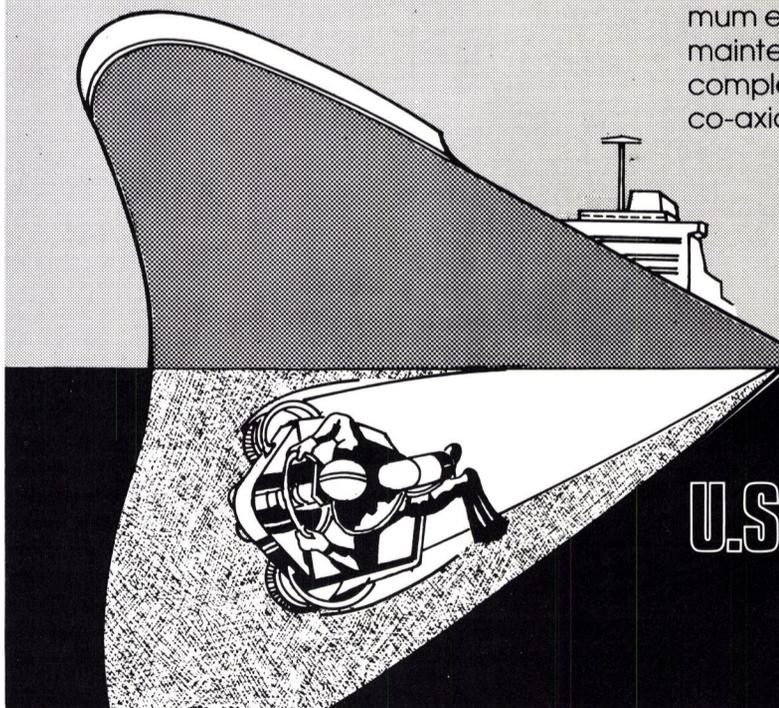
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# Series Production Of Aluminum LNG Spheres

P. Takis Veliotis \*

In the fall of 1972 General Dynamics signed the first contracts in the United States for the construction of 125,000 cubic meter liquefied natural gas (LNG) carriers. Subsequently, in 1973 and 1976, contracts for additional vessels were signed for a total of 12 ships.

This series of essentially duplicate vessels would require 60 identical 120-foot-diameter aluminum cargo containment spheres, five for each ship, to be manufactured at the rate of 20 spheres per year. In order to achieve this production and, at the same time, maximize the rate of ship deliveries, it was necessary to make the most efficient use of resources. A plan was therefore developed whereby the ships would be constructed by experienced shipbuilders while the spheres would be built simultaneously, but offsite by an experienced sphere builder, then transported by barge to the shipyard and loaded into the completed hull.

This concept required extensive modernization of the shipyard. An automated standard parts fabrication shop, two 875 by 150-foot building basins and a 1,200-ton Goliath crane for loading of the spheres into the ships and handling ship modules were installed.

Concurrent with the modernization of the shipyard facilities, a sphere subcontractor was selected and Charleston, S.C., was chosen as the manufacturing site. The sphere subcontractor began facility work in 1973, with production scheduled to begin in 1974. By September 1974 it became evident that the subcontractor would be unable to meet contractual requirements. The shipyard therefore freed itself of relationships with the subcontractor by assuming the responsibility for building the spheres.

During the last three months of 1974, the shipyard undertook an around-the-clock planning effort which also drew upon resources from other divisions of the corporation. This effort had three phases: (1) the definition and evaluation of alternative

methods to obtain LNG spheres; (2) selection and concurrent development of the manufacturing process and facility requirement for those alternative methods having the highest potential for success and cost effectiveness, and (3) final selection and implementation of the optimum method to obtain LNG spheres.

Criteria for evaluation included: (1) capital investment required; (2) high confidence that the selected manufacturing plan would work; (3) flexibility in production process; (4) earliest and most rapid rate of sphere deliveries, and (5) acceptable risk.

Against these criteria, the following possible alternatives were evaluated: (1) build spheres at the Charleston site; (2) build spheres at a new site; (3) build spheres at a new facility contiguous to the shipyard; (4) build spheres in the ship, and (5) select another subcontractor to build spheres at the Charleston site or at a new facility.

This evaluation indicated that the shipyard could build spheres either at Charleston or at a new site at a rate equal to or faster than the original sphere subcontractor with a higher confidence in obtaining scheduled deliveries.

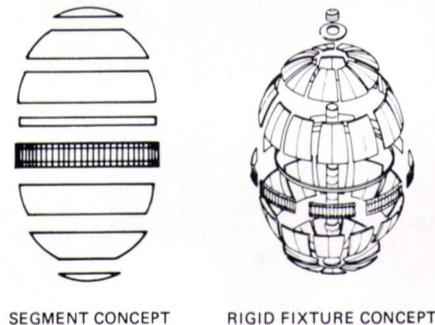


Fig. 1—Manufacturing plan alternatives

With this knowledge in hand, various alternatives were pursued in parallel: (1) the detailed development of two different manufacturing plans — the segment concept and the rigid fixture concept, Figure 1; (2) the acquisition of alternative manufacturing sites, and (3) exploratory negotiations with other sphere subcontractors.

In parallel with exploratory negotiations with other sphere subcontractors, the shipyard developed two alternative manufacturing plans. Investigation of two different manufacturing plans, the segment concept and the rigid fixture concept, stemmed from observing problems encountered by the sphere subcontractor in

attaining the required degree of sphericity and acceptable welds.

The weld problems experienced were primarily the result of poor fitup and welding in an open environment exposed to contaminating elements of nature — dust, wind, and moisture.

The basic problem of repeated poor fitup was determined to result from parts not manufactured repetitively to rigorously controlled dimensional tolerances. When traced to the cause, poor fitup was found to result from inadequate design of tooling and fixtures.

This detailed technical evaluation established the specific criteria around which a manufacturing plan would have to be developed, namely: (1) each of the spheres must be repetitively produced to strict dimensional tolerances; (2) each fixture used in the production process must be capable of achieving and maintaining rigorous dimensional tolerances, and (3) all welding must take place in a weather-protected environment.

With these principles defined, the details of the two different manufacturing concepts were developed. The first, a segment concept, envisioned the sphere being sliced horizontally into five or six circular sections. These sections would be fabricated from plates and welded together into 360-degree rings. Final assembly would take place by stacking and welding sections together. From the bottom of the sphere, each succeeding ring would be placed on top to the next until the sphere was complete. Alternatively, each of the two hemispheres would be assembled from three rings with one hemisphere lifted on top of the other.

The second plan also envisioned the sphere being sliced into five sections, but being assembled downward and then upward from the equatorial ring by loading two or four plate subassemblies in one sphere assembly fixture.

Each element of the two alternative production processes was then broken down, and the technical requirements and tooling fixtures required to manufacture the parts, subassemblies and major assemblies defined. Each element was then analyzed from an industrial engineering standpoint to determine cycle times, labor manning requirements and the number of sphere assembly stations needed to meet schedule requirements. These requirements were then translated into facili-

ties definition and lead times for construction.

The two manufacturing plans competed against each other and against proposals received from other sphere subcontractors. Proposals from sphere subcontractors ultimately were rejected because their manufacturing plans were insufficiently detailed to generate necessary confidence in the workability of their manufacturing processes or because they required excessive time to complete planning and facility construction.

The segment construction alternative also was rejected.

The single rigid-fixture equatorial ring assembly concept was selected so the entire sphere could be assembled prior to welding. Thus, welding fits and sphericity tolerances could be verified early in production and corrected easily where necessary.

## Testing

Trans-lifts walk the tank from the assembly hall into the cylindrical hydropneumatic test stand, which consists of one fixed segment and two hinged segments that swing open to receive the tank. The weight of the gates during opening and closing is borne by air bearings sliding on level tracks. After the gates have been closed and bolted, the tank is landed on an elastic foundation that equalizes the reaction into the column and beam structure. The cargo-tank transport ring is then lowered so that the tank is supported by its skirt.

## Tank Insulation

The final fabrication operation at the sphere manufacturing facility is insulating the spheres. Like sphere construction, the insulating process requires a specially designed facility to apply and secure the one acre of insulation and complete the sealing cycle in 2.5 weeks to meld with the sphere production rate.

A single sphere is transported into the insulation building and placed on a uniquely designed stand where it will remain for the complete insulation cycle. The stand supports the sphere's weight and provides as well the facility for sphere rotation which minimizes access requirements during insulation installation. Once the sphere is seated and the transport equipment is removed, the insulation process commences.

## Land Transport

Three different methods were evaluated for transporting the cargo tanks from the assembly

\*Mr. Veliotis, president and general manager of General Dynamics, Quincy (Mass.) Shipbuilding Division, at the time of writing this paper, is now general manager of the General Dynamics' Electric Boat Division. He presented the paper abstracted here before the recent Annual Meeting of The Society of Naval Architects and Marine Engineers. The complete paper may be obtained from the Society, One World Trade Center, Suite 1369, New York, N.Y. 10048.

building to the hydropneumatic test stand, to the insulation building and then to the barge. The Trans-lift system selected was shown to be more flexible and economical—in terms of the initial investment and the recurring costs—than crawler or rail-bogie transport.

The transport system consists of three Hydranautic's Trans-lift units, each of 335-ton capacity, and a sphere support ring of 70-foot outside diameter. The three Trans-lift units operate in unison, all receiving the same hydraulic pressure and the same electrical commands from a single operator controlling through a remote pendant control. The speed of travel is one foot-per-minute up or down a two-percent grade in 40-mph winds. Motion can be forward, backward or sideward. Each unit can be rotated independently to change direction, or all three can be made to move together in a circle, thus rotating the tank about its polar axis. The Trans-lift units move and position the tank by "walking," using the principle of repeatedly sliding the load along a prepared surface on the center foot, and then with the load transferred to the side feet, the center foot is raised and advanced 27 inches in the direction of travel. Thus, the tanks can be moved over a variety of surfaces without a permanent track system and without external traction forces from ground-anchored members.

#### Barge Transportation

The spherical aluminum tanks are transported from the building facility, 22 nautical miles up the Cooper River from Charleston to the shipyard at Quincy, Mass., on the special-purpose, unmanned towed barge Hercules, which was designed and constructed at Quincy.

The barge is towed on a wire hawser by a twin-screw tug of at least 4,300 hp. During the winter months the route parallels the coastline from the Charleston sea buoy to Diamond Shoals, then north to abeam Cape Henry, then north-northeast to south of Block Island, then through Vineyard and Nantucket Sounds and around Cape Cod to the shipyard.

At the time of writing, five loaded voyages have been completed during the winter months at an average speed of 9.5 knots. According to the Moran Towing and Transportation Co., Inc. personnel, towing behavior has been excellent.

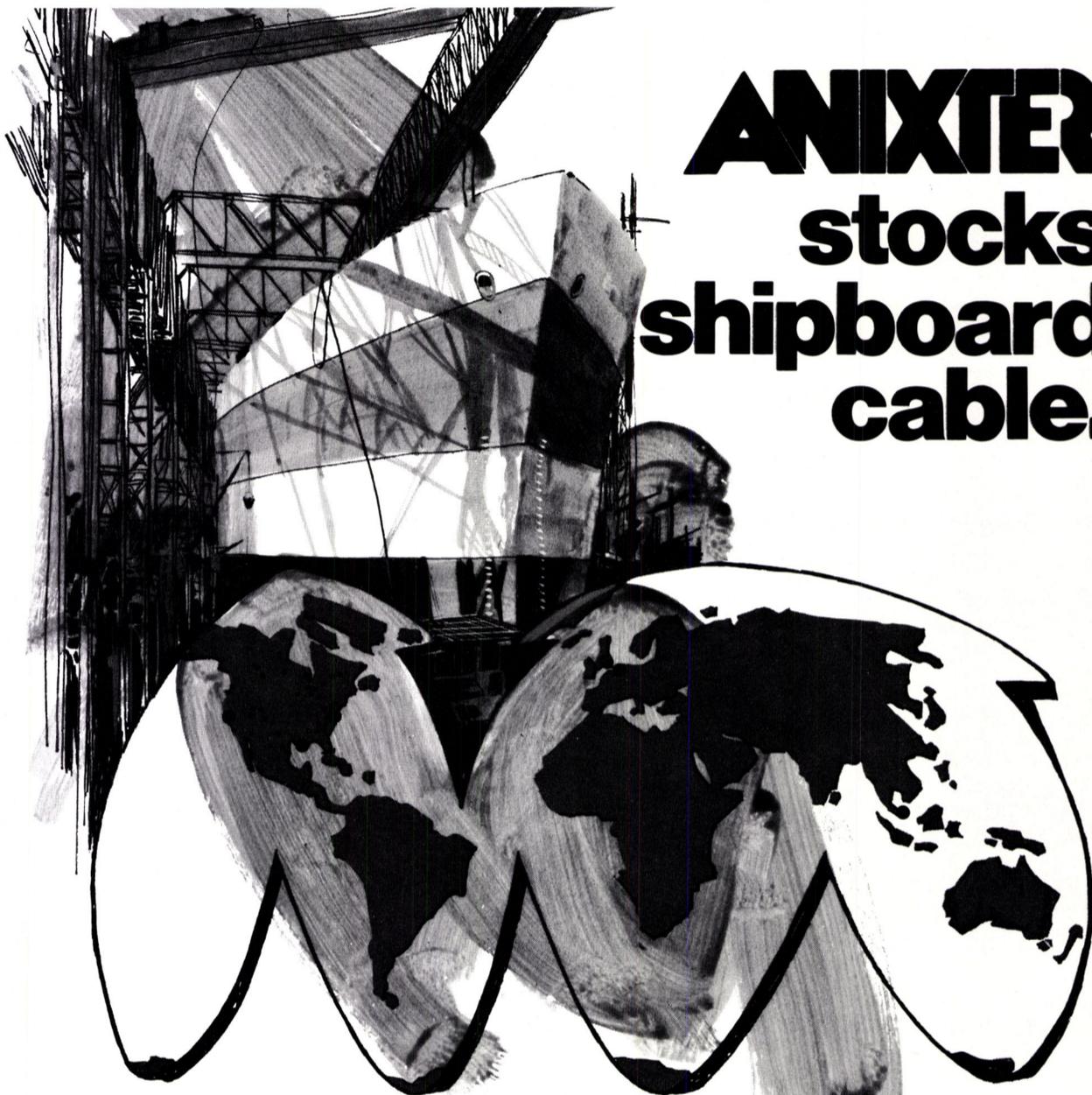
#### Sphere Loading

Upon arrival at Quincy, Hercules is maneuvered into the outboard end of the shipyard's No. 6 basin, modified with a new watertight bulkhead to accommodate the barge in an area 297 by 132 feet. The sphere is unfastened from its support structure and the basin is drained until Hercules rests on nine concrete slabs, each measuring 14 by 12 by 8 feet.

After 55-ton tests are conducted on each of the sphere's 18 aluminum lift pads, permanently attached as part of the skirt, actual transfer from the barge to a hull under construction in an adjoining basin begins. Utilizing three hooks and specialized lifting gear consisting of trusses, equalizer bars and 18 wire-rope pendants attached to the lift pads, the Goliath crane, designed by Vevey-Mague, lifts the sphere straight up from the Hercules. Movements

as minimal as 1/4 inch are governed by the crane operator with both computer and manual controls. The sphere is lowered against wood-faced guide brackets and loaded into the deck opening with clearances of only 4 to 12 inches. Exact dimensional measurements of each sphere skirt are sent from Charleston to Quincy prior to sphere arrival and are used to determine circumference profile to the steel skirt in the hold to achieve proper alignment.

Transfer of the 676-metric-ton sphere from the barge to the ship takes approximately three hours. With the sphere's aluminum skirt resting on the matching steel skirt in the ship, the wire-rope pendants are disconnected from the lift pads and the final welding process begins, lasting 24 to 36 hours. The operation is completed when a 258-metric-ton prefabricated steel cover is lowered over the sphere by the Goliath crane.



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**ICHCA Conference  
Set For Helsinki  
May 26-June 1, 1979**

The XIVth Conference of ICHCA (International Cargo Handling Co-ordination Association) will take place in Helsinki, Finland, from May 26 to June 1, 1979, under the theme "From Raw Material to Finished Product." **R.P. Holubowicz**, the chairman of the council and executive

board of the association, on making this announcement in London, stated that conference delegates will be stimulated by the approach of ICHCA Finland to the way in which the conference was being organized. Delegates would be spending about a day and a half of the conference in technical visits, where they would have the opportunity of seeing at first hand various aspects of Finnish industry related to cargo handling. Specialized papers related to the

visits will be presented during the course of these tours, as a means of giving more "life" to the technical papers presented and more substance to the technical visits.

The remainder of the time would be taken up discussing international subjects related to the theme at the Finlandia Conference Hall in Helsinki. At the same time, the chairman issued a call for papers from members of ICHCA and others, covering

the handling and movement of general cargo (to include aspects of container, ro/ro and breakbulk operations), bulk solids, liquids, and specialized cargo by land, sea and air.

Mr. **Holubowicz** emphasized the need for authors to cover these subjects from practical experience, setting out the problems met and overcome, together with the methodology used. He stressed that the 1979 Conference would concentrate mainly on aspects of practical cargo handling as, from a survey of delegates attending the Melbourne Conference this year, it was quite clear that this was the area which interested most members. Prospective authors were asked to provide an outline of their proposed paper to ICHCA Central Office as a first step.

Further information from those wishing to submit papers may be obtained from ICHCA, Abford House, 15 Wilton Road, London SW1 1LX, England.

**Comet Marine Named  
Marine Distributor  
By Crane Packing**

**John Perez**, general manager of Comet Marine Supply Co., New York, N.Y., has announced the appointment of Comet as marine distributor for John Crane Mechanical Seals and Packing, manufactured by Crane Packing Co.



