MARITIME
REPORTER
AND
ENGINEERING NEWS

John T. Gilbride Andrew E. Gibson Ralph F. Anselmi

Todd Galveston Shipyard Scene Of Dual Ceremony —Keel Laying Of World's Largest Floating Drydock And Dedication Of New Maritime Research Center

(SEE PAGE 6)

APRIL 1, 1972

He was England's claim to California.

If Sir Francis Drake had only stayed in California instead of taking off for other parts, the Golden State would be called "New Albion," Los Angeles might be New London, and San Francisco, Devonshire.

But Drake, the first Englishman to sail around the world, had other ideas when in 1577, he set out from Plymouth with five ships and 164 men on his most famous voyage.

His ship was the "Golden Hind" and his purpose was to annex territories to promote English trade in the Pacific Ocean.

Drake sailed through the Strait of Magellan, discovered Cape Horn, sailed up the west coast of South America, past Mexico to California.

He landed there and claimed the land, which he called "New Albion," for England. Then, he took off, sailed west across the Pacific, rounded the Cape of Good Hope and reached England on November 3, 1580.

Drake was knighted by Queen Elizabeth I, and timber from his ship, the "Golden Hind," was made into a chair that is kept at Oxford University.

Was he really in California in 1579? He had claimed he left a brass plaque and, in 1933, a plate of brass answering his description was found, thrown away, and found again on Marin Peninsula in 1936.

After many tests it was declared authentic and it is now at the University of California.

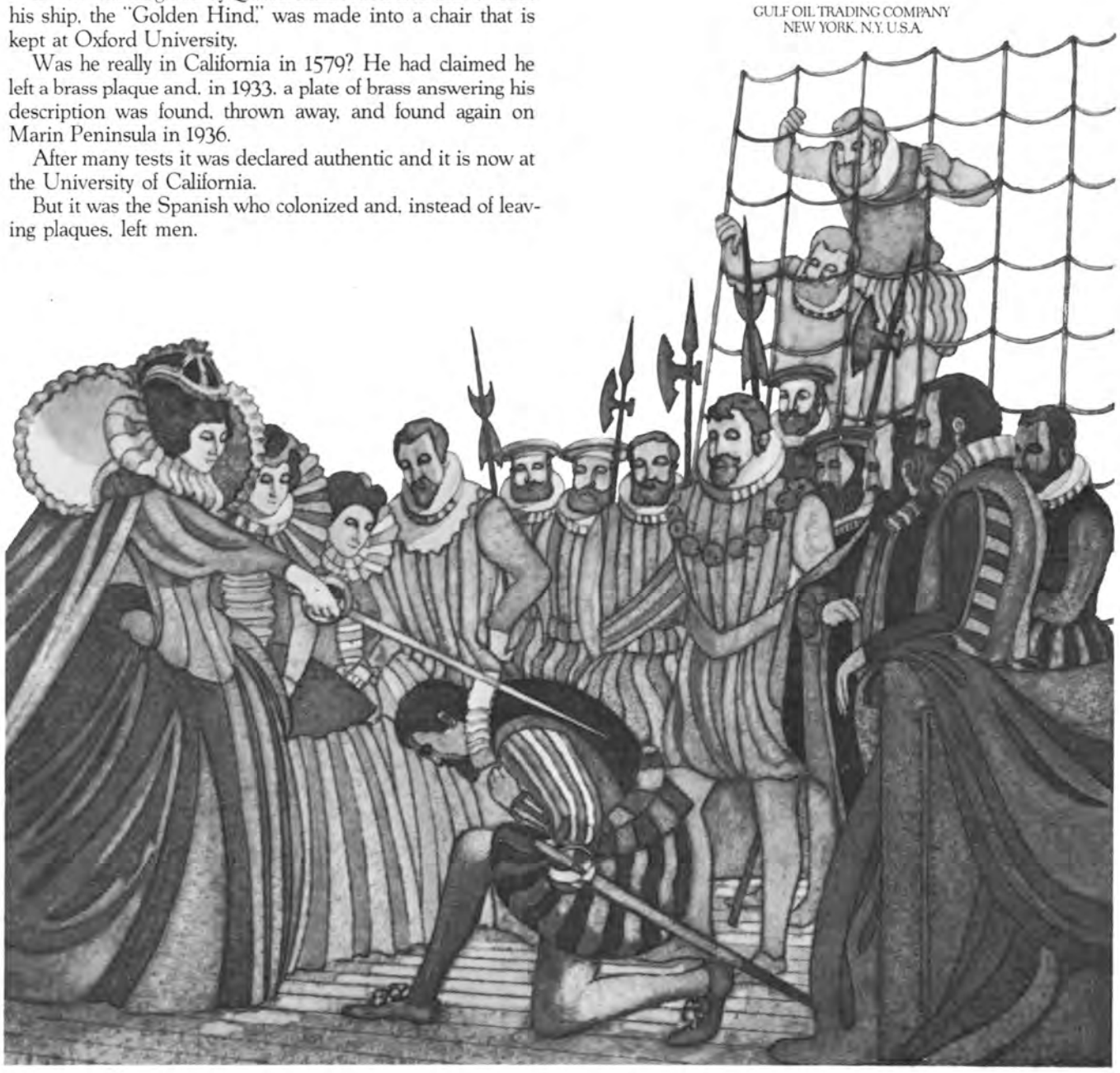
But it was the Spanish who colonized and, instead of leaving plaques, left men.

So, today, California everywhere reflects the cultural influence of its early Spanish settlers just as the U.S. East Coast reflects the pioneering colonists from England.

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

Gulf®

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



Three mighty important ladies in New York Harbor affairs.

The one in the background needs no introduction. The two in front can introduce new speed and efficiency to your towing, docking, and undocking. They're the Jane McAllister and Grace McAllister, two of the newest supertugs in the Balanced Fleet. McAllister Brothers, Inc., Towing and Transportation, 17 Battery Place, New York, N.Y. 10004. Serving the ports of New York, Norfolk, Philadelphia, Montreal, and San Juan.

Brazilian Yard To Build 51,000-Dwt Bulkers

Contracts have been signed between Verolme Estaleiros Reunidos do Brasil S.A.-Jacuacanga/Brazil and Companhia de Navegacao do Vale de Rio Doce "Docenave"-Rio de Janeiro for the construction of two 51,000-dwt bulk carriers for Docenave.

Classed by the American Bureau of Shipping, the vessels will have the following characteristics and approximate measurements: overall length 674 feet, breadth 98 feet, and a 40-foot draft. The main engine will be of Sulzer-type 6RD90.

Delivery of the vessels is planned for early and middle 1974, and they are to be used for the strongly expanding ore transport from Brazil, in which Companhia Vale do Rio Doce plays an important role. For the yard, this means a further increase of its order book of larger vessels. The ships are part of the shipbuilding program sponsored by the Brazilian Government.

Norwegian Gas Turbine Manufacturer Sells License To Kobe Steel

Representatives for Kobe Steel Ltd., manufacturers of steel machinery and processing plants, and A/S Kongsberg Vapenfabrikk, a major Norwegian industrial concern, have signed a licensing agreement giving Kobe Steel Ltd. manufacturing rights for Kongsberg gas turbines in the Japanese market.

With the final negotiations concluded, **B. Hurlen,** managing director of A/S Kongsberg Vapenfabrikk, stated: "The signing of the agreement marked an important step in the international marketing of international Kongsberg gas turbines. Japan is a significant market for the type of prime mover developed by Kongsberg, particularly in the marine sector, as realized by the early deliveries made for on-board installations before the agreement was concluded. License agreements have overcome trade and geographical obstacles and are helping to result in a more effective worldwide marketing of Kongsberg gas turbines."

The Viking gas turbines are developed by Kongsberg specifically for marine and industrial applications.

In addition to their manufacturing activities, Kobe Steel will also assume full systems engineering responsibility for the various types of applications for this gas turbine engine. In the marine field, major applications are standby generating sets for supertankers, inert gas systems, bow thruster drive, and hydraulic pump drive.

MARITIME REPORTER AND ENGINEERING NEWS

No. 7 Volume 34

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

MUrray Hill 9-3266, 3267, 3268, 3269

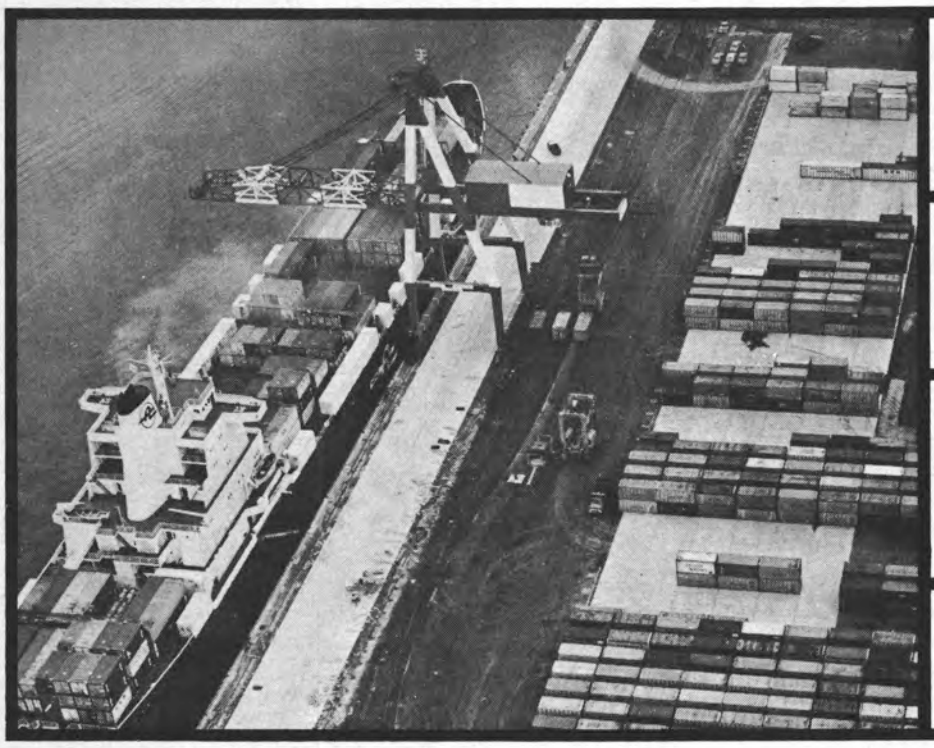
ESTABLISHED 1939

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

Controlled Circulation postage paid at Hoboken, New Jersey 07030

Member
BPA
Business Publications Audit of Circulation, Inc.

You can't beat the system.



30-Ton Star Karricon High-Speed Straddle Carrier Will Clear and Stack All Standard Length Containers Up To 9 Ft. in Height, Three High.

30-Ton High-Speed Star Chassis Loader Capable of Loading or Unloading Containers From Over-the-road Trailers or Off-the-road Chassis.

70-Ton Super Starporter Container and General Cargo Crane with Capability of Tilting and 360° Load Rotation—Northeast Marine Terminal Co., Inc., Brooklyn, New York Terminal.

40-Ton Starcon Gantry Crane with 70-Foot Inside Clear Width—Rubber Tire Mounted.

(Starsystem™ Container Handling Equipment)

Star Iron & Steel pioneered many advancements in container handling. Today, Star's reputation for innovative engineering, on-time delivery and superior performance is unmatched in this rapidly growing field.

The Starsystem is another example of Star's leadership. It is an integrated System of versatile container handling equipment including: Starporter® container and general cargo cranes; Starcon™ mobile gantry cranes, rubber tire or rail mounted; Star Karricon® straddle carriers; and Star Chassis™ loaders.

Put them together in a combination to fit your requirements and you'll have a container handling system that's unmatched in fast ship turnaround, dependability and every other factor of performance.

Starsystem leads the way in interchangeability of parts and machinery components. No other line of equipment gives you so much flexibility. Your equipment operators can move from one piece of equipment to another with complete familiarity and maximum efficiency. You stock less parts, save time in maintenance and keep your equipment working for maximum profitability. Cabs, power brakes, wheel yokes, fully automatic telescopic spreaders, wheels, tires, electrical components — these are just a few examples of Starsystem components that are freely interchangeable.

But, let's make one thing clear — the word "system" in our name does NOT mean inflexible product design. Whatever cargo flow problems you might have, Star has the creative design ability, experience and the flexibility of manufacture to come up with modifications to suit your needs and budget.

We'd like to tell you more reasons why you can't beat the system — the Starsystem of container handling equipment.

Write today for our Starsystem brochure. Or, for immediate action, give us a call.

SIS™

STAR IRON & STEEL CO.
A Subsidiary of Breeze Corporations, Inc.

326 Alexander Avenue / Tacoma, Washington 98421
Telephone (Area Code 206) 627-9131 Telex No. 327 453

East Coast Representative: Robert Moore Corporation
350 Main Street, Port Washington, N.Y. (zip code 11050) (Area Code 516) 883-7660

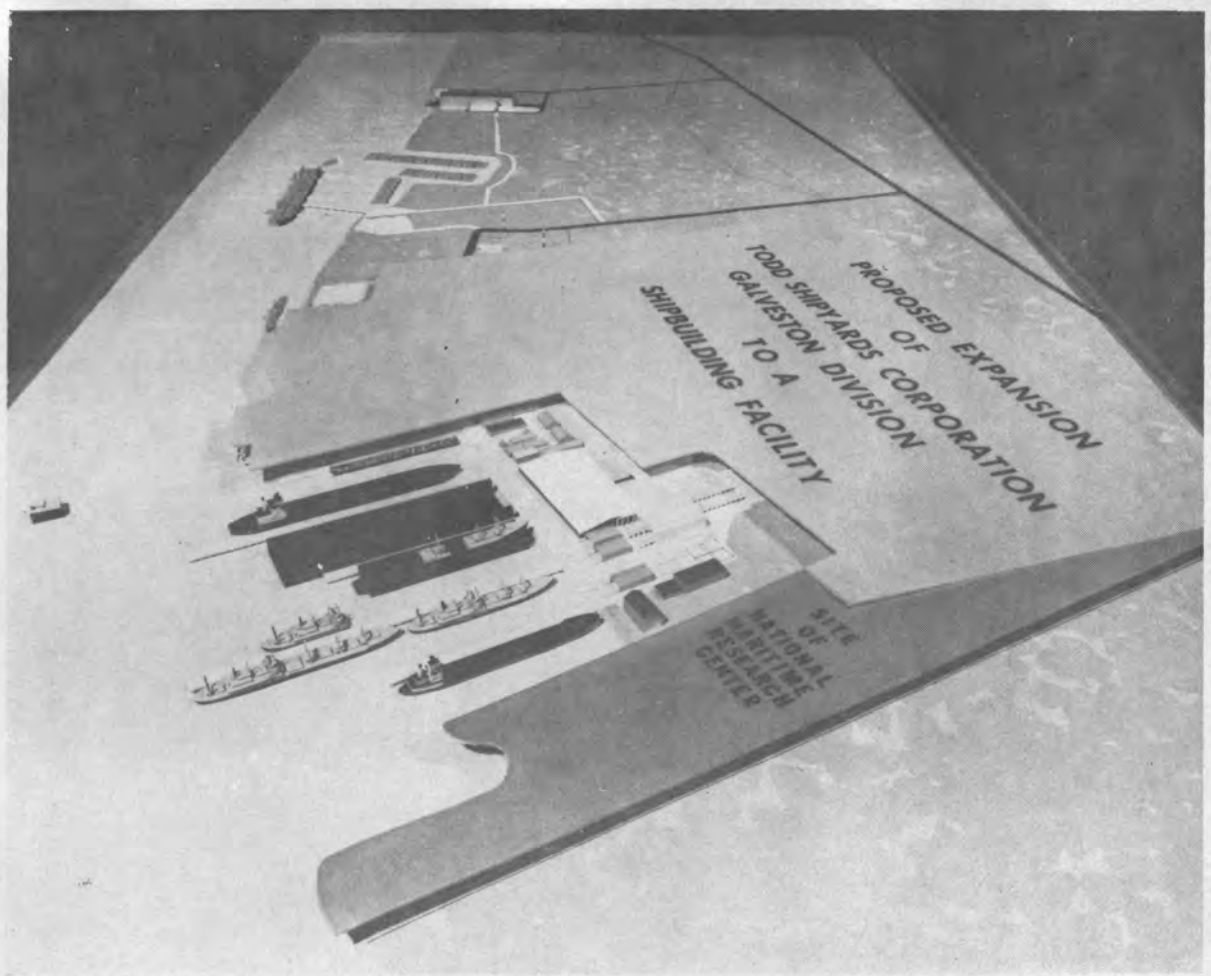
Southeastern Representative: John Blake Engineering & Sales Co.
P.O. Box 99, Picayune, Miss. (zip code 39466) (Area Code 601) 798-7895

Export: Contact Star Iron & Steel Co. Direct

STARPORTER Container Cranes are also built by the following licensees:
Canada: Canron, Limited, Western Bridge division
Japan: Kawasaki Electric & Machine Co., Ltd.

