

MARITIME REPORTER

AND
ENGINEERING NEWS

JOHN J. O'MALLEY
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BELLEROSE, N.Y. 11426

MC



**Addition Of Tanker Exxon Galveston
Increases The Exxon Company, U.S.A.
Ocean Fleet To Eighteen Vessels**

(SEE PAGE 11)

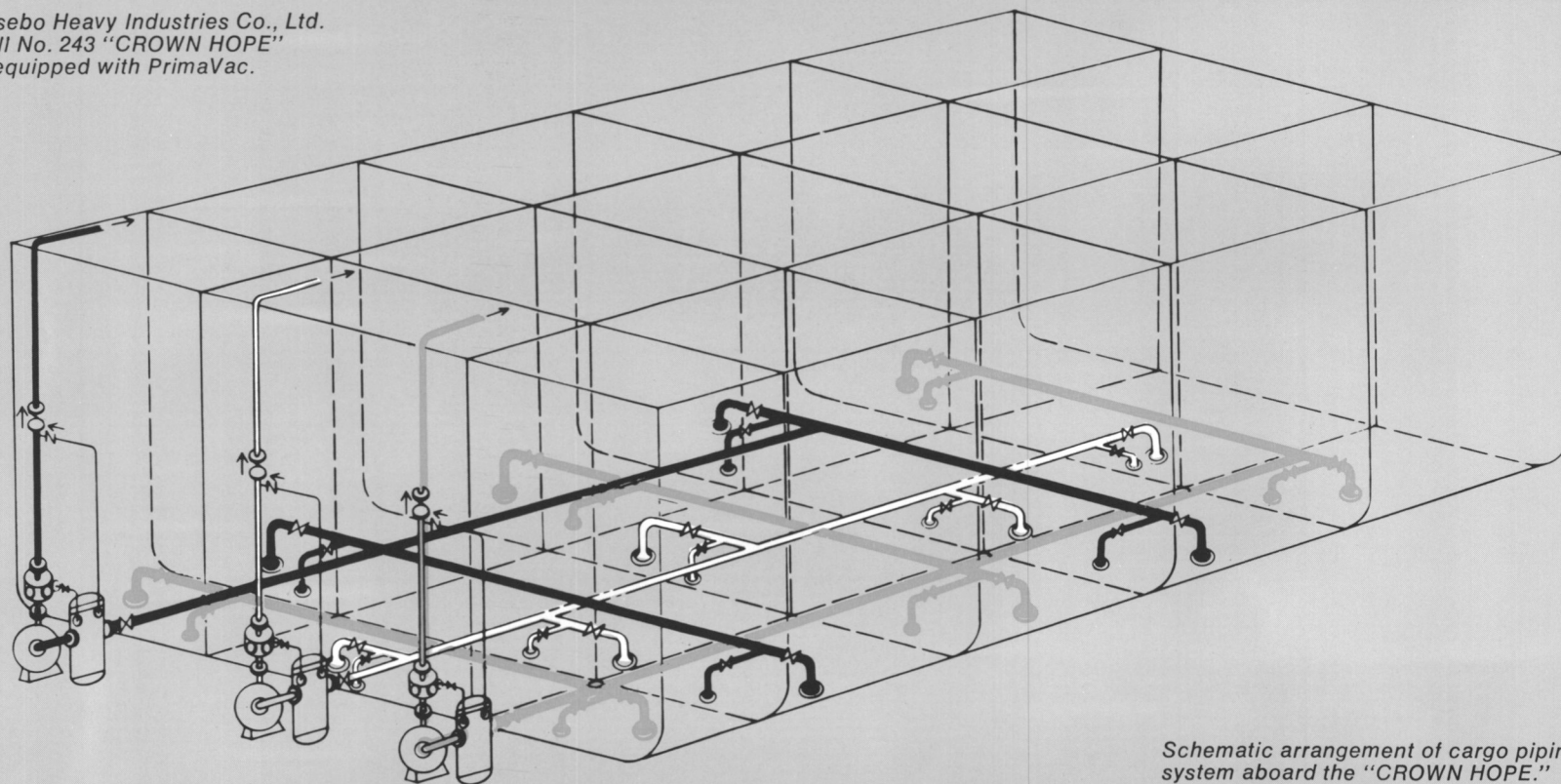
JULY 15, 1978



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*Schematic arrangement of cargo piping
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MarAd Approves Increase For Liberty Bell Tugboats

Deputy Assistant Secretary Samuel B. Nemirow has reconfirmed the March 9, 1976, approval in principle of an application of Liberty Bell, Inc., New Orleans, La., for a Title XI guarantee to aid in financing the construction of two oceangoing tugboats, and has approved an increase in the actual cost of the vessels. Originally scheduled for delivery in 1977, the 7,000-hp oceangoing tugboats now are expected to be delivered in June and July 1979.

The maximum amount of the guaranteed obligations for the two vessels has been increased from \$6,116,250 to \$7,778,365. This represents 87½ percent of the estimated actual cost of the vessels. The vessels are designed to be used for marine construction purposes and have employment potential in the commercial ocean-towing business.

Modern Marine Power, Inc., Houma, La., will build the vessels.

Increased Cost Of Tug/Supply Vessels Approved By MarAd

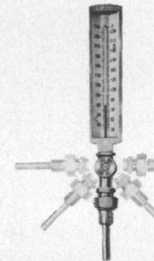
The Deputy Assistant Secretary, U.S. Department of Commerce, Maritime Administration, has approved increases in the actual costs of three ocean tug/supply vessels financed with the aid of Title XI mortgage guarantees. The increases are the result of construction delays, additional escalation resulting from employee raises at the shipyard, and various changes, extras and owner-furnished items.

The three vessels—the Ocean Fin, Ocean Tarpon, and Ocean Bonita—are part of a group of eight being built for Ocean Marine Services, Inc. Guarantee closings already have been held for the other five vessels.

The maximum amount of the guaranteed obligations for the three tug/supply vessels has been increased by \$2,198,014 to \$14,132,337. That guarantee represents 87½ percent of the estimated actual cost of the vessels.

The shipowner has indicated that the vessels will be placed in operation off the East Coast of the United States.

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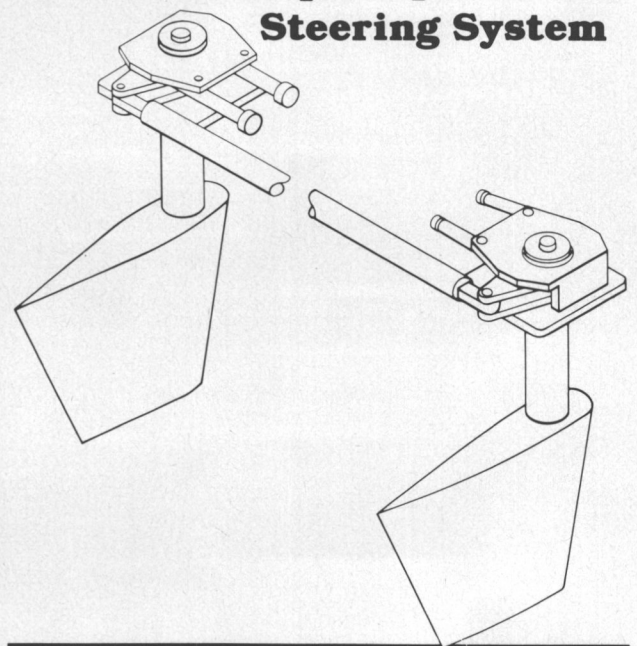


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No. 14

Volume 40

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

(212) 689-3266, 3267,
3268, 3269

ESTABLISHED 1939

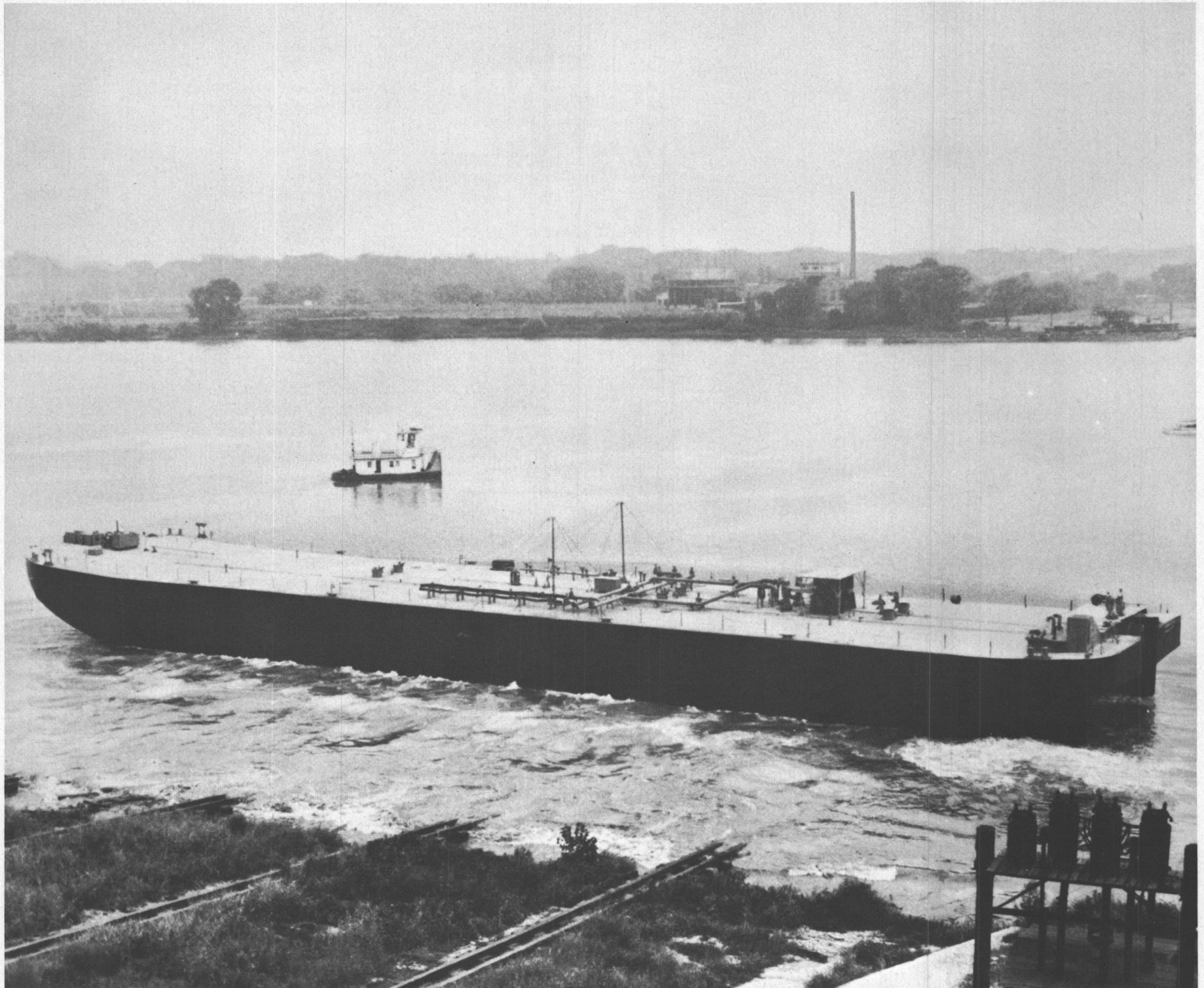
Maritime Reporter/Engineering News is published the 1st and 15th of each month by Maritime Activity Reports, Inc. Controlled Circulation postage paid at Waterbury, Connecticut 06701.

Postmaster send notification (Form 3579) regarding undeliverable magazines to Maritime Reporter/Engineering News, 107 East 31st Street, New York, N.Y. 10016.

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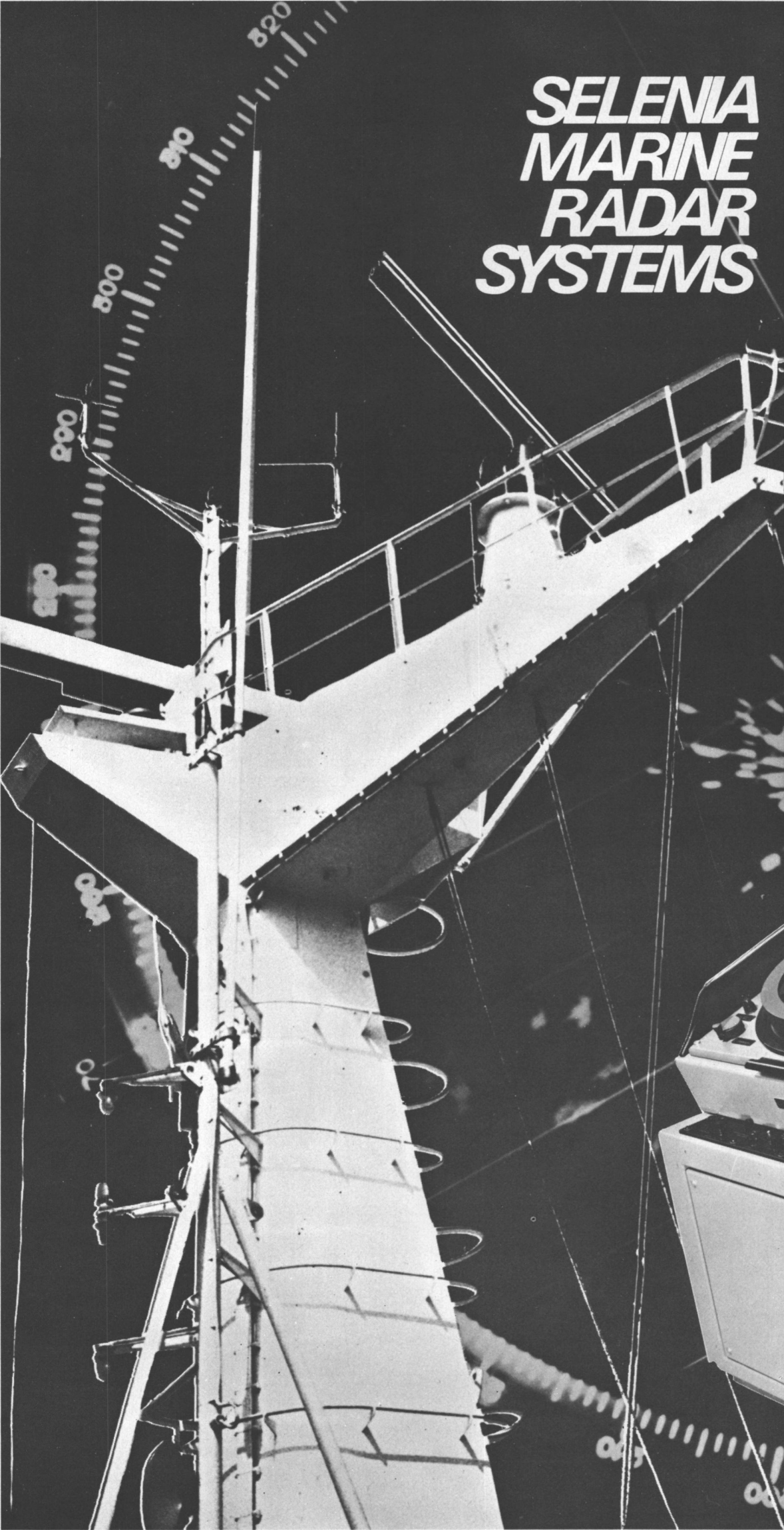
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Harry Kendall Joins Lips Propeller Works



Harry Kendall

Harry Kendall has joined Lips Propeller Works and will act as their marine consultant on the Great Lakes. Mr. Kendall has over 16 years' experience in the field of controllable-pitch propellers and bow thrusters, and is widely known on the Great Lakes for his contributions to the development of improved propulsion and maneuvering systems.

Bethlehem Beaumont Yard Receives Drilling Rig Contract From Marlin

Marlin Drilling Co., Inc. has awarded Bethlehem Steel Corporation's Beaumont, Texas, shipyard a contract for construction of a new independent leg jackup drilling rig.

The new rig, to be named Marlin No. 14, is scheduled for delivery in August 1979, becoming Marlin's 10th offshore rig.

In announcing the award, Sherman Perry, general manager of the Beaumont Shipyard, said that he expects the contract to provide employment for approximately 225 additional employees.

The four-legged jackup will be capable of drilling wells to 30,000 feet in depth while operating in offshore water depths from 12 feet to 150 feet. The substructure will feature a cantilevered drill floor allowing the contractor to position the rotary and derrick as much as 45 feet astern of the rig's hull. This capability offers the added advantage of being able to cantilever over existing production platforms to drill developmental wells.

The rig will structurally consist of a buoyant hull 145 feet long by 150 feet wide. Four cylindrical columns passing through the platform support the rig on location and provide the means for jacking the platform above offshore waters. The unit offers a normal moving draft of 15 feet and on-board living accommodations for 56 persons.

Located in Houston, Texas, with operations offices in Lafayette, La., and Natal, Brazil, Marlin Drilling, headed by George B. Grafton, president, is currently operating two tenders, three platform rigs, three jackups, one semisubmersible, and one land rig, with three under construction.

Northwest Marine Gets \$2.67-Million Drydock Contract From IHI

Northwest Marine Iron Works of Portland, Ore., has been awarded a \$2.67-million contract by Ishikawajima-Harima Heavy Industries Co., Ltd. of Japan for outfitting and testing of the Port of Portland's new drydock #4.

The contract award made by IHI was announced by Jim Butler, vice president and general man-

ager of Northwest Marine Iron Works' Marine Division.

The contract includes removing temporary enclosures and accessories required during the towing of the drydock from IHI's shipyard in Japan to Portland. It also includes installation of pumps, connection of electrical equipment and operational testing.

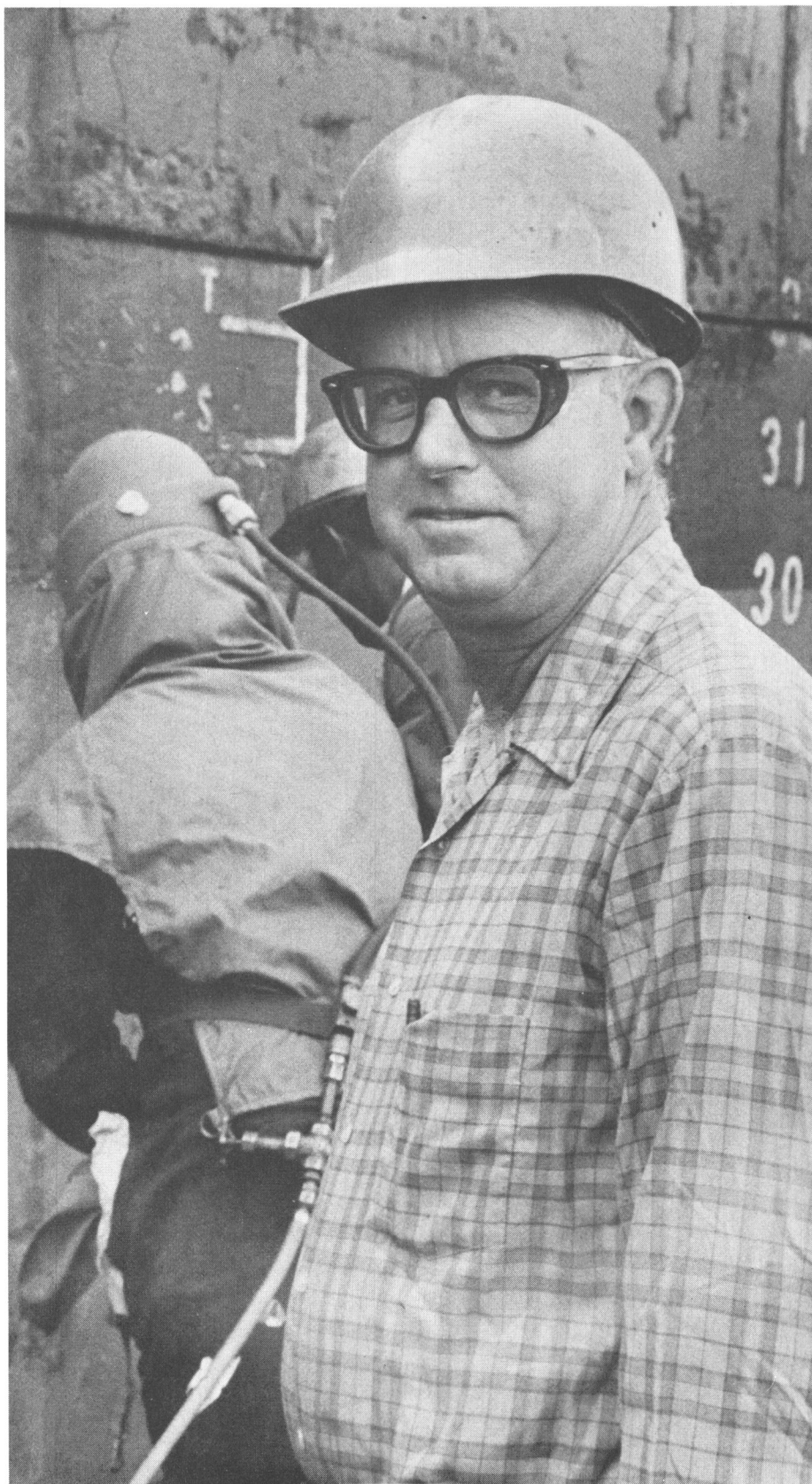
Construction of the drydock is on schedule, according to an IHI spokesman. The drydock will be launched on August 8, and will

arrive in Portland on October 1. Northwest Marine Iron Works' contract calls for completion of its work by January 1.

The drydock, which will be the largest on the West Coast and one of the largest floating drydocks in the world, will be 990 feet in length and 185 feet in width.

Northwest Marine Iron Works, one of Portland's primary ship repair and conversion companies, will be one of the main users of the new drydock.

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Moran Towing And Crowley Maritime Form Ocean Salvors

Two leading tug firms in the United States, Moran Towing Corporation of New York, N.Y., and Crowley Maritime Corporation of San Francisco, Calif., have announced the formation of Ocean Salvors Company (OSC), a joint

venture, to provide marine salvage, oil pollution control, wreck removal and ocean engineering services on a worldwide basis.

Thomas E. Moran, president of Moran Towing, and Leo L. Collar, executive vice president of Crowley Maritime, stated that Peter S. Barracca, who formerly headed the Merritt Division of Murphy Pacific Marine Salvage Company, became president of the company

effective July 1, 1978. Mr. Barracca served as an officer in the United States Coast Guard, and was a marine salvage executive with the Merritt-Chapman & Scott Corporation prior to joining Murphy Pacific.

Ocean Salvors Company will initially station salvage/oil pollution strike teams in Miami, Fla., and Hampton Roads, Va. These stations will be equipped with an

improved model of the Coast Guard-type ADAPTS pumping units, conventional salvage pumps, air compressors, beach gear, diving equipment and other salvage and oil pollution gear. The equipment will be palletized and loaded on trailers for quick movement by air, ship or truck, to the scene of a casualty. Each strike team will be headed by an experienced salvage master, and includes a salvage foreman, pump engineer, diver and oil pollution specialist.

Moran operates tugs ranging up to 6,000 horsepower in ports from Texas to New England, as well as coastwise and in Puerto Rico. Crowley operates worldwide, but in the Gulf and Caribbean alone maintains a fleet of 26 tugs, mostly in the 9,000-horsepower class, together with a fleet of 23 oceangoing barges. These tugs regularly operate from the southern United States to Puerto Rico, Venezuela and the Dominican Republic, providing substantial salvage coverage in the Gulf and Caribbean. Ocean Salvors will have priority call on all the assets of both organizations to provide salvage and oil pollution services unmatched anywhere in the world.

Pending outfitting of the company's New York City offices at Two World Trade Center, the headquarters staff will be located in the offices of Moran Towing Corporation, One World Trade Center, Suite 5335, New York, N.Y. 10048. Around-the-clock dispatching services will be provided by the Moran operations group.