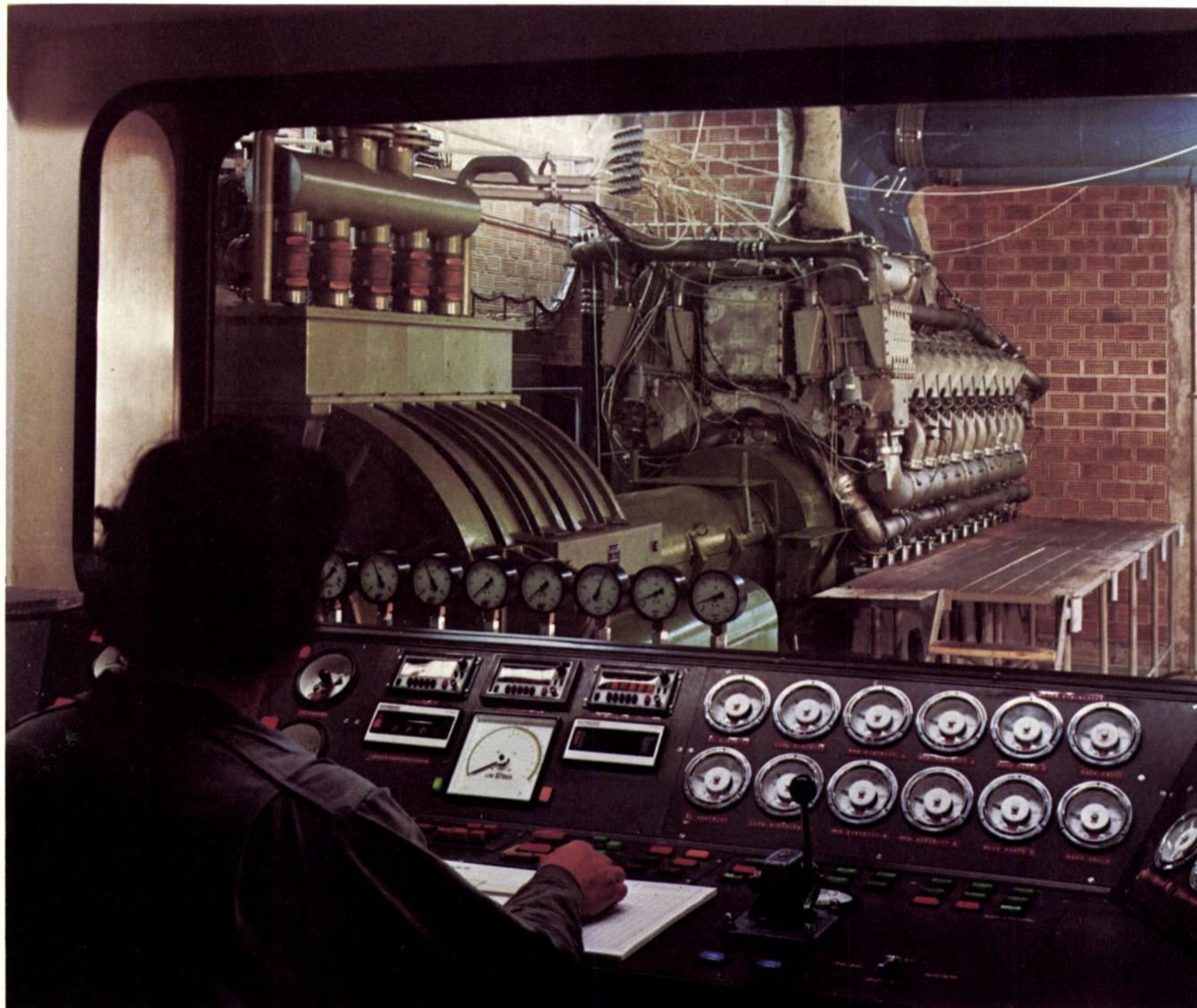
**John Perez**

Crane is one of the world's largest manufacturers of seals for pumps and similar types of rotary shaft equipment — bellows, pusher, O-ring, and gap types in a variety of metallurgies to handle any service, and complete range of shaft sizes, including many metric sizes.

Comet will also stock a full line of packings and gaskets for every conceivable operating condition to further establish improved service to the marine industry.

Comet Marine is one of the industry's largest suppliers of a wide range of marine deck and engine supplies, including pump parts, instruments and other spare parts.

For your free copy of a four-color packing and seal catalog which contains complete specifications and detailed drawings for all units and component parts, write to **John Perez**, Comet Marine Supply Co., 155-157 Perry Street, New York, N.Y. 10014.



**MTU presents:  
engine series 1163**

With the introduction and presentation of their engine series 1163, MTU Friedrichshafen continues the successful and market-oriented development of its product line. The long stroke version 1163 derived from the well tested and proven engine series 956 opens applications in boats with a low propeller r. p. m. and in the power generator field. Range of output: 1800 KW to 4400 KW (2450 to 6000 H. P.) at 1200 r. p. m.

- Advantages:
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  - direct mounting capability
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MTU supplies complete propulsion systems with a horse power range

of 400—6000, automatic control operating and monitoring systems, from one source, all in one package and interdependent to achieve optimal output and reliability in operation.



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Shell's *Caprinus R Oil* guards towboat EMD's against corrosive wear of rings and liners.

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### Here's why over 40 towboats are now using Shell's high-alkalinity *Caprinus R Oil 40*.

We were proud to introduce *Caprinus*<sup>®</sup> T Oil a few years ago and delighted with its performance on the waterways. *Caprinus* T is a hard act to follow. But *Caprinus*<sup>\*</sup> R Oil 40 is a significant step ahead. Towboat operators agree and are now using this premium lubricant in over 40 EMD-powered motor vessels.

*Caprinus* R Oil 40 is higher in initial alkalinity than *Caprinus*<sup>\*</sup> T Oil (10.2 TBN-E compared to 7.5) and *retains* effective alkalinity in extended high-stress service.

That means *Caprinus* R Oil can continue to neutralize combustion acids and guard against corrosive wear of rings and liners

over long periods. It helps prevent corrosive wear caused by high-sulfur fuels.

**Maximum filter service life**  
The dispersant additive system in *Caprinus* R Oil helps keep insolubles in suspension to promote engine cleanliness. Results: In some installations it has been possible to extend filter service life *to the limit* of filter element durability—an important maintenance saving.

And what engineer wouldn't like the long oil service life of *Caprinus* R Oil! It offers high oxidation stability, high detergency to meet the needs of the latest-design diesels with up to 250 hp per cylinder. Fights thickening

and deterioration over the long haul, too.

*Caprinus* R Oil has all the properties to do the job and keep at it!

**Workhorse *Tornus*<sup>®</sup> Oil will still be available**

For many years, Shell's *Tornus*<sup>\*</sup> Oil has worked its way in and across ports, harbors and the inland waterways of the U.S., delivering good performance in high-horsepower diesels. Its alkalinity level is considerably lower than that of *Caprinus* R Oil (TBN 5.7 compared to 10.2). But it does provide good wear protection, helps keep engines clean and gives good oil and oil filter life in moderate service.

Shell will continue to offer *Tornus* Oil but encourages a change to *Caprinus* R Oil 40 to meet the demanding requirements of modern engines and high-sulfur fuels.

Send for full details — we'll be glad to send you our technical bulletin on *Caprinus* R Oil — its properties and applications in marine power plants. Just write: Shell Oil Company, Manager, Commercial Communications, One Shell Plaza, Houston, Texas 77002.



**Come to  
Shell for answers**

\*This is a trademark for the product indicated above and is used as such in this writing.

## Oceangoing Towing Guidelines Issued By Det Norske Veritas

Det norske Veritas has recently issued the publication "Guidelines and Requirements for Towing Declarations." The increasing number of towing operations now taking place necessitates such guidelines, which are the first of their kind.

The publication lays down the requirements for the towed object, towing vessel, towing arrangement and equipment, and communications systems, which have to be met to obtain a towing declaration.

Traditionally, only a few companies have carried out oceangoing towing operations, and evaluations of the strength and equipment of towing vessels as

well as towing arrangements, etc., have to a large extent been based on experience.

In recent years, towing activities have expanded rapidly, especially in connection with offshore installations, and the towing distances have increased, while towing vessels of today also differ from the traditional tugs in design and towing capacity.

Furthermore, the towed objects

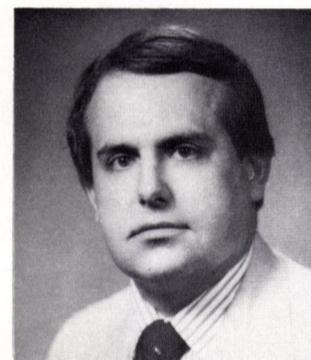
are more varied than before in size and shape, and towing of such units as drilling rigs, platform foundations, pipelines and ship sections, as well as transportation by lighter of large modules and sections have become commonplace.

These towed objects represent large sums of money, so that both operators and insurance companies have a need for a thorough evaluation of the whole operation before the actual towing starts.

Det norske Veritas, through its section for Maritime Advisory Services (MAS), disposes of the necessary maritime experience and know-how to carry out such an evaluation reliably.

By means of the new guidelines, the owners and other interested parties will be informed in advance of the requirements, and based on these requirements be able to improve the planning and execution of the whole towing operation.

## Bird-Johnson Names Darby Sales Engineer For The Gulf Coast



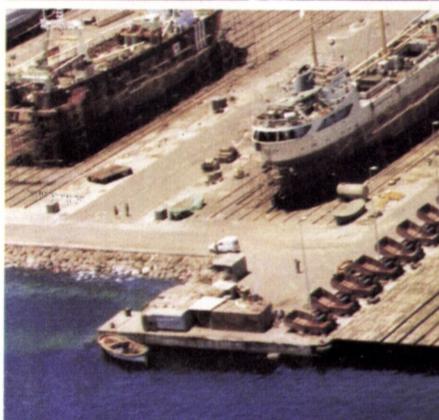
Jim Darby

In keeping with the growing demands of the offshore market, **Jim Darby** has recently been appointed sales engineer for Bird-Johnson's Gulf Coast office located at 6430 Hillcroft, Houston, Texas. This assignment represents an expansion of the company's regional resources. Mr. Darby will work in conjunction with the Gulf Coast regional manager, **Gary W. Dayton**, to provide dual technical and sales support services on controllable-pitch propellers and thrusters to all area marine customers.

Prior to joining Bird-Johnson, Mr. Darby sailed as a third assistant engineer on a variety of steam and diesel vessels, having obtained his Bachelor of Science degree in marine engineering, and his third assistant engineer's license from Texas A&M University, College of Texas Maritime Academy. Following this assignment, he was employed as a sales engineer for marine rotating equipment.

Mr. Darby is an associate member of The Society of Naval Architects and an associate member of the Houston Engineering & Scientific Society.

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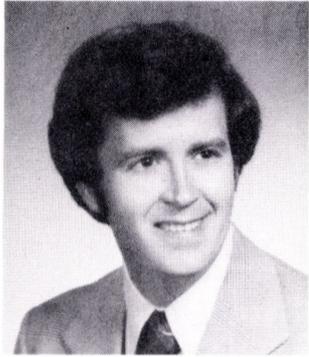


A. DUBAI, UAE: Concrete caissons weighing 4,000 tons launched on Syncrolift.® Assembly line construction in transfer area.

B. LAS PALMAS, CANARY ISLANDS: 27,400 DWT vessel, Cobetas, 183 m. long being transferred to parking area from Syncrolift.®

C. PUERTO CABELLO, VENEZUELA: 30,500 DWT vessel constructed in two sections on land. Each is launched separately on Syncrolift.® and the two sections are welded together in the water.

**Union Mechling Names  
O'Malley Supervisor  
Boat Operations**



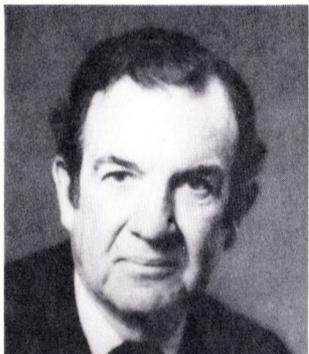
Michael J. O'Malley

Michael J. O'Malley has been appointed supervisor, boat operations for Union Mechling Corporation, the subsidiary barge line of Dravo Corporation. He will be located in Memphis, Tenn.

Mr. O'Malley joined Union Mechling in 1974 and was previously a safety representative.

He is a graduate of California State College, California, Pa., and is a member of the American Industrial Hygiene Association, the National Safety Council, and the American Society of Safety Engineers.

**Farboil Appoints  
P. Norman Webb**



P. Norman Webb

The appointment of P. Norman Webb as national accounts sales manager for the Marine Division of Farboil Company was announced. He will be based at the division's New York City offices.

Mr. Webb had been manager of marine sales for the National and International Marine Paint Divisions of Patterson-Sargeant since 1962. Previously, he had served in the U.S. Navy as an engineering officer and was a technical representative with National Lead Company for corrosion control projects involving the National Bureau of Standards, Office of Naval Research, and various state highway specification departments.

He holds a U.S. Coast Guard First Assistant Marine Engineers License.

Farboil is a Beatrice Chemical company, a division of Beatrice Foods Co. It produces and markets worldwide a full line of marine coatings for both deepwater and inland shipping.

**Perko Full Line  
Catalog Just Released**

Perko, Inc. has just released their new 1978-79 full line Catalog #230. This edition illustrates and describes thousands of marine lights, hardware and accessories for boats and ships of all types and sizes, including scores of new and improved products introduced in recent months.

The new Perko catalog is a

valuable where-to-get-it trade reference manual. Commercial boatmen will find it a handy source of information on ways to fit out their craft, large and small.

Major categories covered in the new Perko catalog are: navigation lights for vessels under 65 feet; navigation lights for vessels over 20 meters (65.7 ft.); electrical switches, panels, connectors, etc.; searchlights; blowers, ventilators and vents; windows,

portlights, sinks, bells, foghorns, etc.; steering equipment underwater fittings, filters, strainers, pumps, drainers, etc.; deck fittings and exterior hardware; door, cabinet and cabin hardware; fishing hardware.

The new Perko catalog is free to the trade. Requests must be on company letterhead. Write to Frederick Perkins, Perko, Inc., 16490 N.W. 13th Avenue, Miami, Fla. 33164.



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Campbell-Ewald 1222/Rev

## Frankel Elected President Of IMODCO

Bernard Frankel has been elected president of IMODCO, 10960 Wilshire Boulevard, Los Angeles, Calif. 90024, rapidly expanding offshore marine terminal systems division of Amtel, Inc., it was announced by Amtel chairman/president Jerome Ottmar, who had previously also held the top IMODCO position.

Two new vice presidents of IMODCO were additionally announced by Mr. Ottmar. They are George M. Pomonik as vice president-research and development, and Blair M. Kerr as vice president-European area.

Mr. Frankel served as senior vice president of IMODCO, Inc., prior to its acquisition by Amtel two years ago, and since that time has been the division's executive vice president and chief

operating officer. A pioneer in the offshore marine terminal field, Mr. Frankel has been an executive of IMODCO for the past 15 years.

Mr. Pomonik replaces William R. Reid, who returned to the University of Michigan for studies leading to his Ph.D. in engineering. A graduate in mechanical engineering from City College of New York, Mr. Pomonik has previously been associated with Me-

chanics Research, Inc., a subsidiary of System Development Corp., for nine years.

Mr. Kerr has been regional manager and managing director of IMODCO, Ltd., London, since 1971, and earlier was IMODCO regional manager in Australasia. A graduate of the Royal Australian Naval College and of the Royal Naval Engineering College, Plymouth, England, Mr. Kerr served in the Royal Australian Navy from 1949 through 1965.

# Introducing The Magnificent Magnavox Marisat Terminal

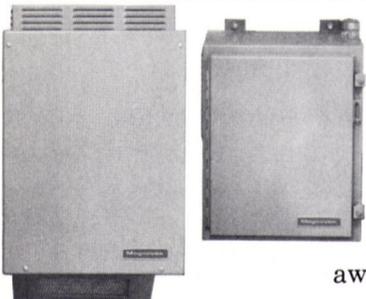
This new shipboard communications terminal puts you in instant, private and remarkably clear two-way telephone or telex contact with your ship anywhere, at any time, in the Atlantic or Pacific Oceans.

## Simple

For telex, just start typing. All functions are controlled through instructions to the microprocessor via the teleprinter. For voice calls, a single push button establishes contact with the operator for calls anywhere in the world.

## Space Saver

The space saving Magnavox MX 111 terminal needs space in the radio room for only the telephone and the desktop teleprinter. The compact power supply and electronics unit are bulkhead-mounted and can be tucked away almost anywhere.

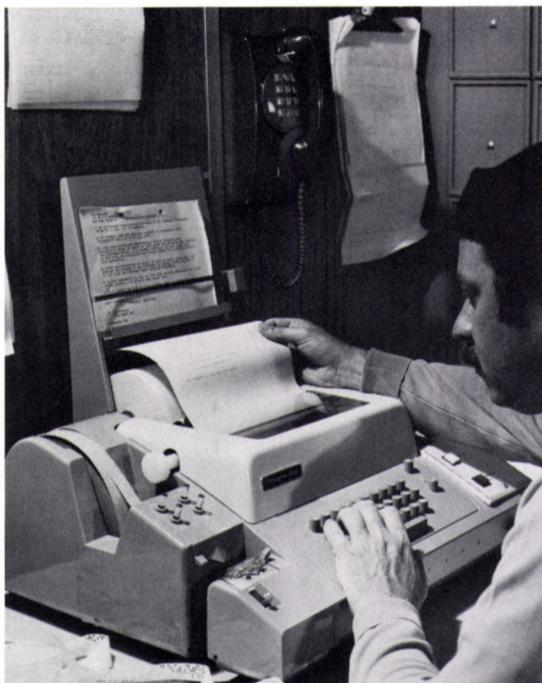


## Modular Flexibility

System changes, options, expansions and provisions for future satellites are easily accomplished because the system is designed with future changes in mind.

## Hard Copy Record

Telex messages, and all system operations, annotated with GMT, are



supplied by the teleprinter.

## Easy To Install

The MX 111 is extremely rugged incorporating large design margins based upon years of Magnavox marine experience. Extensive factory burn in is performed to assure reliable operation on board your ship.

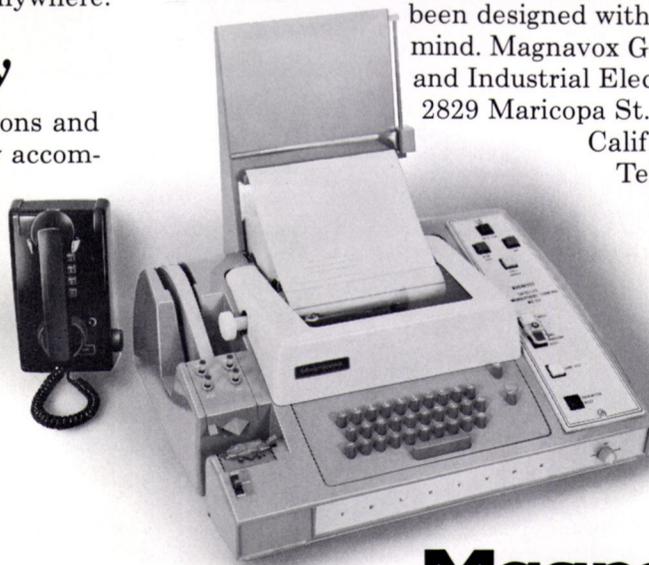
## Reliable

The single cable between antenna and electronics may be of any length. Modular components allow variety of installations to fit cramped ship spaces.



## Check Out The MX 111

Magnavox has years of experience in the design and manufacture of high reliability electronics for shipboard use. Before you specify any Marisat communication terminal, be sure you've checked out the Magnavox MX 111. It's been designed with your ship in mind. Magnavox Government and Industrial Electronics Co., 2829 Maricopa St., Torrance, Calif. U.S.A. 90503. Telephone (213) 328-0770. Telex 674373.



**Magnavox**  
Magnavox Government and Industrial Electronics Company.

## ASNE Day 1978 Set For May 4-5

The American Society of Naval Engineers has completed the first phase of arrangements for ASNE Day 1978. ASNE Day 1978 is the Society's annual national meeting, and will be held May 4 and 5, 1978, at the Shoreham-Americana Hotel, Washington, D.C. The theme for ASNE Day 1978 is "Naval Engineering is Total Engineering."

Additional details are available from ASNE National Headquarters, 1012 14th Street, N.W., Suite 807, Washington, D.C. 20005.

## CADCOM, Inc. Appoints F. William Helming

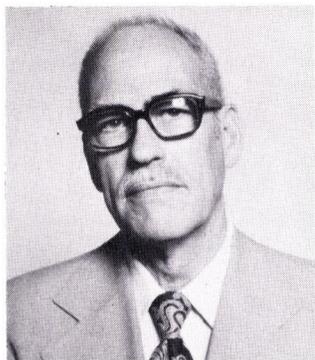
Dr. Charles O. Heller, president of CADCOM, Inc., Annapolis, Md., has announced the appointment of F. William Helming as program director for CADCOM's Washington, D.C. office. In his new position Mr. Helming will have responsibility for sales and marketing, liaison with Government and commercial clients, and for the initiation and supervision of programs and projects.