Todd And MarAd Jointly Announce Expansion Plans

ON THE COVER: John T. Gilbride (left), president, Todd Shipyards Corporation, and **Ralph Anselmi,** general manager, Todd's Galveston Division, lend moral support to **Andrew E. Gibson,** Assistant Secretary of Commerce for Maritime Affairs, as he applies the welder's torch to lay the keel for the world's largest floating drydock.



PROPOSED $60 MILLION EXPANSION for Todd's Galveston shipyard is shown by the overlay on model of existing yard. It indicates the more than 200 acres of unused Todd property where the facility would be built. The new floating dry dock is shown near the center of the picture and the new National Maritime Research Center is shown in the lower portion. The Southwest Industries' property which Todd has purchased is shown at the top of the picture.

At a joint ceremony held recently in Galveston, Texas, the Maritime Administration announced the establishment of a National Maritime Research Center and **John T. Gilbride,** president of Todd Shipyards Corporation, disclosed plans for a major expansion of Todd's Galveston Division. **Andrew E. Gibson,** assistant secretary of Commerce for Maritime Affairs, officially opened the new National Maritime Research Center which will concern itself with basic and applied research into the maritime aspects of nuclear power, pollution abatement, tug-barge linkages, maintenance and repair, and liquefied natural gas transportation projects. Todd Shipyards will act as supporting contractor for this project.

Todd's immediate expansion plans, according to Mr. **Gilbride,** call for the keel laying, which took place during the ceremonies, of a $16 million floating dry dock—the largest in the world—which will give the company the unique and flexible capability of both launching new construction and drydocking the giant "superships of the future."

The future portion of the expansion program, as envisioned by Mr. **Gilbride,** is the construction of a major shipbuilding facility on more than 200 acres of currently unused Todd land on Pelican Island, which could be serviced by the new dry dock and, if constructed, would give the Port of Galveston a shipbuilding capability for liquefied natural gas (LNG) carriers, large tankers, the new lighter and barge carrying vessels (LASH and SEABEEs), and other types of cargo vessels.

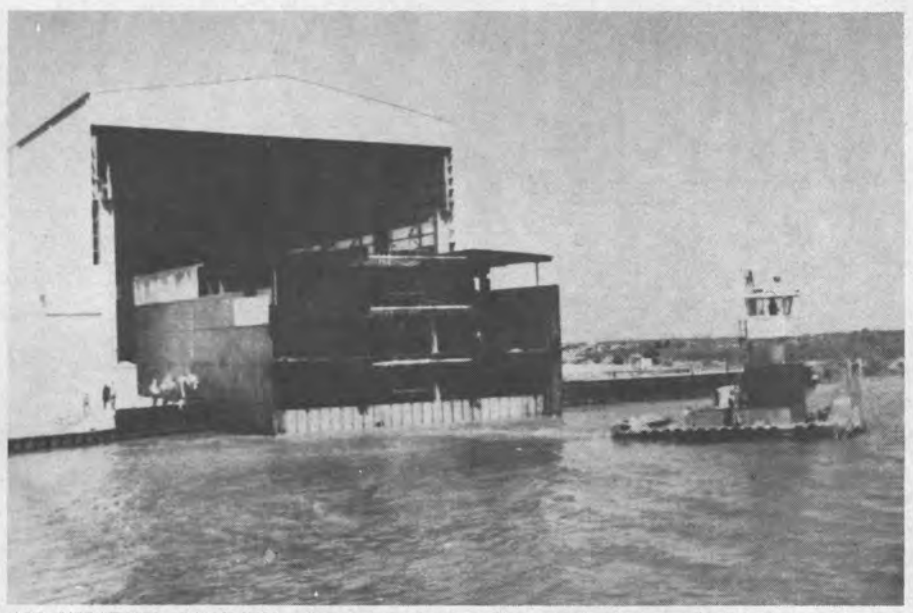
Mr. **Gilbride** pointed out that the new-construction phase of Todd's expansion plan is contingent on the company's receiving firm contracts totalling at least $250 million for shipbuilding. Contracts in this order, of magnitude, he added, are being actively pursued by the company.

Additionally, Todd's president announced that, in conjunction with Galveston Wharves, Todd has purchased the Southwest Industries property, located one quarter of a mile west of Todd's main plant on Pelican Island, from Ingersoll-Rand Company for $3 million. Todd heretofore leased this property to build the midbodies in its Lykes Bros. Steamship Company containership conversion program.

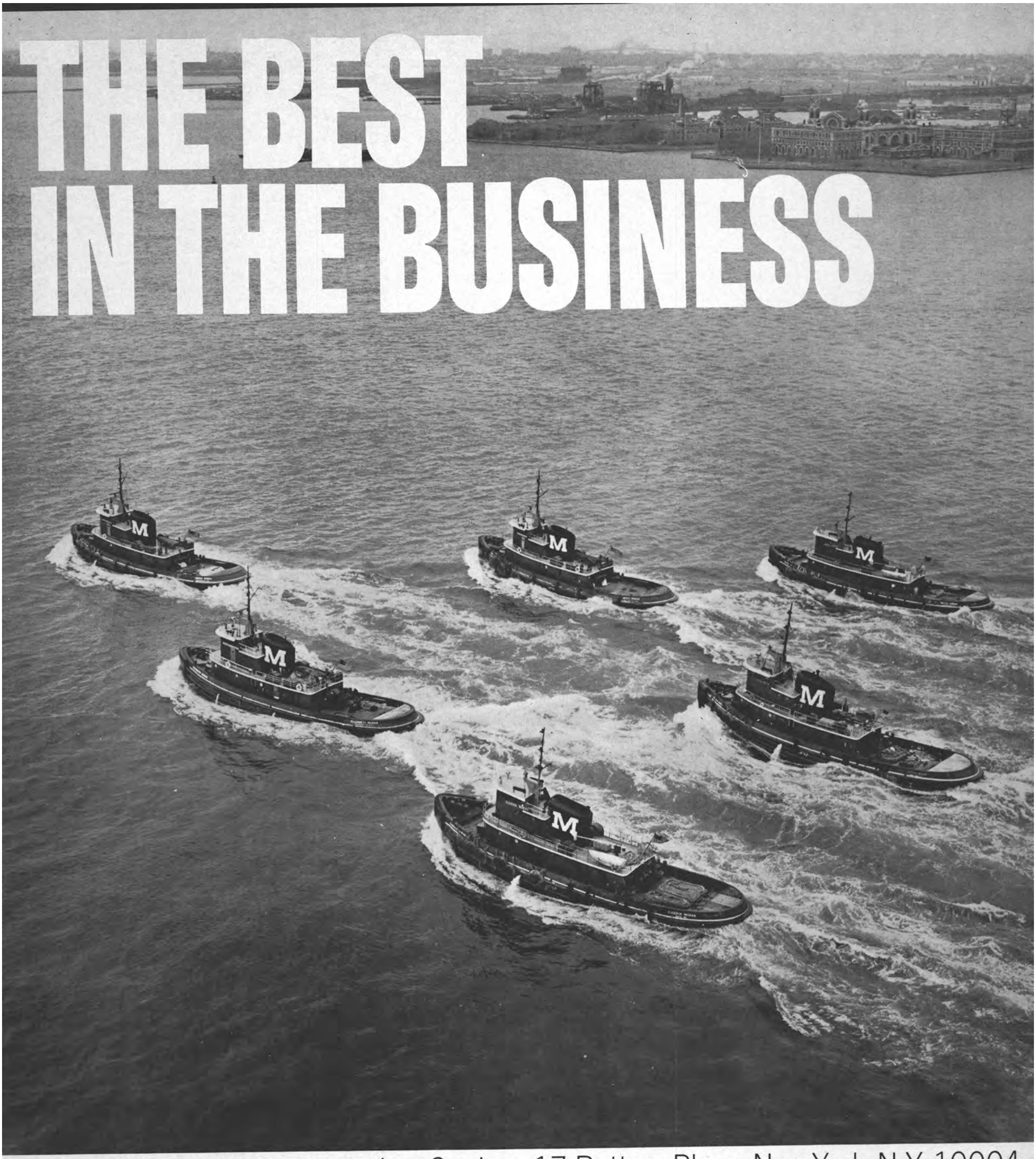
An all-weather facility, the new Southwest Plant will be used to

(Continued on page 8)

PRINCIPALS AT THE LUNCHEON are, left to right: **Marvin Pitkin,** Maritime Administration's assistant administrator for research and development; **Andrew E. Gibson,** Assistant Secretary of Commerce for Maritime Affairs; **John T. Gilbride,** president, Todd Shipyards Corporation, and **Ralph Anselmi,** general manager, Todd's Galveston Division.



ALL WEATHER FACILITY—A yard towboat pulls a midbody for a Lykes Bros. ship out of the shop where it was constructed. This building has more than 90,000 square feet of space. It has overhead bridge-type crane service with a total capacity of 400 tons in three bays and undercover launching facilities. The new dry dock will be built here.



Moran Towing & Transportation Co., Inc., 17 Battery Place, New York, N.Y. 10004

Visitors to the Todd-MarAd ceremonies attended a cocktail party hosted by Galveston Wharves. **Charles S. Devoy** (2nd from left), port director and general manager, greets guests before taking them on a boat tour of Galveston Harbor.

Todd And MarAd Expansion Plans—

(Continued from page 6)

build the new dry dock over the next 12 to 14 months and for fabricating, assembling and erecting major components for all types of marine and heavy industrial projects, and for servicing offshore drilling equipment.

An immediate usage for this facility could be the conversion of an additional four cargo ships into containerships similar to the nine Lykes Bros. Steamship Company's vessels currently being converted. The plans for this follow-on conversion were announced recently by **J.T. Lykes Jr.**, chairman of Lykes Bros., and will be undertaken as soon as the necessary governmental approvals are obtained. Mr. **Lykes** stated that the ships already converted into combination container/break-bulk vessels have been very successful.

The New Dry Dock

The new dry dock which can also serve as a launching facility will be a modified Rennie-type all-welded steel structure with an overall length of 922 feet and an overall beam of 211 feet. The floating dry dock will have a clearance between wingwalls of 175 feet. The structure will consist of ten individual pontoons tied together with continuous steel wingwalls. The rated capacity will be 90,000 long tons at 12 inches freeboard.

Provision has been made in the design to ultimately increase the clear width between wingwalls to 200 feet and the overall length to 1,412 feet. The rated capacity of the enlarged dock would be 150,000 long tons at a freeboard of 12 inches.

An outstanding feature of the new dry dock will be the ability to use it to launch newly constructed ships. Vessels will be constructed in a level attitude on land and moved into the dry dock for end launching. Plans for a new shipbuilding facility at Galveston which will utilize this concept are presently under way.

The engineering design and details for the dry dock were performed by the Galveston office of Designers and Planners, Inc., a subsidiary of Todd Shipyards Corporation.

Several additional advantages are obtained from the use of such a floating dry dock other than for launching. It can be used for repair work between launchings and can be moved from one location to another. It can also be used to transfer ships ashore for extensive bottom repair work.

The dry dock will be built at the new Southwest Plant of the Galveston Division. This facility features unique fabrication capabilities that are particularly suited to this type of construction. It is planned to fabricate and launch the individual dry-dock sections completely under cover where two cranes with capacities of 200 tons each are available, affording the capability to make 400-ton lifts.

The New Research Center

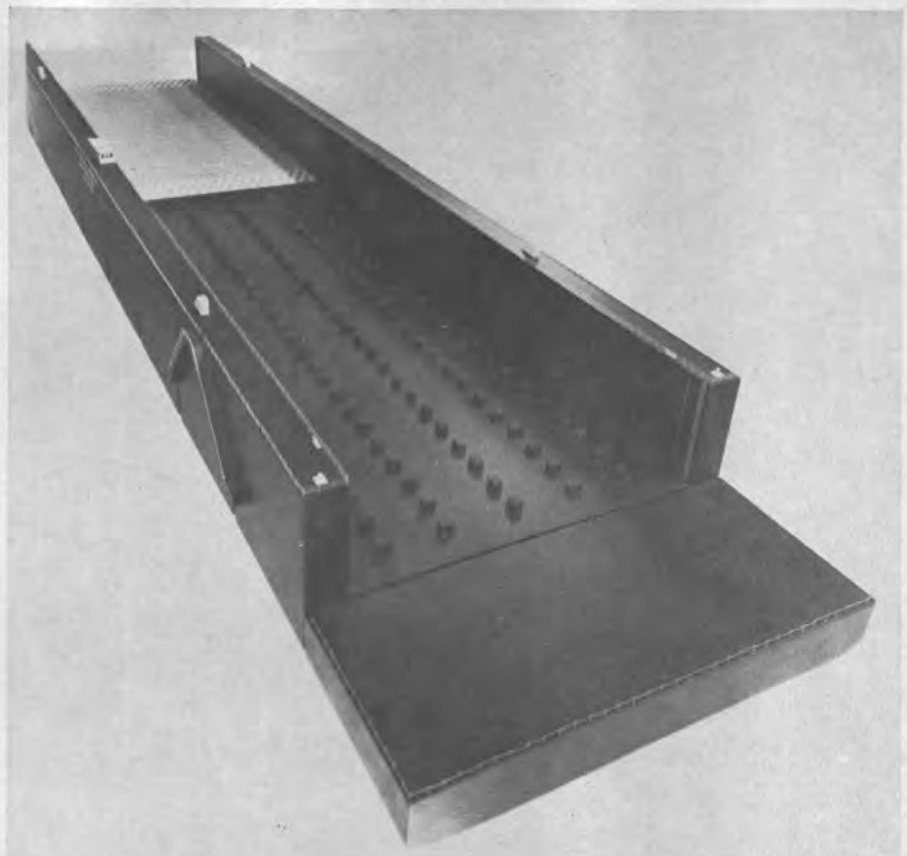
The new Maritime Administration-sponsored research center will be devoted to increasing the productivity of American-flag shipping. The center, the second of its kind in the United States—the first one was opened eight months ago at the U.S. Merchant Marine Academy, Kings Point, N.Y.—will be used to study new technological advances by both the Maritime Administration and the marine industry before being installed aboard merchant ships.

The Research Center is located in the east end of the Galveston Division of Todd Shipyards across the ship channel from Galveston. The facility is comprised of a combination of Maritime Administration and Todd properties, equipment and buildings. The Center can be completely separated from the rest of the shipyard by a high cyclone fence. An additional 24.65 acres of land outside the fence has been leased for the use of the Maritime Administration. This property, leased with an option to buy, is now available to be utilized as desired.

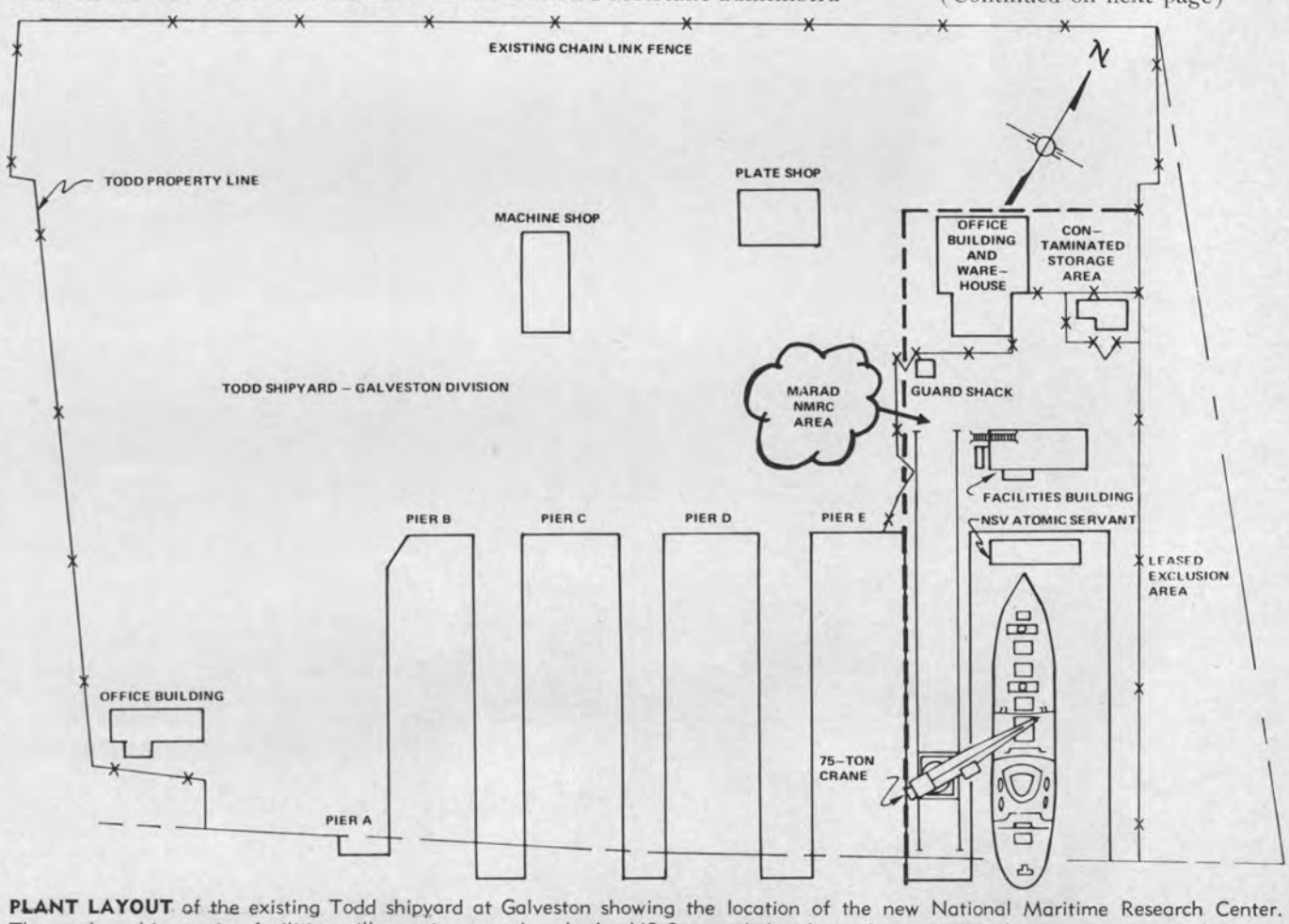
The Center will be under the jurisdiction of the Maritime Administration's assistant administrator for research and development, **Marvin Pitkin**, through his Office of Maritime Research Centers headed by **Berg Paraghamian.** The Center itself will be staffed with a Government management team.