Excess Insurance Appoints CMI, Inc.

The Excess Insurance Company, Ltd. of London, England, has appointed Capacity Managers International, Inc. of New Jersey as its agent for excess casualty insurance in the U.S., according to William Griffiths, director of the company.

Capacity Managers International, Inc. (CMI) is a managing general agency which, together with its subsidiary companies in New York, N.Y., Chicago, Ill., and Los Angeles, Calif., also operate as Excess and Surplus Lines brokers.

In making the announcement, Mr. Griffiths stated the "Excess Insurance Company is particularly pleased to have established a relationship that promises a broad underwriting base that reaches across the continent."

James P. Craig, president of the agency, was joined by Daniel F. Maher, executive vice president, in noting that "the entry of the Excess Insurance Company into the U.S. specialty casualty market is one of the most significant demonstrations of new support in the past three years for a sector of our industry whose capacity problems are legion."

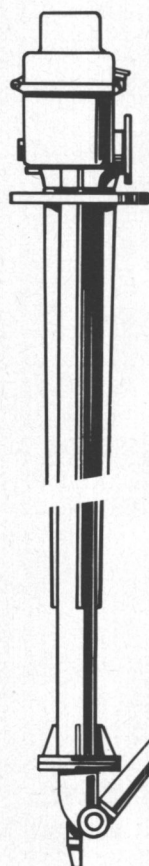
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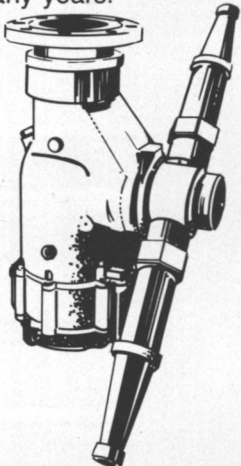
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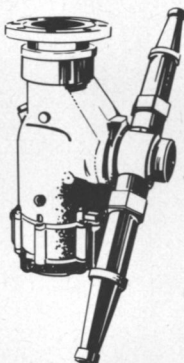
Twin nozzle medium/high capacity washer suitable for oil or water washing. Proven in operation over many years.



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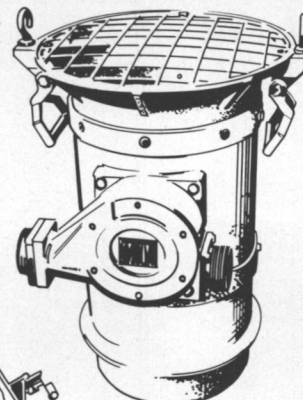
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Amerada Hess To Build Five Tug-Barge Tankers —Total Cost \$249 Million

Amerada Hess Corporation, New York, N.Y., on behalf of five wholly owned subsidiaries to be designated later, has applied for a Title XI guarantee to aid in financing the construction of five "CATUG" integrated tug-barge tanker units.

Each unit will have a capacity of about 47,000 deadweight tons. The applicant indicated they either will be bareboat chartered to an affiliate of, and operated by, Apex Marine Corp., or will be managed and operated by the shipping personnel of the applicant.

Estimated actual cost of the five units is \$249 million, of which the applicant would finance \$175 million with guaranteed bonds or notes. A shipbuilder has not been selected.

The application states that the vessels will be used in the domestic and foreign commerce of the United States.

ICHCA Elects Murdoch To Succeed Holubowicz

At a June meeting of the International Council of the International Cargo Handling Co-ordination Association (ICHCA), held in Amsterdam, the Netherlands, **Peter Murdoch**, director of Small Ports and Operational Services, British Transport Docks Board, and chairman of ICHCA U.K., was elected chairman of the executive board and council of the Association. Mr. Murdoch, who was first associated with ICHCA in 1971, has spent his entire career since 1946 in the ports industry and has had wide experience of operational matters. He has held a number of senior management appointments at BTDB, including chief commercial manager and manager of the ports of Grimsby and Immingham. Mr. Murdoch replaces **Ray Holubowicz**, chairman and managing director of Marine Ventures Ltd., who had agreed at the Melbourne General Assembly in April 1977 to remain as chairman for one further year only. He steps down because of increasing private business commitments but will remain on the board.

The International Council thanked Mr. Holubowicz for the leadership and support which he had given to the Association over the years, and hoped that he would continue to give ICHCA the benefit of his experience. Mr. Holubowicz, in response, said that he had had a long but interesting term as chairman, and he felt that he had left the International Cargo Handling Co-ordination Association in good heart and well prepared to move into the next phase of its existence.

In his view, ICHCA, as a voluntary body comprised of orga-

nizations and individuals in 90 countries, could not be responsible for direct action in the cargo handling field, but could and would continue to play a vital role in acting as a disseminator of information and as a point where future policies could be crystalized sufficiently to give a lead to industry.

Mr. Holubowicz was particularly pleased to note that in the past year the Association had made progress in its policy of dissemi-

nation of information by the publication of the "Information Access" series of documents, the most important of which was the Quarterly Cargo Handling Abstracts, Issue No. 2 which had just been published.

He went on to say that the publication of "Ro-Ro Shore and Ship Ramps — An ICHCA Survey," which encompasses details on over 1,000 ramps, would assist the working party set up by the

International Standards Organization to crystalize the industry's views on the harmonization of the ship/shore interface in ro/ro operations.

Mr. Holubowicz concluded by thanking his colleagues on the International Council for their support during his years of office. He also paid tribute to the Central Office staff for their efforts in implementing the Council's policies.

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**Fred W. Beltz Jr.
Elected Vice President
DeLaval Turbine Inc.**

Donald T. Bixby, president, DeLaval Turbine Inc., announced that **Fred W. Beltz Jr.** was elected vice president by the board of directors on May 24, 1978.

A 29-year DeLaval veteran, Mr. Beltz has served in a number of assignments within the organiza-

tion. Prior to his appointment in 1970 as the general manager of DeLaval's Condenser and Filter Division, Florence, N.J., Mr. Beltz had served five years as manager of the Service and Repair Department at the Turbine Division. On January 1, 1978, DeLaval consolidated its Energy Products Divisions in Trenton, N.J., and Mr. Beltz was selected as general manager of the newly formed Turbine and Compressor Division. In con-

junction with the consolidation, Mr. Beltz will direct a \$24-million program for new facilities and machinery. The program is scheduled for completion by 1980, with \$8 million slated for 1978.

Mr. Beltz recently served as the president of the Heat Exchange Institute (HEI), which is an association composed of the major manufacturers of heat exchangers for the utility industry. The "standards" established by the

HEI are recognized throughout the engineering world.



Fred W. Beltz Jr.

The Philadelphia Section of The Society of Naval Architects and Marine Engineers (SNAME) recently elected Mr. Beltz as its chairman for 1977-78. Mr. Beltz, who has been active in the Society since 1944, is the latest in a long series of DeLaval vice presidents to be elected to the Philadelphia chairmanship, starting with Hans G. Bauer in the early '50s, followed by Ivan Monk, Barton B. Cook Jr., and now Mr. Beltz.

**Pouch To Succeed
Shields As President
Barber Steamship Lines**

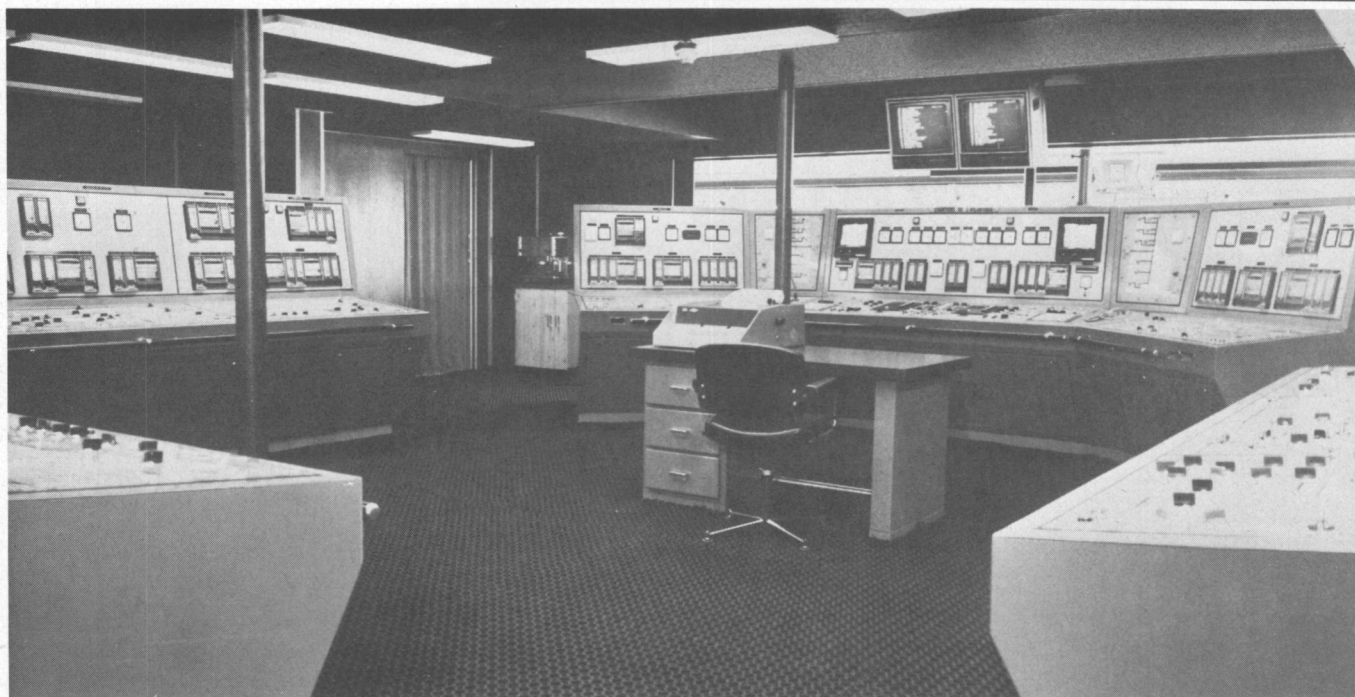
E.J. Barber, chairman of the board, Barber Steamship Lines, Inc., New York, N.Y., has announced the appointment of **Robert H. Pouch** as the next president of Barber Steamship Lines, and as a member of the board of directors.

Mr. Pouch will succeed William J. Shields, who will be retiring October 31, 1978, after 50 years of service with Barber Steamship Lines and its subsidiary companies. Mr. Shields will remain on the board of Barber Steamship Lines, Inc. after his retirement as president.

Barber Steamship Lines was founded in 1883, and was a pioneer in the USA to Far East trade, with the company being the first to offer regular sailings via the Suez Canal. This service, which now operates under the trade name Barber Blue Sea, is a joint venture of Wilh. Wilhelmsen, Ocean Transport & Trading Co., Ltd., and the Brostrom Group.

In addition, Barber Steamship Lines acts as agent for Atlantafrik Express Service, Nordana Line, Barber Line and East Asiatic Company.

Mr. Pouch is a graduate of the Maine Maritime Academy and has served in the merchant marine and the U.S. Navy. Prior to joining Barber, he served as senior vice president of United States Navigation, Inc. He is currently a director of Pouch Terminal, Inc., a member of the board of managers of the Y.M.C.A. of New York Seamen's House, and holds elected office as Deputy Mayor and Trustee of Irvington, N.Y., where he resides with his wife and two children.



From turbines to cargo Foxboro controls the Batillus

The Batillus, recently delivered from the Chantiers de l'Atlantique yard, is the first of a series of four 550,000 DWT ultra-large crude carriers of Societe Maritime Shell and Compagnie Nationale de Navigation. And the control systems for the steam turbines that power these giant ships are supplied by Foxboro.

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FOXBORO

Newport News Shipbuilding Delivers Converted Tanker Exxon Galveston



Powered by two 3,500-hp General Motors Electro-Motive diesels, the twin-screw Exxon Galveston was converted from a tug-barge unit to a tanker at Newport News Shipbuilding and Drydock Company.

The tanker Exxon Galveston, the newest addition to the Exxon Company, U.S.A. ocean fleet, was christened on June 10 at the Port of Galveston, Texas.

Mrs. W.T. Slick Jr., wife of a senior vice president of Exxon Company, U.S.A., broke the traditional bottle of champagne during the christening ceremony.

The Exxon Galveston is 552 feet long, 95 feet wide, and has a displacement of 27,240 dead-weight tons at a full-load draft of 29 feet 6 inches, and was formerly the tug-barge unit Exxon Sunshine State/Port Everglades, which was constructed in 1970 by Gulfport Shipbuilding. The conversion to a tanker was completed by Newport News Shipbuilding and Drydock Company, Newport News, Va., earlier this year.

The new twin-screw tanker is powered by two 3,500-hp General Motors Electro-Motive diesel engines driving through air clutch reversing reduction gears. Maneuvering capabilities are electro-hydraulic by two steering rudders and four flanking rudders. The vessel is automated for pilothouse operation of the propulsion system. The engineering plant was designed for automation and monitoring systems meeting U.S. Coast Guard and American Bureau of Shipping requirements for unattended engine-room operation.

The cargo-handling system includes two independent tank gauging systems, overflow alarms and piping systems which automatically distribute any overflows into adjacent tanks. The vessel also has a segregated ballast system which meets the latest U.S. Coast Guard requirements. Special mooring and cargo-handling systems enable the ship to tie up

to a permanently moored offshore storage vessel and load cargo through a floating cargo hose.

The communications equipment is the latest, consisting of radio telegraph, single-sideband radio-telephone, several VHF radio-telephones, and UHF radio. Navigation equipment includes the latest type dual radars, a computerized collision-avoidance system, radio direction finder and Loran C navigation, and dual Fathometer.

The living accommodations provide housing for 24 crew members, with a central galley serving separate mess areas for the officers and crew. Lounges with television, a stereo tape deck system, and electronic video cassette players are adjacent to the officer and crew mess areas. All living spaces are air-conditioned.

Addition of the Galveston increases the Exxon Company, U.S.A.'s ocean fleet to 18 vessels.

New Coatings Brochure Available From Sigma

Sigma Coatings, worldwide manufacturer and distributor of paint and coatings for marine and industrial use, has recently published a new 12-page four-color brochure describing the company's extensive line of coatings for every marine application. Sigma Coatings are manufactured in over 20 countries, and the company has established an international network of over 200 stock and supply centers in key areas throughout the world. For your free copy of this new Sigma brochure, "Symbol of Protection," write to **Charles A. Gardiner**, Sigma Coatings, Inc., Suite 2802, 19 Rector Street, New York, N.Y. 10006.

MarAd Approves Noble-National Title XI Guarantee

The Deputy Assistant Secretary, U.S. Department of Commerce, Maritime Administration, has approved in principle the application by Noble-National Joint Venture, 1924 South Utica, Suite 600, Tulsa, Okla., for a Title XI guarantee to aid in financing the construction of a shallow-water jackup drilling rig. Noble-National is a partnership between Noble Drilling Corporation (same address) and National Enerdrill

Corporation of Houston, Texas, and Elizabeth, N.J.

The rig will be capable of drilling in a minimum water depth of 10 feet and a maximum depth of 45 feet. It will be used in the Gulf of Mexico and other coastal or inland domestic waterways. The vessel will be 160 feet in overall length.

The drilling rig is being built at Bethlehem Steel Corporation's Beaumont, Texas, shipyard. Delivery is expected about January 1979. The estimated Title XI guarantee is \$11,256,000, which represents 75 percent of the estimated actual cost of the vessel.

Matton Shipyard Delivers The Michael Turecamo —Latest Addition To The Turecamo Fleet



Powered by two 12-cylinder EMD 645-E2 diesels producing 2,900 shp, the 105-foot Michael Turecamo will be employed in offshore towing.

Matton Shipyard Co., Inc. recently delivered the tugboat Michael Turecamo to her owners, Turecamo Coastal & Harbor Towing Corp., New York, N.Y., in a brief ceremony at Cohoes, N.Y. The Michael is now engaged in coastwise towing from the Port of New York.

The 105-foot vessel is powered by two 12-cylinder EMD 645-E2 diesel engines with Lufkin 2524RS reverse reduction gears (2.73:1.00 ratio) which produce 2,900 shp and a speed of 15 knots.

Electrical power is provided by two 75-kw Delco generators driven by 6N71 Detroit Diesel engines.

A standby 30-kw Delco generator powered by a 2N71 Detroit Diesel is also provided. A hydraulic capstan provided by New England Trawler is capable of a 12,000-pound bollard pull. The hydraulic steering gear was built by Teneford.

There are three firefighting stations, two deckboxes and a turret on the pilothouse top. Water is supplied by a Pacific Pump centrifugal pump capable of 500 gpm at 125 psig. A foam system by

National Foam is connected to the fire system. A 975-gallon foam storage tank is built into the engine room.

A central feature of this boat is a complete automation system designed by Hose-McCann, which alerts the crew to potential problems. The system also allows the two main engines and two main generators to be started and stopped from one of three locations—the pilothouse, the control room, or the engine room.

Navigation and communication features include a Decca Pilot 750 autopilot steering control, a Decca Loran C navigation system, Decca 110 and 914 radars, an Elac depthfinder, Motorola / Modar VHF and SSB radios, a Danforth Loudhailer, and a Benmar ADF radio direction finder.

For the comfort of the crew, all living quarters including the galley, the pilothouse, and the control room are air-conditioned and heated with individual thermostats for each room.

The Michael was designed by Merritt Demerest and is classed by ABS for + A-1 Ocean Towing Service.

Shipyard President Named Maritime Man Of The Year

Cecil M. Keeney, president and chief executive officer of Equitable Shipyards, Inc., has been named the 1978 Maritime Man of the Year in New Orleans, La.

The prestigious award is granted annually by The Propeller Club, Port of New Orleans, to honor a local maritime industry official who has contributed to increased trade at the port.

Mr. Keeney received his award at the Maritime Day Banquet, which was held at the Fairmont Hotel in New Orleans on May 20, 1978.

Under Mr. Keeney's direction, Equitable has been a major factor in developing the maritime industry in Louisiana.

About 30 percent of the marine equipment and vessels built by Equitable are exported through the Port of New Orleans.

Continuous marketing by Mr.

Keeney and his staff has resulted in an increase of tonnage through the port to foreign markets.

Equitable, the leader in production of barges for barge-carrying vessels, has produced thousands of lighters now in service at the port.

Equitable has contracts amounting to about \$70 million worth of work, including two ferries for the City of New York, three breakbulk cargo vessels for American Atlantic Shipping, Inc., oil

barges exceeding 200 feet in length, and a 150-foot ferry for the State of Louisiana.



Cecil M. Keeney

Mr. Keeney, who has been with Equitable since May 1970, was graduated from the University of Kentucky with a degree in mechanical engineering. He later completed graduate studies in engineering, powerplant and nuclear design at the University of Maryland, and George Washington University.

Saudi Arabia Awards \$120 Million In Contracts To United Technologies

The Power Systems Division of United Technologies Corporation, Farmington, Conn. 06032, has announced the receipt of more than \$120 million in contracts from the Government of Saudi Arabia. Under the contracts, PSD will supply all of the drive systems for the East-West PetroLine, a 750-mile oil pipeline that will span Saudi Arabia from the Arabian Gulf to the Red Sea.

PSD president Rolf D. Bibow said the agreement with the Saudi Arabian General Petroleum and Mineral Organization (PETROMIN) is the largest in the division's history. It calls for the supply of 33 FT4 Modular Industrial Gas Turbines and all ancillary equipment, as well as full systems engineering and all spare parts.

PSD is a major international designer and supplier of power systems for electric utility, industrial and marine uses.

Red Fox Marine Sanitation Device Brochure Available

With Government regulations causing growing interest in marine sanitation devices, Red Fox Industries has prepared a semi-technical, informative brochure about its Type II MSD product line. Of special interest is the fact that Red Fox devices exceed EPA standards, Coast Guard requirements and IMCO requirements. With models to accommodate crews from two to 2,500, Red Fox marine sanitation devices have eliminated the need for periodic sludge removal and/or back flushing.

To receive a free copy of this booklet, write Beldon Fox Jr., Red Fox Industries, Inc., P.O. Drawer 640, New Iberia, La. 70560.

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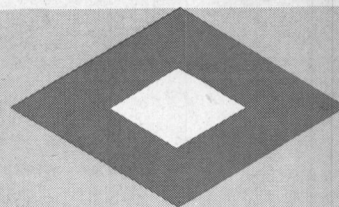
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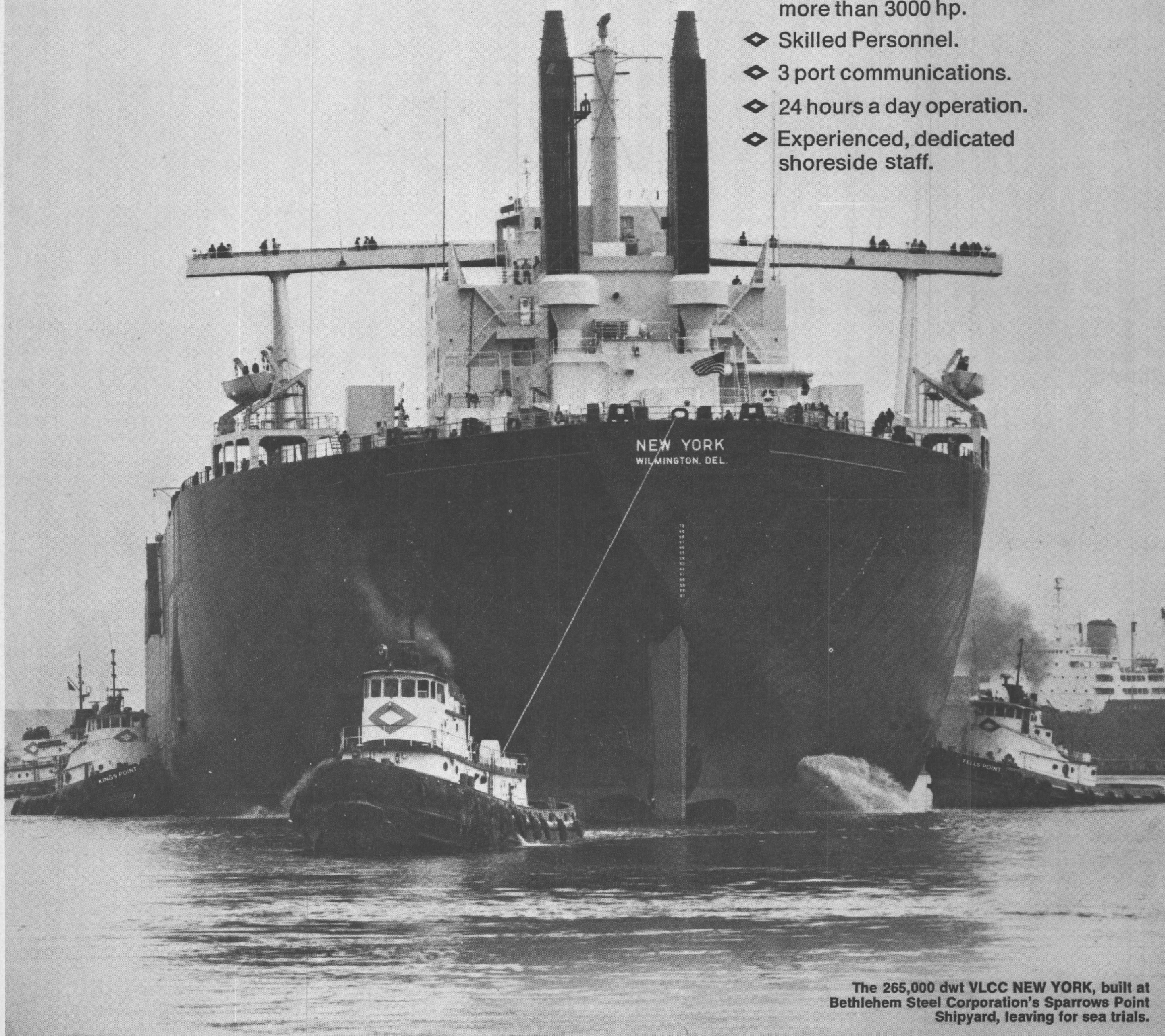
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The 265,000 dwt VLCC NEW YORK, built at Bethlehem Steel Corporation's Sparrows Point Shipyard, leaving for sea trials.