Prior to joining CADCOM a year and a half ago, Mr. Helming worked for Industrial Computations, Inc. of Watertown, Mass., as a consultant in computer-aided ship design. He has been a member of CADCOM's Computer-Aided Ship Design Division, specializing in system design and integration for maritime applications of computer-aided design, prior to assuming his new position.

Mr. Helming is a graduate of Webb Institute of Naval Architecture and holds a B.S. degree in naval architecture and marine engineering. He has also studied naval architecture in the graduate program at the Massachusetts Institute of Technology and is a registered professional engineer.

CADCOR is a recognized leader in the practical applications of high technology, serving industry and government in automation, computer-aided design/manufacturing, engineering analysis and design, environmental technology, safety engineering, simulation and modeling, software development, and technology transfer.

## Eldon Drake Joins Worthington-Shawnee



Eldon Drake

Eldon Drake has joined Worthington Pump-Shawnee as manager of design engineering, where he will be responsible for the design of vertical turbine pumps and will serve as a consultant in the research and development of new products.

Prior to joining Worthington, Mr. Drake was employed as chief engineer-research and development for the Byron Jackson Pump Division of Borg Warner. He has also worked for Reda Pump. A registered professional engineer in Oklahoma, he is listed in the South and Southwest edition of "Who's Who." He received his B.S. degree in mechanical and civil engineering from Oklahoma State University.

Worthington Pump Inc., Mountainside, N.J. 07092, is the world's largest pump company, with 23 manufacturing locations in 13 countries.

## Seatrain Shipbuilding Appoints Hellenbrecht Chief Marine Engineer

Seatrain Shipbuilding Corporation, Brooklyn, N.Y., a wholly owned subsidiary of Seatrain Lines, Inc., has announced the appointment of Edward P. Hellenbrecht as chief marine engineer.

In making the announcement, John Serrie, president of the company, said: "Mr. Hellenbrecht will be responsible for the design, purchase and specification of all marine systems. Mr. Hellenbrecht's extensive background and knowledge of modern marine engineering systems will be a valuable asset to our shipbuilding operation."

Prior to joining Seatrain, Mr. Hellenbrecht was a nuclear project officer with the Electric Boat Division of General Dynamics Corporation. Previous to that, he was a designer with Van Zandt Sails, Inc. in Old Mystic, Conn.

Mr. Hellenbrecht holds a Bachelor of Science degree in mechanical engineering from the University of New Haven, and a Master of Science degree from Rensselaer Polytechnic Institute in New York.

In addition to its shipbuilding operation, Seatrain Lines is a major factor in water transportation and energy. The company is engaged primarily in the chartering of vessels for the transport

of petroleum products and other commodities; the worldwide movement of containerized freight, and the construction of a variety of oceangoing vessels. The acquisition of Pride Refining, Inc. in August 1976, marked the company's entry into an energy-related field. Seatrain maintains offices throughout North America, Europe, the Far East, Middle East, Caribbean and Central America.

## Offshore Logistics Buys Rebel Helicopter Operation

Offshore Logistics, Inc., P.O. Box 5C, Lafayette, La. 70505, has announced that an agreement has been reached to purchase Rebel Helicopter, Inc. Rebel operates eight turbine helicopters in support of oil and gas activities along the upper Texas Gulf coast. The purchase, valued at \$1.6

million, strengthens the position of Offshore Logistics in the rapidly expanding area of offshore gas development.

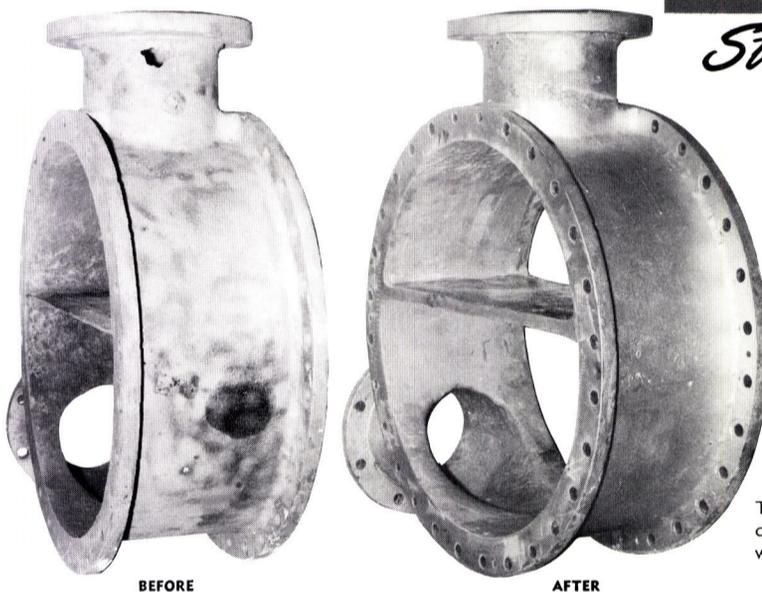
During this year, the company has previously acquired Southland Helicopters of Long Beach, Calif., and Anchorage Helicopter Service, and now operates 95 aircraft through its helicopter division, Air Logistics.

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First proven under the most difficult conditions by the Navy, the Cordobond Strong-Back Method offers a fast and easy method of repair both aboard ship and ashore. Applied quickly by ship or maintenance personnel, Cordobond Strong-Back products are used extensively for repairing and lining:

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The Cordobond Strong-Back Components, when used according to directions, will repair anything from a pin hole to a complete break with a patch of great strength that clings tenaciously and lastingly.

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**STANDARD KIT** For Ocean Going Vessels    **JUNIOR KIT** For Harbor Craft

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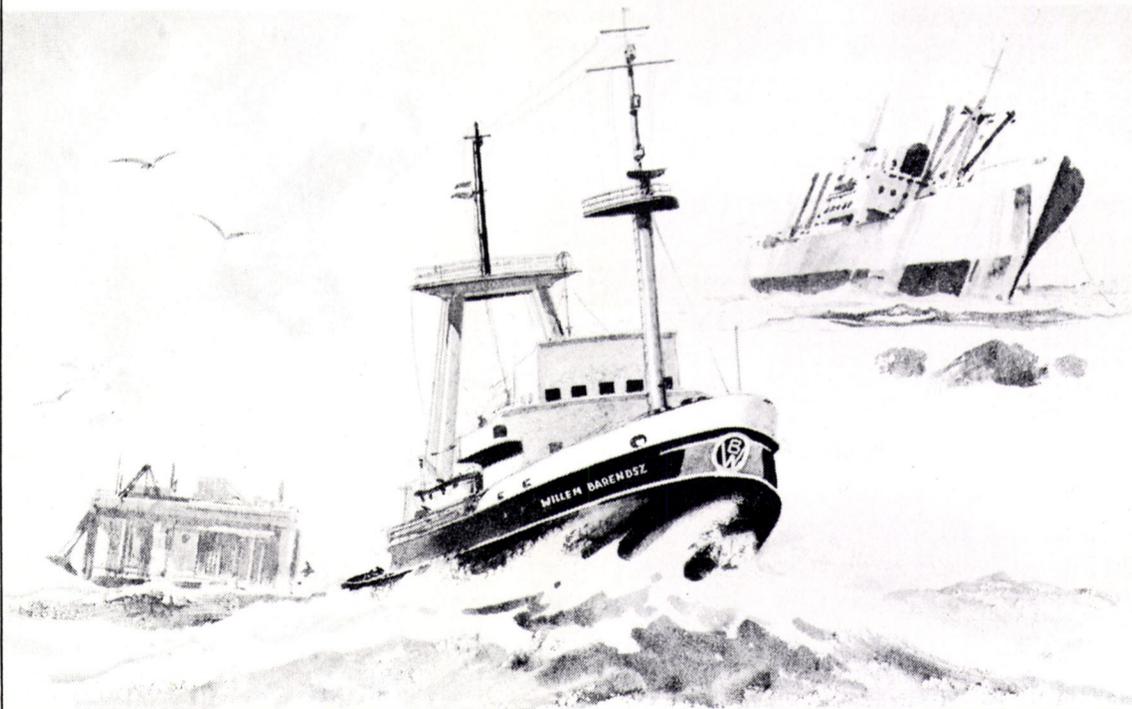
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UNITED KINGDOM: TOWAGE & SALVAGE (LONDON) LTD., 17 Liverpool Street, London E.C.2 - Telex: 883174 - Cables: "Salvortug" London. NORWAY: EGIL BJØRN - HANSEN & CO' A/S Skovveien 2, Oslo 2 - Telex: 18390 - Cables: "Bjoco" Oslo. FRANCE: ASMARINE S.A., 40, Av. Hoche, 75 Paris (8<sup>e</sup>) - Telex: 29542 - Cables: "Asmarineco" Paris.

## KaMeWa Rotatable Thrusters Installed On Large Ferry

The world's first car/passenger ferry to utilize KaMeWa rotatable thrusters has been delivered to A/S Alpha of Norway by Framnes Mekaniska Verkstad. Each of the four thrusters specified for this vessel, rated at 1,150 hp per shaft, were manufactured by Bird-Johnson Company's licensor, Karlstads Mekaniska Verkstad (KMW) of Sweden.

To meet the exact maneuverability requirements of such special-purpose ships, the thruster was designed to rotate in any direction in the horizontal plane. Maximum thrust control is also made possible by varying the pitch of the blades and by utilization of full-engine horsepower in off-design conditions. Both magnitude and direction of thrust are controlled by a single lever in the pilothouse. The thruster can be lifted for inspection or removal without drydocking the vessel.

The KaMeWa rotatable thruster has been put to extensive laboratory and in-field tests, including a full-scale barge test simulating the actual ship installation in which all performance specifications were met or exceeded.

For a complete description of the KaMeWa rotatable thruster, write to **Ole H. Midttun**, Bird-Johnson Company, 110 Norfolk Street, Walpole, Mass. 02081.

## Caterpillar Announces Two New Marine Transmissions

Caterpillar has announced two new marine transmissions—the 7221 and the 7211. Both are compact, single-reduction, layshaft design transmissions. They are designed for the Cat 3412 and 3408 Marine Diesel Engines in heavy-duty applications, such as fishing vessels and tugboats. In both transmissions, oil-actuated clutches are designed to operate without adjustment. Helical gear teeth assure quiet, smooth-running operation. The 7221/7211 are engine-mounted transmissions with ratios from 2.0:1 to 6.0:1. Both can transmit full-rated power continuously in forward or reverse.

The new 7211 transmission had its first U.S. showing as the highlight of the Caterpillar exhibit at "Fish Expo '77," October 14-17, 1977 in Seattle, Wash.

In addition to the Cat 3408/7211 propulsion package, the 3412/7231, a 3306T Marine Generator Set, and a 7271 Marine Transmission were also shown. Four videotapes will be available for viewing on the topics of the Mapleton Foundry, the Basic Engine Plant, the 625-inch Vees, and Caterpillar Engine usage around the world.

Further information on Caterpillar Marine Transmissions is available by writing to **Charles H. Bolton**, Caterpillar Industrial Division, Peoria, Ill. 61629.

## F.W. Hartmann & Co. Promotes Captain Perry

Joseph F. Daly, president of F.W. Hartmann and Company, Inc. has announced the promotion of Capt. **Richard Perry** from port captain to marine superintendent.

Captain **Perry** is a graduate of the U.S. Maritime Service, as well as the U.S. Maritime Academy at Kings Point, N.Y.

He has served as officer and as master of Moore-McCormack Lines vessels, both passenger vessels as well as his main duties aboard dry cargo ships, where he called at ports worldwide. He also served as instructor in the U.S. Maritime Service at Sheepshead Bay, New York City. Captain **Perry** has been with the Hartmann organization since 1972.

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## ASNE Reports Details Of Recent Symposium On Combat Systems

On October 12 and 13, the American Society of Naval Engineers (ASNE), in cooperation with the Naval Sea Systems Command and the Chief of Naval Research, held its first technical

symposium dedicated to Combat Systems Design, Acquisition, and Installation. The symposium was held at the Naval Academy, and over 7,000 people representing the Navy, Department of Defense (DOD) civilian employees, and private industry attended.

Capt. A. Skolnick, program chairman for the symposium, noted that the Navy Combat Sys-

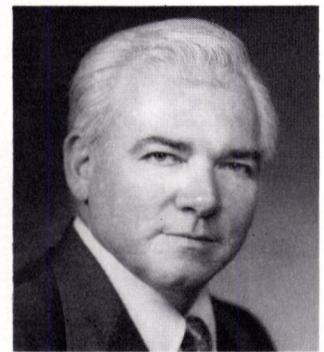
tems Symposium represented an opportunity for discussion and interchange among engineers and managers in the context of a professional forum. Progress made in accepted and classical weapon-related ideas, as well as projections for concepts of a more controversial nature, were reported upon. The symposium provided both stage and forum for con-

cerned and involved engineering professionals to consider the issue of Navy Combat Systems in a climate of technical knowledge coupled with pertinent operational experience.

Speakers and other participants represented both military and civilian interest, which share a common purpose: development and production of more effective combat systems for the Navy's operational fleet to meet the current and projected threat. This symposium was a singular milestone in bringing together key individuals involved in ship combat system design and in permitting extended discussion on a subject of crucial importance.

The symposium was divided into seven sessions: Combat System Design and Engineering; Ship Design for Combat Systems; Combat System Installation; Combat System Survivability; Combat System Acquisition and Acceptance; Combat Systems for 1990-2000; and Combat Systems for Advanced Platforms.

### Combustion Engineering Names Robert Fortier



Robert J. Fortier

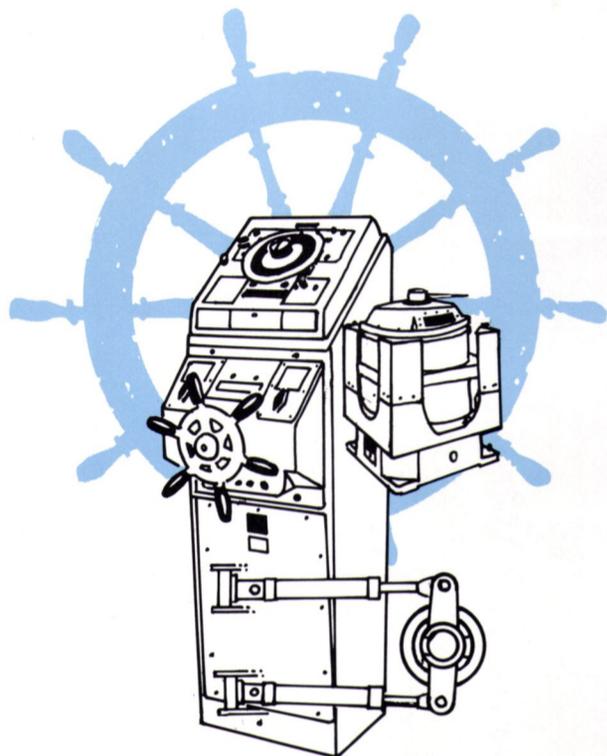
Robert J. Fortier has been appointed director-corporate advertising and marketing communications at Combustion Engineering, Inc., it was announced by William J. Connolly, corporate vice president, marketing and communications.

Mr. Fortier formerly was manager of corporate advertising at C-E. In addition to continuing his responsibilities for corporate advertising, he will establish a marketing communications unit to provide communications support to line operations and to corporate staff functions.

He is located in C-E's headquarters in Stamford, Conn., and reports to Mr. Connolly.

Mr. Fortier joined Combustion Engineering in 1969 as manager of product advertising and sales promotion. Earlier, he held similar positions at Veeder-Root, Inc., Hartford, Conn., and at Texas Instruments, Attleboro, Mass., and American Optical Co., Southbridge, Mass.

Mr. Fortier received a B.S. degree in business administration from Syracuse University, and also attended New England School of Art, Boston.



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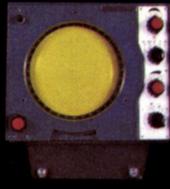
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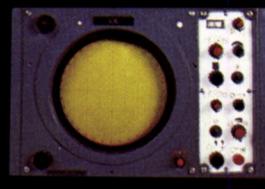
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**Tenneco's Newport News Industrial Corp. (NNI) Appoints M.R. Eshelman**



M. Roger Eshelman

M. Roger Eshelman has been appointed director of engineering for Tenneco's Newport News Industrial Corporation (NNI).

Mr. Eshelman will direct corporation engineering, design and quality assurance for NNI.

A native of Indiana, Pa., Mr. Eshelman is a 1961 graduate of the University of Pittsburgh, with a Bachelor of Science degree in mechanical engineering. In 1970, he received a master's degree in engineering from Old Dominion University in Norfolk, Va.

Mr. Eshelman joins NNI with more than 16 years of designing and engineering experience at Newport News Shipbuilding, including participation on the SSN 688-Class submarine propulsion plant design team from design inception (1965) to lead ship delivery (1976).

Mr. Eshelman is a member of the American Society of Mechanical Engineers and The Society of Naval Architects and Marine Engineers. He also is an elder of the First Presbyterian Church of Newport News.

NNI is a subsidiary of Tenneco's Newport News Shipbuilding. The company's capabilities embrace almost every aspect of commercial nuclear power and it has designed, installed or serviced more than 100 nuclear reactors. NNI is currently engaged in the marketing and production of components and services for nuclear, conventional and hydroelectric powerplants. The company is also involved in nuclear powerplant construction management, heavy and light machining and fabrication, and foundry products of steel and nonferrous iron.

**Italian Yard Starts Building LNG Ships Ordered By Sudoimport**

The Breda state shipyard at Porto Marghera-Venice has started building the first of three liquefied natural gas (LNG) vessels ordered by Sudoimport of the Soviet Union.

Two of the LNG ships each have a capacity of 75,000 cubic meters, and the third 37,000 cubic meters. The first vessel will be delivered to Sudoimport in 1979.

**Southeast Shipyard Association Elects Fitzgerald President**

Jean Fitzgerald, president of Tracor Marine, Inc., Port Everglades, Fla., has been elected president of the Southeast Shipyard Association. Tracor Marine, Inc. is a marine technical services organization which maintains an industrial shipyard and fleet

of oceanographic research vessels. The Fort Lauderdale-based company has installations in Maine and in St. Croix, Virgin Islands. It is a wholly owned subsidiary of Tracor, Inc., an applied sciences firm in Austin, Texas.

Mr. Fitzgerald retired from the U.S. Navy in 1974 as destroyer squadron commander. He is a graduate of the University of Maryland, the National War Col-

lege, and the Kennedy School of Government and Politics at Harvard University. He has been with Tracor Marine since 1974, and has headed the company since June 1976.

Interested in taking a more active role in the community, Mr. Fitzgerald recently has been invited to serve on the board of the Fort Lauderdale Symphony Orchestra Association.

# Kockums' LNG carriers; the seven-year shuttle

Kockums delivered two of the world's largest LNG tankers as long ago as 1969. LNGC Polar Alaska and LNGC Arctic Tokyo have cargo capacities of 71 500 m<sup>3</sup> each. We used the membrane technique developed by Gaz Transport.

Ever since they were delivered, both vessels have been working regular schedules between Alaska and Yokohama, where the gas is converted to power, light and heat. We've been an interested observer, day after day. And what we've seen has made us increasingly proud of our work.