Delma L. Crook has been appointed director of NMRC-Galveston and has already assumed his duties at the Center. He is a graduate of the U.S. Merchant Marine Academy, Kings Point, N.Y., with post graduate courses in marine

(Continued on next page)



WORLD'S LARGEST FLOATING DRY DOCK—Shown above is the model of the $16 million, 922 foot dry dock Todd has started to build. It will be used for repairs and construction. The area in white is as large as a football field.



PLANT LAYOUT of the existing Todd shipyard at Galveston showing the location of the new National Maritime Research Center. The nuclear-ship service facilities will remain even though the NS Savannah has been decommissioned.

Todd And MarAd Expansion Plans—

and nuclear engineering at the University of Virginia, College of William and Mary, Virginia Polytechnic Institute, and the U.S.M.M.A.

Mr. **Gibson** spoke at length on the Maritime Administration's research and development plans at a pre-ceremony luncheon hosted by **Ralph F. Anselmi,** general manager of Todd's Galveston Division. He said, "The Port of Galveston is indicative of the changes that are coming about in the maritime industry. Designated the West Gulf terminal for Lykes' innovative SEABEE service, the port has undertaken an ambitious project to provide berthing facilities for the SEABEE mother ships, a 14-acre barge basin, and a covered barge terminal to complement this service.

"These new facilities and ships represent a new level in shipping efficiency, one that we are working to increase even further through the development and application of new advances to the shipping industry."

As an indication of the greater importance being assigned to research and development programs, Mr. **Gibson** stated "we have advanced in striving toward this goal by greater allocations for maritime research. In Fiscal Year 1969, the appropriation was $6.7 million, half of which was allocated for the operation of the nuclear ship Savannah. In the succeeding years, the budget has risen to $23.8 million and our budget request for Fiscal Year 1973 includes $30 million for research — a new record. Thus, there has been a ten-fold increase in the level of effective maritime R&D funding in the last four years."

In closing, Mr. **Gibson** stressed the Government's desire to restore this nation to a position of preeminence in maritime development.

Mathiesen To Head Det Norske Veritas Machinery Department

Tor-Chr. Mathiesen, principal surveyor of Det norske Veritas, has been appointed head of the machinery department at the Society's head office as of January 1, 1972.

Mr. **Mathiesen** graduated from the Technical University of Norway, Trondheim, in 1962. The following year he joined Det norske Veritas, where he has been working in the machinery and research department and also as a surveyor at the Rotterdam station. In 1969-71, he undertook a postgraduate study in marine engineering at the Technical University of Norway. He was appointed principal surveyor last year. Mr. **Mathiesen** succeeds Mr. **Sivert Overaas** as head of the machinery department.

Mr. **Overaas** has been appointed director of the technical/nautical department of the Norwegian Association of Shipowners in Oslo. He graduated from the Technical University of Norway in 1949, and was with A.M. Liaaen Skipsverft og Mek. Verksted, Alesund before joining Veritas in 1952. Mr. **Overaas** worked as a surveyor at Veritas stations in Hamburg and St. Nazaire for several years and was appointed assistant director and head of the machinery department at the head office in 1965.

National Marine Service Appoints W.B. Arnold

National Marine Service, Incorporated, St. Louis, Mo., has announced the appointment of the W.B. Arnold Company of New Jersey as their East Coast sales representative of their Marine Systems Division for all ports north of Cape Hatteras.

The Marine Systems Division of National Marine designs and manufactures a complete line of Safety Watch Monitoring and Control Systems for diesel-powered seagoing and inland waterway vessels. These Safety Watch systems automatically stand watch over the vessels' vital propulsion systems and sound alarm and take automatic corrective action to protect the vessel should vital systems fail.

The W.B. Arnold Company, organized in 1958, as sales representative adds this Safety Watch group to their well-established line of American and Overseas Marine machinery and equipment offered on the East Coast.

Central Gulf To Order LASH Ships And Barges —Total Cost $80 Million

Two additional lighter-aboard-ship (LASH) cargo vessels are to be ordered by Central Gulf Steamship Corp., it was announced by Trans Union Corp., parent company of the steamship line.

The new ships, designed by Friede & Goldman, Inc., New Orleans, La. firm of naval architects, will be built by Avondale Shipyards, Inc., New Orleans, from which Central Gulf has already ordered a single LASH-type vessel.

Central Gulf already operates two barge-carrying cargoliners in the Gulf-North Atlantic trade. The two ships, built in Japan, were the first LASH ships in the world when they entered service in 1969. Of Norwegian registry, they are under charter to the company.

The three new vessels Central Gulf has ordered, scheduled for delivery in July, October and December 1974, will fly the American flag.

Along with the two new ships, Central Gulf will order 600 barges from an American yard.

The forthcoming order will involve an estimated $80 million, $55 million of which will be for the two new vessels and $25 million for the barges. The total cost of Central Gulf's three-ship construction program, including barges, is put at $108 million.

The new ships will be 893 feet long, have a 100-foot beam, and a deadweight capacity of 40,000 tons. Each will be able to handle 89 lighters, which are loaded and unloaded by a gantry crane.

The three-ship order involves Federal construction subsidy assistance under the 1970 Merchant Marine Act. The vessels will not however, be under the Government's operating subsidy program.

James Hughes, Inc. Names J.J. Hughes VP

James J. Hughes

The board of directors of James Hughes, Inc. has nominated **James J. Hughes** vice president of operations as of March 1, 1972.

James Hughes, Inc. is a well-known East and Gulf Coast I.C.C. Water Transportation Firm which has been in operation since 1896. The new vice president represents the fourth generation of ownership and control of the expanding fleet of coastwise and harbor vessels.

A 1964 graduate of Boston College and a graduate of Naval Officer Candidate School, Newport, R.I., Mr. **Hughes** served three years with the Navy in Vietnam waters, followed by assignment to the Atlantic and Mediterranean areas. He joined the Hughes organization in 1970, after having received his M.B.A. degree from Columbia Graduate School of Business.

His new duties at Hughes will primarily be concerned with the expanding operations of the James Hughes, Inc. fleet of I.C.C. water carriers involved in the transportation of oversized or extremely heavy pieces, such as nuclear and electrical power components, fabricated steel and prestressed concrete units.

Nashville Bridge Gets Contract For 2 Barges From Magnolia Marine

A contract to construct two tank barges has been awarded the Nashville Bridge Company, Nashville, Tenn., by Magnolia Marine Transport Co. of Jackson, Miss. One of the barges will measure 300 feet by 54 feet by 12 feet, and the other 295 feet by 54 feet by 12 feet.

St. Louis Ship Awarded Contract For 2 Barges

National Marine Service, Inc., St. Louis, Mo., has awarded a contract to St. Louis Ship, St. Louis, for two 195-foot by 35-foot by 12-foot tank barges.

Halter Marine To Build Twin-Screw Crew Boat For English Firm

Gray, MacKenzie and Co., Ltd., London, England, has awarded Halter Marine Services, Inc. of New Orleans, La., a contract to build a 930-horsepower twin-screw crew boat. The vessel will measure 71 feet 3 inches by 18½ feet by 9 feet 4 inches.

Sperry Rand Univac Receives $39.3-Million Contract From Litton

Litton Industries has awarded the Univac Division of Sperry Rand Corporation a multi-year subcontract with a potential value of $39.3 million to produce basic shipset electronic computer systems for 30 U.S. Navy Spruance-class (DD-963) destroyers. **James R. Mellor,** Litton senior vice president, made the announcement.

The initial award is for $28.1 million. This covers the production of computer systems for a shore station and the 16 ships funded by Congress.

Design, production, integration and test of the destroyers' electronics systems will be conducted by Litton's Data Systems Division, Van Nuys, Calif.

Each of the basic shipset systems to be manufactured by Univac's Defense Systems Division plants in St. Paul, Minn., and Salt Lake City, Utah, will consist of a three processor AN/UYK-7 computer system and supporting equipment. The AN/UYK-7, which will be wired for future expansion, is a general-purpose high-performance computer adaptable to a wide variety of real-time data processing applications.

Jeffboat To Build 70 Hopper Barges For M-G Transport

M-G Transport Services, Inc., Cincinnati, Ohio, has applied to the Maritime Administration for mortgage insurance to help finance construction of 70 covered hopper barges for hauling bulk commodities on inland waterways.

The barges—30 of which will be 200 feet long of 1,650 deadweight tons, and the other 40 to be 195 feet in length and of 1,500 dwt—are expected to cost some $7 million. They will be built by Jeffboat Inc., Jeffersonville, Ind.

Atlantic Container Line Appoints W.R. Clynes

William R. Clynes has been appointed manager, Terminal and Warehousing Operations, for Atlantic Container Line, Ltd., according to **A.L. Aberson,** vice president, Traffic and Operations of the company.

Prior to joining A.C.L., Mr. **Clynes** held various positions of increasing responsibility with Transamerican Freight Lines, Inc. until his most recent assignment as district manager, Traffic and Operations.

Mr. **Clynes** is a graduate of the Academy of Advanced Traffic and a registered I.C.C. Practitioner.

Carboline Appoints Tarlas Gen. Manager International Division

The appointment of **Hercules D. Tarlas** as general manager of the International Division of the Carboline Company has been announced by **Stanley L. Lopata,** president of the company.

Mr. **Tarlas,** a vice president of Carboline, will be in charge of licensing, joint ventures and international sales to all industries, including marine. The International Division will be operated out of the St. Louis headquarters office. At present, Carboline Company is operating in England, France, Germany, Benelux, Italy, Sweden, Norway, Spain, Venezuela, Mexico, Australia, Japan, Middle East and Far East countries.

A chemical engineering graduate of Washington University, Mr. **Tarlas** started his career with Carboline in 1955. He is a member of the National Association of Corrosion Engineers and the American Institute of Chemical Engineers.

Carboline Company manufactures and markets corrosion resistant protective coatings, waterproofing membranes, industrial finishes, maintenance coatings, fireproofing products, adhesives and specialty materials. The company is located at 328 Hanley Industrial Court, St. Louis, Mo. 63144.


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

response!

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

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

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

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

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

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

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

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

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

CATERPILLAR

W.C. Brodhead Elected AIMS Board Chairman

W.C. Brodhead

One of the nation's key maritime executives, who has long been recognized as a leader in the world's tanker industry, has been elected chairman of the board of the American Institute of Merchant Shipping (AIMS).

He is **W.C. Brodhead,** vice president of the Marine Department, Gulf Oil Corporation, New York. The change in AIMS's leadership was announced by outgoing board chairman **Fred S. Sherman,** president of Calmar Steamship Corporation, a Bethlehem Steel Corp. subsidiary, Sparrows Point, Md., following AIMS's annual meeting at the India House in New York. It was also announced that Capt. **J.W. Clark,** president, Delta Steamship Lines, New Orleans, La., will be the new chairman of the AIMS Liner Council, comprised of regularly scheduled cargoliners operating under Government subsidy contracts. Capt. **Clark** succeeds **Thomas J. Smith,** president, Farrell Lines Incorporated. Continuing as chairman of the AIMS Tanker Council will be **H.A. Steyn Jr.,** manager, Relations Division, Marine Department, Mobil Oil Corp., New York.

Mr. **Brodhead,** who recently completed his 46th year with the Gulf Oil Marine Department, is a prominent figure in the field of marine transportation, both on the national and international scene. Since 1967, he has been vice president of Gulf's Marine Department, which operates one of the world's largest and most modern tanker fleets. Mr. **Brodhead** has long been active in organizations dealing with oil pollution abatement. He is president of the Tanker Service Committee, chairman of the American Petroleum Institute's Marine Oil Terminal Committee, and a member of the National Petroleum Council. He also is a director of the following organizations: Tanker Owners Voluntary Agreement Concerning Liability for Oil Pollution (TOVALOP), the Oil Companies International Marine Forum, the International Tanker Indemnity Association Limited, and the Foreign Supply and Transportation Committee, National Defense Executive Reserve in the Interior Department's Office of Oil & Gas Emergency.

As board chairman of AIMS, Mr. **Brodhead** assumes the leadership of an association that was organized in 1969 through the merger of three steamship trade associations representing all coasts. As the nation's largest American-flag shipowners' association, AIMS is comprised of 34 companies operating some 430 tankers and subsidized and non-subsidized dry cargo ships in the foreign, coastal and intercoastal trades. These vessels represent about two-thirds of all active, privately owned ships registered under the U.S. flag and aggregate over 8-million deadweight tons.

New AIMS board members include: **Edward J. Heine,** president, United States Lines, Inc., New York; Capt. **Charles M. Lynch,** manager, marine operations, Atlantic Richfield Company, Philadelphia; **Leo C. Ross,** president, Pacific Far East Line, Inc., San Francisco; and **Spyros S. Skouras,** chairman of the executive committee and chief executive officer, Prudential-Grace Lines, Inc., New York.

Continuing as board members for 1972, in addition to Messrs. **Brodhead, Smith, Sherman** and Capt. **Clark,** are: **Thomas B. Crowley,** chairman, Alaska Hydro-Train, San Francisco; **J.R. Dant,** president, States Steamship Company, San Francisco; **L.C. Ford,** president, Chevron Shipping Company, San Francisco; **Charles Kurz,** president, Keystone Shipping Company, Philadelphia; **Henry J. Luck Jr.,** general manager, marine transportation, Mobil Oil Corporation, New York; and **Eugene Yourch,** vice president, Marine Navigation Company, Inc., New York.

AIMS officers reelected for the year by the board were **James J. Reynolds,** president; **Albert E. May,** vice president, and **William J. Coffey,** secretary-treasurer. **Philip Steinberg** was reelected vice president of AIMS Pacific Regional Office, San Francisco.

Mr. **Reynolds** said that in 1971, AIMS had been "extremely active" in working with industry and Government toward successful implementation of the 1970 Merchant Marine Act which, he said, "was the most significant piece of legislation in U.S. maritime history." He added that 1972 might witness the "most progress in U.S. merchant shipbuilding in recent years," stating that over 80 merchant ships of all types are now under construction or being converted in U.S. shipyards. In addition, he noted, several operators are making plans to build between 20 and 25 ships including tankers, liquefied natural gas (LNG) carriers, lighter aboard ships (LASH) and roll-on/roll-off (RO/RO) vessels.

Mr. **Reynolds** said that AIMS still had a long way to go in achieving its primary goal—that of bringing together all dissident factions of maritime labor and management with the end result of creating a better public image and a better working relationship with Government agencies charged with maritime affairs. "However," he added, "maritime labor has recently pledged not to strike during contract negotiations, which in my opinion represents a giant step forward toward insuring that steamship operators and unions form a united front in developing a modern and competitive U.S.-flag merchant marine."

Mr. **Reynolds** said that in 1972, AIMS would continue to work with domestic and international organizations to (1) develop sound programs to contain oil pollution and bring about cleaner water; (2) continue to strive toward unification of management and labor to successfully implement the 1970 Act and its 300-ship program, and (3) continue to play a leading role in joint industry-Government efforts (through the National Maritime Council) to bring a much larger share of our nation's foreign commerce to American-flag vessels.