Ashland Petroleum Names Rupert Belt

Rupert D. Belt has been named Gulf Coast manager of inland waterways transportation, according to G. Ward Disbrow, vice president of marine transportation for Ashland Petroleum Company.

Mr. Belt's responsibilities include negotiating and coordinating barge movements in the Gulf Intracoastal Waterway for Ashland Petroleum and its divisions.

The Tolu, Ky., native joined Ashland in 1955 as a laboratory analyst at its Catlettsburg, Ky., refinery. Prior to his recent promotion, he was vice president of TPT, a contract shipper of bulk liquids, in Freedom, Pa. He has transferred to Houston, Texas.

A graduate of the University of Kentucky, Mr. Belt earned his master's degree from the University of Michigan.

Ashland Petroleum is the largest operating division of Ashland Oil, Inc.

Blount Delivers Passenger/Vehicle Ferry For Run Between New London And Fisher's Island



The 132-foot Munnatawket is powered by two General Motors diesels, and attained a speed of 12 knots on trials.

Blount Marine Corporation of Warren, R.I., has announced the delivery of the Munnatawket, a passenger/vehicle ferry designed and built for the Fisher's Island Ferry District.

The Ferry District is an authority of the State of New York, administrated by an elected Board of Commissioners. Raymond F. Doyen, chairman of the District, accepted the vessel at ceremonies held at Fisher's Island. Officials of the Town of Southold, L.I., spoke at the ceremonies attended by most of the Island's residents. While the winter population is rather small, the Island, formerly the site of Fort Wright, boasts an extensive summer colony.

The Munnatawket's name was chosen by Islanders since it is the name Indians gave the Island lying at the entrance to Long Island Sound.

The Munnatawket is powered by two General Motors 12V71N diesels, and attained a speed of 12 knots on trials. For extra maneuverability at congested termi-

nals, it is equipped with a Blount-designed Orbitrol Hydraulic Steering System and a Marco Hydraulic-powered Bow Thruster, with power furnished by a General Motors 4-71 diesel located in the engine room.

The 132-foot by 33-foot by 8-foot vessel was built under United States Coast Guard supervision, and is certified to carry 210 passengers and 44 tons of vehicles and freight (3 trucks and 17 cars). During the construction of the vessel, G. Gilbert Wyland of Sparkman & Stevens, Incorporated, acted as owner's representative.

The Munnatawket is the sixth vessel of this class designed and built by Blount, and will join the Blount-built Olinda on the 7-mile run between New London, Conn., and the Island.

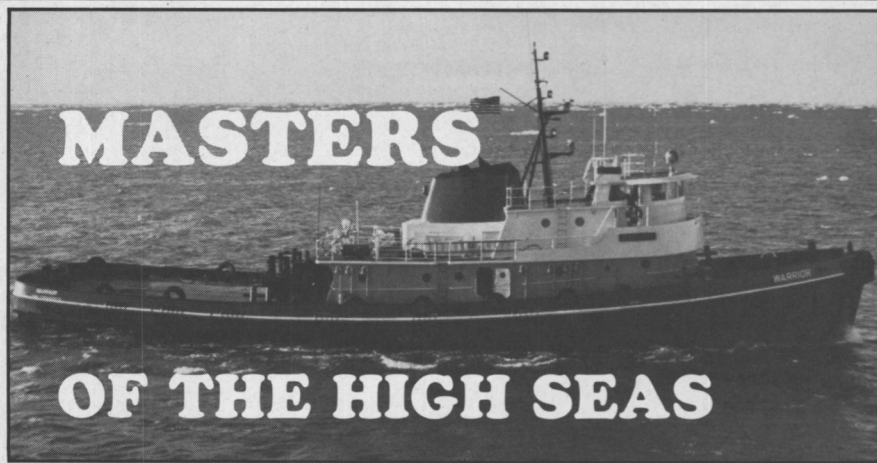
Corps Of Engineers Names Raymond Gabriel Chief Of Procurement

Raymond (Ray) C. Gabriel has been named chief of Procurement and Supply Division for the New Orleans (La.) District, U.S. Army Corps of Engineers, according to Col. Early J. Rush III, district engineer.

As procurement officer, Mr. Gabriel is responsible for carrying out all phases of technical and specialized procurement and supply functions for the New Orleans District.

Mr. Gabriel, a native of Pennsauken, N.J., graduated from high school there. He began his Federal career with the Post Office in Camden, N.J., in 1964. In 1967, he began working for the Philadelphia District of the Corps of Engineers as a procurement assistant.

The new procurement officer transferred to the New Orleans District in 1974 as chief, Procurement Branch. Soon after his arrival in New Orleans, he became chief, Contract Administration Section. In 1977, he was named chief, Contract Branch, and in June 1978 was promoted to chief, Procurement and Supply Division. During his career with the Government, Mr. Gabriel has received numerous awards and commendations.



Crowley Tugs with Markey Deck Machinery

Crowley's tug Warrior and her twenty-four duplicate sister ships, all identically equipped with Markey TDSW-36C diesel towing winches and WYW-20 anchor windlasses,

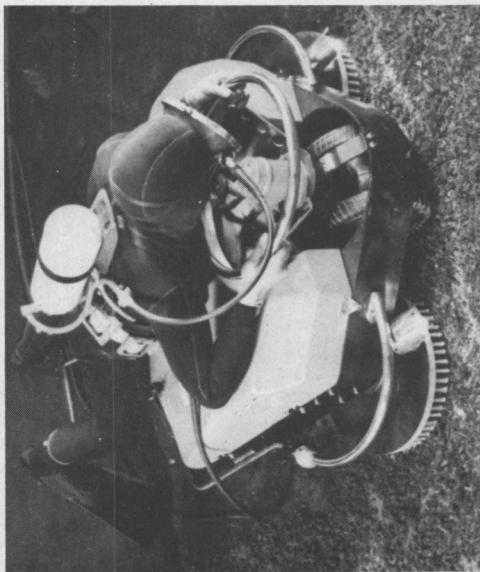
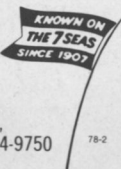
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Hydraulic PHOSMARIN equipment is used in 38 countries and the new semi-automatic package "BRUSH KART", commercialized from 1975, is used in 20 cleaning stations along the major sea lanes, and more BK stations are to come.

The quality of underwater cleaning obtained with BRUSH KART is far better than anything else available: semi-automatic operation ensures a quality standard, nearing perfection, which BK offers alone.

A single diver can clean the VLCCs and ULCCs during very short calls, thanks to the velocity of operation.

Specially designed rotary brushes do not sever the coatings nor does BRUSH KART deprive the weld beads of their protective coats.

Consequently, without any risk of corrosion — corrosion is highly expensive — ship's underwater parts can be maintained afloat during many years thanks to this technology. Brushing can be performed as often as is required to ensure economical trading without speed loss.

the current 'oil and hard cash savings' policy in most countries can only open attractive prospects to this technology, providing cleaning services are offered along the main sea routes throughout the world.

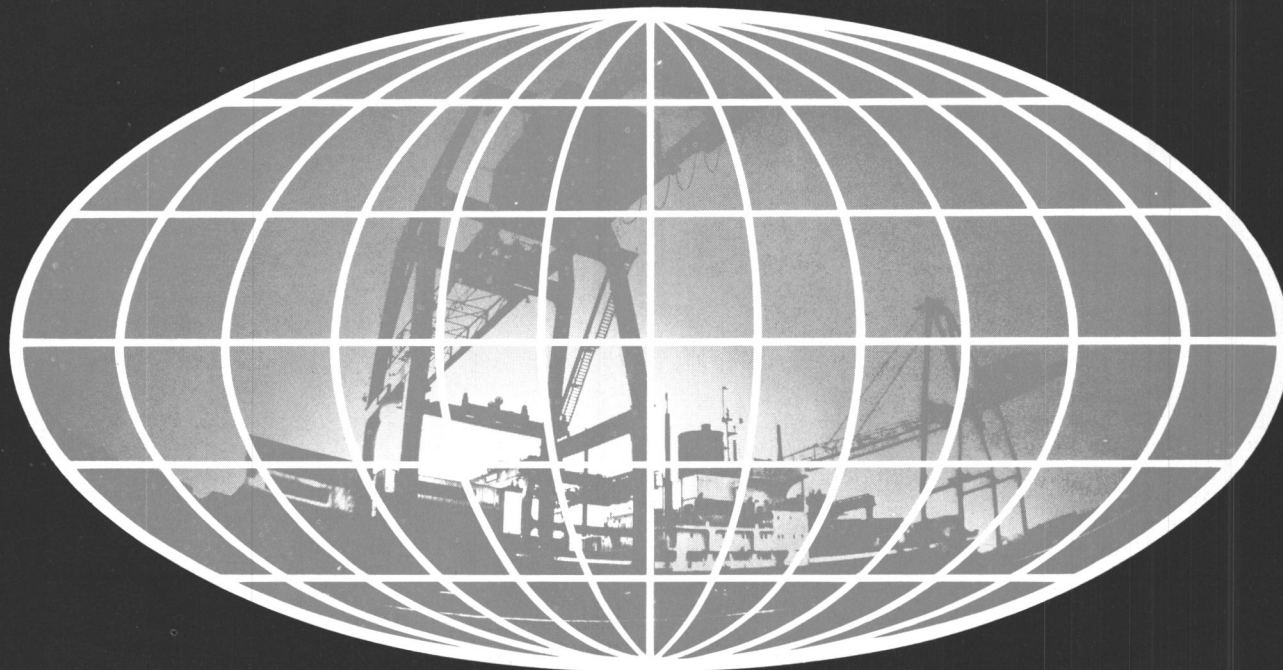
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ASNE And SNAME Pacific Northwest Section Hold Joint Meeting In Bremerton, Washington



Shown at the meeting in the Puget Sound Naval Shipyard are, left to right: Capt. J.K. Nunneley, Commander of the shipyard; M.L. Ingwersen, executive vice president, Lockheed Shipbuilding and Construction, and chairman, ASNE; Marcellus W. Cave, author, Puget Sound Naval Shipyard, and Edward Stewart, secretary-treasurer, Pacific Northwest Section of SNAME.

Approximately 90 members and guests attended a joint meeting of the Pacific Northwest Section of The Society of Naval Architects and Marine Engineers and the American Society of Naval Engineers held at the Commissioned Officers' Mess, Puget Sound Naval Shipyard, Bremerton, Wash., June 8, 1978.

Prior to the meeting, a tour of the Naval Shipyard was experienced by the U.S. citizens, while non-U.S. citizens enjoyed a visit to the battleship USS Missouri, of World War II fame.

Capt. J.K. Nunneley, Commander of the shipyard, welcomed members and guests of both Societies to Bremerton. M.L. Ingwersen, executive vice president, Lockheed Shipbuilding, and chairman of ASNE, also welcomed all SNAME members and guests, and trusted that this would be the forerunner of many meetings to come.

After dinner, a technical paper titled "Use of Air Bearings for Pierside Loading Ramps" was presented by Marcellus W. Cave, mechanical engineer, Puget Sound Naval Shipyard.

In his opening remarks, the author stated that the purpose of this paper was the justification of the selection of air bearings to support a vehicle loading/offloading ramp for waterborne ships, especially an aircraft carrier, which required unloading 700 to 1,000 personal vehicles of the crew necessary for their moving into Bremerton housing to allow the overhaul work to begin as soon as possible. Using the existing method, consisting of a ramp worked by a small crew and crane, unloading time was two days, therefore improvement was mandatory. This was obtained after an analysis of the performance of the following types of bearings: (1) Air or water bearings; (2) Rubber tread casters;

(3) Vibrathane tread casters, and (4) Spherical bearings.

Air bearings were selected on the basis that: (a) They offer practically no opposition to movement in any horizontal direction; (b) They impose much smaller forces on the aircraft carrier than the others; (c) They are fairly inexpensive to purchase (\$1,000 to \$1,500 for a bearing rated at 20,000 pounds), and (d) They are inexpensive to operate (about \$.025 per hour for the above bearing).

In conclusion, the author stated that after the existing steel ramp was modified to accept air bearings, the unloading time was reduced from two days to two hours, with further timesavings expected as more experience was gained. The original goal had been attained.

Copies of the paper can be obtained from the Section Librarian, C.S. Bracken, P.O. Box 24382, Seattle, Wash. 98124.

Tank Ship Fleet Analysis Released

According to the detailed tanker report just published by Sun Shipbuilding and Dry Dock Company, the world tanker fleet continued to grow in 1976 with a 9.6 percent increase in capacity over the previous year. This annual study, "The Analysis of World Tank Ship Fleet," shows that this increase, the smallest in the last nine years, raised the world fleet to a record 5,140 tank ships with a 382.5-million-deadweight-ton (dwt) capacity by the end of 1976.

The tankers operating under the Liberian flag maintained their world leadership with 112.9 million dwt, followed by Japan, United Kingdom, Norway and Greece. Among the leading nations, the United States-flag tanker fleet was in the eighth position.

With the exception of United

Kingdom, all leading nations showed increases under their flag in spite of the accelerated retirement of older tankers during the last two years. Again, Liberia showed the largest increase, with 11 million deadweight tons, followed by Japan, with an addition of almost 3 million tons to her flag fleet. The continued scrappage of the older ships decreased the average age of the world fleet to six years and four months by the end of 1976. Sharp increases in fuel costs since 1973 justified the building of larger and slower tankers. By the end of 1976, recent new shipbuilding had increased the average tanker size to 74,400 dwt, and decreased the speed to 15.7 knots from 15.8 knots of the early 1970s.

As a result of the continued large tanker layups and pessimistic tanker demand forecasts, construction contracts showed an even sharper decline in 1976 than they did the previous year. Tank-

ers under construction contracts or on order totaled 52 million dwt, the lowest tanker orderbook since 1968. More than 23 percent of the newbuilding was contracted by the largest shipbuilder of the last decade, Japan, followed by United States, Sweden, Spain and United Kingdom.

An added feature of the current edition of the Sun Shipbuilding publication is a discussion of the basic aspects of modern tankships, their functional design and typical cargo characteristics. It shows in simple terms the results of the tanker evolution that followed the exploding growth of the trade of liquid fuels.

"The Analysis of World Tank Ship Fleet, December 31, 1976," is the 35th edition of the annual Sun Shipbuilding and Dry Dock publication. It is available for \$15 per copy from Tanker Fleet Analysis, Sun Shipbuilding and Dry Dock Company, P.O. Box 86, Chester, Pa. 19013.

Halter Marine Delivers Two Of Four Supply Boats To Arthur Levy Enterprises



The San Jose Island (shown above) and the Breton Island are ABS classed, Maltese Cross, A-1, AMS Full Ocean Towing, Ice Class "C", carry a Panama Canal Admeasurement Certificate and are U.S. Public Health approved.

Halter Marine Services, Inc., New Orleans, La., has delivered the San Jose Island and the Breton Island, two identical supply vessels, to their owner, Arthur Levy Enterprises, Inc., New Orleans.

Each vessel has an overall length of 185 feet, a 40-foot beam, a 14-foot draft, and a normal operating draft of 12 feet. Their normal displacement is 1,590 long tons.

Both are powered by two EMD 12-645-C diesel engines that produce 1,500 horsepower each at 900 revolutions per minute. Reverse/reduction gearing is Falk 0830 MR with a ratio of 2.968:1. The boats are also equipped with 90-inch-diameter four-bladed stainless-steel propellers and electrohydraulic steering gear from Steering Systems, Inc.

Deck machinery includes an HBL anchor windlass and HBL capstans.

Each contains a Smatco Bulk Mud System with a total capacity of 6,000 cubic feet of dry bulk mud.

Auxiliary equipment includes Delco 98KW main generators driven by Detroit 8V71 diesel engines. Also included is a 29-point engine monitoring alarm system, 10 tons of central air-conditioning and heating, and Quincy air compressors.

Navigation and communications equipment consists of a Raytheon DE-731 depth recorder, two Raytheon 1220/6X radars and a Wesmar DDS600 digital depth sounder with remote display in the captain's cabin. Also included is an RF 448 VHF radio, an RF 220 SSB radio, a DC700 digital compass, a Sperry MK 37 gyrocompass and a Sperry 8T magnetic compass and autopilot.

The San Jose Island and the Breton Island are each equipped with a Bird-Johnson 300-horsepower bowthruster for improved maneuverability during loading and offloading.

Halter Marine Services owns and operates 10 shipyards in the Southeastern United States and is the world's largest builder of offshore supply vessels.

Worthington Pump Appoints H.R. Lemcke



H. Russell Lemcke

H. Russell Lemcke has been appointed vice president, Sales and Marketing, for Worthington Pump Corporation. In this capacity, Mr. Lemcke's responsibilities include the Worthington Pump sales organization in addition to marketing and product planning for the North American region of Worthington Pump.

Mr. Lemcke has more than 16 years' experience in various sales, marketing and engineering positions in the pump industry. Prior to joining Worthington Pump in 1977, he was vice president, sales for S.A. Armstrong Ltd., Toronto, Canada. He has also held key positions at Goulds Pumps and Sun Oil.

Worthington Pump is a leading pump company with 21 manufacturing locations in 13 countries. North American facilities are located in Harrison and East Orange, N.J., Taneytown, Md., Shawnee, Okla., and Brantford, Ontario, Canada. They manufacture pumps for the electric utility and public works, petroleum, chemical and petrochemical, mining, pulp and paper, marine, agricultural and general industries.

Delta Line Combined Fleet Adds New Ports —Executives Named

Delta Steamship Lines, 1700 International Trade Mart, New Orleans, La. 70150, has completed acquisition of Prudential Lines, Inc.'s Latin American services and various vessels, marking the initiation of new Delta services to Latin America from both the U.S. Atlantic and Pacific Coasts. The new combined fleet is comprised of four LASH/container vessels, 16 modern cargoliner and four combination passenger-cargo vessels of the Magdalena class.

Delta, an American-flag steamship line, has been serving the east coast of South America from the U.S. Gulf since the line was founded in 1919. From the Gulf, Delta also serves Central America, the Caribbean and the west coast of Africa.

To these long-established services, the following routes are now added: (a) from U.S. Atlantic Coast ports, Delta will serve ports in Venezuela, Colombia, Panama, Ecuador, Peru, Chile, the Caribbean and Central America; (b)

from U.S. Pacific and Canadian coast ports, express passenger-cargoliner service is offered to Mexico, Panama, Caribbean Islands, Central America, east coast Colombia, Venezuela, Brazil, Uruguay, Argentina, Chile, Peru, Ecuador, and west coast Colombia. Also from the Pacific Coast, express cargoliner serve Mexico, Guatemala, El Salvador, Nicaragua, Costa Rica, Panama, Colombia, Ecuador, Chile and Peru. Capt. J.W. Clark, president of

Delta Line, announced that Delta's West Coast operations will be headed by Albert B. Wenzell, who has been elected a senior vice president of Delta Steamship Lines, Inc., Pacific Division. Other West Coast personnel elected vice presidents of Delta are Messrs. F.E. Waterhouse, J.A. Traina, and W.H. Reich. J.D. Bowe has been elected assistant secretary-treasurer. All of Prudential's former West Coast office locations have been acquired by Delta.

Delta's Atlantic Division will be headed by Capt. Daniel P. Kirby, senior vice president, assisted by H.D. Hunter, vice president, Atlantic Division. Delta's Atlantic Division staff will be substantially expanded by the addition of many experienced former Prudential staff members at New York, Philadelphia, and Miami, including L.A. Viada, also elected a vice president, Atlantic Division.

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Other BUTTERWORTH hose features include...

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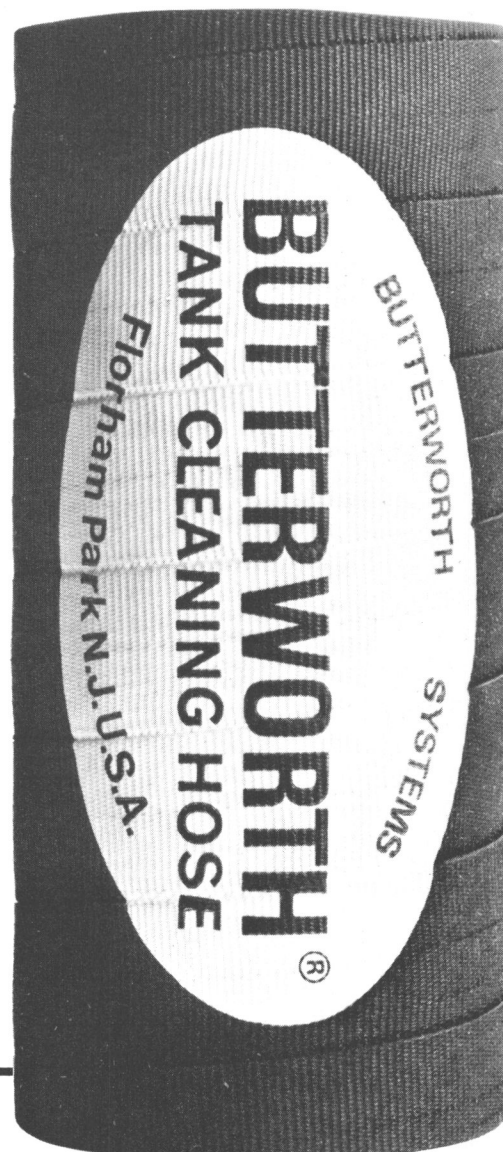
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Systems**

Equitable Shipyards, Inc. Lays Keel For Third 2,000-DWT Breakbulk Vessel For American Atlantic



Keel-laying ceremonies for the third 2,000-dwt breakbulk vessel in a series of three vessels for American Atlantic Shipping, Inc. were held recently by Equitable Shipyards, Inc., at its Madisonville, La., shipyard.

The principals attending the keel-laying ceremonies as identified in the photo above were, left to right: **Larry Hairston**, director of engineering, Equitable; **Frank Fleischer**, Maritime Administration; **Ms. Cheryl Lowe**, project engineer, Equitable; **Frank Bradley**, superintendent of engineering, American Atlantic Shipping; **Olin Edwards**, Deputy Director, Central Region, Maritime Administration; **Ron Rasmus**, executive vice president, American Atlantic Shipping; **Norman Hodge**, general manager, Equitable, Madisonville; **Rick Spillman**, assistant to director of vessel planning, Moore-McCormack; **Bill Gif-**

ford, Moore-McCormack resident inspector, and **W.H. Livingston**, vice president-marketing, Equitable.

Equitable was awarded the contract on May 6, 1977, by American Atlantic Shipping, Inc., to construct three identical 2,000-dwt breakbulk vessels under Maritime Subsidy Board U.S. Department of Commerce Contract MA/MSB-399, MA Design C1-M-122a.

Equitable is a wholly owned subsidiary of Trinity Industries, Inc., a Dallas, Texas-based manufacturer of industrial, marine and structural metal products. The Equitable shipyards are the world's largest builder of lighter aboard ship (LASH) and SEABEE barges, and builds tugboats, crewboats, towboats, supply vessels, and other floating marine equipment for the offshore oil industry.

Sun International Names Vice Presidents

Vincent L. Verdiani and **Gordon S. Cochran** have been appointed to new positions in Sun International, Inc., 200 West Lancaster Avenue, Wayne, Pa. 19087.

Mr. Verdiani assumes the new post of vice president responsible for petrochemical, coal and other commodity trading, a new area of endeavor for the company. He was previously president of Sun Oil Trading Company and a vice president of Sun International, Inc.

Mr. Cochran assumes Mr. Verdiani's duties as president of Sun Oil Trading Company and vice president of Sun International, Inc.