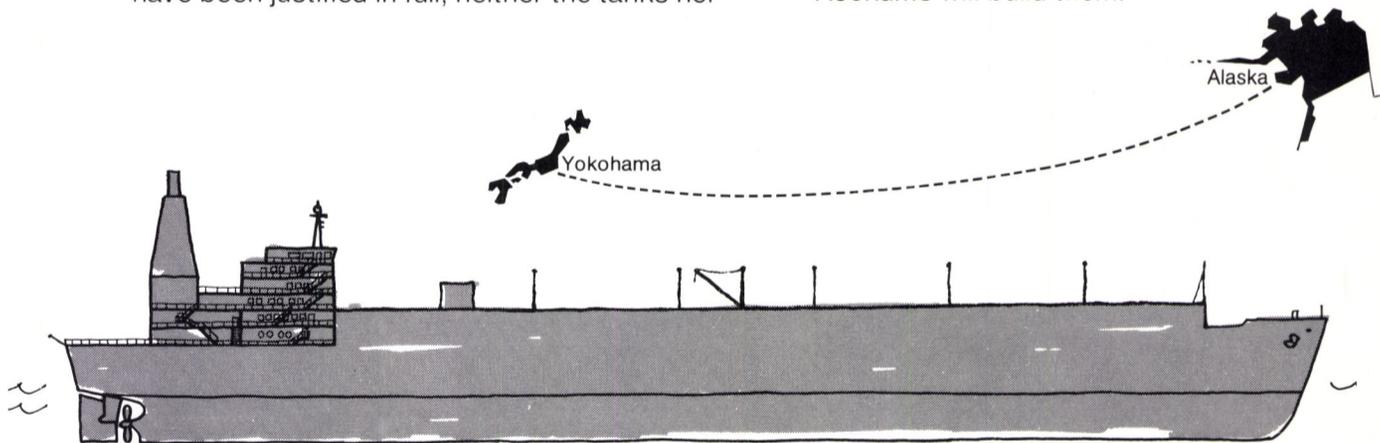
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the hull have shown the slightest sign of fatigue, and corrosion has been nil. Which means that we sleep soundly at night.

But we don't sleep during the day. We're anxious to maintain our position as one of the most technically advanced shipyards in the world.



Kockums Shipyard, S-201 10 Malmö 1, Sweden

**Belcher Tugs To Use  
Burmeister & Wain  
Slow Speed Diesels**

Burmeister & Wain American Corporation, One State Street Plaza, New York, N.Y. 10004, has announced that Belcher Oil Company, headquartered in Miami, Fla., a wholly owned subsidiary of Coastal States Gas Corporation, of Houston, Texas, signed

an agreement with Burmeister & Wain of Copenhagen, Denmark for delivery of two 7L67GF two-stroke diesel engines. At the same time, Belcher has the right under this agreement to take delivery of an additional four engines of the same specifications. Each engine is designed to generate 13,100 bhp at 119 rpm equivalent to 9,600 kw.

The slow speed engines, the first two of which will be deliv-

ered in October 1978 and April 1979, will be manufactured by Burmeister & Wain in their Copenhagen plant.

The engines will be installed in single-screw tug-barge combination vessels to be used to transport petroleum products from Corpus Christi, Texas, and other Gulf ports to Belcher's marketing areas in Florida and the East Coast. This will represent the first application of Burmeister &

Wain slow speed diesel engines to U.S.-flag vessels.

Burmeister & Wain, founded in 1843, designs and manufactures diesel engines for marine and stationary application. The company also designs and builds ships, and specializes in integrated marine transportation designs and systems. The company maintains representative offices in New York, N.Y. and Houston, Texas. In addition, the company's marine service operations in the U.S. are conducted out of New York City, New Orleans, La., and Palo Alto, Calif.

**Capt. William Stark  
Joins Codan Marine**



Capt. William L. Stark

Codan Marine, Inc., 11 Broadway, New York, N.Y. 10004, has announced that Capt. William L. Stark has joined its staff of specialists who are engaged in on-board and underway training of anticollision radar navigation, fire-fighting, accident prevention and safety, and other services to the U.S. and foreign merchant marine.

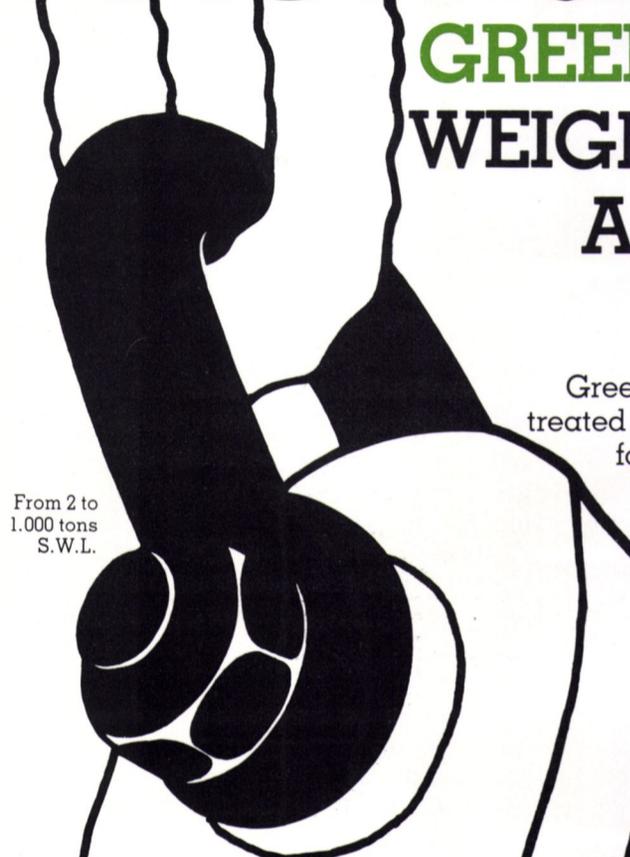
Captain Stark is a 1949 graduate of the U.S. Merchant Marine Academy, Kings Point, N.Y. He has served as master aboard U.S. merchant ships, has taught all aspects of nautical science at The Maritime Institute of Technology and Graduate Studies in Maryland, and as an associate professor at Kings Point. He has authored several papers of importance on maritime safety, and served on many advisory committees relative to merchant marine safety.

**New Deck Furniture  
From Comfort-Mate**

Comfort-Mate, a leader in deck furniture and equipment, has just introduced new maintenance-free deck furniture which eliminates inconvenient cushions and still allows passengers the utmost in comfort. Many new features now appear on this unique line.

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For detailed information on Comfort-Mate maritime equipment, write to James Reiter, P.O. Box 431572, Miami, Fla. 33143.



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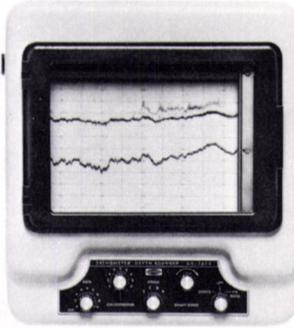
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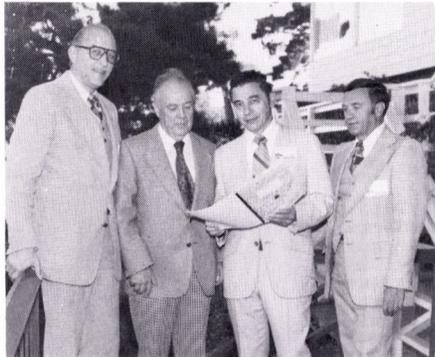
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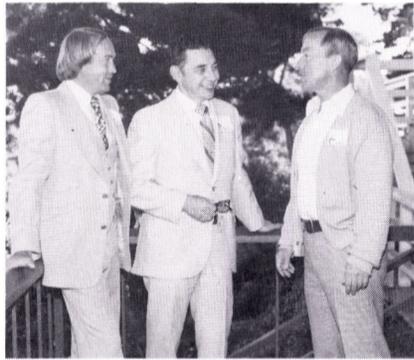
### Three Papers Presented At SNAME California Sections Annual Joint Meeting



Shown at the joint meeting, left to right: Robert G. Mende, national secretary of SNAME; Douglas C. MacMillan, Louis D. Chirillo, and Alfred D. Isaacson, authors.

Over 200 members and guests attended the recent annual California Sections joint meeting of The Society of Naval Architects and Marine Engineers at the Highlands Inn, Carmel, Calif.

The initial paper was presented by Douglas C. MacMillan, Fellow, SNAME, on "Improvements in the Ship Design Process." Mr. MacMillan, formerly chief engineer of George G. Sharp, Inc., presented a compact summary of the design process study portion of the "Ship Producibility" research program.



Left to right: John F. Kenefick, photogrammetrist; Louis D. Chirillo, author, and James A. Stasek, meetings chairman and president of Kings Point Machinery.

Mr. MacMillan outlined various areas studied in a previously developed 150-page report carried out by the Quincy Shipbuilding Division, General Dynamics, and discussed those portions considered most likely to yield significant improvements, such as contract level design, consideration of sacrificing lightweight for producibility on ships not sensitive to deadweight limitations and improved methods for construction drawings and specifications.

Written comments on Mr. MacMillan's paper were presented by George A. Uberti, National Steel and Shipbuilding Company; Vincent Van Riper, American Bureau of Shipping, San Francisco; H.A. (Packy) Schade, professor emeritus of naval architecture, University of California, Berkeley; Robert N. Herbert, naval architect; Henry Kozlowski, American President Lines, and H.P. (Bud) Stewart, consultant.

The second paper, "Propulsion

Plant Standards," was presented by Alfred D. Isaacson, P.E., M. Rosenblatt & Son, and authored jointly with Naresh M. Maniar, also of M. Rosenblatt & Son.

This paper outlined the technical feasibility, economic benefits and drawbacks possible in the implementation of standardized propulsion components for U.S. commercial shipbuilding.

Considered for standardization were performance, dimensions, physical characteristics, packaging and software. The authors concluded that direct shipbuilding costs could be reduced by as much as 5 percent, in addition to reducing the overall construction time.

Written discussions on the paper were prepared by George F. Henning, DeLaval, William A. Hood, Joshua Hendy, and Charles S. Conklin, Poseidon Engineering.

The final paper, "Aspects of the National Shipbuilding Research Program Which Impact on Owners, Designers, Regulators and Suppliers," was presented by

Louis D. Chirillo, R&D Program manager, Todd Shipyards Corporation, Seattle Division.

Mr. Chirillo outlined all the various facets examined by the National Shipbuilding Research Program in the general area of simplifying and improving ship production on a cost-sharing basis with the U.S. shipbuilding industry.

Included in his remarks were examples of technology introduced for the first time to the maritime area, improved procedures for communicating with regulatory bodies, and practical examples of development of standardized components and procedures.

Written comments on Mr. Chirillo's paper were presented by Robert L. Bass, Southwest Research Institute, John F. Kenefick, photogrammetrist, and John W. Reiter, American Bureau of Shipping.

The meeting additionally included a full social schedule in perfect weather.

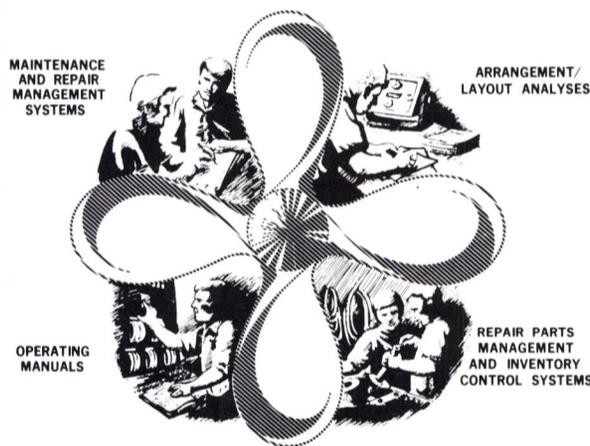
### Cunard Lines Orders Marland System For Flagship Vessel QE 2

Bob Daniels, vice president and marketing director of Marland Environmental Systems, Inc. has announced the sale of their MTT-4 (VAR) MSD system to Cunard Lines for their flagship vessel, the QE 2.

The Walworth, Wis., company specially designed this Marland system to handle the complete waste-water treatment of 3,000 people. Marland's physical/chemical systems are all designed to function in most available spaces, and are simple and economical to install. Mr. Daniels says: "It is virtually maintenance free and extremely efficient. It is USCG certified and is fast becoming the standard for cruise and commercial ships."

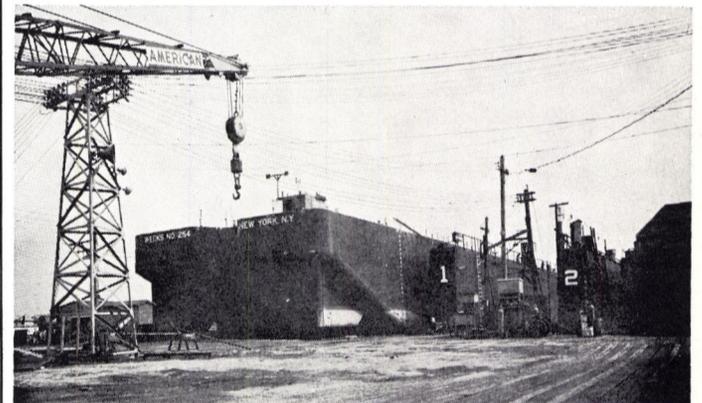
For a description of the Marland System, write to Bob Daniels, Marland Environmental Systems, Inc., 227 North Main Street, Walworth, Wis. 53184.

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## UNITOR Ships Service Holds Dedication Ceremony To Mark Opening Of Facilities In New Jersey



Pictured at the chain-cutting ceremony to officially open UNITOR's new office and warehouse in Port Jersey Industrial Center are, left to right: **Rolv E. Norderhaug**, international president of UNITOR Ships Service A/S, Oslo, Norway; **Tore Stornes**, sales manager, UNITOR Ships Service Inc., Jersey City, N.J.; **Georg K. Thestrup**, Consul General of Norway, and **Egil Ruud**, president of UNITOR Ships Service Inc., N.J.

The Honorary Consul for Norway, **Georg K. Thestrup**, has officially opened UNITOR Ships Service's new office and warehouse facilities in Port Jersey Industrial Center.

The company's operations in the USA have increased substantially in the past few years, and the company realized the need to operate from larger and more suitable premises.

The new warehouse is ideally located to service ships calling at the Port of New York. The New York office also works in close contact with the shipowner companies in the New York area.

UNITOR Ships Service Inc. has been in operation in New York since 1967. In addition to the New York office, the company has branch offices in Baltimore, Norfolk, Philadelphia, Miami, New

Orleans, Houston, Beaumont, Los Angeles, and San Francisco.

Worldwide UNITOR Ships Service operates in 350 ports through 43 branch offices and 150 agents.

UNITOR Ships Service offers the maritime and offshore operators products and services consisting of gas and electric welding equipment; inert gas systems; fire and safety equipment; air tools and hand tools; compressors, winches and tackle; and chemicals and refrigerants.

UNITOR's worldwide service system is the key to its operations, and the company services 14,000 ships and offshore units from 72 nations.

UNITOR Ship Service Inc.'s new facilities are located at 310 Port Jersey Boulevard, Jersey City, N.J. 07305.

### Brochure Describes New Fire-Safe Valve

A brochure on its new fire-safe "trunnion" valve, which features exclusive resilient/metallic seating, is offered by Posi-Seal International, Inc., North Stonington, Conn.

Developed for the chemical processing, petrochemical, power, petroleum and marine industries, the new valve—PHOENIX III™—offers bi-directional, bubble-tight shutoff up to 1,440 psi in sizes from 3 inches to 72 inches in Class 150, 300 and 600 ANSI.

Posi-Seal's new brochure contains descriptions and illustrations of the valve's unique three-point sealing. The sealing technique features constant metal-to-metal seating prior to, during, and after fire. In addition, fire-safe performance tests, conducted under procedures established by the EXXON Basic Practice (BP3-14-1) and the Oil Companies Ma-

terials Assn. (OCMA-FSV.1) and passed by the new valve, are reviewed. Specifications and ordering instructions are also included in the new publication.

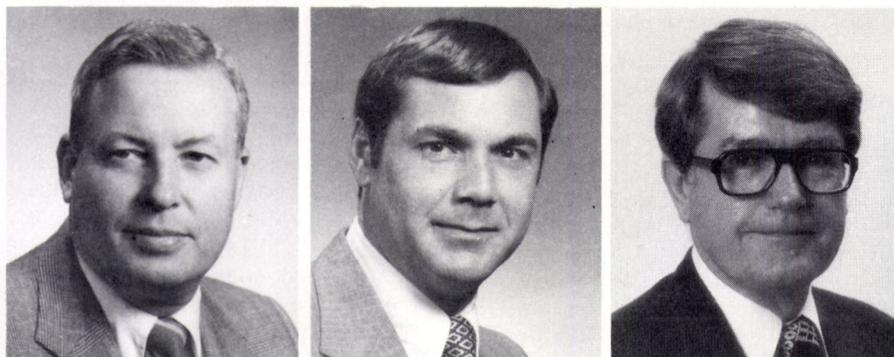
For a copy, write to **Lawrence Struzik**, Posi-Seal International, Inc., North Stonington, Conn. 06359.

### Totem Ocean Trailer Opens Houston Office

Totem Ocean Trailer Express, Inc. (TOTE) has announced the opening of a new sales office in Houston, Texas. The office is located at 6330 West Loop South, Bellaire, Texas. Mailing address: P.O. Box 1501, Houston, Texas 77001.

**Bruce Jones** has been appointed the sales representative for the Texas area. Mr. Jones brings to TOTE several years of experience in the transportation industry, three years with Matson Agencies, Inc., and two years with General Steamship Corp.

## Magnus Maritec Names Three To Sales Posts



Arthur W. Sievert

John C. Finnegan

John C. Norwalk

**Richard F. O'Boyle**, vice president-sales of the Western Hemisphere of Magnus Maritec International, Inc., 150 Roosevelt Place, Palisades Park, N.J. 07850, has announced that rapid expansion of sales activities has resulted in three promotions.

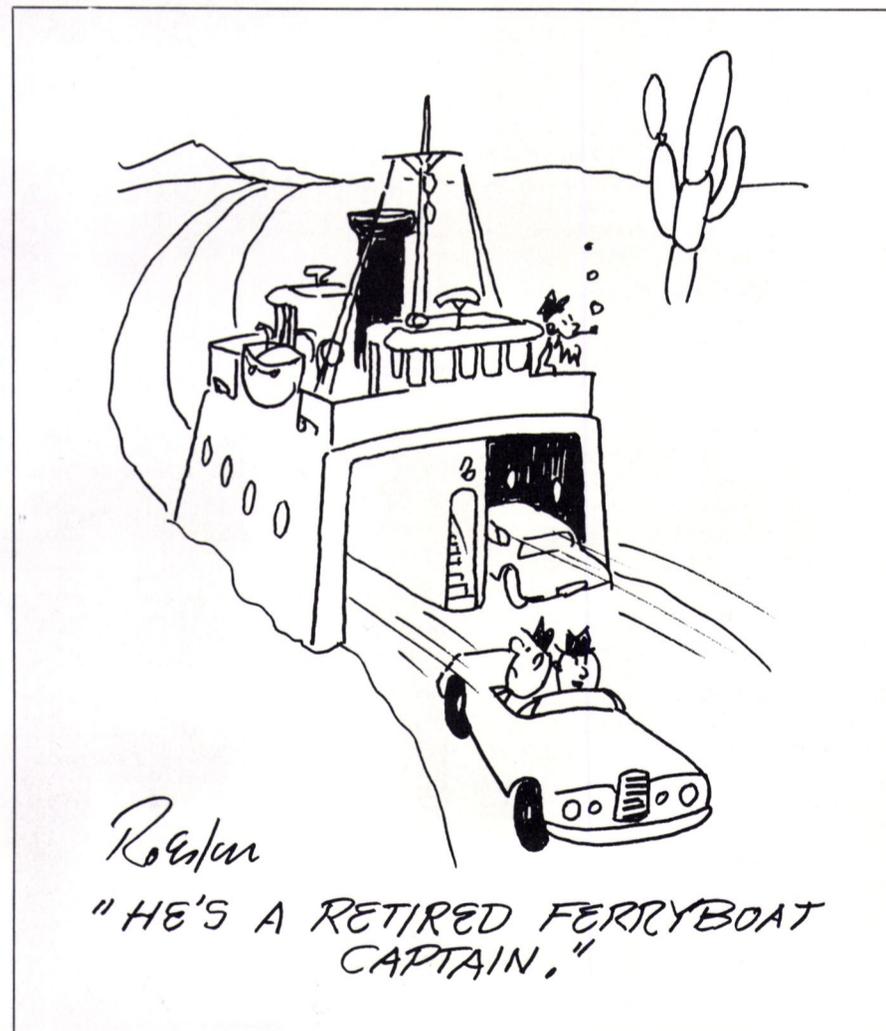
**Arthur W. Sievert** has been promoted to sales supervisor with responsibilities in the United States, dealing with all distributors to assist them in their sales and service development. Mr. Sievert will also supervise the sales force outside the New York area.