On the last point, Mr. **Reynolds** deplored the fact that U.S.-flag ships carry only a small percentage of U.S. commercial foreign trade. "The American merchant marine must carry at least 50 percent of U.S. commercial foreign trade cargo," he said, "if the fleet is to flourish and provide competitive services to benefit all U.S. businessmen engaged in overseas trade as well as serve adequately the nation's economic and defense needs."

World Orderbook For Drilling Rigs

U.S. shipyards continue to dominate the world market for new drilling rigs and platforms. List at end of last quarter of 1971 shows over 60 percent of all under contract to be with U.S. yards. World total of 51 rigs is comprised of 31 semisubmersibles, 15 jack-ups and 5 floating. Current list shows Norway second, with France, Singapore, Spain, Japan and Canada sharing the third spot. Finland and Italy complete the list. It should be noted that the contract values are approximate and in some cases are based on assumption for statistical purposes only.

Shipyard	Type	No.	Approx. Dollars
UNITED STATES			
Avondale, Bayou Black, La.	Semisubmersible	5	$104,000,000
Bethlehem, Baltimore, Md.	Semisubmersible	1	16,000,000
Bethlehem, Beaumont, Texas	Semisubmersible	4	78,000,000
Bethlehem, Beaumont, Texas	Jack-up	1	11,000,000
LeTournneau, Brownsville, Texas	Semisubmersible	4	76,000,000
LeTournneau, Brownsville, Texas	Floating	1	25,000,000
LeTourneau, Vicksburg, Miss.	Jack-up	7	66,000,000
LeTourneau Mar., Corpus Christi, Texas	Jack-up	1	10,000,000
Levingston, Orange, Texas	Semisubmersible	4	86,000,000
Levingston, Orange, Texas	Floating	1	10,000,000
Levingston, Orange, Texas	Jack-up	1	10,000,000
Sun Shipbuilding, Chester, Pa.	Floating	1	40,000,000
	United States Total	31	$532,000,000
FOREIGN			
Halifax, Nova Scotia, Canada	Semisubmersible	2	$37,000,000
Anders, Finland	Semisubmersible	1	20,000,000
C.F.E.M., France	Semisubmersible	2	40,000,000
Castella, Italy	Floating	1	14,000,000
Mitsubishi, Japan	Semisubmersible	1	15,000,000
Mitsubishi, Japan	Jack-up	1	15,000,000
I.H.C., Netherlands	Floating	1	14,000,000
Akers, Norway	Semisubmersible	4	81,000,000
Nylands, Norway	Semisubmersible	1	12,000,000
LeTourneau, Singapore	Jack-up	2	18,000,000
Bethlehem, Singapore	Jack-up	2	20,000,000
Barreras, Spain	Semisubmersible	2	32,000,000
	Foreign Total	20	$318,000,000
	WORLD TOTAL	51	$850,000,000

A NEW VENTURE was launched with the signing of agreement between Arvan Maritima, S.A. and Esso Chemical Supply Company. Arvan Maritima S.A., a Panamanian corporation, and its agent in the United States, Arvan (U.S.A.) Ltd., will set up and control the worldwide distribution of marine chemical specialties products for Esso Chemical Supply Company. Enjay Chemical Company, Esso Chemical's U.S. affiliate, will be the primary manufacturing and supply unit of the product line, which will include environmental control chemicals such as low toxicity oil spill dispersants, demulsifiers, heavy duty marine cleaners, and degreasers and other specialty products. Pictured above at signing are two principals of Arvan, **George Veliotis,** president, and **Kemon Retzos,** vice president, in foreground; and from left, top, **George Ahearn** and **Ray Bittner** of Esso Chemical, and **William O'Brien** of Enjay. Arvan (U.S.A.) Ltd. will have its headquarters at 1 Rockefeller Plaza, New York, N.Y. 10020.

"Ship Optinomics"

SNAME Annual Spring Meeting To Be Held In Williamsburg

The annual Spring Meeting of The Society of Naval Architects and Marine Engineers will be held in Colonial Williamsburg, Williamsburg, Va., May 24-27, 1972. Eight technical papers by leaders in the marine field will be presented in the Williamsburg Lodge. The theme of the meeting, hosted by the Society's Hampton Roads Section, is "Ship Optinomics."

The papers to be presented on Thursday, May 25, are: "Ship System Economics—Less the Ship" by **John J. Nachtsheim;** "Trade Forecasting" by **John F. Wing** and **John F. Hillman;** "Increasing the Productivity of U.S. Shipping" by **James R. McCaul, Robert B. Zubaly,** and **Edward V. Lewis;** "Optimizing Containerships and Their Terminals" by **Stian Erichsen,** and "Factors Contributing to the Increased Cost of Naval Ships" by **James A. Konouck** and **C. Leonard Willis.**

The following papers are to be presented on Friday, May 26: "System Safety Analysis Techniques as Applied to Shipboard Systems" by **R.A. Duregger, E. Leon,** and **J.R. Sample;** "Nuclear Maritime—An Economic Revival" by **R.W. Dickinson, S.H. Esleeck,** and **J.E. Lemon,** and "Progressive Fire Protection" by **D.F. Sheehan.**

The social events from 2:30 p.m. on Wednesday, May 24, include the showing of the movie "Story of a Patriot" at the Conference Center Auditorium and, at 5:30 p.m., the dedication of the William Francis Gibbs Collection at Mariners Museum, followed by a social hour. On Thursday, May 25, there will be a ladies' tour of Williamsburg in the forenoon, followed by a luncheon for the members and their ladies, with an address by **Paul Buchanan,** director of architectural research at Williamsburg, and in the evening the Society's President's Reception will be held. On Friday, May 26, there will be a tour of Carter's Grove for the ladies, a men's luncheon, a harbor cruise in the afternoon for the members and their ladies, and in the evening, a dinner-dance which will conclude the formal program for the Society's 1972 Spring Meeting. On Saturday, May 27, a tour of the Newport News Shipyard is planned for all who wish to take advantage of being in the area to see the facilities.

Also occurring during the Spring Meeting will be special meetings of the Society's steering committee on technical and research, ship production committee, and committee on Sections.

Technical Papers

1. "Ship System Economics—Less the Ship" by **John J. Nachtsheim.**

Synopsis—The ship itself accounts for only about 25 percent of the total cost of transporting many products in international trade, with inland transportation and port costs accounting for the remainder. This paper focuses attention on the non-ship aspects of the physical distribution problem which, in some cases, have not been considered by ship designers. Specifically, the paper investigates total system modeling and simulation; commodity form change; cargo origin and destination, forecasts and hindcasts; documentation and data management; neo-bulk movements, and related matters.

2. "Trade Forecasting" by **John F. Wing** and **John F. Hillman.**

Synopsis—This paper presents basic principles for the forecasting of ocean trade movements. These methods include trend extrapolation, in-depth economic analysis, input-output analysis, and methods based primarily on the judgment of experts. The strengths and weaknesses of each in terms of accuracy, cost, time, and data required are discussed and data sources for the preparation of trade forecasts are given. Two in-depth samples are presented: 25-year forecasts of U.S. wheat exports, and imports of bauxite and alumina. These forecasts were used for fleet planning requirements.

3. "Increasing the Productivity of U.S. Shipping" by **James R. McCaul, Robert B. Zubaly,** and **Edward V. Lewis.**

Synopsis—This paper provides a broad view of the subject of productivity in overseas transportation systems, with particular emphasis on directions in which productivity can be improved. It is recognized that oceangoing vessels are only one of the elements in overseas transportation systems and that costs must be assessed on a system-wide basis. References are made to analyses carried out and techniques developed at the Center for Maritime Studies in the course of a project for the Maritime Administration (Contract MA-4956); the project was a joint effort by the National Maritime Research Center at Kings Point and the Center for Maritime Studies at Webb Institute of Naval Architecture.

4. "Optimizing Containerships and Their Terminals" by **Stian Erichsen.**

Synopsis—Recognizing that the principal subsystems of an ocean transportation system are land transport, port interface, and sea transport, in the movement of unitized cargo the port interface and sea transport subsystems can be unitized and optimized without danger of sub-optimizing the entire transportation system. In this paper, the economic and technical relations for containerships and their terminals are investigated and optimum combinations of ships and port installations are established.

5. "Factors Contributing to the Increased Cost of Naval Ships" by **James A. Konouck** and **C. Leonard Willis.**

Synopsis—This paper presents a survey of the various factors which have had an impact on the increased cost of naval ships. Factors which are specifically discussed include: increased performance requirements and technical complexity; increased software and administrative requirements; inflation, and the market in general.

6. "System Safety Analysis Techniques as Applied to Shipboard Systems" by **R.A. Duregger, E. Leon,** and **J.R. Sample.**

Synopsis—The current Navy emphasis on system safety considerations during the design phases of shipboard systems is discussed. System safety requirements are reviewed, their use by the marine industry examined, and objectives of system safety analyses as related to marine systems are considered. This is followed by a description of the various types of safety analyses that may be applied to shipboard systems. The preliminary hazard, fault tree, and fault hazard analysis techniques are discussed in depth, and examples of their development are presented. Lastly, the key elements of the SSN688 Class Submarine System Safety Program are described.

7. "Nuclear Maritime—An Economic Revival" by **R.W. Dickinson, S.H. Esleeck,** and **J.E. Lemon.**

Synopsis—This paper surveys the progress of nuclear ship propulsion from the 1950s, when the N/S Savannah's spreadout uneconomical PWR was designed and built for demonstration, to the modern Consolidated Nuclear Steam Generator (CNSG) with its successfully operating prototype aboard the N/S Otto Hahn. The CNSG offers a 120,000-shp capability in the same physical envelope as the 20,000 shp of the N/S Savannah. Accumulated nuclear technology and experience, coupled with escalating oil prices and stabilized nuclear fuel prices, make the decade of the seventies promising for nuclear propulsion.

8. "Progressive Fire Protection" by **D.F. Sheehan.**

Synopsis—The purposes of this paper are to survey the U.S. Coast Guard's fire research activities which have been conducted to support the intent of the regulatory effort. Specifically discussed are research relative to fire extinguishing agents, methods, and systems; also, research regarding construction materials and methods is reviewed.

Foreign Construction Costs For LNG Ships Released By MSB

The Maritime Subsidy Board has announced that representative foreign shipyard costs for building liquefied natural gas (LNG) carriers of a type planned for the United States would be between $64 million and $68 million each. These foreign costs are necessary for determining construction subsidy differentials for building such vessels in U.S. shipyards.

According to the MSB, shipyards in France and Norway were used for the comparison of a proposed six-ship building program by El Paso Natural Gas Co. The El Paso project is still tentative and no construction subsidy application has as yet been filed.

However, the ruling by the Federal Power Commission authorizing importation of LNG from Algeria for Distrigas of Boston has evidently speeded handling of the El Paso plan by the subsidy board.

The board has only one firm application for subsidy to construct LNG carriers. Filed last October by Transportation Techniques Inc. of New York, the proposal calls for three vessels of 120,000-cubic-meter size.

The subsidy board announcement of foreign costs for LNG carriers would be for 125,000-cubic-meter ships.

Wisconsin Barge To Order 25 Barges From St. Louis Ship

Wisconsin Barge Line Inc., Cassville, Wis., has applied to the Maritime Administration for Mortgage insurance on 25 hopper barges it plans for its bulk commodity services on the Illinois and Mississippi Rivers.

The estimated $3 million worth of barges is expected to be built by the St. Louis Ship Division of Pott Industries. Each barge will have a capacity of 76,660 cubic feet.

Texas Transport & Terminal Appoints Henry Schneider

Texas Transport & Terminal Co., Inc., International Trade Mart, New Orleans, La. 70130, ship agents and stevedores, has announced the appointment of **Henry J. Schneider** as general manager, U.S.A., Full Cargo and Tanker Division. Mr. **Schneider** has been associated with Texas Transport & Terminal Co., Inc., since January 1958, in all phases of vessel operations.

Bulk lube oil delivery

at major U.S. ports

Shell distributors at 13 U.S. ports are lifting lube oil in bulk directly into ships' tanks.

Advantages: faster than drums, safer than drums, more economical than drums, and with less material handling, less likelihood of product contamination.

Our large photo on the opposite page shows a bulk lube oil delivery by Standard Boat Company, Shell's marine distributor at the Port of New York.

Those silvery objects on the lighter's deck are "jumbo tanks."

Pumping from the 450-gallon jumbos, Standard Boat delivers more than 1300 gallons of lube oil in 30 minutes.

At Port of Portland, Maine, the Shell marine distributor delivers lube oil in bulk by "tank boat"—a four-compartment vessel with total capacity of 48,000 gallons.

From port to port, equipment may vary but results are the same: fast, clean, safe delivery. Minimum assistance needed from ships' hands. No interference with cargo operations. No hold-ups on turn-around.

Shell has completed bulk lube oil delivery systems at the ports shown on the map. For details, call the Shell Marine representative at the Shell Transportation Sales area office nearest you.

◀ Standard Boat Company, Shell's marine distributor at the Port of New York, pumps lube oil from 450-gallon "jumbo tanks" directly into ship's tanks at a rate of 2640 gallons per hour. A fast, clean, safe delivery.

"Jumbo tanks" positioned on lighter of Standard Boat Company. Each jumbo is "dedicated"—receives only one type of oil—thus assuring freedom from contamination.

And with the increasing use of Shell's MELINA Oil, a heavy-duty multipurpose lube oil, this bulk delivery trend is accelerating.

The more motorships that use Shell MELINA® Oil, the more advantage there is to bulk delivery facilities. And the more reason to believe that bulk lube oil facilities are a good investment for all concerned.

If you want to take full advantage of the speed, cleanliness, safety and economy of bulk lube oil delivery, Shell is ready for you at major ports on the East, West and Gulf Coasts. Shell Commercial Marketing, One Shell Plaza, Houston, Texas 77002.

For details, call the nearest Shell Transportation Sales area office:

Stamford, Conn., (203) 327-3600
Baltimore, Md., (301) 821-5905
Chicago, Ill., (312) 341-3275
New Orleans, La., (504) 521-2684
Menlo Park, Calif. (415) 325-0721

Bulk Lube Oil Delivery

SHELL

Long Term Importation of LNG Gets Green Light From F.P.C.

The first long term importation of liquefied natural gas into the United States has been authorized by the Federal Power Commission, Washington, D.C. The gas, to be shipped from Algeria, is to be distributed over the next 20 years in the northeastern United States, where there are shortages.

The importer is Distrigas Corporation. It proposes to import 15.4-billion cubic feet of gas annually from Alocean, Ltd., a company formed by Gazocean and Sonatrach, the Algerian national oil company which operates Algeria's Hassi R'mel field.

Distrigas is owned by the Cabot Corporation of Boston, Mass., and by Gazocean, a French group. It will deliver the liquefied gas to facilities to be built at Everett, Mass., and Staten Island, N.Y. The LNG will go to seven distributors: Boston Gas Co., Mystic Valley Gas Co., Connecticut Gas Co., Providence Gas Co., Fall River Gas Co., Brockton-Taunton Gas Co., and Brooklyn Union Gas Co., It sets a precedent also for a number of other applications for such imports, including a much larger amount by El Paso Natural Gas Company.

Distrigas told the Commission it proposed rates of from $1.04 to $1.64 per million British Thermal Units at Everett, and from $1.07 to $1.74 per million BTUs at Staten Island. But under the terms of the F.P.C.'s decision, the company can charge what the traffic will bear so long as the gas is sold within Massachusetts or New York State. F.P.C. controls would go into effect if it is sold in other states.

The majority opinion was delivered by Commissioner **Pinkney Walker** who was joined by Commissioners **John A. Carver Jr.** and **Albert B. Brooke Jr.,** The ruling pointed out that the nation is running "dangerously short of natural gas," and the F.P.C. said it was "in effect inviting venture capital into the development of LNG import projects and expressing its intention not to regulate them to the extent they are intrastate in nature."

ARTCo Orders 100 Barges Featuring Arch-Shaped Covers Made Of Reinforced Plastic

American River Transportation Co. (ARTCo), St. Louis, Mo., has announced that 100 new covered hopper barges will be built for the firm, one of the largest such orders in the towing industry in recent years.

The added barges will more than double ARTCo's capacity to transport bulk commodities on the inland waterways, **R.C. Helsing,** ARTCo operations manager, said.

The barges, Mr. **Helsing** said, will have a cargo-carrying capacity equivalent to 1,700 conventional railcars.

Sixty box barges and 40 rake barges, with 72,000 to 80,000-cubic-foot capacity each, are scheduled for completion and delivery by September 30, 1972. "Each vessel will be custom designed to provide greater flexibility and efficiency in shipping all kinds of bulk commodities," Mr. **Helsing** said.

The major expansion of ARTCo's fleet "reflects the significant growth in our supplying waterway transportation for bulk commodity shippers, and our anticipation of increasing waterborne commerce in the immediate future," the official declared.

Among the special features of the new barges will be covers formed of fiberglass reinforced plastic to span the holds. The arch-shaped covers allow increased loads, are resistant to rust and corrosion, and are about one-third the weight of conventional steel covers.