Sun International, Inc., an operating unit of Sun Company, is engaged in the trading of crude oil and petroleum products, marine transportation, terminalling operations and the foreign marketing of petroleum products.

Sun Oil Trading Company is one of four major operating units of Sun International, Inc.

Bailey Meter Is Now Bailey Controls Company

Bailey Meter Company, U.S.A., a Wickliffe, Ohio-based subsidiary of Babcock & Wilcox, has received a new name—Bailey Controls Company.

"Our new name more accurately reflects the true nature of our business today, which is high technology control and instrumentation systems and products for the electric utility, industrial processes and marine industries," said Bailey president **Robert J. Campbell**.

In conjunction with its new name, Bailey now becomes a division of Babcock & Wilcox.

"This change was necessitated by the recent merger of Babcock & Wilcox and J. Ray McDermott, a New Orleans, La.-based firm which acquired B&W in 1977," Mr. Campbell said.

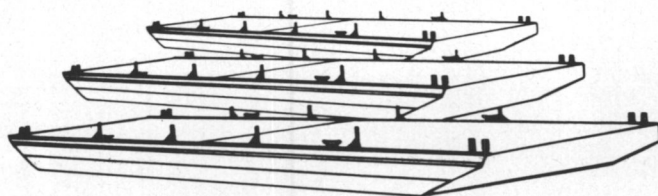
Bailey was organized in 1916 and became a wholly owned subsidiary of Babcock & Wilcox in 1953.

Bailey also operates facilities in Williamsport, Pa., and Daytona Beach, Fla., and maintains sales and service offices nationwide.

Internationally, Bailey operates subsidiaries in Canada, Brazil, Australia, and West Germany, and maintains a joint venture in Japan.

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Michael Westgate/Director

For additional information about BIG BERTHA
Contact: Rick McNeil, Marketing Director
Economic Development Industrial
Corporation of Boston
60 Congress St., Boston, Mass. 02109 (1-617-725-3344)



"I'D LIKE TO SPEAK TO YOU ABOUT
MY NEW COMMAND...THE 'LOVE BOAT.'"



A. E. "Bud" Dacus finds Caprinus R Oil 40 helps keep EMD-567Cs in top condition. "Works equally well in my Detroit Diesel 6-71 auxiliary diesels," he says.

"I'm impressed—Shell's Caprinus® R Oil 40 keeps my EMD's in better condition than any other oil I've used in 20 years."

Says A. E. "Bud" Dacus, Chief Engineer of the M/V Crescent City since her launching in 1958.

"We've tried a good many engine oils in the Crescent City over the past 20 years," continues Mr. Dacus, veteran engineer for the Sioux City-New Orleans Barge Company of Hartford, Illinois.



Absence of carbon or ash deposits on piston undercrowns demonstrates outstanding stability of Caprinus T and Caprinus R Oils.

"Until recently, we considered Shell's Caprinus® T Oil 40 the best. It kept our EMD's in fine condition. But Caprinus R Oil 40 looks even better."

Mr. Dacus made his comments during a routine teardown of his EMD 16-567Cs after 18,875 hours of service. The engine photographed had been on Shell's Caprinus T Oil and switched to Caprinus R Oil for the last 5,000 hours.

Exceptional Cleanliness

"I never saw an engine look so clean after 5,000 hours on any oil," adds Mr. Dacus. "It looked even cleaner at 18,875 hours than at the 13,000 hour mark. Top decks had just a light oil film. Intake ports were wide open. Practically no sludge in the sump. Minimum wear on rings."

Guards against corrosion

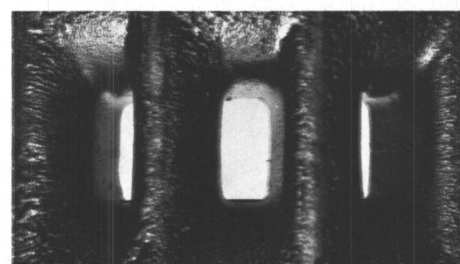
Caprinus R Oil 40 is higher in initial

alkalinity than Caprinus T Oil (10.2 TNB-E compared to 7.5) and retains effective alkalinity in extended high-stress service. It neutralizes combustion acids and guards against corrosive wear of rings and liners over long periods.

Filters frequently last longer, too. Caprinus R Oil's dispersant additive system helps keep insolubles in suspension, prevent heavy deposit buildup. Result — the possibility of significantly extended filter service life, an important maintenance saving.

The switch is on to Caprinus R

Top engine performance is why nearly 100 towboats, including ten from the Sioux City-New Orleans Barge Company, have already switched to Shell's Caprinus R Oil. Look into this high alkalinity engine oil for your vessels. It could mean important savings in operating costs for you!



Intake ports for an EMD 16-567C cylinder are completely free of deposits after more than 13,000 hours on Caprinus T Oil and 5,000 hours on Caprinus R.

Send for technical bulletin describing the properties and applications of Caprinus R Oil 40 in medium-speed diesels. Just write: Shell Oil Company, Manager, Commercial Communications, One Shell Plaza, Houston, Texas 77002.



Come to Shell for answers

*Caprinus is a trademark and is used as such in this writing.

Global Marine Awards Drilling Rig Contract To Davie Shipbuilding

Global Marine Drilling Company of Houston, Texas, and Davie Shipbuilding Limited of Lauzon, Quebec, Canada, have announced the signing of a contract for a marine jackup drilling rig.

The cantilever rig, which is based on the Marathon Le-

Tourneau design, has a full leg length of 360 feet, and can drill in water depths of up to 250 feet while withstanding wind speeds of 100 mph. The platform, which is supported on three triangular legs, includes three 50-ton lift marine cranes with 100-foot booms, a heliport, and sufficient crew accommodations to house 72 persons. The rig has an elevating speed of 90 ft./hour. The basic platform is designed to meet the

specifications of ABS (American Bureau of Shipping) class Maltese Cross A-1.

The new rig is the first of the jackup type to be ordered by Global, who are best known for their fleet of sophisticated dynamic-positioned drillships. Global Marine Drilling Company will employ the rig in the Gulf of Mexico and possibly off the U.S. East Coast.

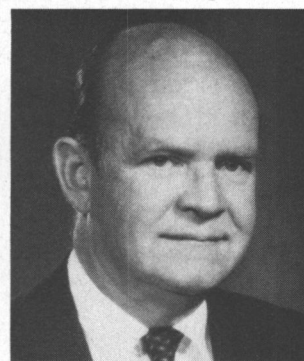
The contract will provide ap-

proximately 300-350 man-years of work at the "Davie" yard, and has a gross value of 20-million Canadian dollars.

Grandson Of Founder Nominee For Todd Board

J.T. Gilbride, chairman, announced that Todd Shipyards Corporation will present to its stockholders William H. Todd, 54, financial advisor, as a nominee for election to the board of directors at the annual meeting on July 19, 1978.

In commenting on the nomination, Mr. Gilbride said: "Over the years, Bill Todd has attained an enviable reputation as an investment banker and financier. He is held in high esteem by his colleagues, and we feel his presence on our board will be of inestimable value to the corporation."



William H. Todd

Mr. Todd has recently left Kuhn Loeb & Co. Inc., where he served as a managing director since 1977 and a partner since 1965. He started his career in the investment community in 1947 with Gude, Winmill & Co., moving to Delafield & Delafield in 1948, and to Kuhn Loeb in 1954. A graduate of Williams College, he continued his formal education at N.Y. University Graduate School of Business Administration.

Mr. Todd's grandfather, William H. Todd, was the founder, in 1916, and first president of the corporation until his death in 1932. His father, the late J. Herbert Todd, was vice president of Todd Shipyards Corporation until 1946, when the Todd family sold its interest in the corporation.

Marine Fueling Division Names Clemens Reiss

Clemens A. Reiss III has been appointed president of Marine Fueling, division of Reiss Oil Terminal Corporation, Sheboygan, Wis. 53081. Previously, Mr. Reiss was assistant to the president of Marine Fueling.

Mr. Reiss succeeds David B. Manuel, who will be continuing as a consultant to Marine Fueling. Mr. Manuel founded Marine Fueling in 1952, and developed it into the largest vessel fueling company on the Great Lakes.

Mr. Reiss served in a number of management capacities with Exxon USA before joining Marine Fueling in October 1975.

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and state-of-the art methods to provide routine maintenance, extensive machinery and hull repairs, jumbo/conversion or modification to IMCO standards. Whether it's a luxury cruise ship, fully loaded containership, a supertanker or any other type of vessel, we have a berth for it.

We also have a 300,000 square foot machining center, a 23-story gantry crane able to lift 900 tons, a complete pattern shop and a complete materials testing laboratory...plus our own foundry that specializes in pouring stern frames, rudders and valve bodies as well as other steel, stainless steel and non-ferrous castings...and a steel fabrication center with over 500 machines designed for the precision preparation of steel.

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Mississippi Marine Launches Its First Offshore Supply Vessel

Mississippi Marine Towboat Corporation, Greenville, Miss., recently launched its first offshore supply vessel. The 112-foot by 26-foot by 11-foot 2-inch Utility-class vessel was designed by the naval architectural and marine engineering firm of van Bentem and Associates of Ocean Springs, Miss., and has been sold to Briley Marine Service, Inc. of Lafayette, La. The vessel has been named Elaine Naquin, and will operate out of the Port of Morgan City, La., according to the president of Mississippi Marine, John Nichols.

The vessel will be classed by the American Bureau of Shipping Maltese Cross A-1 All Oceans, and will be certified by the United States Coast Guard and the United States Public Health Service.

The vessel is propelled by two Detroit Diesel 12V-149 engines with Twin Disc MG-527 reduction gears, and has two Detroit Diesel/Delco 4-71/60-kw generators, all of which were supplied by Stewart and Stevenson, Inc. of Houston, Texas. The Elaine Naquin is also equipped with a Red Fox Marine Sanitation Device.

In addition to the 112-foot vessel just launched, Mississippi Marine has under construction two 125-foot vessels which have been sold to an undisclosed interest. Mr. Nichols, president of Mississippi Marine, also noted that steel has been purchased for two additional 125-foot vessels which are scheduled for completion in late 1978 and early 1979. Mr. Nichols also noted that these vessels are available for sale.

Mississippi Marine is one of the major inland shipyards located in Greenville on Lake Ferguson, with extensive experience in all types of marine construction, including towboats, drydocks, tank barges, deck barges, and other related marine equipment.

Free Omega Paper Available From Tracor

Tracor Instruments Group is offering free copies of a paper entitled "Automatic Three-Frequency Omega." It was presented at the RTCM Assembly in Detroit, Mich. The paper discusses manual vs. automatic and single frequency vs. three-frequency operation. It also contains valuable information on operating procedures and use of a fourth transmitter. The paper is free for the asking to anyone interested in Omega navigation. Write to Harry Thomas, Tracor Instruments, 6500 Tracor Lane, Austin, Texas 78721.

SNAME 1978-79 Program For San Diego Section

The San Diego Section of The Society of Naval Architects and Marine Engineers has announced the following program for the 1978-79 season:

September 20, 1978—Regular meeting of the San Diego Section. Paper: "Heavy Lift Ship Design and Costs," by Benjamin V. Andrews, consultant, Menlo Park, Calif.

October 13, 14 and 15, 1978—California Sections Joint Meeting, Santa Barbara, sponsored by the Los Angeles Metropolitan Section.

November 15, 16 and 17, 1978—SNAME 87th Annual Meeting, The New York Hilton, New York City.

November 29, 1978—Joint meeting with The American Society of Naval Engineers, San Diego, Calif. Papers: "Vibration Anal-

ysis of Rotating Machinery," by Michael Schwabbe, PRC Inc., and "Ferro Graphics Analysis," by Comdr. Charles Remo, Nav Air Pac.

January 17, 1979—Regular meeting, San Diego Section. Paper: "A Proposed Combined Cycle Marine Power Plant," by Norman L. MacIntyre, product engineer, Solar Turbines International.

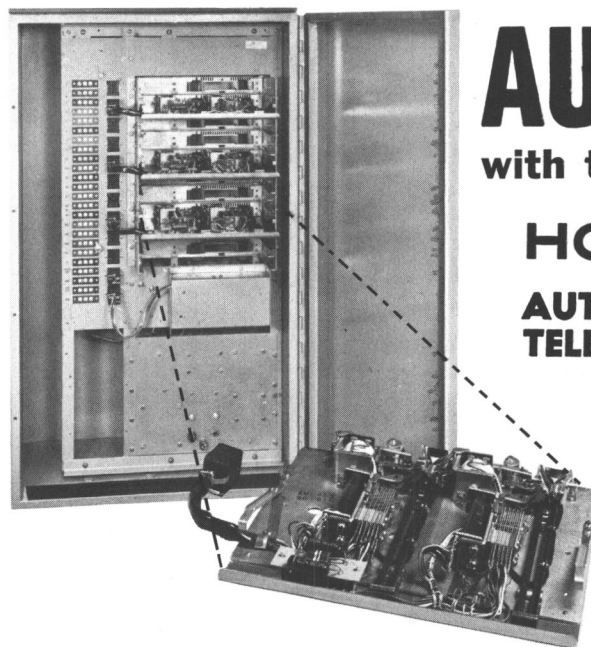
February 21, 1979—Regular meeting, San Diego Section. Paper: "Marine Corrosion Control With a Coating Based on Wool Wax," by Dr. Warren C. Simpson, Eureka Chemical Co., South San Francisco, Calif.

March 21, 1979—Regular meeting, San Diego Section—Past Chairman's Night. Paper: "3K Surface Effect Ship—Noise and Vibration Control Techniques," by Gary Fox, Rohr Industries, San Diego.

April 20, 21 and 22, 1979—Annual Spring Meeting, San Diego Section, Sea Lodge, La Jolla, Calif. Theme, "Marine Diesel Power—A Forward View." Papers: "Recent Operating Experience with Slow Speed Marine Diesels," by Robert Lavine, David B. Sucharski and E.V. Stewart, Atlantic Richfield Company, Operations—Marine Transport Department, Los Angeles; "Current Design and Performance Requirements—Medium Speed Diesel for Marine Service," by Alan C. Barich, DeLaval; "Some Thoughts on Main Propulsion Marine Diesel Engines and Their Applications," by R.D. Jacobs, manager-marine sales, Fairbanks Morse.

April 27 and 28, 1979—SNAME 1979 Spring Meeting/STAR Symposium, Hyatt Regency, Houston, Texas.

May 1979—San Diego Section Field Trip.



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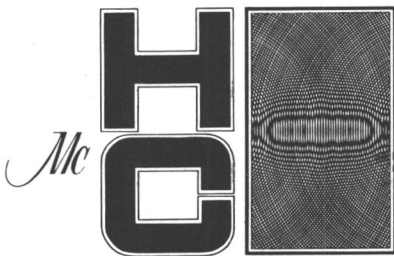
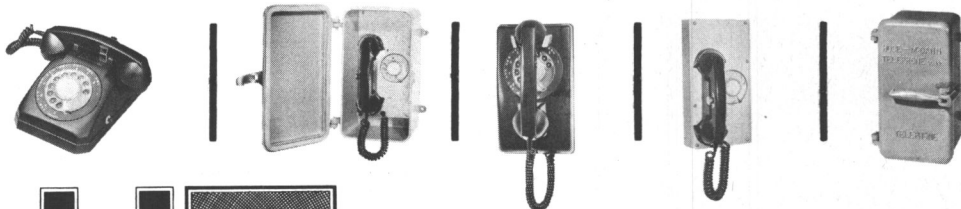
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Bethlehem Steel Awards Design Contract To Morris Guralnick Assoc.

Morris Guralnick Associates, Inc., San Francisco, Calif., has been awarded a contract by Bethlehem Steel Corporation to provide complete design and engineering services for a major overhaul of the USNS Albert J. Meyer.

The U.S. naval vessel, a 370-foot-long, twin-screw cable layer built in 1945, will be entirely refitted at the Bethlehem Key Highway Yard in Baltimore, Md., during a year-long overhaul. Among the various items of machinery and equipment to be installed are a modern diesel electric powerplant, new type deckhouse, masts, stack, deck winches, and cable-handling machinery, as well as all electrical power, lighting, navigational and communications systems.

Morris Guralnick Associates, Inc., now in its 32nd year of operation, is the largest architectural and engineering firm of its type on the West Coast, with offices in San Francisco and San Diego, Calif., and Bremerton, Wash.

Robert H. Wager Co., Inc. Elects New Officers

Michael Wager has been elected president and chief operating officer of the Robert H. Wager Co., Inc., Chatham, N.J., manufacturer of marine valves and smoke pollution control equipment.

By action of the board of directors, Robert H. Wager Jr., president of the Wager Company since 1958, now assumes chairmanship of the board and will also serve the company as chief executive officer.

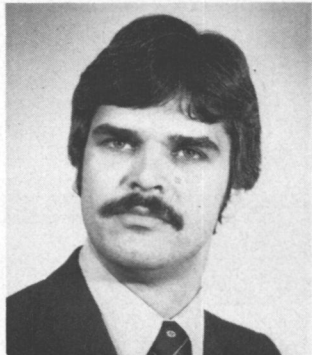
At the same time, Walter Trespasz, treasurer, has been elected executive vice president of the Wager company.

Michael Wager, a marketing major graduate of the University of Miami, Fla., and active in Wager sales and marketing since joining the company in 1973, is the third generation Wager to be president of the company, succeeding his father. The company was founded in 1933 by his grandfather Robert H. Wager Sr., a design engineer, for manufacture of his innovative "ball float" inverted vent check valves and visual smoke indicators. Robert H. Wager Jr., who became president on his father's death, has been responsible for a marked diversification of the company's manufacture in recent years, notably for the research and development of Wager photoelectric smoke density and opacity meters, and the recently introduced Wager Combustion Optimizer, a control that fine-tunes the fuel/air ratio of the boilers in steam-turbine-powered vessels.

The Wager company's original

facilities in Maplewood, N.J., were moved to nearby South Orange in 1942, and in 1969 the company purchased six acres in Chatham, constructed and occupied their present modern 15,000-square-foot facility.

Colt Appoints Penewell Manager So. Calif. For Fairbanks Morse Engines



E.J. Penewell

The appointment of E.J. Penewell as district manager-southern California, for Fairbanks Morse Engine Division, Colt Industries, has been announced by Bruno Ghinazzi, the firm's Western regional manager, headquartered at San Francisco, Calif. Mr. Penewell will be responsible for diesel engine sales in southern California and Arizona, and will be located in the firm's Los Angeles office. He is a graduate of the University of Wisconsin, White-water, with a degree in management and finance.

Engines marketed by the division include a Fairbanks Morse opposed piston design with ratings up to 4,200 hp, and a larger Colt-Pielstick unit with ratings up to 11,700 hp.

Natomas-Skaarup Offers Bunkering Services In Jeddah, Saudi Arabia

A new bunkering service for vessels engaged in all types of trade has commenced in Jeddah, Saudi Arabia, the Natomas-Skaarup Marine Sales company of Greenwich, Conn., announced. The former bunker barge Bunker Antigua, renamed Al Fadhili, recently arrived in Jeddah and is available to service all types and all sizes of ships with a complete line of marine fuels.

The Bunker Antigua (formerly stationed at the West Indies Oil Company in Antigua) is a 42,000-barrel barge capable of pumping 1,000 tons/hour of Bunker C, all grades of intermediates, marine diesel oil, and marine gas oil. The completely refurbished Al Fadhili is now being operated by the National Bunker Company, Ltd. in Jeddah.

For inquiries concerning the supply of bunkers at Jeddah, contact the U.S. and Canadian representatives, Natomas-Skaarup Marine Sales, 475 Steamboat Road, Greenwich, Conn. 06830.

Philadelphia Section Holds Annual Dinner-Dance



At the head table, left to right: (standing) P. Karazalis, vice chairman, Entertainment Committee; Mrs. Karazalis; G.C. Swensson, vice chairman, Philadelphia Section; Mrs. Liddle; L.F. Liddle, chairman, Entertainment Committee; (seated) Mrs. Hood; F.W. Beltz Jr., chairman, Philadelphia Section; Mrs. Swensson; E.M. Hood, president, Shipbuilders Council, and Mrs. Beltz.

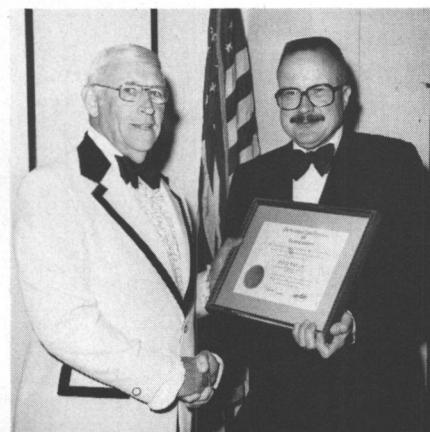
The annual dinner-dance of the Philadelphia Section of The Society of Naval Architects and Marine Engineers was held on June 3, at the Cherry Hill Inn, Cherry Hill, N.J.

The formal affair was attended by 460 members and guests representing approximately 30 various organizations associated with the marine industry. A cocktail hour in the Inn's Starlight Lounge preceded the dinner.

President and board chairman of the Shipbuilders Council of America, E.M. Hood, accompanied by Mrs. Hood, were guests of honor.

Al Raymond's Orchestra provided the music throughout the evening. The ladies were presented with a gift of Lenox china.

A.C. Brown presented a certificate of appreciation to the Sec-



A.C. Brown presenting certificate to immediate past chairman, F.W. Beltz Jr.

tion's immediate past chairman, F.W. Beltz Jr.

Elected officers for 1978-79 are: chairman, G.C. Swensson; vice chairman, K. Gyswyt, and secretary-treasurer, J.J. Hibbits.



Michael Marinaro Advanced By Worthington Compressors' Division



Michael W. Marinaro

Michael W. Marinaro has been named vice president of air power marketing at the Air Power and Construction Division of Worthington Compressors, Inc., Holyoke, Mass.

In his new position, he will be responsible for marketing and sales activities for air compressors sold through the company's industrial distributor organization. He will also direct marine and navy compressor marketing.

Since joining the company in 1975, Mr. Marinaro has progressed from marketing manager of reciprocating compressors to rotary compressor manager and most recently, director of marketing.

Prior to that, he held various sales assignments with Gardner-Denver, and was vice president and general manager of Worthington's distributor, Tide-Air in Houston, Texas.

A graduate of City College of New York with a bachelor's degree in business administration, Mr. Marinaro is a member of the American Management Association and is an amateur radio operator.

Marland/Clear Water Introduces New Marine Sanitation Device

The new Marland Model MTT-3 Type II Marine Sanitation Device is the latest advance in physical/chemical systems and meets all USCG Type II MSD standards as well as the proposed IMCO standards. The Marland MTT-3 is a completely modular 3-piece unit. Because it fits through all existing hatches and doors, there is never a need to tear out the hull. Capacity of the unit is 3,000 gallons per day.

The Marland MTT-3 features an automatic backwash so that filters do not have to be changed. The unit is fully automatic and is easy to retrofit.

For more information, write Bob Daniels, Marland/Clear Water, Inc., North Main Street, Walworth, Wis. 53184.

Johnny's Propeller Shop Expands Houma Facility

Johnny Conrad, president of Johnny's Propeller Shop, has announced the completion of a 5,000-square-foot addition to the company's Houma, La., facility. The company, founded in 1963 and headquartered in Morgan City, La., is one of the largest propeller repair operations in the Cen-

tral Gulf Coast and Mississippi Valley Area.

According to Mr. Conrad, the new addition will all be under roof and will house a second five-ton overhead crane, new air compressors for grinding and polishing equipment power, additional gauges for use in straightening and re-pitching propellers, and numerous individual welding stands.

Mr. Conrad stated that the Houma facility will soon be operating at capacity and should greatly enhance service to the offshore, pushboat, shrimping and fishing industries.