Mr. Sievert has been with Magnus Maritec since May 19, 1975. He has significant prior marine sales experience, having dealt with European owners to sell Simmonds Precision LNG measuring systems. He is a licensed marine engineer with a number of years at sea.

**John C. Finnegan** has been promoted to sales supervisor, and is also a licensed marine engineer

and a 1969 Kings Point, N.Y., graduate who joined Magnus Maritec on October 11, 1976 as a national account executive. Mr. Finnegan had prior sales experience with Sperry Marine Systems and was familiar with many Magnus Maritec marine accounts. His key responsibility will include supervision of national account sales. Executive account and service staff in the Palisades Park office will report to him, as well as territory manager of the Great Lakes and inland waterways.

Magnus Maritec also announced the appointment of **John C. Norwalk** as territory manager of the U.S. Great Lakes area. Mr. Norwalk will be responsible for promoting sales and service of Magnus Maritec's tank cleaners, fuel and water treatments, engine room maintenance products, and ballast tank coatings. He will also be responsible for sales of a wide variety of Economics Laboratory's Steward and Galley stores in the marine market in his area.



## Raytheon Marine Names Stanley Clark

Stanley L. Clark has been named manager of marine marketing operations at Raytheon Marine Company, Manchester, N.H.

In this new position, Mr. Clark will oversee the North American marketing and sales operations for the Raytheon and Apelco lines of marine electronics. The firm's products include Mariners Pathfinder® shipboard radar systems, Fathometer® depth sounders, radiotelephones, and other navigational aids.

Mr. Clark comes to Raytheon from Intermarine Electronics, Inc., where he was vice president. In addition, he has served as vice president of ITT Decca Marine, Inc.

A graduate of New York University and of Adelphi University, Mr. Clark is a veteran of the U.S. Navy.

## Zapata In Joint Fishing Venture In Costa Rica

Zapata Corporation has announced that its subsidiary, Zapata Seafoods, Inc., has completed arrangements establishing a tuna fishing joint venture in Costa Rica with a group of private investors.

The diversified natural resources company said that the primary joint venture firm is Pescamar De Centroamerica S.A. Pescamar will operate three tuna seiners formerly in Zapata's domestic operations. An affiliate, Sardimar S.A., has a small sardine fishing operation in Puntarenas, Costa Rica.

Zapata said that it has received approval from the U.S. Maritime Administration for the transfer of eight tuna vessels from U.S. to foreign registry. Three of the vessels, formerly called the Anna Maria, Blue Pacific, and Jacqueline A, have been renamed the Cariari, Talamanca, and Boruca, respectively, and are registered under the Costa Rican flag for operation by Pescamar. The company said that the other five vessels will be re-registered outside the U.S. Zapata previously has mentioned its intent to establish a tuna venture in Mexico. Two additional tuna vessels remain under the U.S. flag.

William H. Flynn, Zapata Corporation chairman and president, said that the new Costa Rican venture represents the first step in the company's long-range program to redeploy part of its tuna fleet to countries which control the resource. He cited the recent adoption of 200-mile territorial zones by a number of Latin American countries as responsible for major changes in tuna resource economics. Mr. Flynn added that Zapata's participation in such fishing and processing ventures will broaden its access to different fish resources and

help to stabilize year-to-year variations in resource availability.

The company said that the Pescamar/Sardimar venture will allow Zapata to affiliate with an existing sardine fishing and canning operation, providing it with a modest participation in that resource. Zapata added that Sardimar will can tuna at its existing processing plant, using fish provided by Pescamar.

Zapata Corporation entered the fishing business in 1967 with the acquisition of U.S. menhaden op-

erations. It established its tuna operations in 1973, and began a Mexican anchovy fishing venture in 1976.

In recent years, Zapata has emerged as one of the largest independent fishing operations in the Free World, and the world's largest non-governmentally owned producer of fish meal. Its fishing operations now involve a total of 60 vessels, 35 spotter aircraft and seven processing plants, located in four countries. The company's

tuna division operates 15 vessels, and a cannery at St. Andrews, New Brunswick.

Zapata Corporation (NYSE), Zapata Tower, P.O. Box 4240, Houston, Texas 77001, provides diversified natural resource services and products around the world. In addition to fishing, its businesses include offshore drilling, marine services, petroleum exploration, bulk shipping; coal and copper mining; and construction and dredging.

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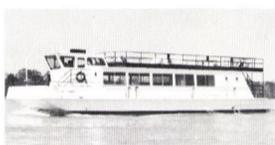
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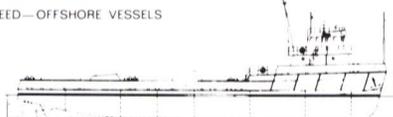
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**Sun Ship Forms New  
Estimating Department  
—Brawner Named Manager**



H. Peirce Brawner Jr.

Sun Shipbuilding and Dry Dock Co., Chester, Pa. 19013, has formed a new department — New Construction Estimating, Budgeting & Cost Analysis — and appointed **H. Peirce Brawner Jr.** manager of the new department, reporting to the president.

The new department will be responsible for providing all estimates on new ship construction

and major conversion work, converting those estimates to operating budgets, and establishing a system for cost analysis of performance against budget.

Mr. Brawner is a 1952 graduate of Cornell University with a Bachelor of Electrical Engineering degree.

He was assistant to the manager and also chief of cost controls for Bethlehem Steel Company's Shipbuilding Division yard in Quincy, Mass., before joining Sun Ship in 1964 as administrative assistant to the vice president of engineering. In 1967, he was named head of manufacturing engineering, and in 1968 he assumed the additional duties of managing the New Ship Estimating Department.

In 1972, he was appointed projects manager with responsibility for contracts, estimating, and Product Group business functions.

He is a member of The Society of Naval Architects and Marine Engineers, is active in civic affairs, and serves on the board of directors of several companies.

**Society Of Naval Engineers Discuss Technology  
Advances In Solid Fuel Gas Turbine Development**



Officers of the Golden Gate Chapter of ASNE, shown left to right, are: **John Meyer**, treasurer; **Russ Gorman**, vice chairman; **Ed Callahan**, chairman; **Joe Koch**, departing chairman, and **George A. Bottom III**, councilor and past chairman.

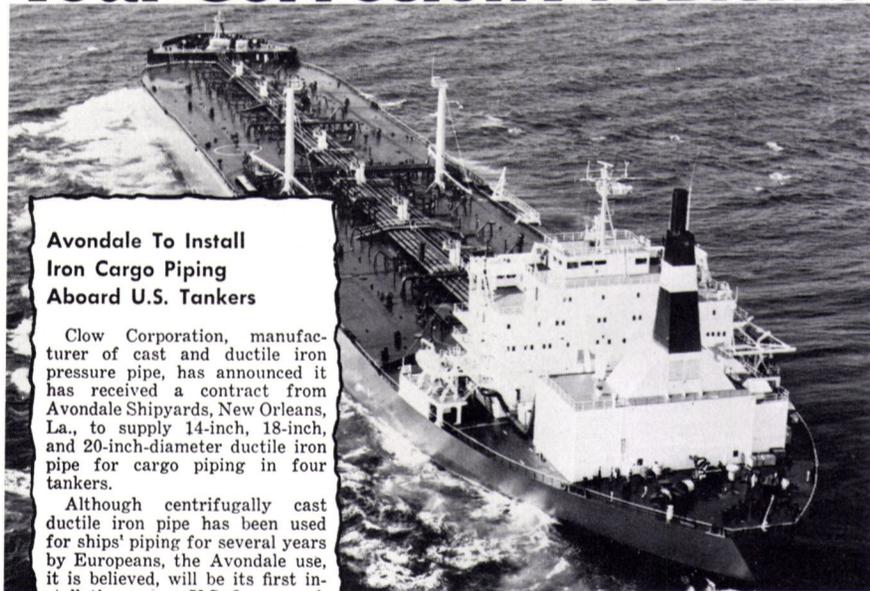
At a recent dinner meeting of the Golden Gate Chapter of the American Society of Naval Engineers, **Edwin T. Callahan**, recently appointed chairman of the Section, introduced Capt. **Ken Phillips**, USN (ret.), to make a technical presentation on the subject "Technology Advances in Solid Fuel Gas Turbine Development."

Captain Phillips, chief projects director, Power Systems Division, Combustion Power Company, de-

scribed his development program for converting energy from municipal solid waste and other similar solid fuels, utilizing a pressurized fluid bed combustion gas turbine system. The corrosion problems, test results and process problems were detailed. Results of tests in the 1 MW Process Development Unit of this firm indicated that it showed promise of solving the major problems.

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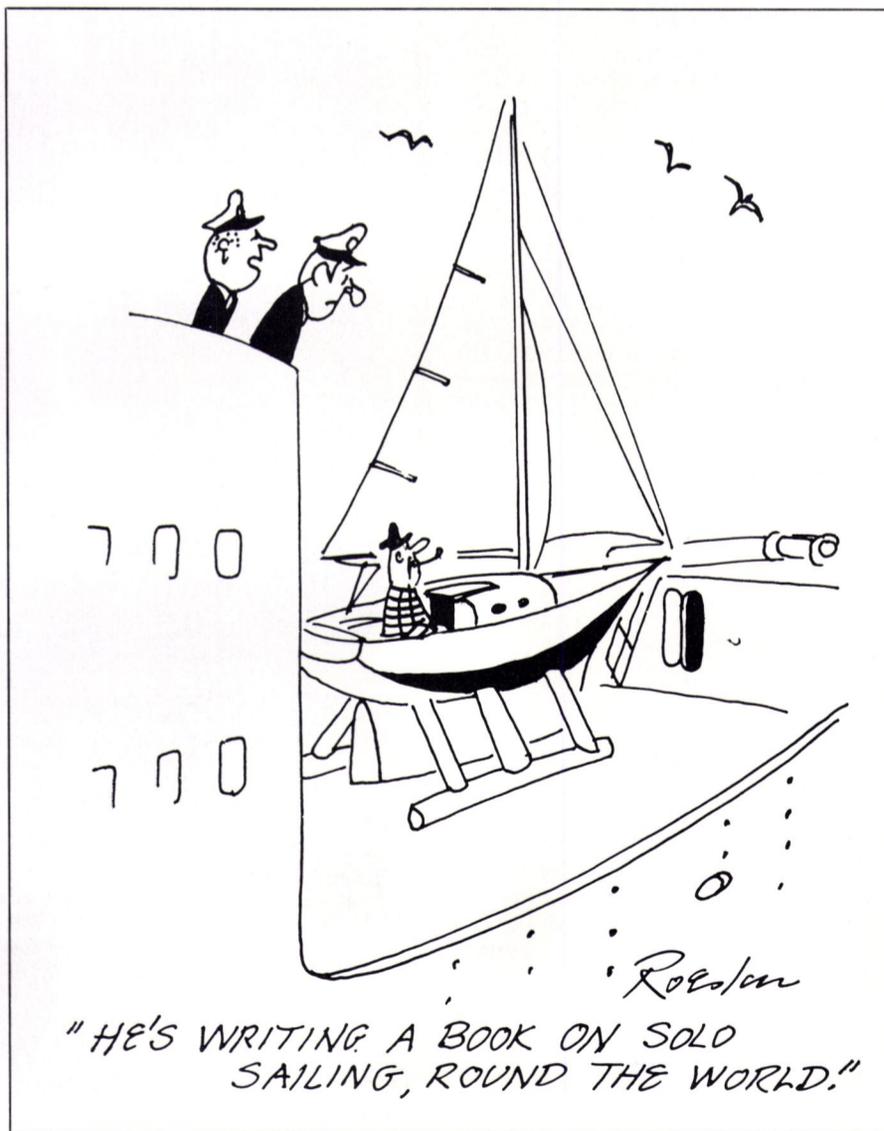
Clow Corporation, manufacturer of cast and ductile iron pressure pipe, has announced it has received a contract from Avondale Shipyards, New Orleans, La., to supply 14-inch, 18-inch, and 20-inch-diameter ductile iron pipe for cargo piping in four tankers.

Although centrifugally cast ductile iron pipe has been used for ships' piping for several years by Europeans, the Avondale use, it is believed, will be its first installation on a U.S.-flag vessel. Pipe selected is standard 60,000 tensile ductile pipe which is in widespread use for underground pressure piping, except that the ductile iron will be alloyed with 2 percent nickel for added corrosion resistance. Pipe will be plain end and joined by couplings. Ductile was chosen on the basis of an anticipated extended life in service, despite a higher initial cost.

The choice of ductile pipe was made following U.S. Coast Guard and American Bureau of Shipping approval for the use of this pipe for "cargo and ballast systems."

Clow Ductile pipe and fittings, alloyed with 2% nickel, offer the most economical corrosion resistance for cargo or ballast piping. For crude, saltwater, or similar service, investigate Clow Ductile. Clow's cargo and ballast piping meets or exceeds the requirements of the American Bureau of Shipping and U.S. Coast Guard.

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## Barney Evans Opens Public Relations Firm



Barney Evans

Barney Evans, widely known as a PR specialist in the maritime field, recently took early retirement from Crowley Maritime Corporation and has opened his own public relations consulting firm at 215 Market Street, Suite 530, San Francisco, Calif. 94105.

He served with the Crowley organization, San Francisco-based operator of the world's largest fleet of tugs, barges and specialized marine equipment, for 27 years, the last 15 of them as corporate public relations director. He has also acted for 15 years as the executive secretary-treasurer of Western Shipbuilding Association, representing shipyards and allied industries — both management and labor — on the West Coast of the United States.

While continuing in the capacity of special consultant to Crowley Maritime Corporation and in his position with the Western Shipbuilding Association, Mr. Evans plans to expand and diversify the scope of his involvement in the PR and employee relations fields.

Mr. Evans has been active in maritime and civic affairs for many years, presently serving as a member of the board of governors, The Propeller Club of the United States. He is also a member of the Navy League of the United States, National Defense Transportation Association, Commonwealth Club of California, San Francisco Traffic Club, Save San Francisco Bay Association, Maritime Writers Association, Apostleship of the Sea, Binnacle Club, and others.

## Thistle Field Drilling Started By Santa Fe

E.L. Shannon Jr., president of Santa Fe International Corp., Orange, Calif., has announced that development drilling has started in Thistle Field in Block 211/18 in the North Sea.

Mr. Shannon said the first production well began drilling October 27, deepening a hole previously drilled to about 1,300 feet.

If there are no weather, drilling or startup problems, Mr. Shannon said, oil should be flowing to permit loading the first tanker by the end of December.

Thistle Field, discovered in

1973, is expected to begin production at a rate of about 40,000 barrels a day.

Two drilling rigs, operated by a Santa Fe subsidiary, became operational in July, and since that time have drilled 13 wells to about 1,300 feet below the ocean floor and have set and cemented a 20-inch conductor in each. This, Mr. Shannon said, will reduce drilling time on each development well by six to eight days.

The Thistle Field Unit, in which Santa Fe holds 16.29 percent interest, has chartered three tankers, each capable of carrying about 600,000 barrels of crude oil, and has installed bow-loading equipment on them to permit loading oil from a tanker-loading buoy in seas as high as 14 feet.

Mr. Shannon said it is anticipated that all Thistle crude oil will be loaded into tankers in the field until terminal facilities at Sullom Voe in the Shetland Islands are ready to receive Thistle crude through the Brent pipeline system.

## IMODCO Wins Petrobras Contract To Install SPM At Record Depth

IMODCO, pioneer offshore marine terminal systems company, a division of Amtel, Inc., has received a contract of several million dollars from Petrobras, national oil company of Brazil, for the engineering and design of a Single Point Mooring (SPM) terminal. It is for speedy installation in the Garoupa Field of Brazil's Campos Basin, 150 miles northeast of Rio de Janeiro.

Amtel chairman Jerome Ottmar said the terminal will not only be constructed and delivered in record time—by mid-December 1977—but will be installed at a record depth of 410 feet of water 50 miles offshore from Cape Sao Tome.

The buoy, to be 12.5 meters (about 41 feet) in diameter, 14 feet high, and weighing 213 tons, will be utilized in conjunction with a nearby storage barge SALM terminal. Crude oil will

be pumped from the barge through the IMODCO terminal to vessels securely moored to it, with the tankers then transporting their cargoes to refining ports.

During the loading operation, the vessels will easily weather-vane around the SPM in response to wind, current and waves. The IMODCO system will be able to withstand a wind velocity of 30 knots, surface current of 2 knots, and wave height of 18.7 feet under operating conditions.

The entire Garoupa Field sea-floor production complex is the first dry/sea system in South America, and probably the most modern installation in the world. Initial production will not involve the use of permanent platforms.

The sizable offshore oil deposits in the Campos Basin were discovered in 1974, with the Garoupa Field expected to produce 200,000 barrels daily. The production and terminal systems including the IMODCO SPM are devised to place the field into production in the shortest possible time.