Jeffboat, Inc., Jeffersonville, Ind., will construct the 60 box barges for ARTCo. The 40 rake barges will be built by American Bridge Division of U.S. Steel Corporation at Ambridge, Pa.

The reinforced plastic covers for the barges will be produced by Proform, Inc., at its Paducah, Ky., plant.

ARTCo headquarters are at 7733 Forsyth Boulevard, Clayton, Mo.

CENTRAL GULF CITATION: A special citation for maintaining high sanitation standards on all vessels in its fleet during 1971 was awarded to Central Gulf Steamship Corporation by the U.S. Public Health Service and the Food and Drug Administration. Capt. **Joe L. Perrin** of Dallas, Texas, Chief of the Special Programs Branch of the FDA, made the presentation of the award to company officials at a luncheon at International House, New Orleans, La. Captain **Perrin** said Central Gulf qualified for the award by scoring 95 or higher during inspections of each of its ships. Admiring the award plaque are (from left) Captain **Perrin, O.C. Webster,** purchasing agent for the steamship company, and **Erik F. Johnsen,** president of Central Gulf.

Danes have. So have French, Italians, Norwegians, Dutch, English and Argentines. Maybe you've seen a NOHAB POLAR F Diesel engine sometime, somewhere in the world.

NOHAB, Trollhättan, Sweden, has been making diesel engines since 1896. One of them powered the first motor ship to cross the Atlantic. Another took Amundsen to the South Pole.

In 1962, NOHAB introduced the POLAR F, 500 to 3200 horsepower in-line or Vee types. All with a common cylinder size. They quickly set the international standard for performance and reliability in their class. Today, POLAR F Diesels power offshore and ocean-going vessels around the world.

Now, NOHAB has appointed George Engine Company (GECO), New Orleans, its first and sole distributor for POLAR F Diesel engines for the U.S. GECO will provide the same dependable service on POLAR F that has made it one of the world's largest Detroit Diesel distributors.

Haven't seen a NOHAB POLAR F Diesel engine? You will. Soon.

NOHAB POLAR F DIESEL ENGINES
GEORGE ENGINE COMPANY, INC.
SOLE U.S. DISTRIBUTOR

604 Destrehan Avenue
Harvey, Louisiana 70058 U.S.A.
CABLE: GECOINC TELEPHONE: (504) 347-7341

GEORGE ENGINE COMPANY, INC.

TTT's R.D. Carter Elected President Of Containerization Inst.

The election of **R.D. (Nick) Carter,** president of Transamerican Trailer Transport Inc., as 1972 president of the Containerization Institute, was announced in New York during the Institute's 12th Annual Conference at the Americana Hotel. The announcement was made by outgoing Containerization Institute president **Jacques J. Leblanc,** who will serve as chairman in 1972. Mr. **Leblanc** is president of Dart Containerline Inc.

Introducing Mr. **Carter** to a luncheon gathering of 300 shippers, line executives, forwarders, and equipment suppliers representing a wide cross section of the billion-dollar-plus containerization industry, Mr. **Leblanc said:** "We are indeed fortunate that we will have a man with Mr. **Carter's** exceptional qualifications in both lift-on and roll-on containerization at the helm this year when containerization faces its most profound challenges and opportunities," adding, "Mr. **Carter** has brought success, innovation, and energy to TTT over the past five years, and we hope to see this fortuitous combination flowing into the affairs of the Containerization Institute in 1972."

Joining TTT in 1967 as executive vice president, Mr. **Carter** was elected president and chief operating officer in April 1968, shortly after the line's first roll-on vessel, the 26-knot Ponce de Leon, sailed on her maiden voyage to San Juan, Puerto Rico. The $20-million Ponce de Leon, the world's fastest and largest roll-on trailership, was joined by the Eric K. Holzer, a sister ship, in 1970.

R.D. Carter

Mr. **Carter** also serves as chairman of the executive committee of the Puerto Rico Ocean Service Association, whose members include Sea-Land, Seatrain, Transamerican Trailer Transport, and Gulf-Puerto Rico Lines, in the Puerto Rican trade.

Before joining TTT, Mr. **Carter** was with United States Lines as general sales manager, where he helped inaugurate the first cellular containership service in the European trade in 1966. A former president of the Spain-U.S. Chamber of Commerce, the Spanish Government presented him with a rarely bestowed civil medal for his efforts to broaden trade relations.

NKK Names Asano New York Manager

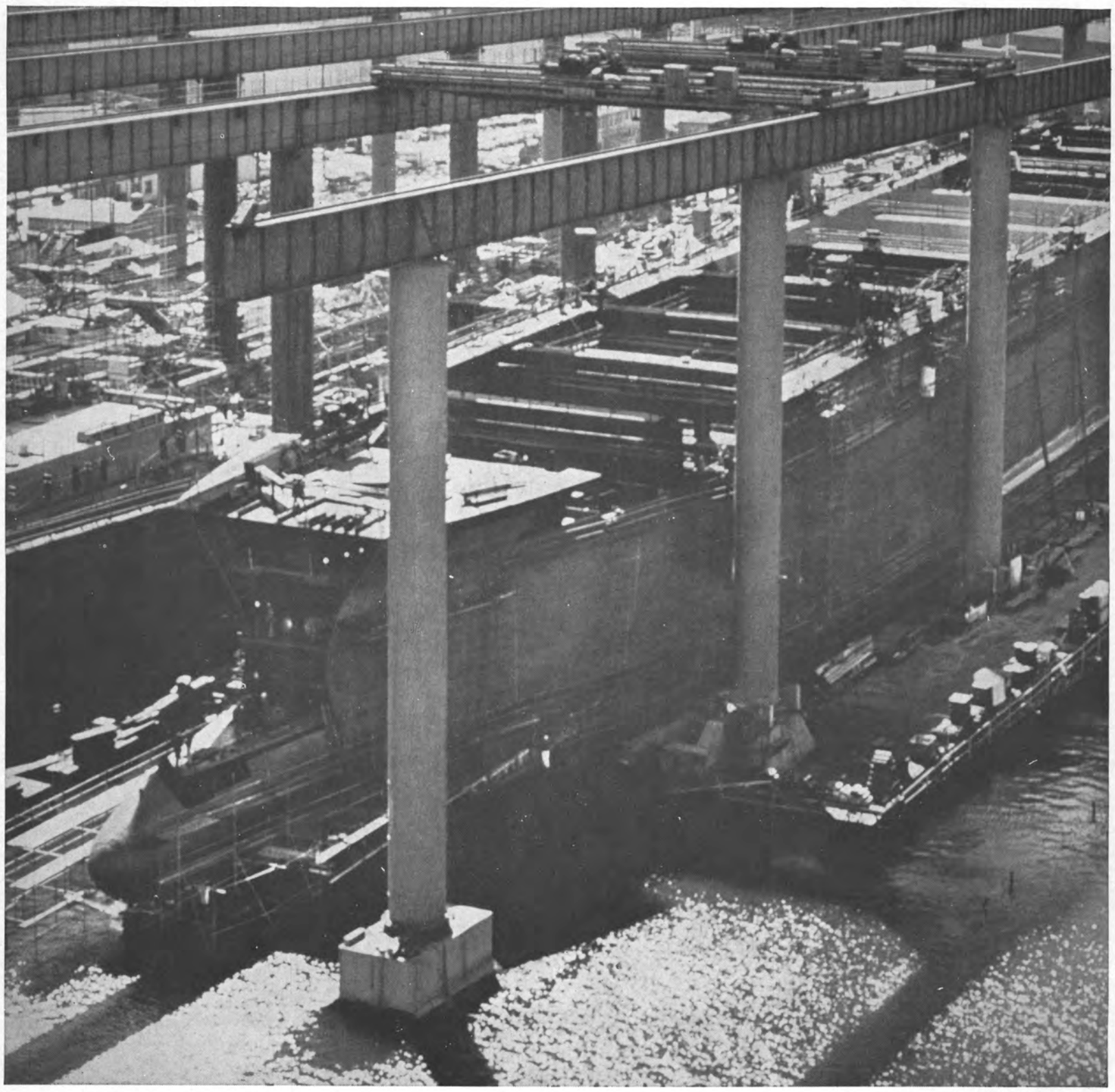
Yoshikazu Asano

Yoshikazu Asano has been appointed general manager, New York office, Nippon Kokan (NKK), succeeding **Toshio Isago,** who has been named special assistant to the president, Tokyo.

NKK is Japan's number two steelmaker and only integrated shipbuilder-steelmaker-fabricator. The company's fiscal 1970 sales (April 1, 1970, to March 31, 1971) were $1,631,303,000.

Mr. **Asano** has been assistant director, technical research center, NKK-Tokyo, since January 1970. Prior to that time, he held executive positions in the company's shipbuilding research and development, administration, and planning departments.

Mr. **Asano** joined Nippon Kokan in 1940, upon graduation from the University of Tokyo Faculty of Engineering.



Rome wasn't built in a day, but we built Chicago in a year.

The Sea-Land containership *Chicago* nicely demonstrates the speed and the economy of Todd's conversion work. The forebody shown here – 533 feet long – was constructed and joined by Todd to an existing stern. Jumboizing techniques like this can generate new tonnage at about one-half the cost of building a whole new ship, in about one-third the time. Save time and money with Todd conversions.

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

Talk to TODD

Stal-Laval Reports Experience Covering Ten Years Of

Marine Turbine Gearing

Review Of 2.5 Million Service Hours With AP-Type Turbines And Gearing Indicate Trends For Very Large Ships With High Horsepowers.

Ingvar Jung and Per-Erik Larsson

In September 1963, a paper entitled "Propulsion Gears for Steam Turbines" was read before the New York Metropolitan Section of The Society of Naval Architects and Marine Engineers. In this presentation, the combination of planetary gearing for the first reduction with parallel gearing for the final reduction was introduced. In a 1966 SNAME paper, the progress of the single-plane propulsion unit employing epicyclic primary gears was reported and alternative gear solutions for high powers and low propeller speeds were discussed.

During the past ten-year period large and rapid changes have taken place in ship sizes, propulsion power and propeller speeds, all of which have presented the gear manufacturers with new and interesting design problems.

Now it is almost ten years since the first designs of single-plane units employing epicyclic primary gears (designated the AP-type) were ready in principle and it appears timely to review the experience from 106 ships which were at sea at the end of 1971, representing some 2.5 million service hours and 3.1. million shaft horsepower. This service experience indicates the problems and changes required for future gearing and, in particular, for Very Large Cargo Carriers (VLCC).

In addition, there are AP units of about 3 million shp to be installed in ships on order where the feedback of today's experience will be of further benefit to quality and availability.

*Mr. **Jung,** professor and doctor of technology, and Mr. **Larsson,** manager of gearing design, Stal-Laval Turbin AB, presented the paper condensed here before a recent meeting of the New York Metropolitan Section of The Society of Naval Architects and Marine Engineers.

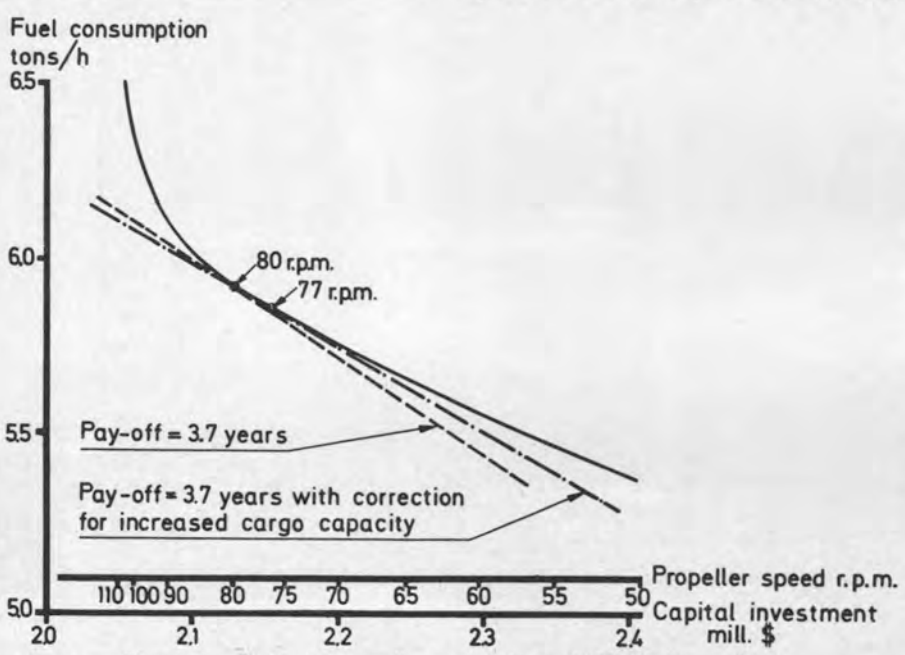


Figure 1—Optimum propeller speed for a 200,000-dwt tanker.

Bearing Pressures

Bearing pressures prevent the use of the planetary-type gear for large powers and high planet-carrier speeds. In such cases, an epicyclic gear with a stationary carrier, the star gear, has been employed. Typical applications are in triple reduction and in double reduction for high powers.

For larger powers the speed difference between the h-p turbine and the l-p turbine becomes larger and makes the use of an extra gear reduction on the h-p side economically and practically attractive.

The first units with triple-reduction gears on the h-p side were commissioned in the middle of 1967. At that time, mounting of the primary gear on the forward side even of a double-reduction h-p side became standard in an attempt to reduce the vibration sensitivity experienced with the previous arrangements.

With demand for low propeller speeds for tankers, triple reduction was the natural solution. Optimizing calculations showed that even with VLCCs of 200,000 dwt, propeller speed should be kept below 75 rpm,

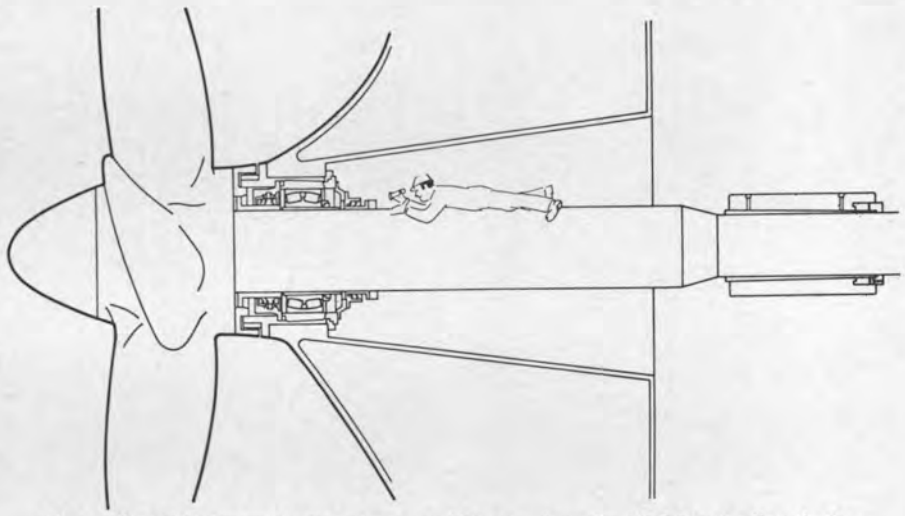


Figure 2—SKF stern-tube bearing and SKF coupling for VLCC propeller shafts.

and for tonnages over 300,000 dwt, the speeds used today of 80-85 rpm are still uneconomically high, Figure 1.

Alignment

The original alignment instructions supplied with the gears stated the displacement of the components delivered relative to an infinitely stiff foundation at a certain temperature. This was in line with the experience and practice employed at the time of introduction of the AP type. The offset during cold alignment was mainly compensation for thermal growth.

The knowledge gained from alignment measurements on a large number of ships confirms the presence of deformations of origin other than temperature differentials, and which are of the same or greater magnitude than the thermal movements.

Alignment measurements have been carried out in about 40 ships in operation in order to establish the changes that take place due to loading, warming up, power and seaway. Extensive instrumentation has been used to monitor the conditions in a ship during a voyage from Europe to the Persian Gulf and partly back. Of major interest was the effect of maneuvering, of hot cargo, and of passages where rapid changes in water temperature are experienced. Double-bottom deflections giving movements in the turbine center of 0.025 inches and movements between cold and hot conditions of 0.065 inches were measured.

It would be impractical to analyze all the results from these activities and only the following general conclusions are given:

1. Ships behave as individuals, even if they are made from the same drawings.
2. The movements are repeatable.
3. Cold alignment and cold alignment checks should be performed within narrow limits of draft and with defined temperatures in lube-oil tanks and other tanks in the engine region.
4. Checking or running alignment as well as checking of main shafting during sea trials is recommended.
5. The results have not revealed any movements that should prevent acceptable alignment of present engines from being obtained. The results do indicate that the next generation of tankers, 500,000 to 1,000,000 dwt, needs to be designed with attention to stiffness in the engine region and that the engines should be designed to accept larger misalignments than hitherto. No doubt these problems will be solved if hull and engine designers cooperate in the initial stages.