In addition to propeller repairing, Johnny's inventories Federal, Michigan, and Coolidge propellers up to 52-inch diameter, as well as Morse marine bearings, and rubber bumpers.



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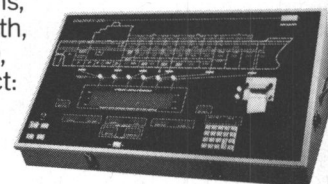
Face it. Time is money. And so is accuracy when you're making load distribution calculations. So, if you have a way to make them faster than a LOADMAX system can, don't read any further. If not, then our LOADMAX story could open the door to greater profit per voyage for your ships.

Modern containerships, product tankers, RO-RO, LASH—as well as LNG, VLCC and bulk carriers—have made accurate load calculation more complex than ever. Hull stress, shear force, bending moments, stability and trim are all critical factors to be reckoned with. Thus, old rules of thumb, mechanical analyzers, manual calculations, even analog systems with cumbersome thumbwheels and pointers just don't measure up any more. That's why we introduced LOADMAX. It's digital...pushbutton...instantaneous...instantly readable...continuously updated...and accurate. The LOADMAX 200, for example, can be used

*computation cycle time

to make stability, draft and stress calculations simultaneously in a fraction of the time required by other calculation methods. And with unsurpassed accuracy.

If you're a shipowner you probably already know about Raytheon's reputation for reliability and service. Now, if you're interested in maximizing your ship's profitability, there's a lot more you should know about the Raytheon LOADMAX. To get the whole story contact the Marketing Manager at Raytheon Company, Maritime Systems, West Main Road, Portsmouth, R.I. 02871. (401) 847-8000, ext. 2236. In Europe contact: Raytheon Copenhagen, Siljengade 6, Copenhagen 2300, Denmark.

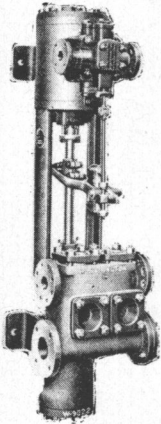


RAYTHEON

July 15, 1978

PUMPS

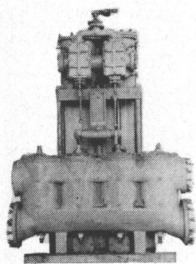
UNUSED WORTHINGTON VERTICAL SIMPLEX PUMPS



7½ x 4 x 10—3" suction—2" discharge—1½" steam—1½" exhaust. OAH 5'2"; OA depth 23"; OAW over air dome 2'2". Weight about 800#. Suitable for Liberty Ships EC-2 & Victory Ships VC2, AP2 & AP3. (Fuel oil service) Liquid capacity from 8 to 20 GPM—up to 350#. Also suitable for small boiler feed service. Steam WP 220# and 10# exhaust.

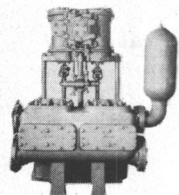
\$795

WORTHINGTON 16" X 14" X 18" VERTICAL DUPLEX STRIPPING PUMP



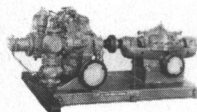
1400 GPM @ 110 PSI — suction lift 11.5 ft. — steam back pressure 15 lbs. 14" Suction — 10" discharge — 2½" steam — 4" exhaust. Overall width 6'8" — overall height 9'1½" — depth 3'9½". Wt. approx. 10,000 lbs.

STEAM DRIVEN VERTICAL DUPLEX FIRE & GENERAL SERVICE PUMPS



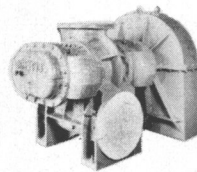
10 X 11 X 12 — Worthington — 560 GPM @ 125# G. 8" Suction — 6" discharge pumps bronze fitted.

NEW TURBINE DRIVEN FIRE PUMP



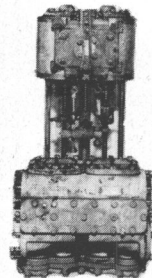
Allis-Chalmers 6x5 pump type SKH — 1200 GPM — 125 PSI — 3500 RPM. Coppo's turbine type TF-22-2½ — 3500 RPM. 273# — 50° superheat.

WATEROUS CARGO PUMP



Model P1118 — 600 GPM @ 100 PSI @ 222 RPM — 8" suction — 8" discharge. Complete with input gear box. For diesel motor drive. Ex Y.O. & Y.W. vessels.

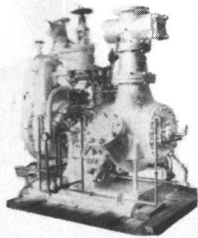
8" X 8" X 10" VERTICAL DUPLEX PUMP



Hendy design Suction 8" — discharge 6" — 160 GPM @ 100 PSI.

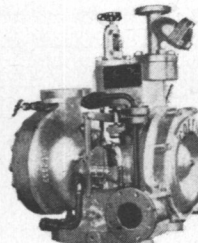
WE HAVE MANY MORE PUMPS
AVAILABLE FOR IMMEDIATE
DELIVERY. TELL US WHAT
YOU NEED.

COFFIN FEED PUMPS — ALL SIZES — TYPE DE



3 TYPE DE-2
540 GPM 1870' NET HEAD
8450 RPM — 585 PSIG — 0°-200° superheat — exhaust pressure 15 lbs — NSPH 30 — typical serial 4683DE

2 TYPE DE-B 214 GPM 2070' NET HEAD
7040 RPM — 241 HP. Steam pressure 597 PSI — superheat 100°-300°F. Typical serial No. DEB 1-25-37



TYPE CG

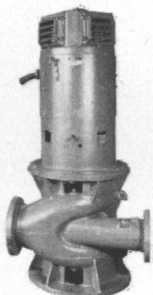
2 TYPE CG 350 GPM 1880' NET HEAD
7220 RPM—311 HP. Steam pressure 580 PSIG—0°-100° superheat. Exhaust 15 lbs—typical serial #5437-CG-8-8-33

• LSM BALLAST PUMPS



1500 GPM @ 56 feet (25 lbs) — vertical bronze ballast pump—8" suction—6" discharge. Practically new 30 HP 440/3/60/1750 RPM motor.

• BALLAST PUMPS



Gardner-Denver — bronze — vertical — total suction lift 15' — 8" suction — 6" discharge — 1500 GPM @ 25 lbs — 1750 RPM. MOTOR: 30 HP — 230 VDC — 112 amps — made by Century.

• ANCHOR WINDLASS MOTORS

Vertical — 20 HP — 230 volts D.C.

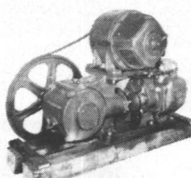
• RAMP WINCH MOTOR

20 H.P. gearhead deck ramp winch motor.

• MISCELLANEOUS

- Bronze Triplex Strainers
- Pneumatic Control Stands
- Combination Lube Oil & Fresh Water Pump for Reduction Gear
- 35000 CFM Fans

WORTHINGTON 2½ x 2 MOTOR DRIVEN RECIPROCATING DUPLEX SANITARY OR DRINKING WATER PUMP

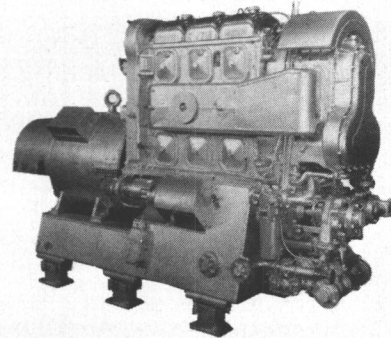


20GPM @ 80 lbs.—Whitney chain drive. SANITARY: 1½" suction—1¼" discharge — 1½ HP motor. DRINKING WATER: 1½" suction — 1" discharge—¾ HP motor. Approx. 3' overall length—20" wide. Motor is presently 2 HP 230 VDC for sanitary service. We will furnish with 440 VAC if required.

PLEASE NOTE:

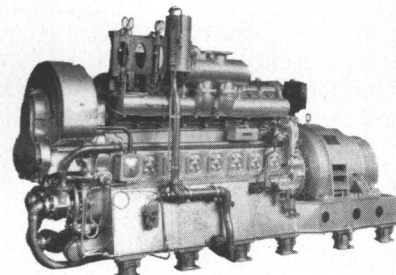
Our Marine Dept. & Warehouse is r
250 Scott St. at McHenry — Baltimo

G. M. 3-268A 100 KW A.C. DIESEL GENERATOR SETS



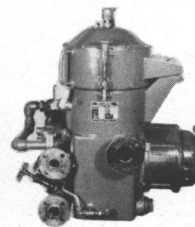
ENGINE: GM 3-268A—6½ x 7—1200 RPM—80% power factor—electric starting. GENERATOR: 100 KW—440/3/60/1200 RPM—161 amps. Drip-proof — open — self-ventilated. (Class "A" insulation stator — Class "B" insulation on field). EXCITATION: 2 KW DC unit — 9' 1¾" long — 37" wide.

G. M. 8-268A 200 KW A.C. DIESEL GENERATOR SETS



ENGINE: 8-268A—6½" bore—7" stroke—1200 RPM—driving Westinghouse generator—200 KW—440 volts—3-phase—60 cycle—321 amps—80% power factor at 1200 RPM. Switchgear available.

DELAVAL UNIMATIC PURIFIER



Reconditioned—ready to go. Lube Oil model 65-N-13. 225 GPH—motor 2 HP 440/3/60. Will handle 300 GPH when set for fuel oil.



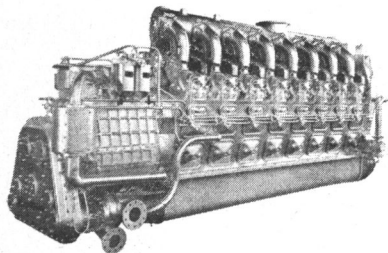
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G.M. 16-278A 1700 H.P. DIESEL ENGINES

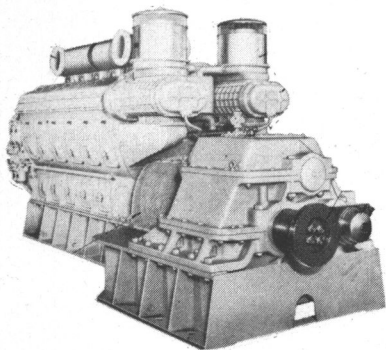


Limited supply remaining

Complete, clean and in very good condition. As removed from U.S. Naval vessels. 1700 HP @ 750 R.P.M. Your inspection invited.

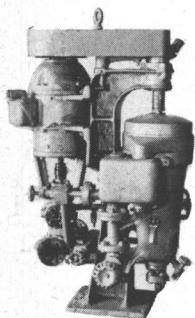
MATCHED PAIR 900 H.P. G.M. 12-567A DIESEL ENGINES

with Falk reverse and
reduction gears



ENGINE: 12-567A — 8½x10 — VEE type — 2-cycle — 747 RPM—electric starting—serial Nos. 1041 & 1060. GEAR: Falk Air Flex—reverse and reduction—2.48:1 forward—2.52:1 reverse.

SHARPLES OIL PURIFIER



Ex U.S.N.—reconditioned—ready to go. Complete with motor starter & pump. For lube or fuel oil. 225 GPH — viscosity 45, SSU @ 100°F fuel oil. 225 GPH—viscosity 180-200 SSU—130° lube oil. For lube oil models M-85-34-5-23BM-44 — for fuel oil M-85-35-5-8CA-13. Bowl speed 17,000 RPM—1" oil inlet & outlet. Vertical 2 HP 440/4/3400 RPM motor. Many units with stainless steel bowls.

\$2495 EACH

n METALS CO.

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1900 Marine Dept.: (301) 752-1077
AD. U.S.A. TWX 710-234-1637

T-2 EQUIPMENT

Selected Items Listed

UNUSED G.E. MAIN PROPULSION STATOR

Type ATB-2 — serial No. 6978272. 2300/2370 volts — 60/62 cycles — 3 phase — 3600/3720 RPM — amps armature 1237/1315 — 4925/5400 KW — 1.0 P.F.

T-2 UNUSED G.E. MAIN PROPULSION STEAM TURBINE WITH ROTOR

10 Stage — 435# — 720°T.T.
Turbine complete with rotor — serial No. 109166 — 4925/5400 KW — 3600/3720 RPM — 10-stage — 435# — 720°TT — 28.5" VAC.

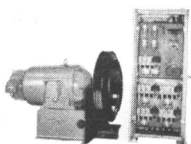
WESTINGHOUSE MAIN PROPULSION STEAM TURBINES

1 unit shrouded
WILL SELL ROTOR SEPARATELY

WESTINGHOUSE MAIN PROPULSION GENERATOR STATOR

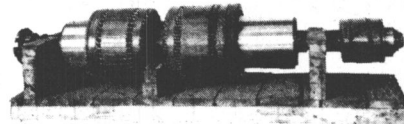
From Ex-Pecos — in like-new condition. With A.B.S.

5-SPEED FORCED DRAFT FAN MOTOR WITH IMPELLER



For T-2 Tanker. MOTOR: Totally enclosed—frame 505-S—440/3/60 —1770 RPM—typical serial #673-1807. CONTROLLER: 50 HP — CR-5333-820 — Cat. 932-1485. Max. amps 60.

WESTINGHOUSE 538 KW AUX. GENERATOR EXCITER ARMATURE



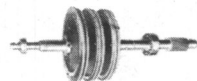
We have both types:

110KW — 32KW — 5.5KW
110KW — 28KW — 5.5KW

SPECIAL OFFER T-2 AUXILIARY GENERATOR ROTORS

G.E. AUX. TURBINE ROTORS
DORV-325M — 5645 RPM

For G.E. 525 KW TURBO GENERATOR SETS



Very little use. In like-new condition. Balanced, and with A.B.S. Certificate.

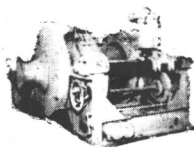
STATIONARY BLADING AVAILABLE

COMPLETE WESTINGHOUSE 538 KW TURBO GENERATORS

Complete steam end, reduction gear, electrical end. Some units recently overhauled for U.S. Government.

WESTINGHOUSE 538 KW TURBINE ROTORS

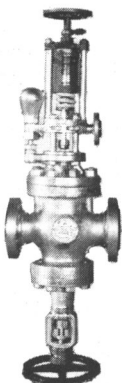
100,000 lb. Almon Johnson Constant Tension Mooring Winches



1 Available. In very good condition. Series 232 mooring & anchoring winches — automatic self-tensioning. Wide range from 100,000 lb line pull at 10 FPM to 26,000 lbs at 400 FPM. Gypsy line pull 12,000 lbs at 125 FPM. Drum declutchable through spiral jaw clutch for free spooling.

Driven by 50 HP — 230 VDC motors — Westinghouse CK — 575 RPM — ½ hour — 75°C rise — stab. shunt — 181 amps — max. RPM 1900. Cutler-Hammer brake — 18" — type NM.

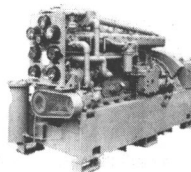
LESLIE PUMP VALVE GOVERNORS RECONDITIONED



For U.S. Naval vessels. 2" size.
Type CT-HNS-3 and CT-HS-3

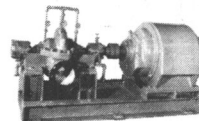
ASK FOR
OTHER SIZES

100 KW GBD-8 DIESEL GENS.



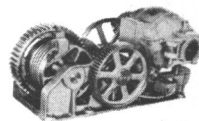
From LST vessels. 120/240 VDC — 417 amps — stab shunt — 1200 RPM — Delco gen.—self-excited. ENGINE: Superior GBD-8 — 8 cyl — 5½x7 — 150 HP — 30 volt electric starting. Reconditioned to ABS. Dry wt 10,000 lbs — DAL 124" — 65-11/16" high — 42" wide. Ht necessary to pull piston 68". Fuel consumption 0.620 lbs/hr

WORTHINGTON ALL-BRONZE 400 GPM FIRE PUMP



Navy pump—400 GPM @ 150 lbs—73 HP—440/3/60/3550—6" suction—5" discharge. Fully reconditioned and ready to go. With magnetic starter.

SPERRY STEERING ENGINE NO. 2 MOTOR DRIVEN DRUM ASSEMBLY ONLY



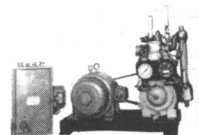
5 HP—120 VDC motor—40 amps—800 RPM—1 hour duty—40° rise—frame 2.5. Electro-dynamic magnetic clutch, mechanical brake & limit switch.

\$2195 COMPLETE

Motor, Magnetic Clutch and Brake only

\$1650

600 LB. DIESEL STARTING AIR COMPRESSOR



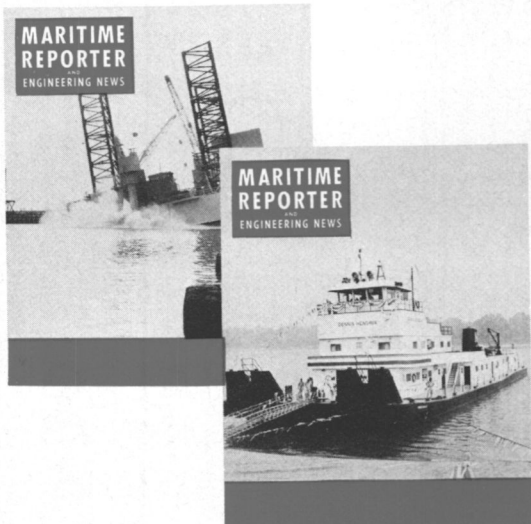
Ingersoll-Rand—bronze Navy air starting compressor and motor—4½x1½x3½ type 30—class T—600 lb. discharge pressure. For GM and O.P. Fairbanks engines. CAPACITY: 10 CFM @ 600 lbs.—with intercooler, aftercooler and relief valves. MOTOR: 7½ HP—

440/3/60 — 1760 RPM — with magnetic starter. Total weight about 700 lbs. AOL 3' 6"—OAW 20"—OAH 3' 2". Completely overhauled. Can be demonstrated running.

C4-S-A1 KAISER VESSEL

Formerly Operated by Bethlehem Steel Co.

- 3 Worthington-Moore 400 KW aux turbine rotors — seven stage — 6097 RPM — form S6
- Two main stop valves — boiler — 600 series — 5" Crane
- Lube oil transfer pump & motor with Foote Bros. gear



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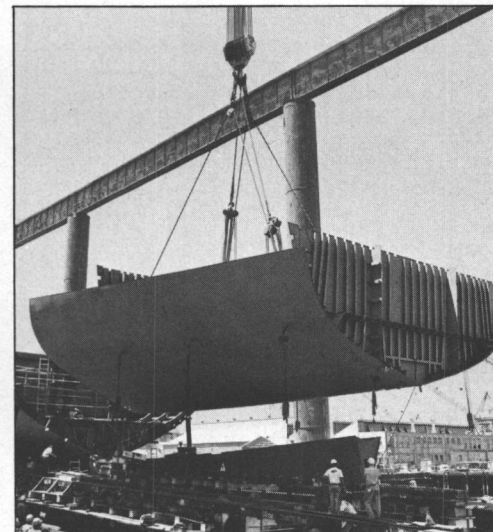
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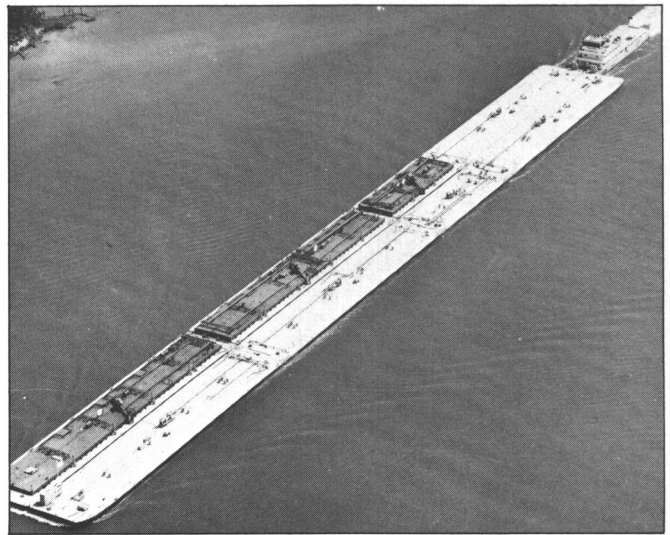
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LOWEST COST — Why pay more ... MARITIME REPORTER's advertising rates are the lowest, cost per buyer, in the entire industry.

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**MARITIME
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ENGINEERING NEWS

10-Year, \$100-Billion Navy Shipbuilding Program Advocated

Senator Gary Hart (D-Colo.), and former Senator Robert Taft Jr. (R-Ohio) have joined in drafting the 1978 edition of White Paper on Defense, entitled "A Modern Military Strategy for the United States," which calls for

"new force structure, which combines smaller but more modern ground forces with a more effective Navy."

Strong emphasis is placed on "new challenge to United States maritime security" posed by "the modern Soviet Navy" and role of U.S. naval power as "a more flexible foreign policy tool than ground forces."

The White Paper presents de-

tailed "10-year advanced technology naval shipbuilding program" which is summarized as follows:

"This program includes, among other elements, one additional nuclear-propelled Nimitz-class aircraft carrier, 23 small aircraft carriers, 37 nuclear and conventional attack submarines, several types of air-capable escort ships, hydrofoils, surface effect ships, and merchant ships converted to

military roles. It would cost \$100 billion over a 10-year period, FY 1979-88. Projecting the proposed FY 1979 shipbuilding budget of \$4.7 billion as a base of comparison, the proposed program would cost an additional \$53 billion in naval ship construction and related funding . . .

"In terms of direct shipbuilding costs alone, this would, at its peak, approximately double current ship construction budget. For FY 1979, the Administration requested \$4.7 billion for naval ship construction and conversion. The proposed program begins at \$6.8 billion in FY 1979, and climbs to a maximum of \$9.7 billion in FY 1987 (all figures in FY 1979 dollars) . . ."

To the question of "where is the money to come from?" Senators Hart and Taft responded in this way: "We have already noted that, realistically, the defense budget may not be able significantly to exceed present levels. If there is no large overall increase over the period of years planned, the money must come from a reordering of priorities based on the realization that the United States is by nature a sea power, not a land power. We must reallocate our resources from land power to sea power, from expensive land power responsibilities that should be borne by those nations that are essentially land powers, to sea power."

Taywood-Santa Fe Awarded Management Project In North Sea

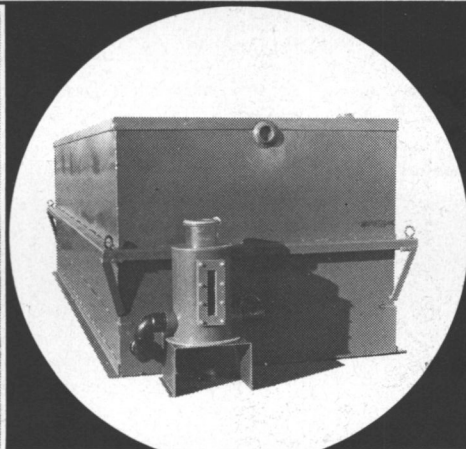
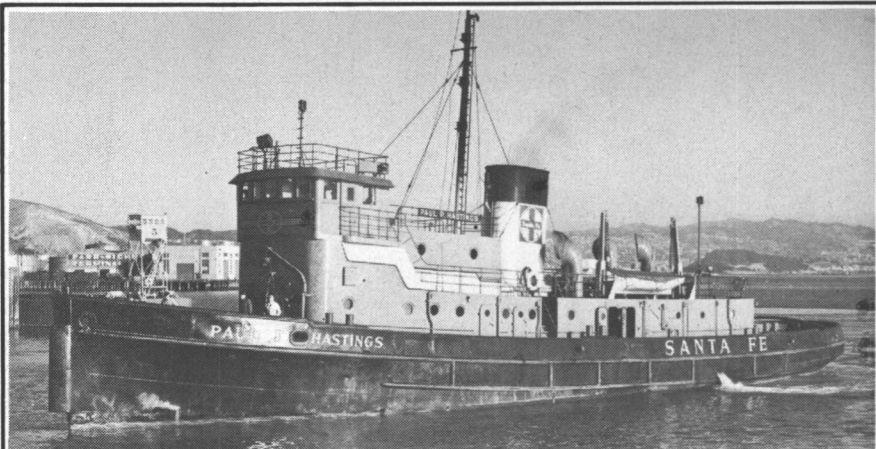
Taywood-Santa Fe Limited has been awarded a contract by Shell U.K. Exploration and Production, acting on behalf of the Shell/Esso partnership, for the project management and detailed design of the topside facilities for the North Cormorant platform in the North Sea.