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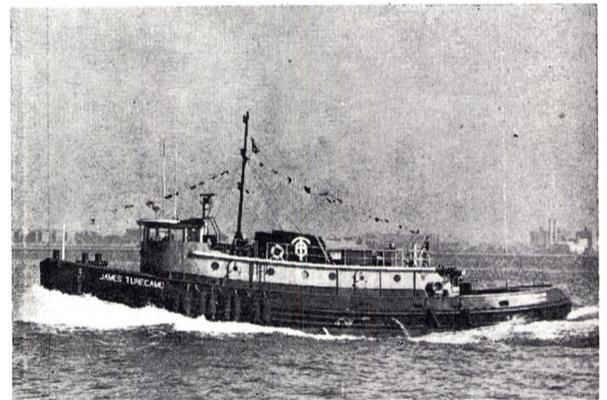
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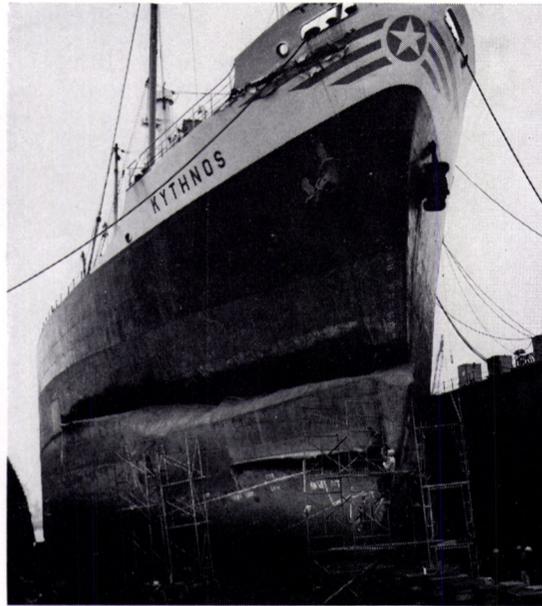
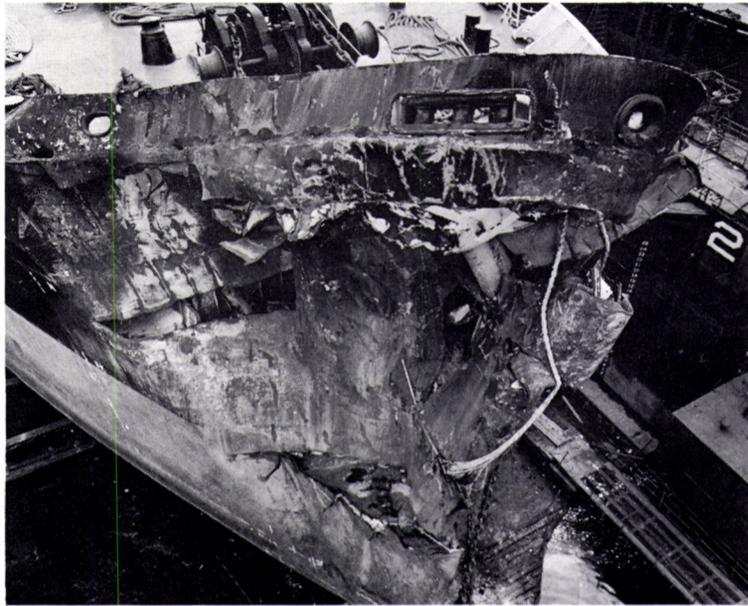
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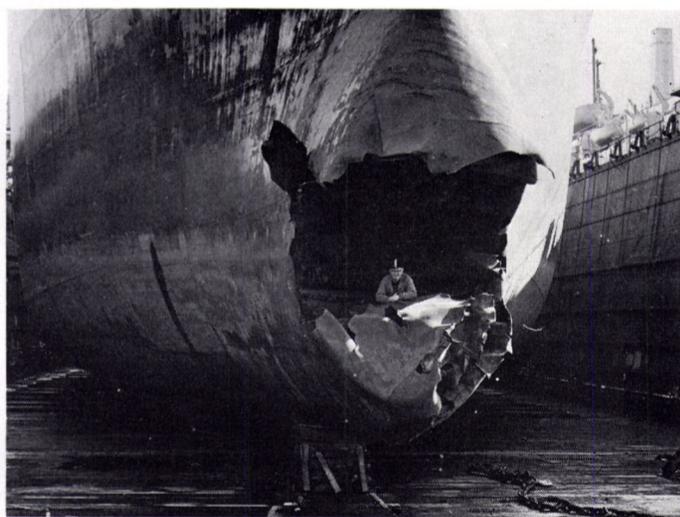
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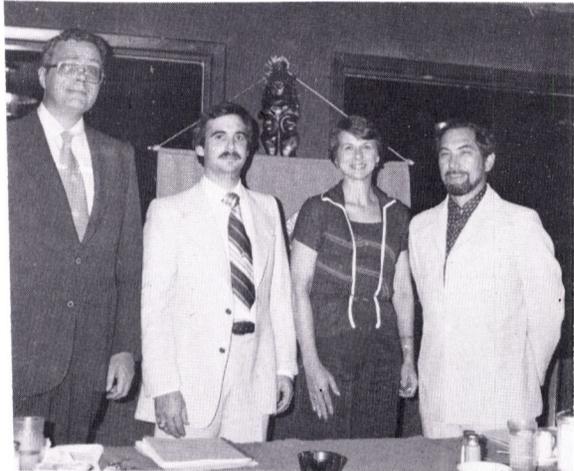
Bethlehem Steel—Shipbuilding

**Second Generation LNG Carriers  
Subject Of Paper Presented At  
ASNE Pascagoula Section Meeting**

The Pascagoula Section of the American Society of Naval Engineers met recently at the TIKI Restaurant in Gautier, Miss.

A cocktail hour preceded a business meeting, which was chaired by A.C. LiCausi, Section chairman.

During the technical session which followed, Alan Nierenberg of the Advanced Programs Group of Avondale Shipyards, Inc., presented his paper on "The Development of Second Generation LNG Carriers for Future Importation Projects."



Shown at the Pascagoula Section, ASNE, meeting, are left to right: Comdr. Gene H. Lindsay; Alan Nierenberg, speaker; Mrs. Kay Bennett, treasurer, and A.C. LiCausi, Section chairman.

Mr. Nierenberg made the following statements as an introduction to his paper:

"The development of a ship design as an integral part of a transportation system is always a challenge to the naval architect and marine engineer. In most cases, the project has been under development for several years before the actual ship design is started, and several constraints already exist to which the ship must be adapted.

"There are several such LNG importation programs which are nearing final regulatory approval and authorization for construction. These programs will require approximately 21 additional LNG carriers in the 125,000 to 130,000-cubic-meter class to be constructed in the United States. These ships will represent "second generation" LNG carriers in the United States and will include major refinements to the vessel design, cargo containment system, and automation contained aboard the ship.

"Although it is still uncertain which of these programs will proceed and what the final ship requirements will be, this paper will discuss some of the features that have been included in a particular design for the importation of LNG from Indonesia to the U.S. West Coast. Although it is not the prime intent of this paper to discuss the LNG containment systems themselves, it is inevitable that certain portions of the systems will be reviewed due to their impact on the remaining ship design. There is an extensive and continuing evaluation of the containment systems by both the shipyard, prospective owners and independent consultants to insure that timely and efficient production, without unforeseen problems, can take place after contract on these capital intensive vessels.

"As the information contained herein and the vessel design itself is still under further refinement and the subject of negotiations among numerous parties, I regret that it is not possible to address specific details in certain areas."

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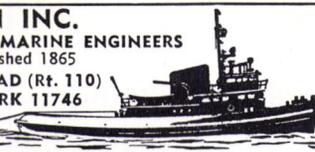
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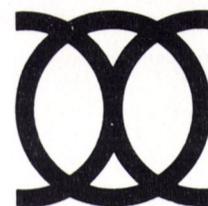


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**NKK Converts Reefer To Supply Fuel To Fishing Fleet And Return With Fish Cargo**

A massive conversion of the refrigerator cargo vessel Shuyo Maru involving the addition of a 150-ton midship section that lengthened the vessel from 293 feet to 325 feet has been completed at NKK's Asano dockyard.

Takeo Arakawa, NKK New York general manager, said the purpose of the new midship section was to accommodate a 600-ton-capacity fuel tank, which increased the ship's gross tonnage from 1,944 to 2,350.

By means of the new fuel tank, Shuyo Maru can supply fuel to a fishing fleet mothership at sea. On the ship's return voyage, the tank is filled with packaged fishmeal cargo.

The complicated conversion—a specialty of the Asano dockyard—involved cutting the vessel at midship after placing her in dock. Then, the fore hull was separated from the aft hull by means of a pulley board fitted with steel rollers, thereby preventing damage to insulation materials.

The prefabricated midship section was positioned in drydock by means of a 300-ton floating crane.

Altogether, the conversion took one month. NKK (Nippon Kokan) is Japan's second largest steelmaker, and only integrated steelmaker/engineer-constructor/shipbuilder.



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**Great Lakes/Great Rivers Section  
Hears Three Technical Papers  
During Fall Meeting In Ann Arbor**

The Great Lakes and Great Rivers Section of The Society of Naval Architects and Marine Engineers convened its fall meeting at the Ann Arbor Inn in Ann Arbor, Mich. A record turnout for the Section of 266 participants made the occasion a very lively one. Many of the registrants were students in the Department of Naval Architecture at the University of Michigan, also located in Ann Arbor. Since the Section recently adopted plans for a student section, it was particularly gratifying to see so many of them in attendance.

Three papers were presented during the technical session, as follows:

"Comparisons of Calculation Procedures with Model Test and Full Scale Vibration Data of the M/V Roger Blough," by Dr. William S. Vorus and Messrs. S.G. Stiansen and Ralph H. Bertz.

The second paper dealt with "Procedures for Diesel Exhaust Energy Actualization Aboard Great Lakes Bulk Carriers," by John B. Woodward III.

The last paper, which created a great deal of interest, was a presentation by U.S. Coast Guard Capt. J.A. Wilson and Comdr. C.L. Loosmore on their findings from the Board of Inquiry, and was entitled "Analysis of the Loss of the Edmund Fitzgerald."

At this time during the session, David A. Groh, speaking on behalf of Lake Carriers' Association, pointed out the industry's position, which rejects the board's findings, and suggests another method for the analysis which resulted in a different conclusion. Spirited discussion ensued, but little new ground was covered or any conclusions reached.



Shown above, left to right standing, are authors Ralph H. Bertz, S.G. Stiansen, John B. Woodward III, and Comdr. C.L. Loosmore. Seated, left to right, are Dr. T. Francis Ogilvie, Department of Naval Architecture & Marine Engineering, University of Michigan, Dr. William S. Vorus and Capt. J.A. Wilson, authors, and David A. Groh, speaker.

Following a luncheon, the various tours were available for member participation to the towing tank maneuvering facilities, and so forth, on the University campus. The next scheduled meeting of the Section has been set for January 19, 1978, at the Bond Court Hotel, Cleveland, Ohio.

**Union Mechling's Application  
For Aid To Build 58 Barges  
Approved In Principle By MarAd**

The Maritime Administration's Deputy Assistant Secretary Robert R. Casey has approved in principle the application by Union Mechling Corporation for a Title XI guarantee to aid in financing the construction of 50 covered hopper barges and eight tank barges. The vessels are designed for transportation on inland rivers and canals.

Twenty of the vessels are semi-integrated, covered hopper barges measuring 195 feet in length, 35 feet abeam, and 12 feet in depth. They are rated at 927 gross tons. Thirty are box-covered hopper barges measuring 200 feet by 35 feet by 12 feet, and rated at 945 gross tons. All 50 hopper barges were scheduled for delivery between February 18 and April 29, 1977.

The eight tank barges measure 195 feet by 35 feet by 12 feet, and are rated at 733 gross tons. Five have heating coils and three do not. The tank barges were scheduled to be delivered between September 30, 1977, and January 31, 1978.

All the barges are being built at Dravo Corporation, Pittsburgh, Pa. Union Mechling Corporation is a wholly owned subsidiary of Dravo, and is the successor company of the 1973 consolidation of Union Barge Line Corporation and A.L. Mechling Barge Lines, Inc.

The estimated actual cost of the barges, less depreciation for those that have been delivered, is approximately \$12.8 million.

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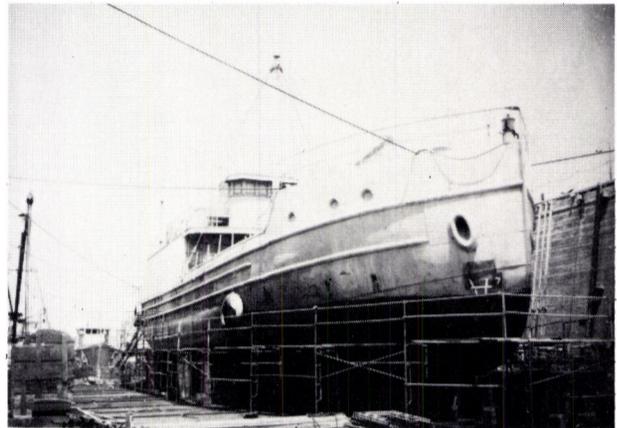
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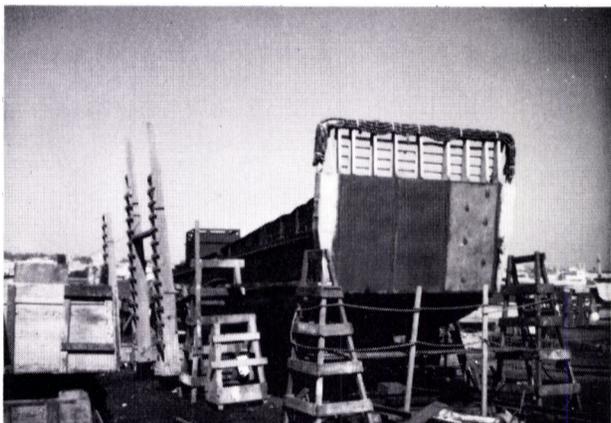
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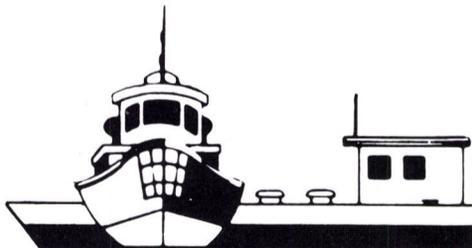
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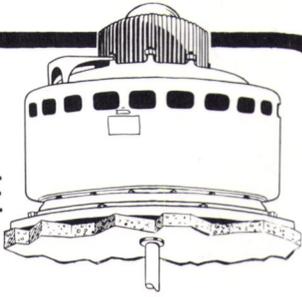
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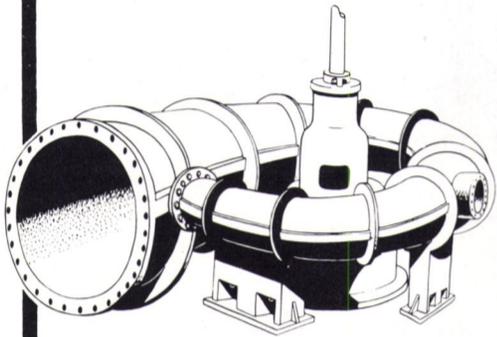


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**Technical Report Released On  
Impact Of Degraded Marine Fuels  
On Marine Propulsion Systems**

The Maritime Administration has released a technical report examining the effects of highly degraded marine bunker fuels on various marine systems. The study was conducted by George G. Sharp, Inc., New York, N.Y., under contract to MarAd.

The systems studied include: fuel oil transfer, service and heating, major marine propulsion equipment, and boilers and medium-speed diesel engines. Such requirements as steam tracing, fuel blending, and water washing were evaluated from both a technical and economic viewpoint.

The study, "Impact of Degraded Marine Fuels on Marine Propulsion Equipment and Systems," consists of a final report and appendices. It is available from the National Technical Information Service, 5285 Port Royal, Springfield, Va. 22161. The report, order number PB 272727/AS, costs \$7.50.

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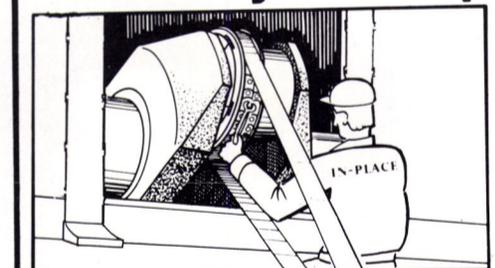
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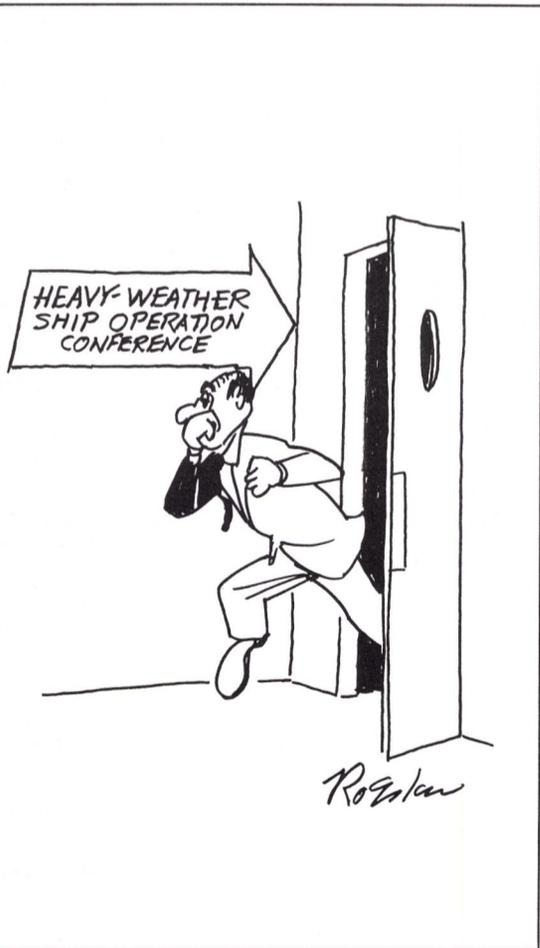
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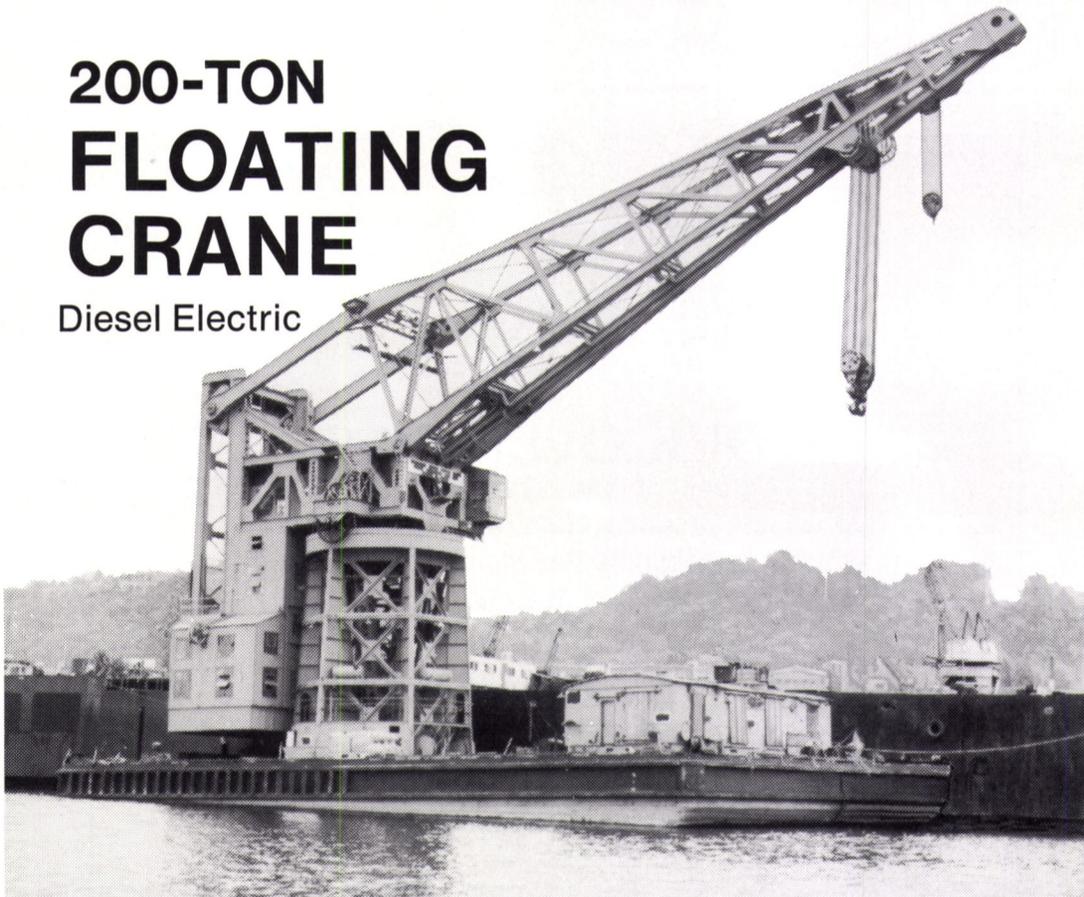
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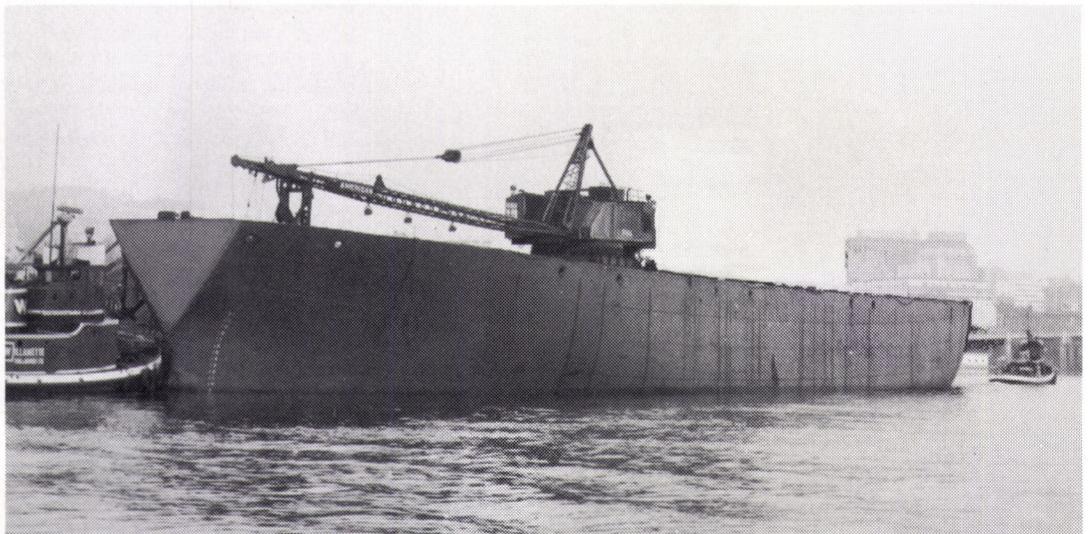
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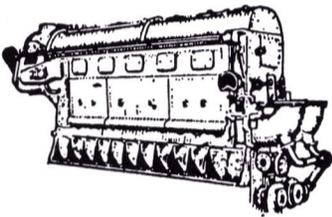
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### D. C.