Future AP Designs

The experience reported in this paper has developed the gears and brought detail improvements in design and manufacturing. Lower stress levels and close attention to foundation design and to alignment will further increase the safety margins. Future gears for installations of the kind described in this paper will follow the same concepts utilizing triple-reduction gears of star/planet/parallel type for low-speed applications. For larger powers and generally larger ships a more flexible design is introduced. The first h-p gear will

(Continued on page 32)

"When that storm hit, I thought I'd lost my tow for sure —any other rope would have parted."

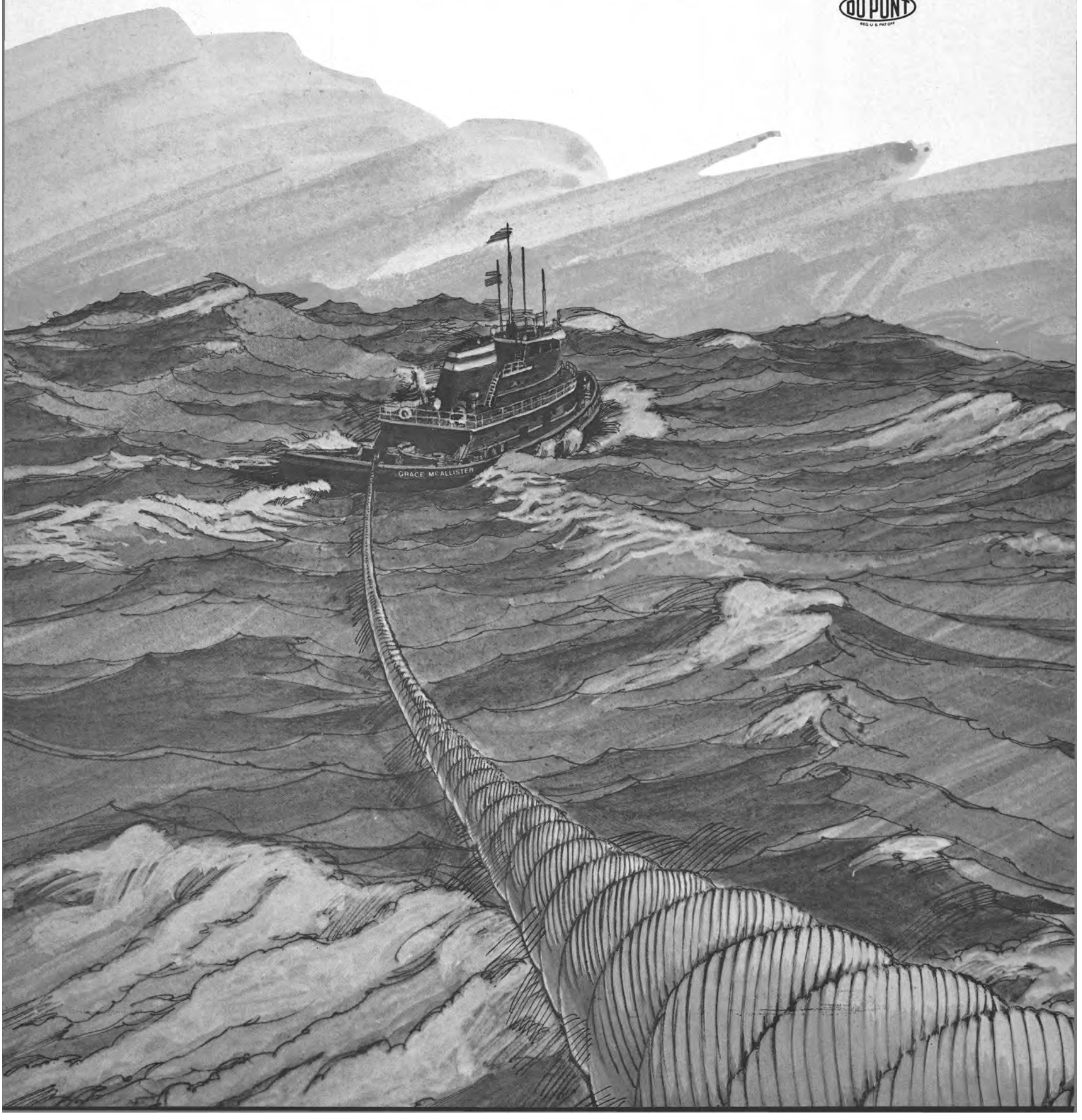
When the McAllister Towing Company first decided to use new blue-tinted Super 707 nylon rope, they didn't know what was in store for them. Captain Frank Bradley was to make a routine trip hauling two heavily laden mud dumpers. Out at sea, a sudden storm caught the captain and his tow. The load put on the Super 707 rope was so great that the heavy-duty-steel thimble was bent. Yet the line held. And everybody and everything got back safely.

The large lines of Super 707 nylon now available are the strongest ever made per unit of weight. In a recent test, the breaking strength of a 3-inch-diameter rope of Super 707 exceeded the Military Spec (MIL-R-17343-D) for nylon by *twenty tons*—although it contained less nylon than permitted by that spec.

And what that means to you is a tougher, more reliable rope. A longer-lasting rope—with greater resistance to abrasion.

So get Super 707 nylon rope. It's the tough one—tinted blue so you'll know it. For more information, write: Du Pont Company, Room 31H1, Wilmington, Delaware 19898.

DU PONT
REG. U.S. PAT. OFF.



Marine Turbine Gearing–

(Continued from page 30)

be moved from the main gear casing to the turbine baseplate to make the best use of the longer quill shaft which connects the first and second h-p gears.

The short quill shaft between the h-p turbine rotor and the first h-p sun wheel then only has to take care of deflections within the turbine baseplate.

Today, the AP gear family consists of a number of types with torque numbers (kW/rpm) equal to 90 to 420. For torque numbers over 180, all are triple-reduction gears. With alloy steel in the bull wheel and K factors in accordance with the rules of all classification societies, the AP design can cover 46,000 shp at 80 rpm with a bull wheel of about 210 inches in diameter. It is at present considered that this dimension should not be exceeded due to handling and transport problems.

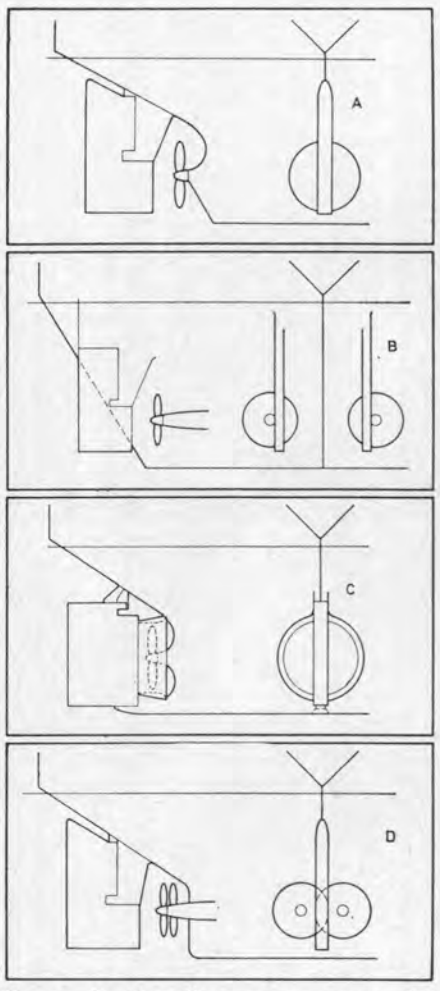


Figure 3—Propeller arrangements for VLCC ships studied by Kockums shipyard.

For containerships with propeller speeds of 115 to 130 rpm, a torque number of 420 gives powers of 70,000 up to 75,000 shp, which should be sufficient for the coming demand as far as can be estimated, having due regard to the cavitation problems of the propellers.

Gears For Very High Torques

Many shipyards are working on studies for the next generation of VLCC and limits for single-shaft engines are being discussed. For the time being, propeller manufacture and the stern-tube bearings, rather than the gearing, have limited the shaft torques. According to the propeller designers, propellers for low speed can now be made up to 40-feet in diameter and of weights up to 70 tons, sufficient for 50,000 shp at 80 rpm, representing a torque number of 460, which might be somewhat more than could be managed in practice by the largest triple-reduction AP gear. The stern-tube bearing is already giving trouble in some cases with the largest propeller weights.

As the bearing pressure increases with size—weights increase with the cubic dimension while the bearing area only increases with the square of the linear dimension—the load-carrying oil film more or less disappears at propeller speeds lower than 15 to 20 rpm. With barring of the engines at propeller speeds below one rpm, there is definitely a risk of white metal wear in the stern-tube bearing unless jacking oil is applied.

The SKF design with a roller bearing, Figure 2, offers an interesting alternative. The roller bearing is short and cheap and can be inspected at sea. Fatigue tests prove that the bearing can work for quite long periods even with a very high content of water in the lubricating oil.

For extremely high torques exceeding the present capacity of the AP series or any other two-pinion configuration, the locked train is a natural choice. For torque numbers around and above 500 (e.g. corresponding to 55,000 shp at 80 rpm), and low propeller speeds an arrangement is proposed which employs triple-reduction gearing on the h-p side. For large powers the speed difference, which is approaching a factor of 2.5 times between the h-p and l-p turbine, has grown sufficiently large to justify a primary gear which contributes to a balanced locked-train design.

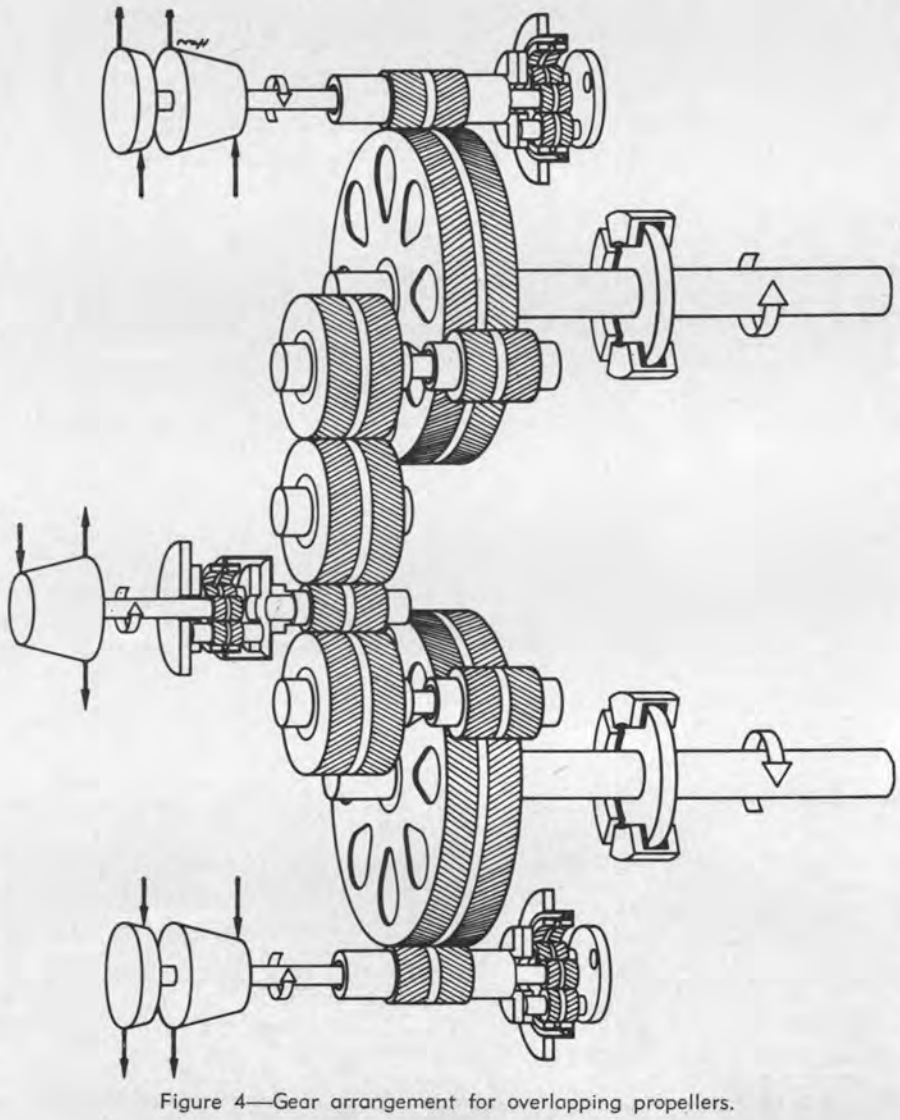


Figure 4—Gear arrangement for overlapping propellers.

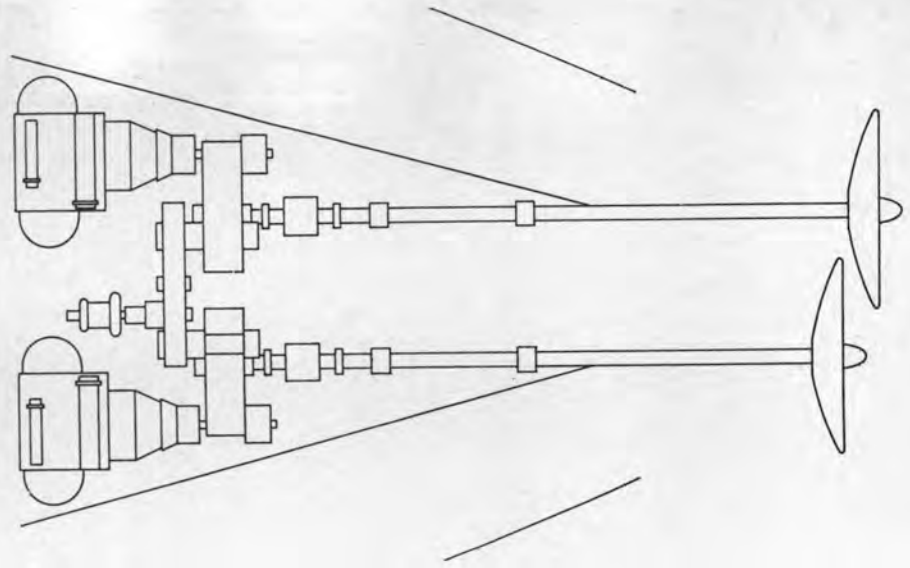


Figure 5—Engine room layout for overlapping propellers in a gas tanker.

The primary h-p gear will consist of a star gear mounted on the turbine baseplate as for the larger AP units.

The locked-train unit is designed to meet the increasing demands from the VLCCs. Extrapolation of the experience gained with the AP series has focused attention on features pertaining to alignment and foundation. Symmetry with regard to supports, gear mesh forces and train temperatures is provided in this new design in order to ensure symmetrical deformations in all modes of operation. Four-point support of the main gear casing similar to that of the AP gears has been chosen to isolate the gear casing from hull distortion. Separate gear casings for the first and second reduction will be employed to realize the design objectives.

Gear For Overlapping Propellers

The megaton tanker will sooner or later be built, in the opinion of shipbuilders and oil companies. For the propulsion plant, one, two or even three propellers have been discussed. A study made available by the Kockums shipyard in Sweden shows the following comparison of power demands for tankers in the sizes of 400,000 to 600,000 dwt:

A. One propeller, conventional 100%

B. Two propellers, conventional 115%

C. One propeller in nozzle 95%

D. Two propellers, overlapping 95%

100 percent represents about 0.1 shp/dwt at about 80 rpm. The propeller arrangements tested are shown in Figure 3.

It is quite interesting that overlapping propellers promise such a definite gain in power compared with the two-propeller arrangement with two rudders.

For the drive of overlapping propellers, an engine is proposed with one h-p turbine and two l-p plus astern turbines, Figure 4.

The h-p turbine with 50 percent power transmits power through a star gear to both shafts. The shafts are synchronized by parallel gearing. The l-p turbines are coupled to the propeller shafts with normal AP planetary/parallel gearing. Such an engine-room layout is shown in Figure 5.

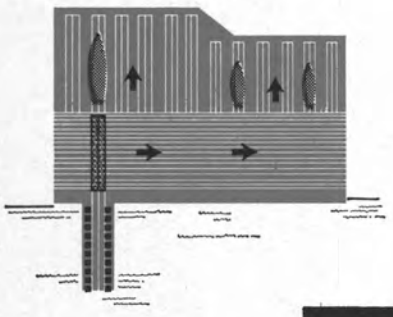
There is no doubt that this gearing is less complicated than some CODAG and COGOG machineries now in service in the leading navies. It also is less complicated than the schemes for contra-rotating propellers that have been published, for example, by the authors.