The detailed design work will be started shortly by Humphreys and Glasgow as the prime subcontractor to Taywood-Santa Fe.

Taywood-Santa Fe is jointly owned by Taylor Woodrow Construction, a leading U.K. engineering and construction contractor, and Santa Fe International Corporation, a U.S.-based international oil-drilling, construction and engineering company.

Taywood-Santa Fe has completed other major offshore management projects in the North Sea, including provision of the prime project management support for the billion-dollar Thistle Field development.

Humphreys and Glasgow is a well-known international engineering, design and contracting firm. Its most recent offshore project included the design responsibility for topside facilities on Chevron's Ninian southern platform.



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The SHIPYARDER out performs any other powered stage or aerial lift on the market! Work at heights of 20 ft. to over 200 ft. with ease. Allows work to be performed on the ship at drydock or while afloat. Crowded drydocks and gantry cranes do not hinder lateral or vertical travel of the SHIPYARDER. Unit shown is 20 ft. by 3 ft. wide.

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NAVSECPHILADIV Annual Awards Presented To Carlton And Bruner

The Naval Ship Engineering Center, Philadelphia Division recently held its Annual Awards Banquet.

The Joseph Cacciola Technical Achievement Award for 1977 was presented to **Gilbert Carlton** of the Heat Power Systems Department for his participation and management in bringing about a large Navy-wide improvement in the development of shipboard waste heat recovery systems. His efforts have resulted in a continued reduction of maintenance requirements and an increase in reliability in these systems.



Shown at the Annual Awards presentation are, left to right: **Gilbert Carlton** and **Ronald Bruner**.

The Publications Award for 1977 was presented to **Ronald F. Bruner** of the Measurements and Materials Department for authoring the paper entitled "Theoretical and Experimental Assessment of Uncertainties in Non-Intrusive, Ultrasonic Flow Measurement." The paper treats in detail a theoretical and experimental analysis of the uncertainties associated with the use of an externally mounted, ultrasonic flow measuring system.

SMATCO To Supply Winches For Drydock —Executives Named

The Maritime Division of SMATCO, Inc., a TBW Industries company, P.O. Box 4036, Houma, La., has been awarded the contract to provide four triple drum winches for the new 932-foot-long floating drydock being built for the Port of Portland, Ore.

SMATCO, Inc. also announced the appointment of **John Borg**, sales manager of the Maritime Division, with **Wayne Johnson** as chief engineer of the group. Mr. Borg was operations coordinator for Sub Sea International prior to joining SMATCO. Mr. Johnson comes to SMATCO after 20 years of electrical and mechanical design responsibilities with Lake Shore, Inc.

In another announcement from SMATCO, Inc., **John Hudson** has been named sales manager for offshore deck equipment. Mr. Hudson was formerly operations manager in Aberdeen, Scotland, for Drexel International.

FMC Corporation Names Gill To Newly Created Post

Robert L. Witt, engineering manager of the Fluid Control Division of FMC Corporation, 10516 Old Katy Road, Houston, Texas 77024, announced that **William A. Gill** has been named offshore engineering manager. In this newly created position, Mr. Gill's department will be responsible for the development of off-

shore loading systems, including a boom-to-tanker loading concept currently underway.

Before coming to Brea, Calif., in 1974, Mr. Gill, who has been with the company for 10 years, was chief engineer at FMC Europe.

A native of upper New York state, Mr. Gill holds a degree in mechanical engineering from the University of Buffalo, and is cur-

rently working toward his MBA degree at the University of Southern California.

FMC Corporation, headquartered in Chicago, Ill., is a major international producer of machinery and chemicals for industry and agriculture, with 1977 sales of \$2.29 billion. Worldwide, the company has more than 43,000 employees located at 127 manufacturing facilities in 32 states and 13 foreign countries.

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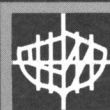


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G.M. Electro-Motive Diesels Hit 100-Millionth Horsepower Mark

Over the past four decades, 100 million horsepower has been produced in the form of diesel engines by the Electro-Motive Division (EMD) of General Motors Corporation.

The production milestone was announced by **Peter K. Hoglund**, vice president of General Motors and division general manager, in ceremonies held on June 7, 1978, at EMD headquarters in La Grange, Ill.

The ceremonies began at 10:30 a.m. with a reception, followed by a tour of exhibits of historical engine display component developments and a preview of the film "Moving Target." Next came the luncheon, during which introductory remarks were given by **Mr. Hoglund**, who introduced the speaker, **Thomas A. Murphy**, chairman and chief executive officer of General Motors Corporation. The luncheon was followed by plant tours.



Thomas A. Murphy, chairman and chief executive officer, General Motors Corporation, is shown addressing the group during ceremonies at EMD headquarters in La Grange, Ill.

The 100-millionth horsepower was incorporated in a 16-cylinder, turbocharged EMD 645 Series engine.

Since 1938, EMD has produced over 65,000 medium-speed diesel engines for a host of power generation applications worldwide, including use in railroad locomotives, marine vessels, oil-well drilling rigs, municipal and industrial power systems, and off-the-road vehicles.

The 645 Series represents EMD's second generation engine. Introduced in 1965, following EMD's first generation 567 Series engine, it incorporates significant engineering improvements in overall performance and reliability. These include major reductions in both fuel consumption and smoke emissions.

Today, over 44,000 railroad locomotives powered by EMD diesels are operating in 52 countries to transport people, freight and livestock.

EMD's engines are also on the world's seas, rivers, and canals powering towboats, tugs, workboats, fishing boats, ore carriers, and car ferries. These marine powerplants come in seven different sizes capable of delivering from 900 shp to 3,500 shp.

Other units are drilling for oil on both land and sea. The size of these powerplants has increased dramatically since the early 1950s — from a simple 2,000-hp unit for a

land rig to a 23,000-hp plant for a sophisticated self-propelled offshore rig.

Other EMD-built power generators are helping out in electric utility operations — boosting power in fringe areas during high-peak demand or in remote sites where full-fledged powerplants aren't warranted. These remote control generators range in size from 2,750 to 13,750 kilowatts.

Besides the La Grange plant, EMD operates a second manufacturing facility in Chicago, Ill., four factory rebuild branches elsewhere in the United States, and 11 domestic parts warehouses.

Supporting its international sales and service, EMD has nine overseas associated companies, a network of 15 application contractors, 11 marine sales representatives, and district offices in Mexico City, Rio de Janeiro, Singapore, and Zurich.

In keeping with GM philosophy—"Today's biggest job is to get ready for tomorrow"—EMD is taking advantage of this 100-millionth-hp milestone to announce a new line of utility power-generation plants specifically designed for 50 Hz service.

The new plants operate at 1,000 rpm, 50 Hz, and provide power at 6,600 volts (Wye) or 3,300 volts. (A total of 122 countries use 50 Hz; 34 countries use 60 Hz.) Kilowatt capacity at base-load rating ranges from 2,600 kw for a single unit up to 13,000 kw for multiple units.

The heart of the new plants is a two-cycle EMD Model 645E10 turbocharged diesel engine and a new EMD Model A-33 three-phase, 6,600/3,300-volt a-c synchronous generator with rotating brushless exciter.

Another example of EMD's continuing effort to improve engine reliability — also announced on the occasion of passing this 100-millionth-hp mark — is the use of the world's largest industrial laser. The first of four 5-kw carbon dioxide lasers is installed and operating at the La Grange plant. The powerful, pencil-sized beam of light is hardening cylinder liners of turbocharged diesel engines.

This latest engineering innovation is representative of the advancing technology that has produced some 65,000 EMD diesel engines, with a total output of 100,000,000 horsepower.

Bird-Johnson Receives Bow Thruster Contract

Bird-Johnson Company, Walpole, Mass., has been awarded a contract for a 990-hp bow thruster by AmShip Division of The American Ship Building Company. The unit will be installed as a replacement on the S/S Elton Hoyt 2nd. The Hoyt, a Great Lakes bulk freighter capable of carrying 23,200 gross tons of iron ore pellets, will also be converted to a self-unloader at AmShip's Toledo, Ohio, yard this winter.

The thruster is driven by a Caterpillar D398 turbocharged engine and will deliver approximately 24,000 pounds of thrust at full horsepower. Equipped with stainless-steel controllable-pitch propeller blades, the unit can adjust pitch from maximum port to starboard in about 12 seconds, while the prime mover runs at a constant speed in one direction only. This is accomplished by moving a single lever at the bridge control station. The positioning of this lever also simultaneously regulates the amount of thrust delivered during all maneuvers. These features enhance the vessel's operating efficiency, provide improved heading control at low speeds and will limit tug assistance requirements.

The Hoyt conversion is part of a \$70-

million expansion program announced by Pickands Mather & Co. for the Interlake Steamship fleet. A new self-unloading bulk freighter, capable of carrying over 60,000 gross tons, is also included in this program. Bird-Johnson Company will provide twin-screw controllable-pitch propellers and a 1,500-hp thruster for this vessel. She is scheduled for delivery in 1980 by AmShip's Lorain, Ohio, yard.

Sun Ship Tanker Christening Highlights Yard's Family Day

A 120,000-deadweight-ton tanker was christened at Sun Shipbuilding and Dry Dock Co., Chester, Pa., on June 3, 1978, by **Mrs. Roger Bexon** before an audience of several thousand shipyard workers and their families. **Mrs. Bexon**, the wife of a senior SOHIO official, christened the 869-foot tanker, the *Kenai*.



Mrs. Roger Bexon stands with **Joseph D. Harnett** (left), president of The Standard Oil Company (OHIO) and **Peter S. Hepp** (right), president of Sun Shipbuilding & Dry Dock Company prior to christening the S/S *Kenai*. The 869-foot "ecology" class tanker will be used by SOHIO to transport its Alaskan oil to American refineries.

The vessel is named after a region along the southern coast of Alaska, and is the second "ecology" class tanker to be built by Sun Ship for time charter to SPC Shipping, Inc., a subsidiary of The Standard Oil Company. The tanker will carry crude oil from Valdez, Alaska to Pacific Coast ports. The tanker is scheduled for delivery later this year.

Immediately preceding the christening, Sun Ship president **Peter S. Hepp** welcomed the audience of shipyard workers and their family and friends to the yard.

The christening was a highlight of a Sun Ship Family Day program that included an open house of the yard shops and shipbuilding facilities, shipyard displays, an employee arts and crafts show, and musical entertainment by the Chester City Band and the Duffy String Band.

The *Kenai* is a Sun-designed double-hull "ecology" class tanker incorporating several environmental safeguards. The ship's double-hull space combined with other ballast spaces in the ends of the ship provide the tanker with a clean ballast capacity of 43,000 tons. High-strength steel has been used in the upper deck plating and sheer strake areas to enhance structural crack resistance in cold weather service. A sewage storage and treatment system is provided on the ship. Oil-water separators clean the bilge water and cargo tank washings before discharge overboard.

Other features of the *Kenai* include automation, permitting control of engine speed and direction from the bridge, air-conditioned crew quarters, and an elevator connecting the four superstructure decks with the engine room. Four pumps are installed to discharge the 845,000-barrel cargo in 12 hours.

No. California SNAME Discusses Ships And Terminals For Nodules Mined From Deep Pacific Ocean

Benjamin Van Cleve Andrews, naval architect, presented a paper entitled "Transport Ships and Marine Terminals for Manganese Nodules Mined from the Deep Pacific Ocean," at a recent dinner meeting of the Northern California Section of The Society of Naval Architects and Marine Engineers, held at the Engineers Club in San Francisco, Calif.



Shown at the SNAME Northern California Section meeting are, left to right: Robert Werner, Chevron, Executive Committee; Frank Vibrans, Nickum & Spaulding, discussor, and Benjamin Van Cleve Andrews, author.

Mr. Andrews presented a detailed analysis of all significant economic and technical considerations involved in the ocean mining projects presently being developed in the Eastern Pacific area just north of the equator.

Mr. Andrews pointed out that this area makes it practically possible to use either U.S. or foreign-flag ships. American ships would be more expensive.

Mr. Andrews examined in detail the considerations involved in selection of handling methods from conventional dry bulk to slurry.

The current "distress prices" for "oriental" new buildings, involving little more than material costs, were graphically depicted in all economic studies, but had to be neglected for long-term projections due to their unpredictable validity.

This paper generally summarized a National Oceanic and Atmospheric Administration research project.

Discussers were: Peter Fisher, Matson Navigation; Vincent Vanriper, American Bureau of Shipping; Alan Windley, naval architect; Christopher Barry, Morris Guralnick & Associates; Peter Woodyatt Bowman, marine engineer; Miklos Kossa, naval architect; Allan Thomas Maris, Morris Guralnick & Associates, and Frank Vibrans, Nickum and Spaulding Associates, Inc.

Mexican Ship Operator Employs British Company To Supervise Construction In Japanese Yard

Ocean Fleets Limited's Naval Architects and Engineering Departments, Liverpool, England, have won a contract from a Mexican company to supervise the building of three ships in a Japanese shipyard.

The ships are being built for Transportation Maritime Mexicana at Hitachi Shipyard, Innoshima, which is situated on a small island south of Kobe. The vessels' engines will be built in Osaka.

Marshall Meek, director and chief naval architect of Ocean Fleets, signed the contract in Mexico City in April.

Work has already begun on the first ship

and on the manufacturing of the engines. During the next 15 months, a team of Ocean Fleets staff will be closely involved with the project.

The senior shipbuilding superintendent for the contract is Maurice Peacock.

The three ships are similar to Ocean's "M" class combination ships.

They have an overall length of 178 meters (about 584 feet), and tonnage of 18,860 dwt (metric). The molded breadth is 26.5 meters (87 feet), the molded depth is 14.2 meters (47 feet), and the design draft 9.5 meters (31 feet).

The main engine on each vessel will be a Hitachi Burmeister & Wain 8L67GF diesel engine, 15,000 bhp at 119 rpm, and the ships will operate at a service speed of 18.5 knots.

One unusual feature of the design is a monster crane. Each ship will be fitted with a 250-ton Suelken-type derrick.

In addition, there will be on each vessel a single 20-ton crane, and two versatile twin cranes, consisting of two sets of single 20.5-ton cranes which can be swung through 90 degrees.

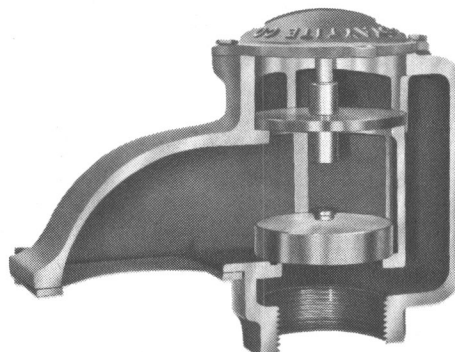
Ocean Fleets is one of the few shipping companies with its own staff of naval architects and engineering designers. The team has designed many classes of ships and was responsible for pioneering the largest containerships in the world, built for the Ocean Group associate Overseas Containers Limited.

Ocean Fleets Limited is the ship management company of Ocean Transport & Trading Limited, one of Britain's largest shipping, transportation and distribution groups.

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Zapata Corp. Forms New Fishing Group— Conrad Named President

Zapata Corporation, Zapata Tower, P.O. Box 4240, Houston, Texas 77001, announced that it has consolidated all of its fishing operations under the management of a new wholly owned subsidiary, Zapata Protein, Inc. The company

said that Earl J. Conrad Jr. will be president of the new Houston-based unit.

Zapata said that the consolidation involves its menhaden, anchovy, tuna and sardine fishing and processing operations, which previously had been conducted by a number of independent subsidiaries and affiliates. The company explained that, under the new Zapata Protein organization, these

functions are being centralized into four divisions.

Ronald C. Lassiter, Zapata Corporation senior executive vice president, said that the company's fishing activities have grown substantially in recent years until today Zapata is one of the largest companies in the Free World's fishing industry. He said that, with the new centralized organization, management has expanded

its continuity of effort in dealing with the larger scope, and broader geographical and resource diversity of its fishing businesses.

"We plan to continue to expand Zapata's participation in the fishing industry as economics warrant," Mr. Lassiter stated. "Domestically, the resources in New England, the Gulf of Mexico and the Pacific Northwest are of particular interest," he said. "Changing international jurisdictions point the way to ventures in those countries which control access to fish resources, such as Costa Rica and Mexico," he added.

Mr. Conrad, the new Zapata Protein president, comes to that company from Zapata Haynie Corporation, Zapata's menhaden fishing operation, where he has served as president since 1975. A veteran of 25 years in the industry, he has been associated with Zapata Haynie and predecessor companies since 1953.

Also joining Zapata Protein is Michael L. Patton, who will serve as vice president-finance and administration. Previously, he held a similar post with Zapata Haynie. He has been with Zapata since 1971.

Zapata Protein operations presently include a total of 58 fishing vessels, 35 spotter aircraft and seven processing plants, operating in the U.S., Canada, Mexico, and Costa Rica. In Zapata's fiscal 1977, fishing provided \$86.1 million in revenues, or about 20 percent of the parent company's total sales. The company's fishing operations currently employ about 2,000 people.

Zapata Corporation began its involvement in the fishing industry in 1967, when it purchased a Louisiana menhaden fishing operation which had two processing plants and a fleet of 16 vessels. In 1972, the size of the menhaden operation was doubled with the acquisition of a Baltimore, Md.-based firm which had two plants and 18 vessels.

The company entered the tuna fishing business in 1973, when it made the first of several separate vessel purchases. Acquisition of a Canadian tuna cannery and fleet early in 1976 provided vertical integration for the tuna operation, and gave Zapata its entry into the consumer marketplace with a substantial share of the Canadian market for canned tuna. Later that year, a Zapata joint venture on Mexico's Pacific coast began an anchovy fishing and processing operation.

In 1977, Zapata transferred some of its tuna vessels to a joint venture in Costa Rica, which added tuna fishing and canning to its existing sardine fishing and processing operations. Plans for a new joint venture for tuna fishing and processing in Mexico are nearing completion.

Under the new Zapata Protein organization, the company's ma-



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for fishing operations are assigned to its divisions as follows:

1. Menhaden fishing and processing (U.S. Atlantic and Gulf Coasts)—Zapata Haynie Corporation and affiliates, headed by **Patrick J. Doody**, executive vice president.

2. Tuna vessel operations (U.S., Costa Rica and Mexico)—Zapata Ocean Resources and affiliates, headed by **S.B. Irvine**, president.

3. Tuna canning and marketing operations (Canada, Costa Rica and Mexico)—Ocean Maid Foods Limited and affiliates, headed by **G.E. Waring**, president.

4. Anchovy fishing and processing (Mexico)—Pesquera Zapata S. A. de C. V., headed by **Rodrigo Vial**, general manager.

The company's menhaden plants are located in Cameron and Dulac, La., Moss Point, Miss., and Reedville, Va. Operating offices for the tuna division are located in San Diego, Calif., and Montreal, Quebec, Canada. Tuna are canned at St. Andrews, New Brunswick; tuna and sardines are processed at Puntarenas, Costa Rica. Zapata's anchovy reduction plant is located in Ensenada, Mexico.

A separate research activity, Zapata Fisheries Development Corporation, surveys fish resources using a special airborne, low-light-level remote sensing process developed by Zapata in 1971.

Zapata Corporation (NYSE) 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; construction and dredging.

Port Everglades Authority Appoints Peter McChesney

Peter McChesney has been named director of port development for Port Everglades Authority. In announcing the appointment, **Paul deMariano**, port director, stated that Mr. McChesney's long-term executive experience with various steamship companies in the area of trade development will be particularly valuable to Port Everglades, Fla., as it enters a new era of growth.

Mr. McChesney's duties have taken him to a large number of foreign markets, in many of which Port Everglades expects to seek new business. He has headed United States trade missions to various foreign countries and has conducted trade expansion seminars and workshops in most major trade centers in the United States.

As director of port development Mr. McChesney will be responsible for marketing, port relations, public affairs, advertising and traffic management at the port.

July 15, 1978

Butterworth Introduces Stainless-Steel Tank Cleaning Machine

Butterworth Systems Inc. has developed a reliable, easily maintained stainless-steel machine designed for cleaning tanks.

The lightweight BUTTERWORTH® LT tank cleaning machine uses rotating jets, which crisscross and overlap the entire

inner surface of the tank. Four cycles, from light rinse to heavy wash, are provided. By varying flow rates and nozzle pressures, the LT machine is suitable for almost any tank cleaning job.

Satisfying the requirements for both clean-in-place and portable tank cleaning, one LT machine outperforms several sprayballs in speed and efficiency by covering a larger area with a more concen-

trated cleaning pattern that uses less washing fluid.

The highly corrosion-resistant LT machine can be used with virtually all types of hot and cold cleaning fluids. Its advanced design and materials deliver high reliability with ease of maintenance and in-plant repair.

For more information, contact **Donald Powell**, Butterworth Systems Inc., 224 Park Avenue, Florham Park, N.J. 07932.

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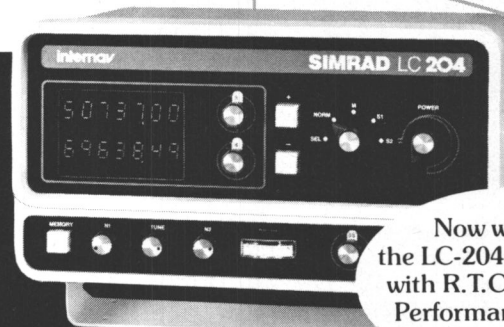
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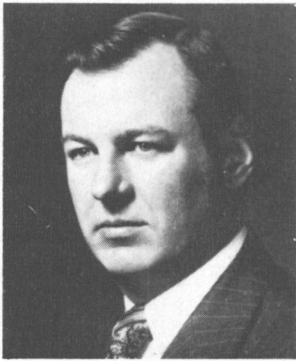
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Worthington Pump Names Dir. Marketing, Product Planning For N. America



John P. Fenlon

John P. Fenlon has been named director of Marketing and Product Planning for Worthington Pump's North American Region. Worthington Pump is a subsidiary of Studebaker-Worthington, Inc.

Mr. Fenlon has been with Worthington Pump for 20 years, and during that time he has held several important positions in sales and marketing. Most re-

cently, he has been director of Marketing, Engineered Products at Worthington's Harrison, N.J., facility.

Worthington Pump has 21 manufacturing locations in 13 countries. Its North American facilities are located in Harrison and East Orange, N.J., Taneytown, Md., Shawnee, Okla., and Brantford, Ontario, Canada. They manufacture pumps for the electric utility and public works, petroleum, chemical and petrochemical, mining, pulp and paper, marine, agriculture and general industries.

Abu Dhabi Orders Offshore Rigs From Hitachi For \$69 Million

Hitachi Shipbuilding and Engineering Co. said it has received an order from Abu Dhabi for the construction of three offshore drilling rigs worth about \$69.6 million.

The company said the jackup-type rigs will be delivered to Abu Dhabi's National Drilling Co. in December 1979.