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

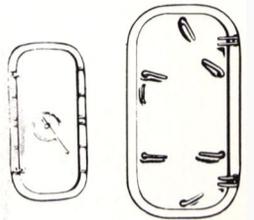
2—WORTHINGTON, 20 CFH, 3000 PSI, 4 stage, 585 RPM, with Worthington Steam Turbine, 47 HP, 5502 RPM.

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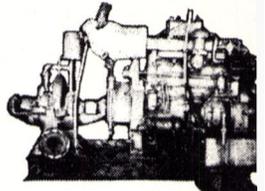
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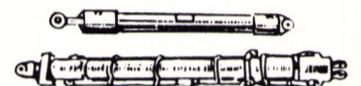
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## FIRE PUMPS



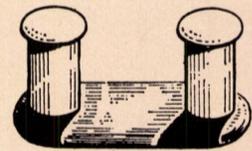
2—BUDA, Model 6-LD-468, Diesel Engine 6 cylinders, 100 BHP, Marine, Garden Denver, centrifugal Pumps, Bronze, horizontally split case, 1000 GPM, 280' head, suction and 5" discharge.

## HYDRAULIC CYLINDERS

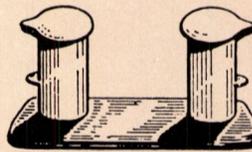


| Bore | Overall Stroke | Rod Diameter | Retracted Length | Action |
|------|----------------|--------------|------------------|--------|
| 10"  | 12"            | 3.75"        | 45 1/2"          | double |
| 10"  | 26"            | 3.75"        | 58 1/2"          | double |
| 2"   | 8"             | 1 1/2"       | 20"              | double |
| 2.5" | 15"            | 1.12"        | 25 1/2"          | double |
| 3"   | 8"             | 1.37"        | 15 1/2"          | double |
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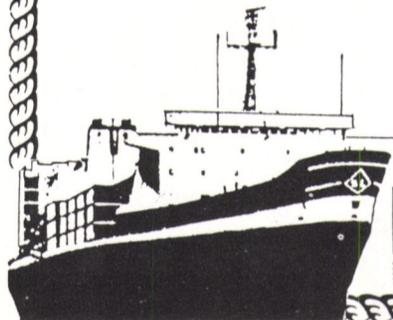
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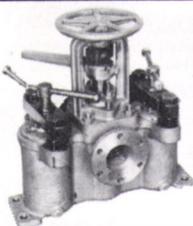
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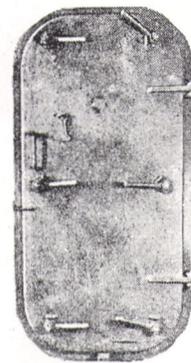
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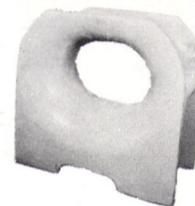
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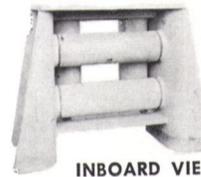
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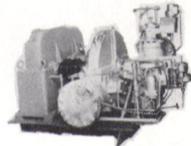


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New England Trawler Equipment Co., 291 Eastern Ave., Chelsea, Mass. 02150  
Skagit Corporation, P.O. Box 151, Sedro-Woolley, Wash. 98284

## DIESEL ACCESSORIES

Alnor Instrument Co., 7301 N. Caldwell Avenue, Niles IL 60648  
Controls, Inc., 2655 U.S. Rt. 22, Union, N.J. 07083  
Exhaust Controls, Inc., 2655 U.S. Rt. 22, Union, N.J. 07083  
General Thermodynamics Corporation, 150 Ballardvale St., Wilmington, Mass. 01887  
Piston Products, Inc., 1140 Bloomfield Avenue, P.O. Box 1079, West Caldwell, N.J. 07006

## DIESEL ENGINES

Alco Power Inc., 100 Orchard St., Auburn, N.Y. 13021  
Caterpillar Tractor Co., Industrial Division, Peoria, Ill. 61629  
Colt Industries Inc., Power Systems Div., Beloit, Wisc. 53511  
Electro-Motive Division General Motors, La Grange, Illinois 60525  
Golten Marine Co., Inc., 160 Van Brunt St., Brooklyn, N.Y. 11231  
Mitsui Engineering & Shipbuilding Co. Ltd., 6-4 Tsukiji, 5-chome, Chuo Ku, Tokyo, Japan

MTU/Motoren-und Turbinen-Union, Friedrichshafen GmbH, P.O. Box 2040, D-7990 Friedrichshafen, W. Germany  
Oosterhuis Industries Inc., 1800 Engineers Road, Belle Chasse, La. 70037

H.O. Penn Machinery Co., Inc., 1561 Stewart Ave., Westbury, N.Y. 11590

Power & Propulsion Systems, Inc., 9821 Katy Freeway, Houston, Texas 77024

## DOCK BUILDERS

DeLong Corporation, 29 Broadway, New York, N.Y. 10006  
GHH Sterkrade, Ferrostral Overseas Corp., 17 Battery Place, New York, N.Y. 10004

## DIVERS

Undersea Systems, 112 W. Main St., Bay Shore, N.Y. 11706

## DOORS—Watertight—Joiner

Overbeke-Kain Co., 20905 Aurora Rd., Cleveland, Ohio 44146

Walz & Krenzer Inc., 400 Tralold Road, Rochester, N.Y. 14624

## ELECTRICAL EQUIPMENT

AMP Special Industries (Div of AMP Products Corp), P.O. Box 1776, Paoli, Pa. 19301

Argo Marine, Div. of Argo Intl., 140 Franklin St., New York, N.Y. 10013

General Regulator Div., Forney Engineering Co., 3405 Wiley Post Road, Addison, Texas 75001

Merrin Electric, 1120 Clinton Street, Hoboken, N. J. 07030

Oceanic Electrical Mfg. Co., Inc., 159 Perry Street, N.Y. 10014

Port Electric Supply, 317 Perry Street, N.Y., N.Y. 10014

Rapid Electric Co., Inc., P.O. Box 2915, Brookfield, CT 06804

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

## EQUIPMENT—Marine

Alexander Industries, Inc., 1901 Julia Street, New Orleans, LA 70113

Argo Marine, Div. of Argo Intl., 140 Franklin St., New York, N.Y. 10013

Beaver Tool & Machine Co., 525 S.E. 29th St., Oklahoma City, OK 73109

Comet Marine Supply Corp., 157 Perry St., New York, N.Y. 10014

Kearfott Marine Products, 550 South Fulton Ave., Mount Vernon, N.Y. 10550

Nicolai Joffe Corp., P.O. Box 2445, 445 Littlefield Ave., So. San Francisco, Calif. 94080

Merrin Electric, 1120 Clinton Street, Hoboken, N.J. 07030

Thompson Marine Supply, Inc., 11 Broadway, New York, N.Y. 10004

Waukesha Bearings Corp., P.O. Box 798, Waukesha, Wisc. 53186

## EVAPORATORS

Riley-Beard, Inc., P.O. Box 1115, Shreveport, La. 71130

## FAIRLEADS—Blocks and Rigging

Crosby Group, Box 3128, Tulsa, Okla. 74101

## FANS—VENTILATORS

Aerovent, Inc., #1 Aerovent Drive, Piqua, Ohio 45356

Camar Corp., 186 Prescott St., Worcester, Mass. 01605

Coppus Engineering Corp., 344 Park Avenue, Worcester, Mass. 01610

Dasic International Corp., 1035 Southeast Ninth Street, Portland, OR 97214

Merrin Electric, 1120 Clinton Street, Hoboken, N.J. 07030

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

## FENDERING SYSTEMS—Dock & Vessel

Hughes Bros., Inc., 17 Battery Place, New York, N.Y. 10004

Johnson Rubber Co. (Marine Div.), 16025 Johnson St., Middlefield, Ohio 44062

Morse Chain Company, Div. Borg Warner, So. Aurora St., Ithaca, N.Y. 14850

## FINANCING—Leasing

General Electric Credit Corp., P.O. Box 8300, Stamford, Conn. 06904

Kidder, Peabody & Co., Inc., 10 Hanover Square, New York, N.Y. 10005

Lazard Freres & Co., One Rockefeller Plaza, New York, N.Y. 10020

Lehman Brothers Inc., One Williams Street, New York, N.Y. 10004

Manufacturers Hanover Leasing Corp., 350 Park Av., N. Y., N.Y. 10022

Warburg Paribas Becker Inc., 2 First National Plaza, Chicago, Ill. 60670

## FITTINGS & HARDWARE

Robvon Backing Ring Co., 675 Garden St., Elizabeth, N.J. 07207

Superior Switchboard & Devices, Division of Union Metal Manufacturing Company, P.O. Box 590, Canton, Ohio 44701

## FURNITURE

Bailey Joiner Co., Inc., 74 Sullivan Street, Brooklyn, N.Y. 11231

Inland Marine Industries, 1818 Harrison St., San Francisco, CA 94103

## GANGWAYS

Rampmaster Inc., 1226 N.W. 23rd Ave., Fort Lauderdale, Fla. 33311

## HULL CLEANING

Butterworth Systems, Inc., P.O. Box 9, Bayonne, N.J. 07002

East Coast Marine Associates, Inc., 80 Broad Street, New York, N.Y. 10004

MP Industries Inc., 1200 Panca St., Baltimore, Md. 21224

U.S. Phosmarine Inc., 3186 Airway Ave., Bldg. F, Costa Mesa, CA 92626

Wheelabrator-Frye, 621 S. Byrkit Ave., Mishawaka, Ind. 46654

## HYDRAULICS—Launching Equipment

Hydranautics, P.O. Box 1068, Goleta, Calif. 93017

## INERT GAS—Generators—Systems

Airfilco Engineering, Inc., 1901 Julia St., New Orleans, La. 70113

Gaulin Corp., Garden Street, Everett, Mass. 02149

## INSULATION—Cloth, Fiberglass

Amatex Corp., 1032 Stanbridge Street, Box 228, Norristown, PA 19404

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

Cryogenic Structures Corp., 10 Fairway Court, Northvale, N.J. 07647

Haveg Industries, Inc. (A subsidiary of Hercules, Inc.) 900 Greenbank Road, Wilmington, Delaware 19808

## INSURANCE

Adams & Porter, 1819 St. James Place, Houston, Texas 77027

Adams & Porter, 5 World Trade Center, Suite 6433, New York, N.Y. 10048

R.B. Jones Insurance, 911 Main St., Kansas City, MO 64199

R.B. Jones Insurance, 120 S. Central Ave., St. Louis, MO 63105

R.B. Jones Insurance, 160 Water St., New York, N.Y. 10038

## KEEL COOLERS

Johnson Rubber Co. (Marine Div.), 16025 Johnson St., Middlefield, Ohio 44062

## LADDERS

Duo-Safety Ladder Co., 513 West 9th Ave., P.O. Box 497, Oshkosh, Wisc. 54901

## MACHINE TOOLS

Master Machine Tools, Inc., 1300 East Avenue A, Hutchinson, Kansas 67501

## MARINE CONSTRUCTION

Morrison-Knudsen Company, Inc., P.O. Box 7808, Boise, ID 83729

## MARINE SERVICE

General Electric, Schenectady, N.Y. 12345

Siemens Corporation, 186 Wood Avenue South, Iselin, N.J. 08830

## MATERIAL HANDLING SYSTEMS

W.A. Whitney Corp., An Esterline Company, 650 Race St., Rockford, Ill. 61105

## MOORING SYSTEMS

Samson Ocean Systems, Inc., 99 High Street, Boston, Mass. 02110

## NAVAL ARCHITECTS, MARINE ENGINEERS, SURVEYORS

Advanced Marine Enterprises, Inc., Suite 500, 2341 Jefferson Davis Highway, Arlington, Va. 22202

Alpha Engineers, 7215 N.E. 13th Ave., Vancouver, Wash. 98665

American Standards Testing Bureau, Inc., 40 Water Street, New York, N.Y. 10004

Amirikian Engineering Co., Chevy Chase Center Bldg., Suite 505, 35 Wisconsin Circle, Chevy Chase, Md. 20015

Anchorage Marine Services Incorporated, 844 Biscayne Boulevard, Miami, Florida 33132

J.L. Blutworth, P.O. Box 5217, Houston, Texas 77012

Boquer & Associates, P.O. Box 30184, New Orleans, La. 70190

Breit & Garcia, Naval Architects, 441 Gravier St., New Orleans, La. 70130

CADCOM Inc., 2024 West St., Suite B, Annapolis, Md. 21401

R.A.CADY-Marine Survey Practice, 2301 Leroy Stevens Road, Mobile, Ala. 36609

Catalina National, Inc., 1725 Monrovia Ave. (Suite A4), Costa Mesa, CA 92627

C.D.I. Marine Co., Regency East, Suite 222, 9951 Atlantic Blvd., Jacksonville, Florida 32211

Childs Engineering Corp., Box 333, Medfield, Mass. 02052

Coast Engineering Co., 711 W. 21st St., Norfolk, Va. 23517

Crandall Dry Dock Engrs., Inc., 21 Pottery Lane, Dedham, Mass. 02026

Francis B. Crocco, Inc., Box 1411, San Juan, Puerto Rico

C.R. Cushing & Co., Inc., One World Trade Center, New York, N.Y. 10048

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

Parker C. Emerson & Associates, 17935 Cardinal Drive, Lake Oswego, Oregon 97034

Christopher J. Foster, Inc., 14 Vanderventer Ave., Port Washington, N.Y. 11050

Friede and Goldman, Ltd., 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

Phillip Gresser & Associates (PTE) Ltd., 122 Eng Neo Ave., Singapore 11

Morris Guralnick Associates, Inc., 550 Kearny Street, San Francisco, Calif. 94108

J.J. Henry Co., Inc., Two World Trade Center—Suite 9528, New York, N.Y. 10048

Hydranautics, Incorporated, 7210 Pindell School Road, Howard County, Laurel, Maryland 20810

Janzen Engineering Co., 6655-H Amberton Drive, Baltimore, Md. 21227

James S. Kroger & Co., Inc., 3333 Rice St., 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., 401 Broad Hollow Road, Rte. 110, Melville, N.Y. 11746

Maritime Service Company, 1357 Rosecrans St., Suite B, San Diego, CA 92106

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

## BUYERS DIRECTORY (continued)

### PACKING & JOINTING MATERIALS

Drew Chemical Corp., 701 Jefferson Rd., Parsippany, N.J. 07054  
**PAINT—Coatings, Protective**  
 Clearkin Chemical Corporation, Schiller & Allen Sts., Philadelphia, Pa. 19134  
 Eureka Chemical Co., P.O. Box 2205, So. San Francisco, CA 94080  
 Farboil Company, 8200 Fischer Road, Baltimore, Md. 21222  
 Hempel's Marine Paint, Inc., 25 Broadway, New York, N.Y. 10004  
 International Paint Co., 17 Battery Place North, Suite 1150, New York, N.Y. 10004  
 Mobil Chemical Co., Maintenance & Marine Coatings Dept., P.O. Box 250, Edison, N.J. 08817  
 Products Research & Chemical Corp., (PRC Coating and Sealants Div.) 5430 San Fernando Road, Glendale, California 91203  
 Union Carbide Corporation, 250 Park Avenue, New York, N.Y. 10017  
 Woolsey Marine Industries, Inc., 100 Saw Mill Road, Danbury, CT 06810

### PETROLEUM SUPPLIES

Shell Oil Co., 1 Shell Plaza, Houston, Texas 77002

### PILOT LADDERS—Wood Products

A.L. Don Co., 58 Grant Avenue, Carteret, N.J. 07008

### PIPE—HOSE—Cargo Transfer, Clamps, Couplings

Camlock Flange Sales Corp., 449 Sheridan Blvd., Inwood, L.I., N.Y. 11696  
 Kubota, Ltd., 22, Funade-cho 2-chome, Naniwa-Ku, Osaka, Japan  
 Penco Division/Hudson Engineering Co., 1114 Clinton St., Hoboken, N.J. 07030

### PLASTICS—Marine Applications

Hubeva Marine Plastics, Inc., 390 Hamilton Ave., Bklyn, N.Y. 11231

### PLATE

Welding Wholesale Co., Div. J.A. Cunningham Ept., Inc., 2151 Dreer St., Philadelphia, Pa. 19125

### PROPELLERS—NEW AND RECONDITIONED—SYSTEMS

Avondale Shipyards, Inc., P.O. Box 52080, New Orleans La. 70150  
 J.W. Berg, S-430 90 Ockerö, Gothenburg, Sweden  
 Bird Johnson Company, 110 Norfolk St., Walpole, Mass. 02081  
 Coalidge Propellers, 1601 Fairview Ave. East, Seattle, Wash. 98102  
 Escher Wyss GmbH, P.O. Box 798, Ravensburg, Germany  
 Lips BV, Lipsstraat 52, Drunen, Netherlands  
 Propulsion Systems Inc., 21213 76th Ave. South, Kent, Wash. 98031  
 Voith Schneider—U.S. Agent: Krupp International, Inc., 550 Mamaroneck Ave., Harrison, N.Y. 10528

### PROPULSION—Marine

Combustion Engineering, Inc., Windsor, Connecticut 06095  
 DeLaval Turbine Inc., Turbine Div., Trenton, N.J. 08602  
 In-Place Machining Co., 1929 N. Buffan St., Milwaukee, WI 53212  
 Maritime Industries Ltd., 6307 Laurel St., Burnaby, B.C., Canada V5B 3B3  
 Port Electric Turbine Div., 155-157 Perry St., New York, N.Y. 10014  
 Schottel of America, Inc., 21 N.W. South River Dr., Miami, Fla. 33128  
 Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523

### PUMPS—Repairs—Drives

DeLaval Turbine Inc., IMO Pump Division, P.O. Box 321, Trenton, N.J. 08602  
 FMC Corporation, Pump Division, 326 So. Dean Street, Englewood, N.J. 07631  
 Hydro-Craft, Inc., 4223 Edgeland, Royal Oak, Mich. 48073  
 Penco Division/Hudson Engineering Co., 1114 Clinton St., Hoboken, N.J. 07030  
 Terry Corporation, P.O. Box 1200, Windsor, CT 06101  
 Worthington Pump Inc., P.O. Box 1250, Mountainside, N.J. 07092

### RATCHETS

CM American, Division Columbus McKinnon Corp., P.O. Box 74, McKees Rocks, Pa. 15136

### REFRIGERATION—Refrigerant Valves

Bailey Refrigeration Co., Inc., 74 Sullivan St., Brooklyn, N.Y. 11231  
 Port Refrigeration Div., 157 Perry Street, New York, N.Y. 10014  
 Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523

### RIGGING & BLOCKS

Crosby Group, P.O. Box 3128, Tulsa, Okla. 74101  
 Superior Switchboard & Devices, Division of Union Metal Manufacturing Company, P.O. Box 590, Canton, Ohio 44701  
 D. Van Beest En Zn.B.V., P.O. Box 57, Merwestraat 1-5, Slidrecht, The Netherlands

### ROPE—Manila—Nylon—Hawsers—Fibers

American Mfg. Co., Inc., Willow Avenue, Honesdale, Pa. 18431  
 Samson Ocean Systems, Inc., 99 High Street, Boston, Mass. 02110  
 The Cordage Group, Columbian Drive, Auburn, N.Y. 13021  
 Wall Rope Works, Inc., Beverly, N. J. 08010

### RUDDER ANGLE INDICATORS

Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913  
 Hose McCann Telephone Co., Inc., 524 W. 23rd St., N.Y. 10011  
 Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.