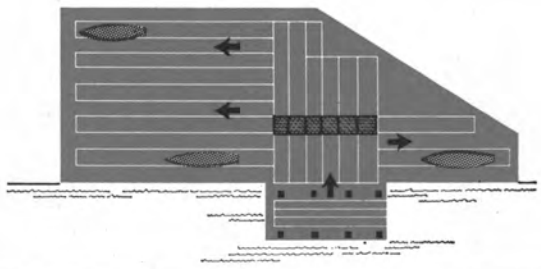
The gearing is a hybrid of the AP design and the locked-train design. The synchronizing gear and the quill shafts connecting it to the final train resembles those of the locked train.

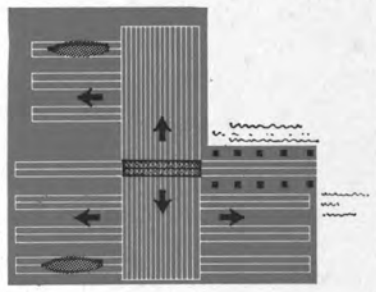
However, evaluation of the risks involved with a novel propulsion arrangement, especially considering cavitation problems in the propellers, may delay realization of this system in spite of promising efficiencies if compared with the conventional twin-screw ship.

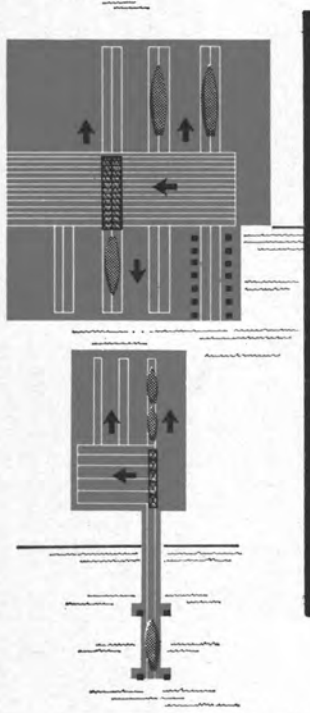
SYNCROLIFT®

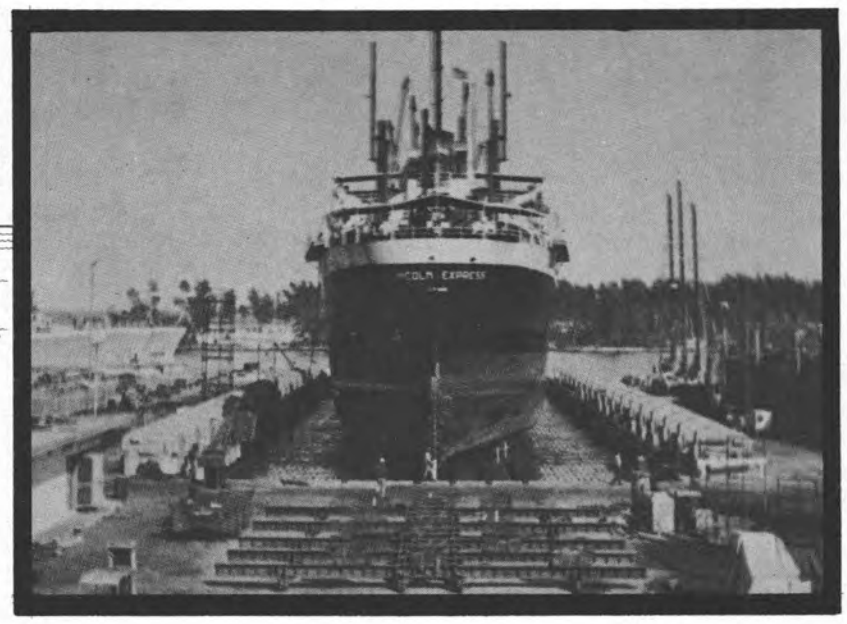
THE WORLD'S MOST MODERN & MOST PRACTICAL DRYDOCKING & TRANSFER SYSTEM

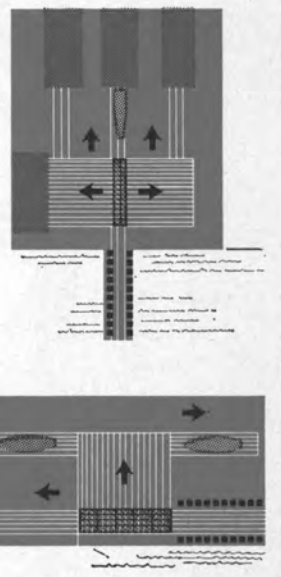












MAXIMUM EXPERIENCE

Pearlson Engineering Co., designers and builders of the Syncrolift, are the most experienced designers and builders of marine elevator drydocks in the world. During the past 12 years more than 70 Syncrolifts have been purchased for use in 32 countries.

MAXIMUM EFFICIENCY AND ECONOMY

The Syncrolift drydocking system is the fastest, most economical method of drydocking and transferring vessels known. Several shipyards have been drydocking at the rate of 500 vessels per year per Syncrolift elevator. Syncrolift requires less man hours for operation and a lower cost of maintenance than any other drydocking system in the world.

MAXIMUM VERSATILITY

Syncrolift offers proven success in performance in shipyards of virtually every size and shape. Offering lifting and transfer capacities up to 60,000 tons deadweight, vessels can be end or side transferred. Syncrolift sectional platforms have been made to allow for operation of part or the entire platform as desired. Almost all Syncrolifts have been designed to allow for future expansion. A number have already been increased in size and capacity. And Syncrolift offers unlimited vertical travel to adapt perfectly to any tidal situation.

LLOYDS AND AMERICAN BUREAU OF SHIPPING CERTIFICATION AVAILABLE

Write for brochures, proposals and cost estimates...

PEARLSON ENGINEERING CO. INC.

P.O. BOX 8 ■ 8970 S.W. 87TH COURT ■ MIAMI, FLORIDA 33156

PHONE: 305/271-5721 ■ TELEX: 051-9340 ■ CABLE: SYNCROLIFT

Bethlehem Sparrows Point Lays Keel For First Of Three 120,000-Dwt Tankers

The keel for the first of three 120,000-deadweight-ton tankers for Atlantic Richfield Company was laid on March 1 at the Sparrows Point shipyard of Bethlehem Steel Corporation, Baltimore, Md. The tanker will be larger than any now sailing under the U.S. flag.

The vessel is scheduled for delivery in the spring of 1973. It will become the largest ship in Atlantic Richfield's tanker fleet.

Attending the ceremonies in Bethlehem's new 1,200-foot-long 200-foot-wide building basin with **William H. Collins,** general manager of the yard, were the following Atlantic Richfield representatives: **Byron E. Milner,** vice president, manufacturing, supply and transportation; **Richard G. Dulaney,** manager, transportation; Capt. **C.M. Lynch,** manager, marine transportation, and **E.V. Stewart,** manager, new marine construction.

The new ship is one of five tankers totaling 500,000 deadweight tons ordered by Atlantic Richfield from Bethlehem. In addition to the three 120,000-ton tankers, a 70,000-ton tanker, Arco Prudhoe Bay, was delivered late last year, and a vessel of the same size is currently under construction for scheduled delivery this spring.

Vessels of the new 120,000-deadweight-ton class, the first to be built at Sparrows Point that are too large for the old conventional building ways, will each consume about 23,360 tons of steel. The vessels are to be 883 feet overall and 850 feet between perpendiculars. Their molded breadth will be 138 feet, molded depth 68 feet, and summer draft 51 feet 9 inches.

Although the tankers will be some 50,000 deadweight tons larger than the largest previous ships built here, they will fit so comfortably into the new building basin that two ships of this class can be under construction in the dock at the same time. Normally one vessel will have her hull completed while the stern section of a second is being built.

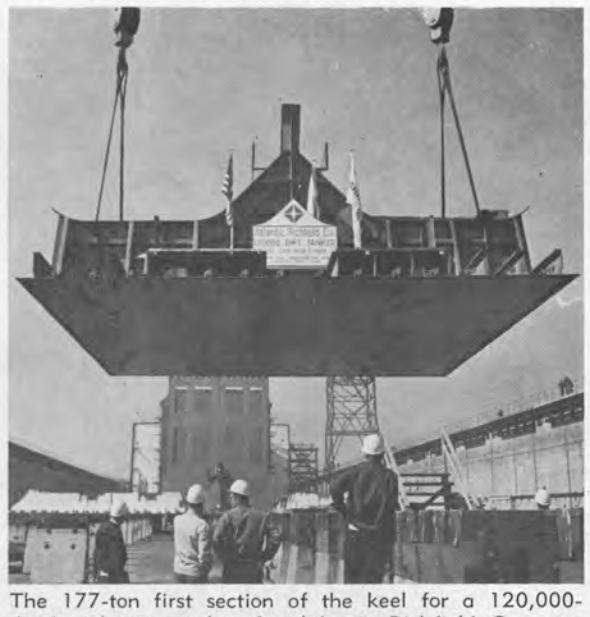
William H. Collins, left, general manager of Bethlehem's Sparrows Point yard, talks with **Byron E. Milner,** vice president, manufacturing, supply and transportation for Atlantic Richfield, just prior to the keel-laying.

A 70,000-deadweight-ton tanker is currently under construction in the building basin and its hull will be completed while the stern section of the 120,000-deadweight-ton vessel is under construction.

The sections for the new vessel will be constructed, in the main, in the Sparrows Point yard's new mechanized and semi-automated panel shop, which can handle ship sections up to 200 tons.

Capacity of the ships will be 940,000 barrels of cargo and the vessels will have a normal sea speed of 16 knots, with a cruising range of 15,000 miles.

Bethlehem has recently announced that it has prepared designs and is ready to build ships of a 265,000-deadweight-ton class. These, too, would be built in the Sparrows Point basin, which was constructed to accommodate the building of vessels of more than 300,000 deadweight tons.



The 177-ton first section of the keel for a 120,000-deadweight-ton tanker for Atlantic Richfield Company is lowered into place at Bethlehem Steel's Sparrows Point building basin.

SNAME New England Section Discusses The Propeller Blade Structural Problem

Attending the meeting, left to right: **J. Casey,** New England Section executive committee; **K. Keays,** vice chairman; **A. Wickham,** chairman; **Dr. J. Kerwin,** moderator; **L. Vassilopoulos,** author; **W. Moffatt,** editor, and **R. Roberts,** executive committee.

The January meeting of the New England Section of The Society of Naval Architects and Marine Engineers was held on Friday evening, January 21, 1972, at the A.D. Little Company, Incorporated, Cambridge, Mass.

Dr. **Justin Kerwin,** professor of naval architecture in the department of ocean engineering at M.I.T., was moderator and introduced the speaker, **Lyssimachos Vassilopoulos,** who presented the technical paper titled "The Propeller Blade Structural Problem and its Solution by Finite Element Methods." The co-author, **Ronald Bradshaw,** was unable to be present. Messrs. **Bradshaw** and **Vassilopoulos** are with Marine Vibration Associates, Cambridge, Mass.

In the paper, the authors point out that the ever-increasing use of large diameter, skewed propellers on large and/or high-powered ships and a number of recent blade failures in service have directed renewed attention to the problem of blade structural behavior. A brief discussion is first given of methods for predicting blade loadings, earlier approaches to blade stressing and the need for realistic design criteria. Using a consistent formulation of blade geometry, a finite-element model of the blade structure is then displayed. A description is given of DYNAPROP, a special-purpose computer program that has been developed for the routine prediction of blade natural frequencies and mode shapes, stress distributions, blade deflections and fatigue life. Computed results are given for a plate, a destroyer propeller that has been tested in the model scale and a moderately skewed blade. The paper concludes with lessons learned from the use of this method and with the nature of several related problems that demand early solution.

An extensive list of references is given at the end of the paper (49 titles), with direct or indirect application to the material.

Informal discussions were held after the presentation, which lasted for more than one hour.

Copies of the paper are available from the New England Section editor, **Wilder Moffatt,** at General Dynamics, Quincy, Mass.

Columbian Rope Company Directors Announce New Executive Alignment

Frank R. Metcalf

Legare R. Hole

Robert C. Soderberg

The board of directors of the Columbian Rope Company, Auburn, N.Y., has announced a new alignment of its top executive management.

Col. **S.W. Metcalf,** chairman of the board since 1953, has been named honorary board chairman. Colonel **Metcalf** is succeeded as chairman of the board by **Frank R. Metcalf,** Columbian's president and chief executive officer since 1963. The new president and chief executive officer is **Legare R. Hole,** who had been senior vice president.

Robert C. Soderberg, a company vice president since 1968, was named to the new position of executive vice president and chief operating officer.

The largest manufacturer of natural and synthetic fiber cordage in the free world, Columbian also markets rope and twine products through its subsidiaries, the Plymouth, Fitler, Cating and Whitlock cordage companies. Its corporate structure includes its overseas subsidiary in the Philippine Islands, Columbian Philippines, Inc.

Split Shipyard Signs MacGregor License

The Yugoslav Shipyard and Diesel Engine Factory "Split" of Split has been granted a license to manufacture and install all types of MacGregor ship-access equipment on vessels built at the yard. The principal reasons for the new license are the worldwide network of the MacGregor organization, its comprehensive range of different types of equipment and the great interest shown by the yard's clients in fitting MacGregor designs.

MacGregor know-how and assistance has already been given to the Split yard in solving some problems on OBO hatch covers of other designs.

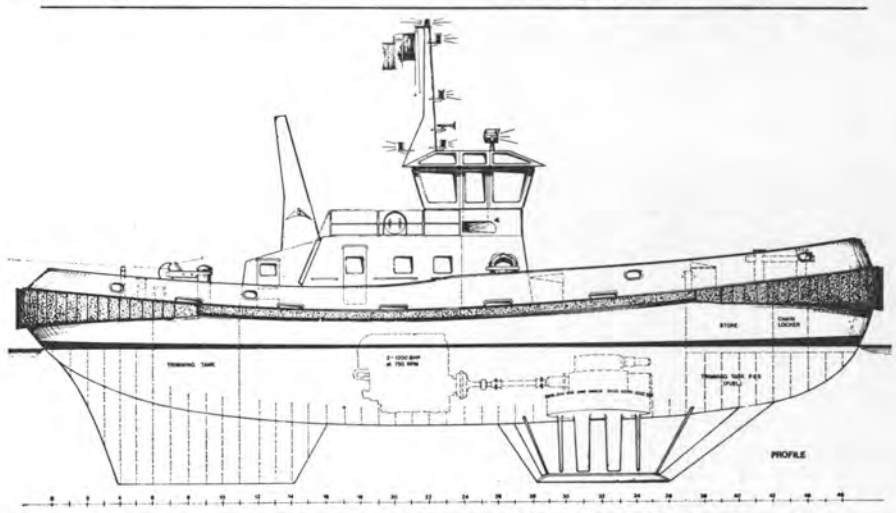
The agreement is exclusive and has been granted with the approval of MacGregor's main Yugoslav licensee, "Metalna" of Maribor, who have been producing steel hatch covers since 1959.

Porter Paint Agrees To Purchase Zinc-Lock

Porter Paint Co., Louisville, Ky., has announced it has entered into an agreement to purchase the Zinc-Lock business of Bituminous Products and Application Co., Inc. of San Francisco. Included are the worldwide Zinc-Lock patents, trademarks, and other major assets. The value of the transaction was not disclosed.

The Zinc-Lock Co., a division of Bituminous, manufactures and markets a line of patented inorganic zinc primers and top coats used in the marine and industrial coating fields.

Porter has general offices and manufacturing plants in Louisville and markets high performance coatings for industrial maintenance throughout the United States. The Zinc-Lock products complement the Porter industrial and marine products, including the Tarset and Tarmastic lines acquired in 1970 from United States Steel Corporation.



VOITH-SCHNEIDER PROPELLED, TWIN-SCREW HARBOR TUG, built by Georgetown Shipyard, Georgetown, P.E.I., Canada, was delivered recently to the Aluminum Company of Canada, Transport Division, Port Alfred, Quebec. The 86-foot vessel was designed by **G.E. Kristinsson,** naval architect, Commercial Marine Services Limited, Montreal. The tug is fully automated for three-man operation and an unmanned engine room. The Voith Schneider propellers are driven by 1,200-bhp Nohab Polar diesel engines, Model No. SF18VS-D.

KNOWN 'ROUND THE WORLD

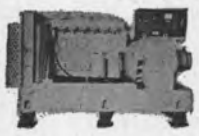
THE BOSTON METALS CO.

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

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

DIESEL GENERATOR SETS

1



G.M. 6-71 DIESEL GENERATOR SET

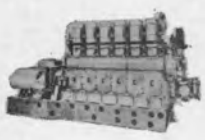
60 KW—440/3/60—1200 RPM—with switchgear.

2

350 KW 120/240 VDC DIESEL GENERATOR SET

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

3



250 KW DIESEL GENERATOR SET

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

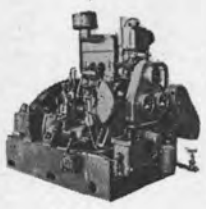
$12,500.