INSPECTION TOUR—Adm. Thomas B. Hayward, USN (center) inspects the Bath Iron Works Corporation, Bath, Maine, where the guided missile frigate Francis X. McInerney (FFG8) is under construction. He was accompanied by John F. Sullivan, BIW president (left), and Henry M. Stupinski, FFG Program manager (right). The shipyard is building 11 of the highly sophisticated new-generation warships under a program that has been so expertly planned and managed by the Navy that the first vessel of the class was delivered one month ahead of schedule. When Bath Iron Works delivered the prototype frigate Oliver Hazard Perry (FFG7) last November 30, it marked the first time in more than a decade that a naval ship has been delivered on or ahead of schedule. The famed shipyard earned national acclaim for its achievement. All of its ships in construction, both naval and merchant, are on or ahead of schedule.

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Advanced Materials Division



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Engine Diagnostic System

P. Schneider*

Today's merchant vessels are framed by the following typical parameters: tight schedules, with drastically shortened downtimes in port; high capital investments; a fuel bill which represents an important part of the overall operation costs; specialized ships with many having very powerful propulsion machinery; reduced number of engineers, and shorter service periods and more frequent crew rotations.

These requirements mean that the chief engineer has to operate and maintain more powerful machinery with less crew and in less time. Furthermore, the frequent crew rotations do not favor a systematic and continuous approach to these problems.

In order to obtain the availability required from the propulsion plant and economic operation, the chief engineer needs qualified information. For the every-day operation, he needs a comprehensive "picture" of the actual condition of the engines. At the same time, he must be informed about undesirable tendencies and unfavorable conditions. In many cases, the chief engineer is not fully aware of the engine's "history." To make the most effective use of available time and manhours, he must be informed about the future maintenance requirements of the engine.

To provide this information to the chief engineer, a condition-monitoring system is required. Such a system would consist of sensors, cables, computers and other electronic components, or, in short, of a certain amount of (visible) hardware. This hardware has to perform in a reliable and accurate way for a diagnostic system to work properly.

This however, is not the typical requirement for such systems, as the above statements are equally true for any equipment onboard ships.

To meet this requirement, Sulzer has developed a diagnostic system for its diesel engines. The distinctive feature of this system, as compared to "conventional" instrumentation, is the analysis of the data obtained from the en-

gine, or the capabilities of the (invisible) software.

It cannot be assumed that engines of different makes, with their different design conceptions, show the same behavior in operation. A detection method for a particular problem which could be very effective for one type of engine might fail completely on another one. The basic principles applied are certainly very often similar, but they have to be adapted to the engine. At one end of the line, it is not sufficient to select the most appropriate sensor, but its location, which is a function of the engine design, will have a major influence. At the other end, the data analysis must be based on thorough knowledge of the engine. From this, it appears that such systems must be based on the engine-builder's know-how, experience and research.

The recognition of these facts and the conviction that such systems represent a useful and powerful tool on today's ships led Sulzer Bros. to actively investigate this field. The Sulzer diesel know-how together with the experience of the Sulzer Industrial Electronics Department in the field of computerized data systems provided Sulzer with in-house technology for the development and production of such systems.

The system developed is called the Sulzer Engine Diagnostic System (SEDS). It is a data acquisition and analysis system based on a mini-computer. The major features are: continuous monitoring of essential engine components and functions, such as, cylinder liner and covers, combustion and injection, piston rings, and turbochargers and air coolers.

The engineers are alarmed at an early stage in case of malfunction. A wide variety of logs can be requested, informing the engineers about all essential parameters. This first task of SEDS assists the engineers in their every-day work to maintain a 100 percent availability of the propulsion unit.

Further, a log of future maintenance requirements of essential components is printed on request. The system automatically informs about trend deviations and warns about overhaul due in the near future. In this respect, SEDS allows for efficient planning of maintenance in function of the actual condition of the compo-

nents. A new chief engineer is immediately informed so that a systematic approach to maintenance is obtained.

The sensors and electronics are continuously controlled—doubtful readings are automatically disregarded. The system warns the operator about anomalies. A self-diagnosis program detects the defective print which has to be replaced; this task can be carried out by the crew without any particular training. A large majority of SEDS components can be maintained by replacement as indicated by the computer. These jobs do not require any knowledge of electronics.

The printer presents all messages, logs, etc. in clear language, without shorts or coding. The operating console allows for simple pushbutton control. To operate SEDS requires neither computer nor computer language knowledge.

The hardware configuration includes data acquisition, central processing and peripherals, sensors and cabling.

The data acquisition and processing system consists of two major components—the data acquisition, by the subsystems, is located in the engine room; the data processing and man-machine communications are located in the engine control room, and a digital data link connects the two parts.

The central processing unit is a mini-computer type produced by the Digital Equipment Corporation.

The analogue cabling of a shipborne data system presents some particular problems, namely, the cables have to be shielded to avoid electrical interference, they have to be protected against mechanical damage, and they should not interfere with the crew's every-day work and overhauls.

SEDS' answer to the cabling problem is a system of prefabricated steel cable ducts. A particular cable duct has been designed for the cylinder liners, the turbochargers and charge-air coolers, the combustion and injection pressure sensors. The sensors, delivered with a short length of flexible cable and a plug, are simply plugged into the ducts. The multi-core cable links between the ducts and the subsystems are protected by steel pipes.

The software package provides for continuous monitoring. The parameters, measured or calculated, are continuously compared to fault detection algorithms. The engineers are warned at an early stage about malfunctions and undesirable tendencies. Parameters not accessible to conventional instrumentation are computed, monitored and can be displayed. Data logs provide a full and instantaneous picture of the engine.

Parameters relevant for the long-term development of the engine's condition (wear and dirt) are recorded. The influence of environmental parameters (temper-

ature, load, etc.) are ruled out by normalizing the data on the basis of standard conditions. The data are registered to form the components history. An extrapolation provides information relevant for future overhaul.

Trend logs, indicating the time delay to the next overhaul, and normalized data logs can be obtained at any time. The computer automatically informs the crew if a component reaches a preset "warning time limit" before overhaul becomes necessary.

Together with the scanning of the sensors, the computer checks the sensors, the subsystems and the peripherals, and warns the operator in case of malfunction.

The remedy for dubious sensors is their replacement. The self-diagnostic program HELP is the remedy for electronic failures. This cassette-resident program is read in, and, by a question and answer procedure, detects the defective printed circuit board, which can be easily replaced. The operation of HELP requires no computer knowledge and no training. Any engineer is capable to carry out the necessary procedures. Maintenance of SEDS is thus reduced in most cases to the replacement of a printed board.

The modular design of SEDS hardware makes the adaptations to an owner's particular requirements easy. Additional sensors (for example on essential auxiliary machinery) can be simply included. The inherent flexibility of the software and the structure applied to SEDS allow for additional programs to control such additional sensors and to analyze the readings, in accordance with the owner's requests.

The prototype SEDS system is installed on the French cargo liner MS Ville de Strasbourg, powered by a CCM-Sulzer 6 RND 90 main engine. This vessel, and SEDS with it, has been operational since July 1975. The system, constantly kept in service, has been operational for about 18,000 hours by the end of 1977. Due to the vessel's particular schedule (Arabian Gulf), the main engine has only been in service for about 8,500 hours.

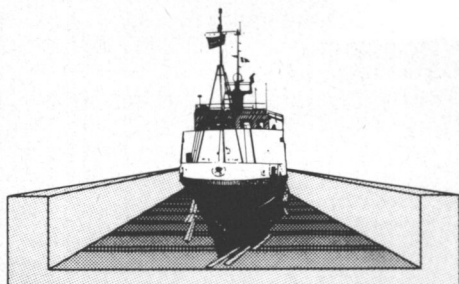
By the end of 1977, four SEDS, to be installed on 8 RNF 90 M engines, were in the course of delivery and erection.

The measuring accuracy and stability of the SEDS was confirmed on the prototype unit. All sensors' accuracies have remained within the original tolerances—no drift adjustment, neither for sensors, nor for the electronics, has been required. After a few "teething troubles," no difficulties were encountered with the electronics. The system's control by the console did prove simple and easy to learn.

A few problems had to be solved in the software. It is considered that these problems have been gradually solved.

*Mr. Schneider, head of Diesel Automation Section, Sulzer Brothers Ltd., 8401 Winterthur, Switzerland, presented the paper condensed here before the recent Symposium on Sustaining Design Thermal Performance of Ship Propulsion Machinery held at The United States Merchant Marine Academy, Kings Point, N.Y.

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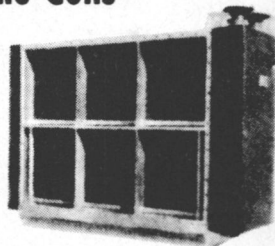
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Gotaas-Larsen Forms New LNG Marketing Unit

Gotaas-Larsen Shipping Corp., a subsidiary of IU International Corp., 1500 Walnut Street, Philadelphia, Pa. 19102, has announced the formation of Gotaas-Larsen LNG, Inc.

The new company, a wholly owned subsidiary of Gotaas-Larsen Shipping Corp., will be responsible for the marketing of Gotaas-Larsen's liquefied natural gas (LNG) vessels and operating capabilities. **Kenneth A.B. Trippe**, Gotaas-Larsen president, noted that the decision to form a separate LNG company reflects the increasing importance of LNG business to Gotaas-Larsen.

Gotaas-Larsen's fleet includes four 125,000-cubic-meter-class vessels for transportation of LNG. Three of the vessels are chartered through the year 1995 to supply natural gas from Das Island, Abu Dhabi, to Tokyo Bay, Japan. The fourth is currently operating in the Indonesia-to-Japan trade.

Nevil M.E. Proes, senior vice president of Gotaas-Larsen, will serve as president and director of the new company. Mr. Proes joined Gotaas-Larsen in February 1977, after six years as president of Texas Eastern LNG, Inc., a subsidiary of Texas Eastern Transmission Corp., Houston, Texas. He previously served for 34 years in various capacities with Shell International Petroleum Co.

Gotaas-Larsen is a diversified shipping company whose other activities include transportation of crude and refined petroleum products, chemicals, coal and grain. The company also operates semisubmersible drilling rigs and has interests in cruise ships, primarily serving Caribbean ports. Its principal offices are in New York City and Oslo, Norway.

IU International is a diversified company serving worldwide ocean shipping, trucking, distribution, utilities, agribusiness and industrial markets.



LION DANCE FOR HUD — The lion dance, normally only seen in the streets of Hong Kong, recently found its way to the Hamburg Shipcare Exhibition, courtesy of Hong Kong United Dockyards Ltd. (HUD). HUD was one of many companies participating in the exhibition which was attended by shipping management from all over the world. The lion dance was one of the major highlights marking the opening of the exhibition. According to **David Hall**, managing director of HUD, considerable interest in HUD resulted from the exhibition, and there was particular interest in the two-phase Tsing Yi development project on which HUD has embarked. Mr. Hall looks on as Mrs. S.A. McFarlane of the Shipcare Organising Committee performs the eye-dotting ceremony.

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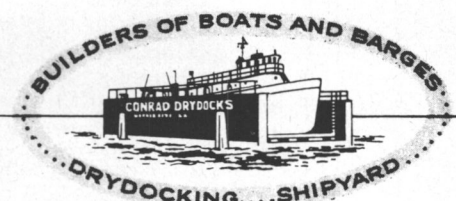
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MANAGEMENT AWARD — P.T. Veliotis, vice president of General Dynamics, and general manager of Electric Boat Division (left), accepts the "Silver Knight of Management Award" from Raymond Lapinski, president of the National Management Association. The award was presented to Mr. Veliotis for "his leadership and management capabilities at the Quincy Shipbuilding Division, which he led from a struggling enterprise to the leading U.S. shipbuilding yard for LNG (liquefied natural gas) ships in just three years." Mr. Veliotis was named general manager of the Electric Boat Division in October 1977.

MMC Unveils A Versatile New Portable Sonic Tank Gauging Tape For Inventory Control

Vital tank gauging information essential to accurate liquid inventory control is the primary purpose of the new MMC Portable Sonic INTERFACE Tape. This versatile, precision instrument combines ullage and interface measurements in one simple operation. It also serves as an accurate calibration check for remote readout systems and as a preset high-level alarm in preventing overflow spillage during tank-loading operations.

The MMC Sonic INTERFACE Tape is a lightweight, hand-held, battery-driven device that requires no external power source. It is solid state throughout, and certified as intrinsically safe by Factory Mutual and BASEEFA. The unit consists of a stainless-steel, dual-purpose ullage / interface sonic probe suspended from a white-face, steel tape, and a special reel housing for the pen-light battery and high-intensity beeper. It requires no correction or compensation for specific gravity of the liquid being monitored, and eliminates the use of floats or chalk in gauging fluid levels.

Readings taken at tank-top from the highly visible, calibrated, white-face tape are accurate to $\pm 1/8$ inch, while affording maximum protection to the operator from gas fumes during inerted tank measurement.

In use, the probe is lowered through the tank gauging port until a continuous audio beeper signal in the reel hub indicates it has reached ullage level. The tape reading is noted at a datum point. The probe is then lowered further, through the cargo, until a pulsating beeper signals the water interface level. Again, the tape is read. A simple subtraction of one reading from the other determines the cargo envelope.

Tape lengths up to 100 feet are available and may be ordered in metric or inch graduations. Each tape unit is supplied with a reinforced wooden carrying case for easy portability.

Further details may be obtained by writing to Charles S. Schmukler, Marine Moisture Control Company, Inc., 449 Sheridan Boulevard, Inwood, N.Y. 11696.

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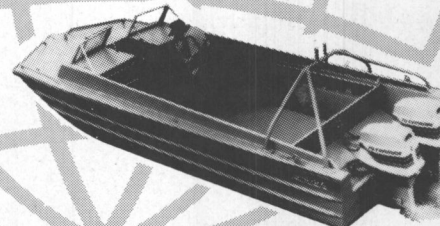
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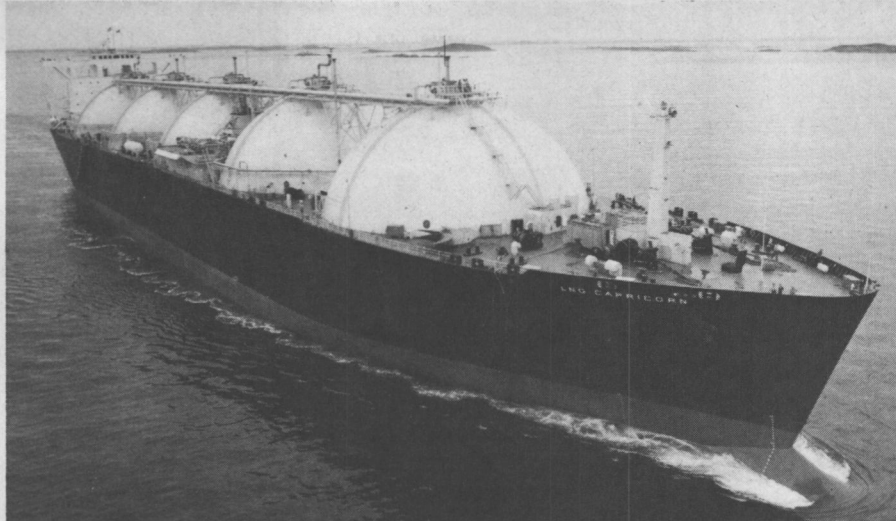
Marine Services Div. Geosource Inc. Delivers Self-Propelled Barge

Construction on a self-propelled work barge for Gulf Energy & Minerals Company U.S. has been completed by the Marine Services Division of Geosource Inc., Harvey, La.

According to Marine Services Division vice president and general manager **D.M. Gordon**, Geosource performed a complete turnkey operation, including providing and installing all equipment for the new 90-foot by 28-foot by 5-foot 6-inch barge.

The Marine Services Division (formerly known as the Shipyard Division) of Geosource Inc. provides repair, construction and modification services for barges, dredges, inland drilling barges, tenders and other vessels, as well as drilling rig equipment repair. The division has two locations on the Harvey Canal near New Orleans, La., and one on the Intracoastal Canal at Morgan City, La.

For a copy of the Marine Services Division complete capability portfolio, write to **Dan M. Gordon**, Marine Services Division, Geosource Inc., P.O. Box 24, Harvey, La. 70059.



THIRD LNG FROM QUINCY—The LNG Capricorn, General Dynamics' third 125,000-cubic-meter liquefied natural gas tanker, has successfully completed sea trials and was officially named during recent ceremonies at Quincy, Mass., where she was built. Her sponsor was Mrs. Campbell McC. Anderson, wife of the director (shipping and special projects) Burmah Oil Co., Ltd. The LNG Capricorn will enter service transporting LNG from Indonesia to Japan under long-term charter to a subsidiary of Burmah Oil Co.

Use Of Fuel Additive Shows Bunker Oil Savings Of Over 10%

In a study funded by the Maritime Administration of the U.S. Department of Commerce, Seaworthy Engine Systems of Essex, Conn., has reported on the effect of commercial fuel oil additives on steamship boiler condition and fuel economy. The most effective additive was a dispersion of inorganic magnesium oxide, organic magnesium and organic manganese, identified by the Rolfite Company of Stamford, Conn., as

one of the company's marine products.

The actual savings realized was a 10.3 percent improvement in fuel economy and sharply reduced boiler maintenance. The ships used in the study each consumes 29,250 tons of Bunker C fuel per year, assuming 17,500 shp normal power and 300 days per year underway. At a fuel cost of \$80 per ton, the yearly fuel bill is \$2,300,000. A 10.3-percent fuel saving represents \$236,900. Additive cost is less than 1 percent of fuel cost for a final saving of over \$210,000 per ship, per year. That is equivalent to an energy saving of 13,694 barrels of oil per year, per ship.

The Maritime Administration evaluation was conducted aboard six jumboized Mariner-class (C6-S-la) U.S.-flag container ships. Boilers were "run against themselves" to strengthen test results. Test boilers were thoroughly cleaned and inspected and run for one trip without the additive to establish baseline data. The boilers were cleaned and inspected, and the additive was used for a total of three trips (approximately 2,000 hours steaming time). The boilers were inspected again and then run without additive to reinforce baseline data.

Rolfite also offers a packaged treatment system which automatically meters additives into the main fuel delivery line during bunkering. Capable of hands-off automatic operation, the system assures thorough mixing of the fuel and additive. Admiralty MM remains fully dispersed and cannot settle out in tanks and lines, due to the submicron size of the magnesium oxide particles.

Copies of the U.S. Maritime Administration Report MA-RD-920-77097 are available at \$6 each from **Rod Rodrigue**, The Rolfite Company, 300 Broad Street, Stamford, Conn. 06901. Full information on Admiralty Marine Products is also available from Rolfite.

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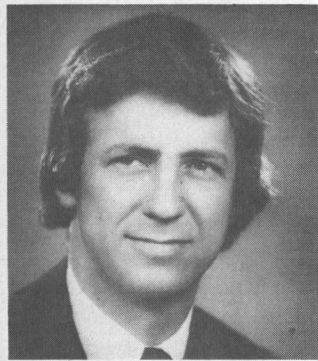
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Strachan Shipping Co. Elects Mickey Lane To Board Of Directors



Mickey Lane

The election of **Mickey Lane**, vice president of Strachan Shipping Company, to the board of directors was announced by **Thomas H. Adams**, president of Strachan Shipping Company.

Mr. Lane, vice president-West Gulf for Strachan, has been associated with the firm for the past 17 years.

Also announced was the promotion of **Ben Hanson** from Houston manager to assistant vice president-West Gulf Agency, and the appointment of **Jules Verberne** as assistant vice president-West Gulf Stevedoring and Terminal Operations.

Strachan Shipping Company, Inc., ship agents and stevedores, represents a number of ship lines servicing the United Kingdom, North Europe and Scandinavia, the Mediterranean, Middle East, Asia, Australia, New Zealand, North and South America, and the Caribbean. The firm maintains offices in major American ports and many cities throughout the interior.

APL Names Schmidt To Operations Post

William B. Hubbard, senior vice president-operations for American President Lines, Ltd., Oakland, Calif., has announced the appointment of **Stephen F. Schmidt** to the position of assistant vice president of operations.

In this newly created position, Mr. Schmidt will act on behalf of the senior vice president of operations, systemwide, as directed.

Mr. Schmidt joins APL after serving the past two years as general manager and operations manager of Industrial Opportunity, Inc. (IOI), a company specializing in the movement of project-type cargoes in specially designed vessels. Before moving to IOI, Mr. Schmidt served nine years with a sister company, Sealand Service, Inc., holding various management positions in terminal operations in the U.S., Puerto Rico and Europe.

A 1964 graduate of the U.S. Merchant Marine Academy, he sailed for three years as a deck officer in the U.S. merchant marine.

APL Plans New Ship Construction Program —Retains L.A. Harlander

W.B. Seaton, president of American President Lines, Ltd., has announced that the marine consulting firm of L.A. Harlander & Associates has been retained to consult with and advise the company in regard to its new ship construction program.

Pursuant to the 20-year Operating-Differential Subsidy Agreement between American President Lines, Ltd. and the Maritime Administration of the U.S. Department of Commerce, the company has agreed to commit to the construction of a minimum of two new containerships by December 31, 1978. The company is presently studying the feasibility of constructing a number of ships in excess of the minimum number contracted for with MarAd.

In performing its consulting services, L.A. Harlander & Associates will play a major role in the design, engineering, contracting for, and construction of the new ships, along with the staff of American President Lines, Ltd. and other outside consultants.

Bay-Houston Towing Announces \$10.6-Million Expansion Program

A \$10.6-million expansion program by Bay-Houston Towing Company was announced by **W.D. Haden II**, chairman of the board, as he disclosed the signing of contracts for four new tugs and option on an additional two vessels.

One tug, the 4,200-hp Captain W.D. Haden, is designed to keep Bay-Houston in the forefront of the harbor/offshore towing industry, particularly for the petroleum industry, Mr. Haden said.

The 106-foot by 34-foot by 16-foot tug is the first diesel electric vessel of its type to be built in the Gulf. It will be equipped with three GM 16-149 TI generator sets, combined to give a total output of 4,200 hp/3,000 kilowatts.

The vessel will have 100,000-pound forward bollard pull and 75,000-pound pull astern. Towing versatility will be assured by the Captain W.D.'s double-drum towing winch.

Named after Capt. **W.D. Haden**, founder of Bay-Houston Towing Company, the powerful tug was designed and will be built by Halter Marine Services of New Orleans, La.

The other three tugs of 95-foot overall length and designed for harbor work will carry the family names of Barbara H. Neuhaus, Laura Haden, and Mark K. The company has an option to build an additional two of the 95-foot tugs. Mr. Haden said the 2,850-hp tugs were designed by Norman DeJong of Jacksonville, Fla., and

are being built by Diamond Manufacturing Co. of Savannah, Ga.

All tugs have EPA approval and are classified by the American Bureau of Shipping. First delivery will commence in November 1978, with the final contracted vessel to be completed by January 1980, Mr. Haden said.

Full electronic gear, radar, loran, SSB and VHF-FM radios, and Fathometer will give the tugs the finest navigational and communication capabilities.

The new vessels are part of an ongoing expansion and modernization program that has included the recent commissioning of two harbor tugs, the C.R. Haden and the Philip K, and the repowering and updating of two other tugs at a cost of an additional \$5.49 million, Mr. Haden reported.

Bay-Houston Towing Company provides harbor and coastwise towing in the ports of Houston, Galveston, Corpus Christi, Freeport and Texas City, Texas.

New Launch Vessel For San Francisco Area



Rees B. Williams Jr., president of California Launch Service Corporation, watches as Mrs. Williams breaks the bottle, officially naming the California Pilot.

The newly formed California Launch Service Corporation christened its first launch vessel on June 14, in ceremonies at the St. Francis Yacht Club, San Francisco, Calif.

Rees B. Williams Jr., president of the firm, headquartered in San Francisco, said the company received authorization to operate as a common carrier earlier this year from the California Public Utilities Commission. Mr. Williams explained the new vessel, designated the California Pilot, will be used to transport ship pilots, steamship agents, crews and customs personnel to and from ships at anchorage in the San Francisco Bay.