### SCAFFOLDING EQUIPMENT

Trus Joist Corp., P.O. Box 60, Boise, Idaho 83707

### SCALERS

Chicago Monarch, Box 9751, Cleveland, Ohio 44140  
 Corrosion Dynamics, Inc., 1100 Walnut Street, Roselle, New Jersey 07203

### SEWAGE—Pollution Control

Argo Marine, Pollution Systems Division, 140 Franklin St., New York, N.Y. 10013  
 Baylor Company, P.O. Box 36326, Houston, Texas 77036  
 Colt Industries, Water & Waste Management Operation, Beloit, Wisc. 53511  
 Demco, Inc., P.O. Box 94700, Oklahoma City, OK 73109  
 Eureka Chemical Co., P.O. Box 2205, So. San Francisco, CA 94080  
 Engelhard Industries, Chloropac Systems, 2655 U.S. Rt. 22, Union, N.J. 07083  
 LaMere Industries, Inc., (Marland Environmental Services and Clear Water, Inc.) 227 N. Main Street, Walworth, WI 53184  
 Mapco, 1437 So. Boulder Ave., Tulsa, Okla. 74119  
 Marine Moisture Control Co., Inc., 449 Sheridan Blvd., Inwood, L.I., N.Y. 11696  
 Microphor, Inc., P.O. Box 490, Willits, CA 95490  
 Red Fox Industries, P.O. Drawer 640, New Iberia, La. 70560  
 St. Louis Ship FAST Sewage Systems, 611 East Marceau St., St. Louis, Mo. 63111  
 Sigma Treatment Systems, 603 Dean Street, Brooklyn, N.Y. 11238

### SHAFTS, SHAFT REVOLUTION INDICATOR EQUIP.

Armco Steel/Advanced Materials Div., 703 Curtis St., Middletown, OH 45043  
 Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913  
 Penco Division/Hudson Engineering Co., 1114 Clinton St., Hoboken, N.J. 07030

### SHIPBREAKING—Salvage

American Ship Dismantlers, Inc., Division of Schnitzer Industries, 3300 N.W. Yeon Avenue, Portland, Ore. 97210  
 The Boston Metals Co., 313 E. Baltimore St., Baltimore, Md. 21202  
 General Metals of Tacoma, Inc., 1902 Marine View Dr., Tacoma, Washington 98422  
 Levin Metals Corp., 1310 Canal Blvd., Richmond, CA 94807  
 National Metal & Steel Corp., 691 New Dock St., Terminal Island, Cal. 90731  
 Zidell Explorations, Inc., 3121 S. W. Moody St., Portland, Ore. 97201

### SHIP MODELS

Jas Foley & Son, 506 Seventh Street, Santa Monica, Calif. 90402

### SHIPBUILDING STEEL

Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042  
 Bethlehem Steel Corp., 25 Broadway, New York, N.Y. 10004

### SHIPBUILDING—Repairs, Maintenance, Drydocking

Arab Shipbuilding & Repair Yard Co., P.O. Box 5110, Bab-Al-Bahrain Building, Bahrain, Arabian Gulf

Astilleros Espanoles, S.A., 17, Padilla, Madrid 6, Spain  
 Avondale Shipyards, Inc., P.O. Box 52080, New Orleans La. 70150  
 Bethlehem Steel Corp., Shipbuilding, 25 Broadway, N.Y., N.Y. 10004  
 Blohm + Voss AG, D-2000 Hamburg 1, P.O.B. 10 07 20  
 Blohm + Voss Co., 55 Morris Ave., Springfield, N.J. 07081  
 Bludworth Shipyard, Inc., (Subsidiary of Elpac, Inc.), 8502 Cypress St., Houston, Texas 77012

Boston Marine Industrial Park, Public Drydock No. 3, 60 Congress St., Boston, Mass. 02109

Carrington Slipways Pty, Ltd., Old Punt Road, Tomago, N.S.W., Australia 2322

CCL Shipcare Limited, Easton Lane Winnall Estate, Winchester Hampshire, England SO237QU

Conrad Industries, P.O. Box 790, Morgan City, La. 70380  
 Curacao Drydock Co., Inc., P.O. Box 153, Willemstad, Curacao, Netherlands Antilles

Dravo Corporation, One Oliver Plaza, Pittsburgh, Pa. 15222

Dravo Steelship Corp., R.4, Box 167, Pine Bluff, Ark. 71602

Equitable Shipyards, Inc., P.O. Box 8001, New Orleans, La. 70122

FMC Corp., Marine & Rail Equipment Div., 4700 N.W. Front Ave., Portland, Oregon 97208

General Dynamics, Quincy Division, Quincy, Mass. 02169  
 Gladding-Hearn Shipbuilding Corporation, 1 Riverside Avenue, Somerset, Mass. 02725

Granges Repair Service GMBH, P.O. Box 3166, Gutenbergring 64, D-2000 Hamburg-Norderstedt Germany

Halter Marine Services, Inc., Route 6, Box 287H, New Orleans, La. 70126

Harland & Wolff Shipbuilding & Engineering, Queens Island, Belfast, Northern Ireland

Havre de Grace, Havre de Grace, Md.

Hillman Barge & Construction Co., P.O. Box 510, Brownsville, Pa. 15417

Hitachi Shipbuilding & Engrg. Co., Ltd., 47 Edoori 1-Chome, Nishi-Ku, Osaka, Japan

Hongkong United Dockyards Ltd., Kowloon Docks, Hong Kong

Hyundai Mipo Dockyard Co., Ltd., 456 Cheonha-dong, Ulsan, Korea

Hyundai Shipbuilding & Heavy Industries Co., Ltd., 5 World Trade Center, Suite 679, New York, N.Y. 10048

Jeffboat, Inc., Jeffersonville, Ind. 47130

Kawasaki Heavy Industries, Ltd., Kawasaki Kisen Kaisha, Ltd., 8 Kaigan-dori, Kuta-ku, Kobe, Japan

Keppel Shipyard Ltd., P.O. Box 2169, Singapore

Kockums Shipyard, S-201, 10 Malmo 1, Sweden

Lantana Boatyard, Inc., 808 N. Dixie Hwy., Lantana, Fla. 33460

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 Dunbartonshire, G81-1YB, Scotland

Marinette Marine, Ely Street, Marinette, WI 54143

Mattson Shipyard Co., Inc., P.O. Box 428, Cohoes, New York 12047

Maxon Marine Industries, Inc., P.O. Box 349, Tell City, Ind. 47586

J. Ray McDermott & Co., Inc., P.O. Box 60035, New Orleans, LA 70160

Mercantile Marine Engineering & Graving Docks Co., N.V., Antwerp, Belgium

Misener Industries, Inc., 5353 Tyson Avenue, P. O. Box 13625, Tampa, Fla. 33681

Mitsui Shipbuilding & Engrg. Co. Ltd., 6-4, Tsukiji 5-chome, Chuo-ku, Tokyo, Japan

Monark Boat Co., P.O. Box 210, Monticello, Ark. 71655

Moss Rosenberg Verft A.S., P.O. Box 53, 1512 Jely/Moss/Norway

Murray & Stewart (Marine) (PTY) Ltd., Ocean Road-Table Bay Harbour, P.O. Box 1909, Cape Town 8000, South Africa

National Steel & Shipbuilding Corp., San Diego, Calif. 92112

Navimar U.S.A., One World Trade Center, Suite 3557, New York, N.Y. 10048

Neorion Shipyards Syros, Ltd., Syros, Greece

Northwest Marine Iron Works, P. O. Box 3109, Portland, Oregon 97208

O.A.R.N. (Officine Allestimento-Riparazioni Navi), P.O. Box 1395, Genoa, Italy 16100

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

Port Allen Marine Service, Inc., P.O. Box 108, Port Allen, LA 70767

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

Sumitomo Heavy Industries Ltd., 2-1 Ohtemachi 2-chome, Chiyoda-ku, Tokyo, Japan

Swiftships Inc., P.O. Box 1908, Morgan City, LA 70380

Terrin Shipyards, Societe Provinciale des Ateliers Terrin, 287, Chemin DeLa Madrague, 13345 Marseille—Cedex 3, France

Todd Shipyards Corp., 1 State St. Plaza, New York, N.Y. 10004

Tracor Marine, P.O. Box 13107, Port Everglades, Fla. 33316

Union Dry Dock & Repair Co., Foot of Pershing Road, Weehawken, N.J. 07087

Vancouver Shipyards Co., Ltd., 50 Pemberton Ave., North Vancouver, B. C., Canada

Wiley Mfg., a unit of AMCA International Corp., Suite 200/Stackton Bldg., University Office Plaza, Newark, Del. 19702

### SHIP STABILIZERS

Sperry Marine Systems Div., Charlottesville, Va. 22901, Division of Sperry Rand Corp.

### SHOCK CORDS

Wm. B. Bliss Inc., 381 Park Ave. So., New York, N.Y. 10016

### SMOKE INDICATORS

Robert H. Wager Co., Inc., Passaic Avenue, Chatham, N.J. 07928

### STUFFING BOXES

Johnson Rubber Co. (Marine Div.), 16025 Johnson St., Middlefield, Ohio 44062

### TANK CLEANING

Butterworth Systems Inc., P.O. Box 9, Bayonne, N.J. 07002

Penco Division/Hudson Engineering Co., 1114 Clinton St., Hoboken, N.J. 07030

### TANK LEVELING INDICATORS

Gems Sensors Div., DeLaval Turbine Inc., Spring Lane, Farmington, Conn. 06032

GPE Controls, Inc., 6511 Oakton Street, Morton Grove, Illinois 60053

### TOWING—Vessel Chartering, Lighterage, Salvage, etc.

Bay-Houston Towing Co., 805 World Trade Bldg., Houston, Texas 77002

Chatin Transportation, Inc., 1414 One Shell Square, New Orleans, La. 70139

Curtis Bay Towing Co., Mercantile Bldg., Baltimore, Md. 21202

Henry Gillen's Sons Lighterage, 21 West Main St., Oyster Bay, N.Y. 11771

Gulf Mississippi Marine Corp., 225 Baronne St., New Orleans, La. 70112

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

Suderman & Young Towing Co., Inc., 918 World Trade Building, Houston, Texas 77002

Turecamo Coastal & Harbor Towing Corp., One Edgewater St., Clifton, Staten Island, N.Y. 10305

B.V. Bureau Wijsmuller, Postbus 510, Ijmuiden, Holland

### TURBINES

Camarc Corp., 186 Prescott St., Worcester, Mass. 01605

Nicolai Joffe Corp., P.O. Box 2445, South San Francisco, CA 94080

Terry Corporation, P.O. Box 1200, Windsor, CT 06101

### UNDERWATER SERVICES

Undersea Systems, 112 W. Main St., Bay Shore, N.Y. 11706

### VACUUM LIFT SYSTEMS

DP Way Corp., 3822 West Elm Street, Milwaukee, Wisc. 53209

### VALVES AND FITTINGS

American-Darling Valve, Div. of American Cast Iron Pipe Co., P.O. Box 2727, Birmingham, Ala. 35202

Contromatics Div., Litton Industrial Products, Inc., 222 Roberts St., East Hartford, CT 06108

Demco, Inc., P.O. Box 94700, Oklahoma City, Okla. 73109

Flexitallic Gasket Co., 5 Linden Street, Camden, N.J. 08102

Leslie Company, 399 Jefferson Road, Parsippany, N.J. 07054

Marine Moisture Control Co., 449 Sheridan Blvd., Inwood, N.Y. 11696

Mechanical Marine Co., 900 Fairmount Ave., Elizabeth, N.J. 07027

Stow Manufacturing Co., 86 Bump Road, Binghamton, N.Y. 13902

Valve Services Corp., 266 54th St., Brooklyn, N.Y. 11220

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Gearmatic Co., Ltd., 7400 132nd St., Surrey, B.C., Canada

Markey Machinery Co., 79 South Horton St., Seattle, Washington 98134

Skagit Corporation, a subsidiary of The Bendix Corporation, Sedro-Woolley, Washington 98284

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Anixter Bros., Inc., 4711 Golf Road, One Concourse Plaza, Skokie, Illinois 60076

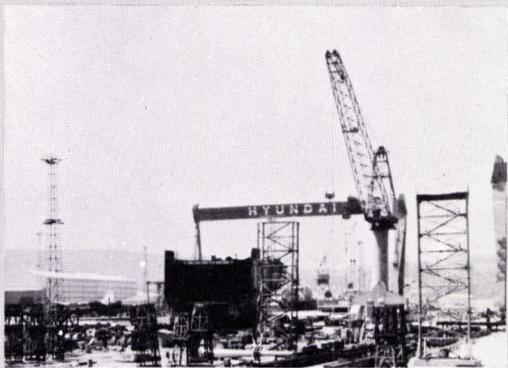
Elkan Electric Cable Co., 248 Third St., Elizabeth, N.J. 07206

### WIRE ROPE—Slings

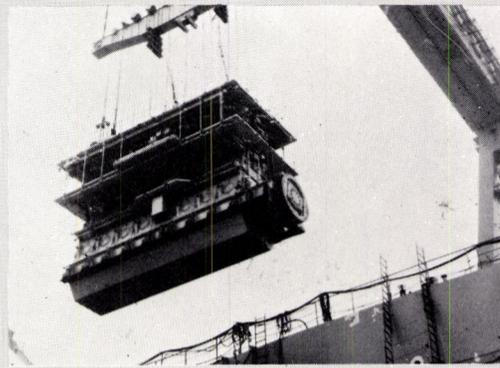
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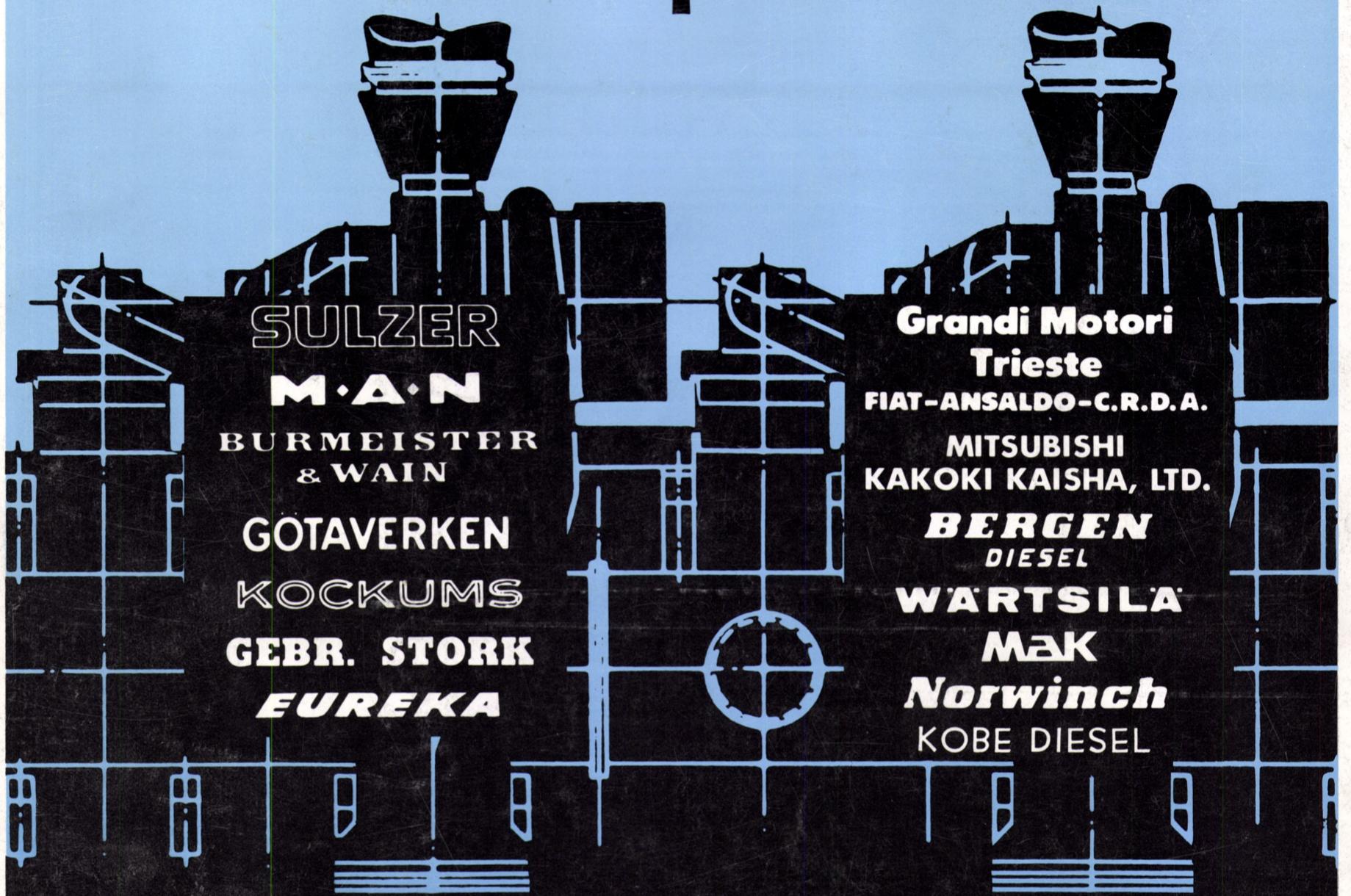
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