California Launch is an operating subsidiary of Willamette-Western Corporation of Portland, Ore., which has operated a similar launch service in the Port of Portland for some 40 years.

Mr. Williams pointed out that the California Pilot, the newest addition to the "service vessel" fleet in the Bay Area, contains the most modern of navigational equipment. It is 44 feet long, has a 15-foot beam, 4-foot 4-inch draft, and is a twin-screw vessel of 740 horsepower.

"The new launch service will be a valuable addition to Willamette-Western's overall marine

services and transportation in the Bay Area," Mr. Williams stated. "Western Tug & Barge Corporation, headquartered in Richmond, and also a division of our parent company in Portland, presently performs ship assisting general towing and barging, marine equipment charters, and marine equipment storage. Therefore, it is only natural that, with the approval granted by the State of California, that we enter into the launch service phase of shipping in order to better serve our shipping customers."

California Launch Service Corporation also operates a chartered vessel, Inland Pilot, from its base at Pier 9 in San Francisco.

Willamette-Western Corporation has offices in Portland, Ore.; San Francisco, Richmond, and Long Beach, Calif.; Seattle and Pasco, Wash.; and Vancouver, British Columbia. Corporate capabilities include heavy marine construction such as piers, docks, dams and other large concrete structures; steel erection; production and sales of sand, gravel, concrete and asphalt products; marine towing and barging; drilling; sub-surface foundation work; clamshell and hydraulic dredging; installation of marine pipelines; and environmental services, including oil and hazardous materials spill control and cleanup.

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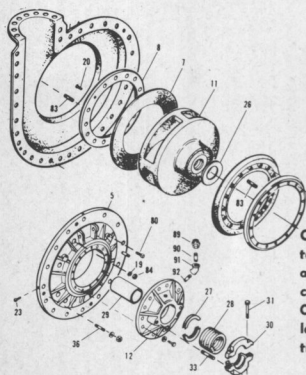
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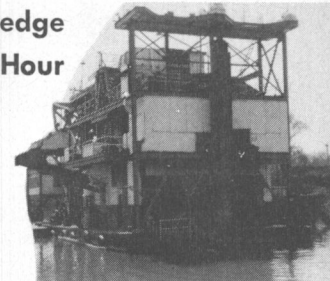
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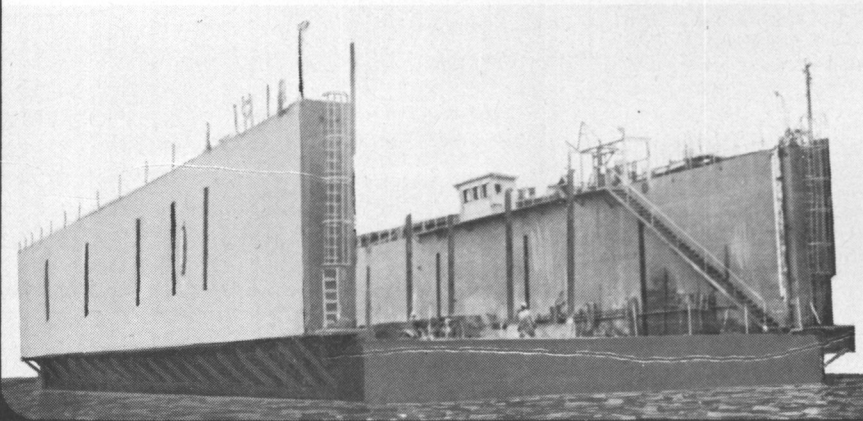
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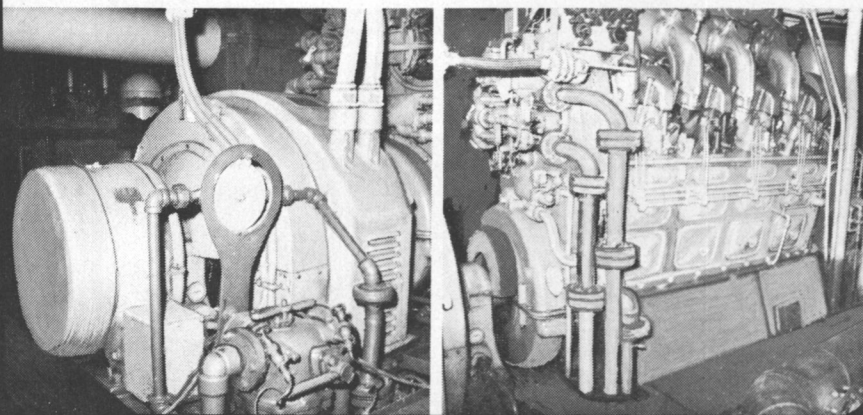
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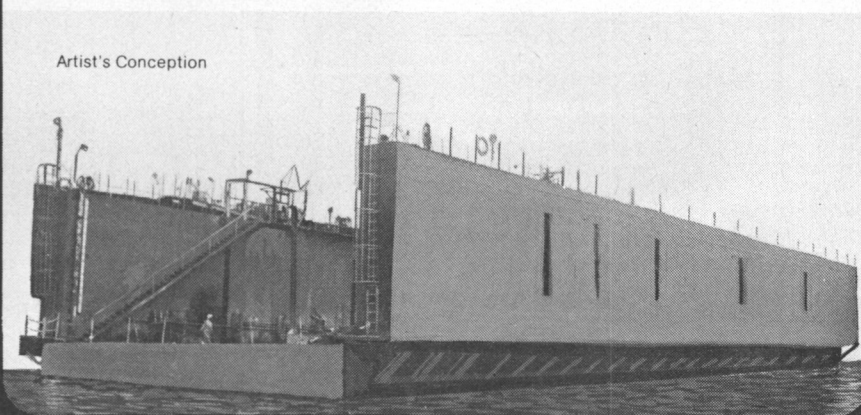
Floating Drydock

Under Construction

Length over-all — 200'
Breadth — 84'
Total depth — 30'6"
Breadth between wing walls — 74'
Capacity — 2,400 tons

Three longitudinal bulkheads; four transverse bulkheads; fifteen watertight ballast tanks. Six 8" centrifugal pumps (40 HP motors). Fifteen air operated flood valves. Total weight — 900 tons. Two ventilation blowers — one for starboard pump room and one for port pump room. 4' keel blocks full length included.

Artist's Conception



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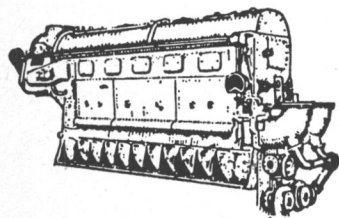
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MARINE DIESEL ENGINES



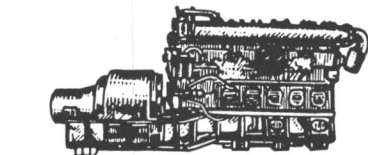
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3—GENERAL MOTORS, Model 3-268A, Marine, 150 HP, 1200 RPM, 3 cylinders, with Allis-Chalmers Generators, 100 KW, 120/240 DC.

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7 — 750 KW, GENERAL ELECTRIC Turbines: Type FN3-FN24, 525 PSI, 10,033 RPM. Generators: 750 KW, 450/3/60, 1200 RPM, Type ATI.

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

D. C.

1 — 400 KW, WORTHINGTON Turbine, 200 PSI with Crocker-Wheeler Generator, 400 KW, 120/240 Volts DC, Type CDC, 1200 RPM.

7 — 300 KW, ALLIS-CHALMERS Turbines, 440 PSI, 5645 RPM, with Westinghouse Generators, 300 KW, 120/240 Volts DC, 1200 RPM.

2 — 300 KW, WESTINGHOUSE Turbines, 440 PSI, 5920 RPM, with Westinghouse Generators, 300 KW, 120/240 Volts DC, 1200 RPM.

2 — 300 KW, TERRY Turbines, 440 PSI, Type TM-5, 5965 RPM, with Crocker-Wheeler Generators, 300 KW, 120/240 Volts DC, 1200 RPM.

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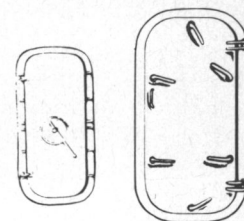
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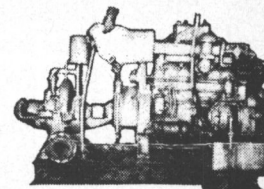
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10"	12"	3.75"	45 1/2"	double
10"	26"	3.75"	58 1/2"	double
2"	8"	1 1/2"	20"	double
2.5"	15"	1.12"	25 1/2"	double
3"	8"	1.37"	15 1/2"	double
6"	8"	4"	144"	double



AIR COMPRESSORS

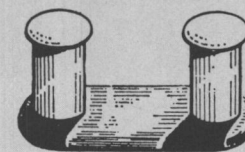
1—GARDNER-DENVER, 150 CFM, 125 PSI, Class WB, Size 7x5 3/4 x5, with Diehl Motors, 45 HP, 230 Volts DC, 870 RPM, 167 Amperes.

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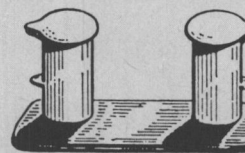
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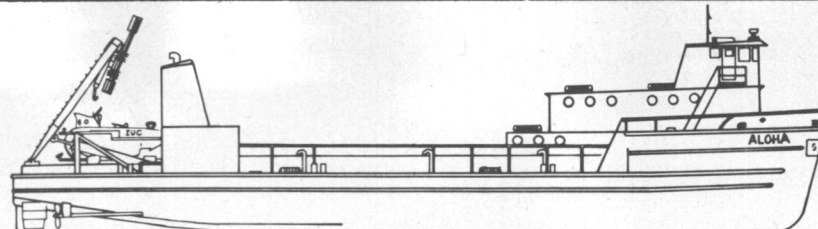
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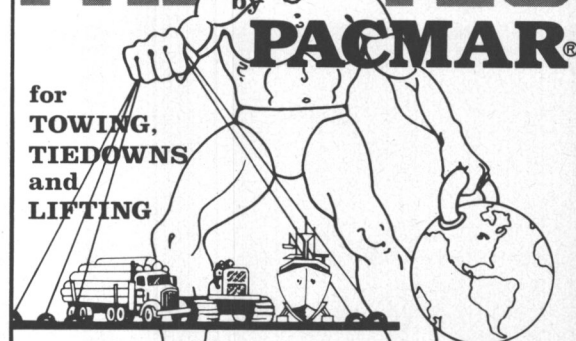
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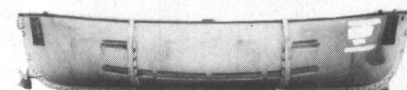
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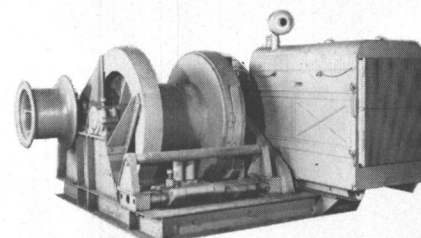
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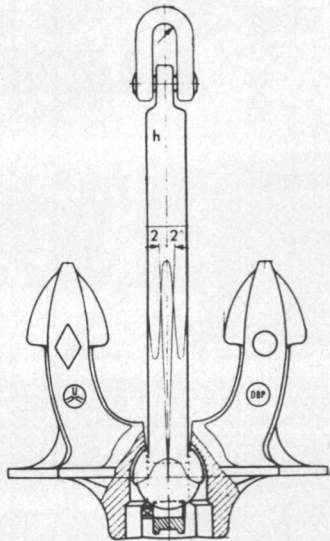


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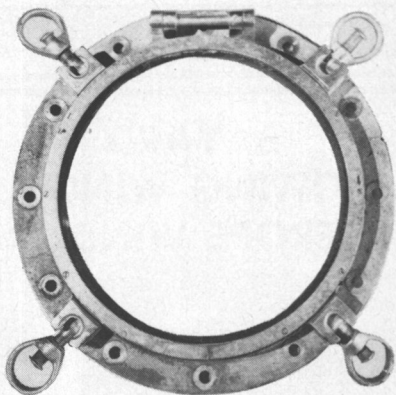
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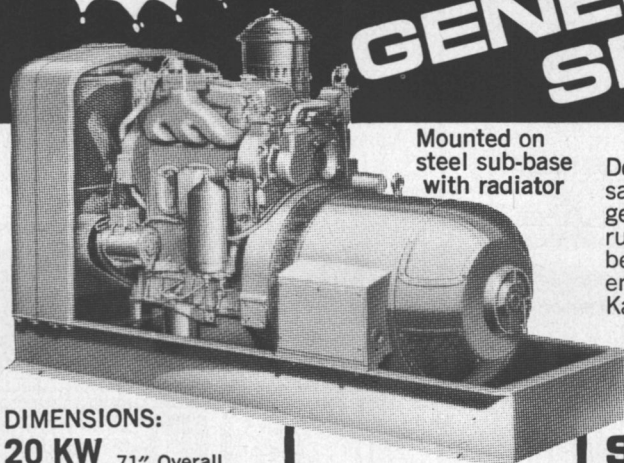
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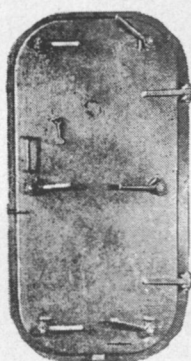
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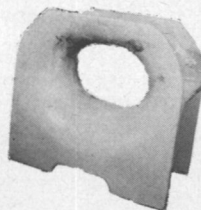
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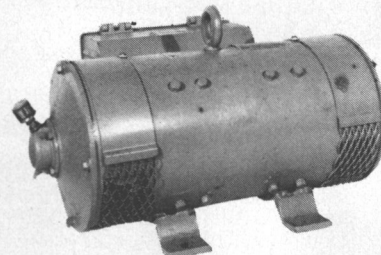
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Nickum & Spaulding Associates, Inc., 811 First Ave., Seattle, Wash. 98104

Ocean-Oil International Engineering Corporation, 3019 Mercedes Blvd., New Orleans, La. 70114

Pearlson Engineering Co., Inc., 8970 S.W. 87th Ct., Miami, Florida 33156

S.L. Petchul, Inc., 1380 SW 57th Ave., Fort Lauderdale, Fla. 33317
Proto-Power Management Corporation, P.O. Box 494, Mystic, Conn. 06355

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Sargent & Herkes, Inc., 611 Gravier St., New Orleans, La. 70130
Schmahl & Schmahl, Inc., 1209 S.E. Third Ave., Fort Lauderdale, Florida 33316

Seaworthy Engine Systems, 73 Main Street, Essex, Conn. 06426
George G. Sharp, Inc., 100 Church St., New York, N.Y. 10007

T. W. Spaetgens, 156 West 8th Ave., Vancouver, Canada V5Y 1N2
SRS Shipping Research Services Inc., 205 S. Whiting St., Alexandria, VA 22304

The Stanwick Company Maritime Systems Department, 3661 E. Virginia Beach Blvd., Norfolk, VA 23502

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Richard R. Taubler Inc., 8 Columbia St., Milford, Del. 19963

H.M. Tiedemann & Co., Inc., 295 Greenwich Ave., Greenwich, Conn. 06830

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Automated Marine Systems Division, Litton Systems Canada Limited, 21101 Oxnard St., Woodland Hills, CA 91364

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Comsat General Corp., 950 L'Enfant Plaza, S.W., Washington, D.C. 20024

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ITT Decca Marine Inc., P.O. Box G, Palm Coast, Fla. 32037

ITT Mackay Marine, 2912 Wake Forest Road, Raleigh, N.C. 27611
Konel Corporation, 271 Harbor Way, So. San Francisco, Calif. 94080

Krupp Atlas—Elektronik, A Div. of Krupp Intl. Inc., P.O. Box 58218, Houston, Texas 77058

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Texaco, Inc. (International Marine) 135 East 42nd St., N.Y., N.Y. 10017

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Voith Schneider—U.S. Agent: Krupp International, Inc., 550 Mamaroneck Ave., Harrison, N.Y. 10528

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Boston Marine Industrial Park, Public Drydock No. 3, 60 Congress St., Boston, Mass. 02109
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China Shipbuilding Corp., c/o Allegro Transportation Supply Co., 393 Seventh Ave., Room 234, New York, N.Y. 10001
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Curacao Drydock Co., Inc., P.O. Box 153, Willemstad, Curacao, Netherlands Antilles
Curacao Drydock, 26 Broadway, Suite 741, New York, N.Y. 10004
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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
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Halter Marine Services, Inc., Route 6, Box 287H, New Orleans, La. 70126
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Havre de Grace, Havre de Grace, Md.
Hillman Barge & Construction Co., P.O. Box 510, Brownsville, Pa. 15417

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Hyundai Mipo Dockyard Co., Ltd., 456 Cheonha-dong, Ulsan, Korea
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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
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Marinette Marine, Ely Street, Marinette, WI 54143
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Sembawang Shipyard (Pte) Ltd., P.O. Box 3, Sembawang, P.O. Singapore, 27
Sun Shipbuilding, Foot of Morton Ave., Chester, Pa. 19013
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Wall Shipyard, P.O. Box 419, Harvey, La. 70058
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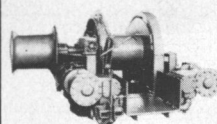
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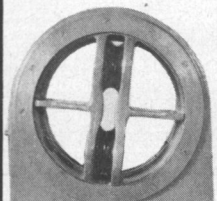
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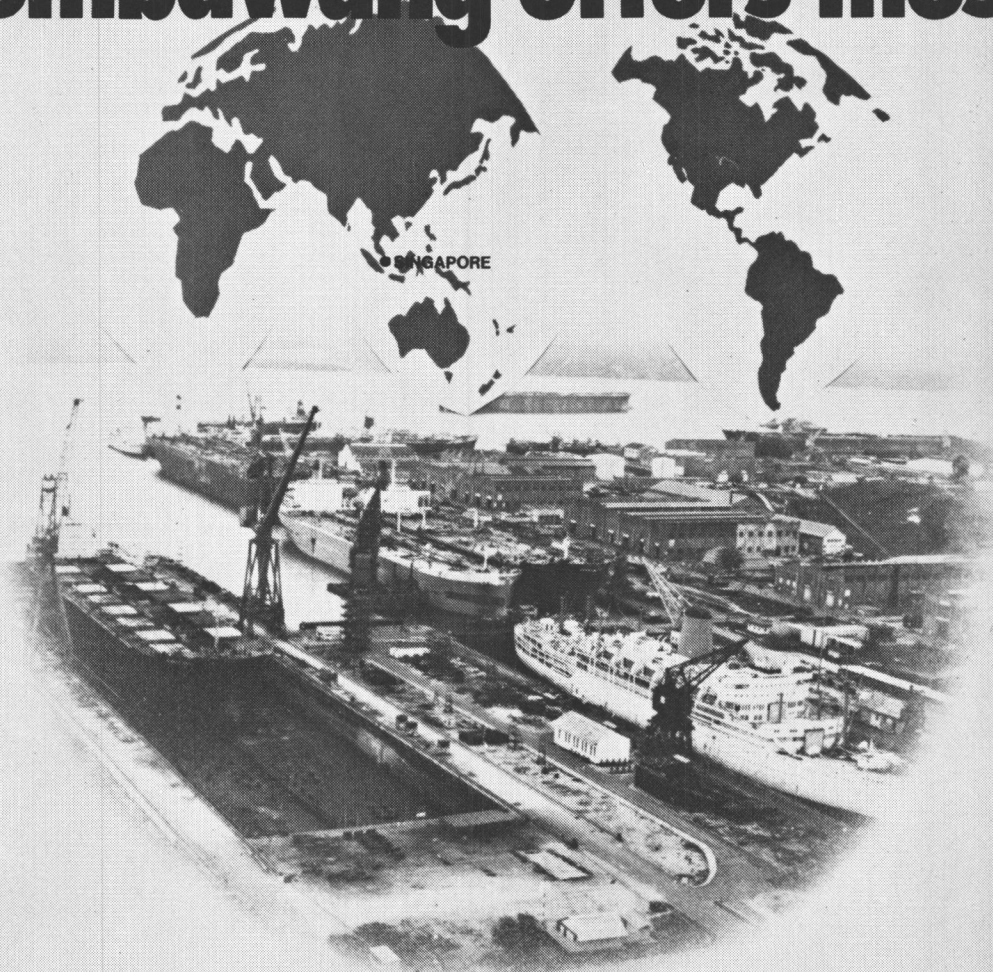
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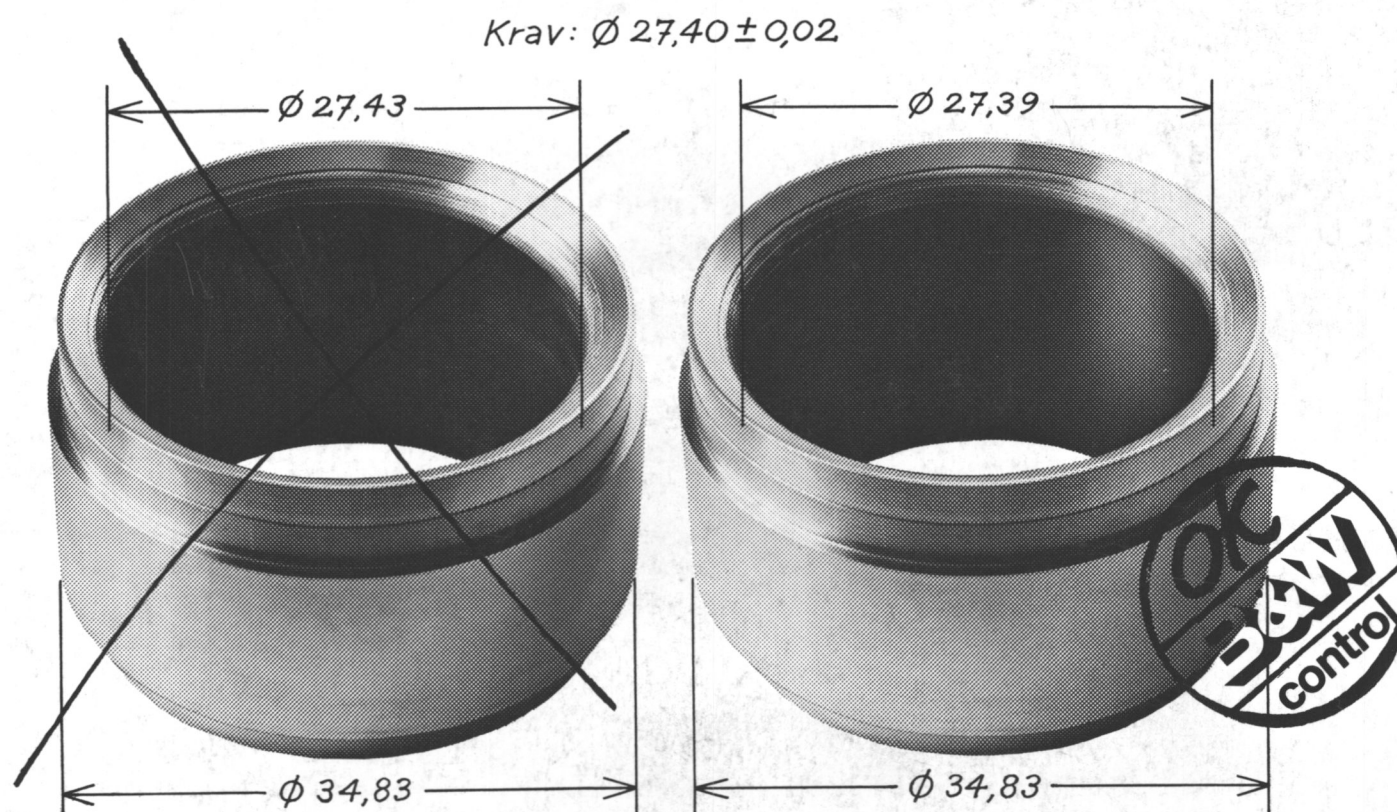
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