4

UNUSED 100KW SUPERIOR DIESEL GENERATOR SET

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

5



UNUSED 10 KW SUPERIOR DIESEL GENERATOR SET

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

6

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

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

TURBO GENERATOR SETS

7

WESTINGHOUSE 440/3/60 200 KW UNIT

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

8

WESTINGHOUSE 60 KW 120 VDC M-20-EH

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

9

300 KW WORTHINGTON-MOORE CROCKER-WHEELER UNITS

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

10

VICTORY 300 KW WESTINGHOUSE TURBO GENERATOR SET

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

2 UNUSED

400KW G.E. TURBO GENERATORS

TURBINE:

11 6-Stage DNS-55. Steam pressure 525/575 condensing. Superheat 0° to 350°. General Electric instruction book G.E.I.-11841.

GEAR:

G.E.—S-172—Form A—ratio 8:314:1.

GENERATOR:

400 KW — type ATI — 450/3/60 — 1200 R.P.M. at 40°C—625 KVA for 2 hours 55°C. Frame 976. Will upgrade to 500 KW.

GUARANTEED & CERTIFIED

C-4

TURBO GENERATOR

TURBINE:

12 Worthington-Moore—440 lbs/740°C—6097 R.P.M.—28.5" vacuum — 400 KW — Form S-6—8-stage.

GEAR:

14x10 — Worthington-Moore — 5.081:1—Pinion 6097.

GENERATOR:

Crocker-Wheeler — 400 KW — 240 volts—1667 amps — 1200 R.P.M. — 40°C rise—size 152 H.D.P.

UNUSED

GENERAL ELECTRIC 200 KW A.C. TURBO GENERATORS

13 TURBINE: DORV-518N — 10012 RPM — 410 lbs gauge—725°TT. GEAR: 10012/1200 RPM. GENERATOR: A/C—General Electric—200 KW—440/3/60—1200 RPM—D.C. exciter 40 KW 120 volts DC.

UNUSED

CROCKER-WHEELER 500 KW GENERATOR ENDS ONLY

120/240 VOLTS D.C.—1200 R.P.M.

FORMERLY USED WITH WORTHINGTON-MOORE TURBINES & GEARS

14 Upgraded by U.S. Navy—rewound in glass. Generator Frame and Armature—Marine 500 KW type 3-1200 — dripproof enclosure — base mount. Modified from Crocker-Wheeler generator frame 152HD — 240/120 volts DC — 2083/521 amps — 1200 RPM. Ambient temperature 50°C. APPLICATION: For C-4-SA1;C-4-SA-3;T-AP-134 vessels, using Worthington-Moore Turbine—Form S-6 and generator Form 14 x 10.

FOR VICTORYS MOORE C2 VESSELS

ALLIS-CHALMERS 300 KW D.C. GENERATORS

15

GENERATOR:

MCW-13—120/240 volts DC—1250 amps—serial 138511—8000 RPM.

GEAR:

Falk—375 HP—8000/1200 RPM.

TURBINE:

Serial 3067—440 lbs.—740°T.T.—8000 RPM.

GENERAL ELECTRIC 1250 KW TURBO GENERATORS

16 GENERATOR: G.E. 1250 KW—440/3/60—3600 RPM. GEAR: 7938/3600. TURBINE: FSN—10-stage—525 lbs/825°TT. With switch gear.

TURBINE ROTORS

MAIN PROPULSION

17

19 STAGE WESTINGHOUSE H.P. ROTOR FOR AP2 VICTORY

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

SPECIAL!

COMPLETE TURBINE OR ROTORS

18 **8500 HP G.E. C-3 Victory—Sun C-4's**

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

NEW L.P. BLADE RINGS

19 **for large 8500 H.P. Victory**
Joshua Hendy Westinghouse

NEW 8500 H.P. G.E. TURBINES

Large Victory or C-3

20 H.P. #72271 L.P. 72272

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

ALSO AVAILABLE

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

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

22 **8500 H.P. G.E. — C-3 OR VICTORY**
H.P.—8-stage—6159 RPM—serial 62043
L.P.—8-stage—3509 RPM—serial 62042
G.E.I. 16263

23 **6000 H.P. G.E. — NORTH CAROLINA C-2**
H.P.—8-stage—serial 78040
L.P.—7-stage—serial 78043
G.E.I. 16262

24 **VICTORY SHIP AP2 H.P. & L.P. TURBINES NEW — UNUSED — 6000 HP SETS**
G.E.—H.P. & L.P.—with throttle valve
Westinghouse—L.P.—with throttle valve
Allis-Chalmers—H.P. & L.P.—with throtle valve

AUX. GEN. ROTORS

25 **250 KW & 300 KW ALLIS-CHALMERS ROTORS**

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

26 **300 KW 5965 RPM JOSHUA HENDY**
Turbine—3H-69 Gear—52269
Turbine—3H-52 Gear—52252
Turbine—3H-62 Gear—52262

T-2 ROTORS, STATORS COOLERS, ETC.

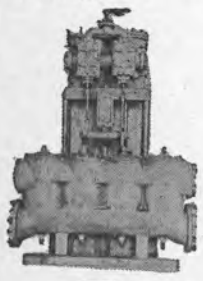
27 **ELLIOTT 10-STAGE MAIN PROPULSION TURBINE ROTOR**
#28702—Ex-Texas Trader—will interchange with large G.E. 1st Row—1 1/8" to shroud—1 3/16" O.A.H. 2nd Row—1 7/16" to shroud—1 9/16" O.A.H.

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

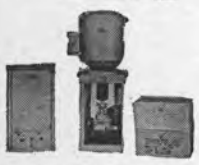
PUMPS

29 **VICTORY AP2 MAIN CIRCULATOR**
Ingersoll-Rand — 18 VCM—20" x 18"—10,500—10 lbs. MOTOR: 75 HP—Allis Chalmers—230 VDC—670 RPM. Spare unused armature. Motor frame F.B.V.—162.

30 **UNUSED 10x9x12 VERTICAL SIMPLEX FUEL OIL TRANSFER PUMPS**
Furnished on some T-2 Tankers. 160 GPM Bunker C —viscosity 70 to 700 SSF 122°F @ 100 lbs. discharge pressure. WP steam 150 lbs.—exhaust 10 lbs. 11¼" steam inlet—1½" exhaust. 4" Pump suction—3½" discharge.



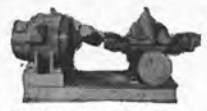
31 **WORTHINGTON 16"x14"x18" VERTICAL DUPLEX STRIPPING PUMP**
1400 GPM @ 110 PSI—suction lift 11.5 ft. — steam back pressure 15 lbs. 14" Suction — 10" Discharge — 2½" Steam — 4" Exhaust. Overall width 6'8"—Overall height 9'1½"—depth 3'9½"—wt. approx. 10,000 lbs.



32 **NEW BLACKMER FUEL OIL TRANSFER PUMP**
Rotary—50 GPM—50 lbs.—2"—5 HP—440/3/60—with starter & spares.

33 **UNUSED BLACKMER VERTICAL ROTARY PUMP**
4"—100 GPM—100 PSI—15 HP — 440/3/60 — gear head.

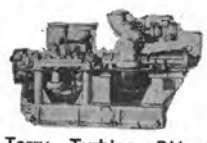
34 **R-2418 WATEROUS CARGO PUMP**
Bronze—14"—top discharge—capacity 2500 GPM—20 PSI. Bilge service—oil service—2400 GPM—75 PSI. Reduction gear. ENGINE: Cummins JN-130M—6 cylinder—4⅛ x 5—130 HP—air starting.



35 **UNUSED WARREN BRONZE PUMP**
1175 GPM—11.1 lbs.—8" x 8". MOTOR: Reliance 10 HP—115 VDC—850—RPM—76 amps.

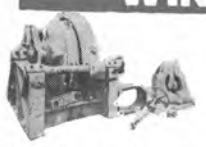
36 **NEW WORTHINGTON VERTICAL SUBMERSIBLE BILGE PUMP**
For emergency use on passenger ships, etc. PUMP: JAS—264 GPM—171' head—two 6" inlets—one 5" outlet. Motor: 40 HP—230 VDC—149 amps.

37 **EXCELSIOR MOLASSES PUMP—SIZE 5½"**
6" Suction and discharge—210 GPM—45 PSI—125 RPM. MOTOR: 10 HP—230 VDC—Frame 67—with gear.



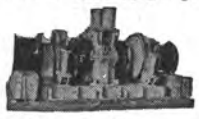
38 **UNUSED SIZE 4 BUFFALO FEED PUMPS**
Terry Turbine—BM—273 HP—550 RPM—exhaust 15 lbs—590 PSI—superheat 0°—425 GPM Buffalo Pump—discharge pressure 750 lbs—5" x 4"—built for USN DD destroyers.

WINCHES AND WINDLASSES



39 **2 LARGE UNUSED 3 13/16" WILDCATS AND CHAIN STOPPERS**
Suitable for windlasses large tankers. Ex-cancelled sister ship "Manhattan." The drive on these was a 14" x 14" steam winch.

40 **VICTORY UNIT WINCHES**
50 HP—230 VDC—U-1, U-2, U-4, U-5—reconditioned.



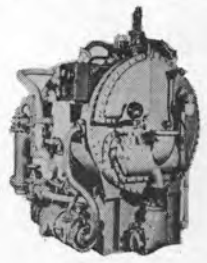
41 **NEW—UNUSED LINK BELT WINDLASS**
1⅝" and 7000 lb. anchors. 56" Centers—50 HP—230 VDC—spares.

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

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

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

MISCELLANEOUS



45 **GRISCOM-RUSSELL LOW-PRESSURE EVAPORATORS**
2 Units. 12,000 gal./day. Bronze, with all pumps & controls. Automatic feed water control & salinity indicator for cells. Excellent condition. Just removed from U.S. Navy ships Mission "San Rafael" & Mission "Santa Cruz." Always maintained in top condition. **$11,750.00.**

46 **1 AQUA CHEM 8000 GAL/DAY FLASH EVAPORATOR**
All pumps—salinity indicator cells **$9850.00.**

47 **VICTORY AP2—WESTINGHOUSE MAIN PROPULSION GEAR**
6000 SHP—Serial 4A—1620—Medina Victory.

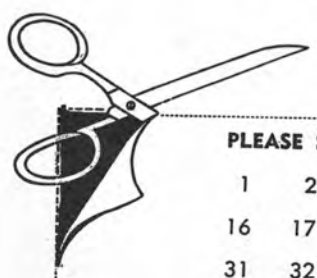
48 **UNUSED 1135 SQ. FT. C.H. WHEELER CONDENSER**
20" Ex. Inlet—⅝" Cu-Ni tubes—with or without air ejector.

49 **1 PAIR OF 300 HP UNION DIESEL ENGINES**
Port and starboard—model 06—300 HP at 350 RPM—4 cycle—direct reversible—11 x 15—overhauled 1966—in good condition. Just in from Navy.

50 **HYDE 30" DOCK CAPSTAN**
10" x 10"—reversible—W.P. 125 lbs—2½" steam—3" exhaust.

51 **DOUBLE INPUT—SINGLE OUTPUT DIESEL REDUCTION GEARS**
Farrell-Birmingham — 3200 SHP. Reduction gear: 1.81:1—handles two 1600 HP diesels @ 720 RPM. With hydraulic couplings & Fawick clutch. Port and starboard.

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



PLEASE SEND INFORMATION ON THE FOLLOWING: (Please circle items) 4/1/72

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

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

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

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

ICHCA Conference Names Panelists

Twenty-three panelists and discussion moderators who will participate in the upcoming International Cargo Handling Coordination Association (ICHCA) technical conference have been announced.

The announcement was made by **Ben E. Nutter,** executive director of the Port of Oakland, president of the U.S. National Committee of ICHCA, and general chairman of the conference. The conference, expected to attract shipping and transportation executives from throughout the world, will be held April 20-21 at the Hilton Inn in Oakland, Calif. Panelists will discuss topics related to efficient freight movement during the course of the two-day symposium.

Topics and panel members are:

"Innovations in Marine Terminal Design and Operation." **Edward G. Westerdahl,** executive director of the Port of Portland, will serve as moderator. Panelists will be **William Hagenzieker,** senior vice president, Universal Terminal & Stevedoring Corp., New York, N.Y.; **P. Meeusen,** Meeusen Consultants, Barendrecht, Holland; **Nicholas Stiglich,** Eness Research & Development Corp., Westwood, N.J., and **Ralph Krueger,** project manager, ports and terminals, Kaiser Engineers, Oakland, Calif.

"New Developments in Refrigerated Cargo Movements." Prof. **Harald Burmeister,** department of business administration, University of California, will be the moderator. Panelists include **William Goddard Jr.,** U.S. Department of Agriculture; **F. Gordon Mitchell,** agricultural extension service, University of California, Davis; **Luigi Fabiano,** vice president of Centro Italiano Study Containers, Genoa, Italy, and **A.R. Middaugh,** president, Monfort of Colorado International, Inc., Greeley, Colo.

"Air Cargo Intermodal Handling and New Developments." **Al Bienn,** manager of air cargo analysis and development for the Boeing Co., Seattle, Wash., will serve as moderator. **Lloyd Eber,** staff engineer, United Airlines, San Francisco, Calif.; **Helmuth F. Klumpp,** general manager-cargo, Lufthansa German Airlines, Frankfurt, Germany, and **Robert Brawner,** director of terminal system planning, Flying Tiger Line, will be the panelists.

"Load Center/Feeder Systems Port Relationship." Moderator will be **Chris Redlich,** president of Marine Terminals Corp., San Francisco. The panel will be made up of **Douglas Lathrop,** senior analyst, Manalytics Inc., San Francisco; **Melvin Shore,** director, Port of Sacramento; **R.B. Osborne,** manager of intermodal transportation, South Railroad System, Atlanta, Ga., and **George G. Gmelch,** vice president of operations, Pacific Far East Line, San Francisco.

"Labor Practices and Port Productivity." **Miriam E. Wolff,** director of the Port of San Francisco, will serve as moderator. Panelists will be **J.F. Parkinson,** executive vice president, Pacific Coast Association of Port Authorities; Dr. **Joseph D. Carrabino,** chairman of EMSCO Corp., Woodland Hills, Calif., and **Henry E. Seyfarth,** a partner in Seyfarth, Shaw, Fairweather and Geraldson, Chicago, Ill.

In addition to panel discussions, the conference will include special papers presented by well-known speakers; a luncheon address by **Weldon B. Gibson** of the Stanford Research Institute; a tour of Port of Oakland container and general cargo facilities, and an international trade dinner, featuring an address regarding trade with China and the Soviet Union delivered by former White House aide **Arthur T. Downing.**

Registration for the symposium is $36 for ICHCA members and $48 for nonmembers. To register, or request further information, contact the U.S. National Committee of the International Cargo Handling Coordination Association, c/o Port of Oakland, 66 Jack London Square, Oakland, Calif. 94607.

Hubeva Marine Plastics Names New Distributor

W. George Huntington, president, Hubeva Marine Plastics, Inc. of New York, sole distributors of Cordobond, announces the appointment of Texas Marine & Industrial Supply Co. as distributors of Cordobond for the Port of Houston, Texas.

'The Use Of Theory In Propeller Design' Subject Of SNAME Chesapeake Section

Shown above at the Chesapeake Section meeting, left to right: **John Heffernan,** Bethlehem Steel Corporation; **Reuven Leopold,** NavSec; **Geoffrey Cox,** Dr. **William Morgan** and Dr. **W.E. Cummins,** of NSRDC, and **Jorgen Strom-Tejsen,** chairman of the Section.

The theme was "welcome new members" at the February technical session of the Chesapeake Section of The Society of Naval Architects and Marine Engineers. The response was outstanding. Approximately 130 members were in attendance, and the "old" gave a grand welcome to the "new."

This technical session was held at the Bethesda Naval Hospital Officer's Club, located on the outskirts of Washington, D.C. Guest speakers were Dr. **William B. Morgan** and **Geoffrey C. Cox** of the Naval Ship Research and Development Center. Subject matter delineated the current art of contemporary propeller design, and the presentation was entitled "The Use of Theory in Propeller Design."

The primary message of this detailed presentation focused on that fact that moderately loaded propeller theory, and the corresponding computer programs, have been developed to the extent that theoretically designed propellers are expected to perform as predicted. This development, dependent on high-speed digital computers, allows the propeller designer to investigate many more parameters on a rational basis than he could in the past. Even with these developments, many aspects of propeller design depend on intuitive judgment.

Design considerations and necessary design decisions were discussed, especially with regard to efficiency, strength, vibration and cavitation. Also, the theoretical aspects of propeller design were reviewed and the interrelation between lifting-line and lifting-surface theory were discussed in some detail. In addition, information relative to highly skewed propellers which have excellent cavitation and vibration characteristics and whose successful development depends to a great extent on theoretical design techniques, were presented.

The moderator of note, as introduced by Section chairman **Jorgen Strom-Tejsen,** was **Reuven Leopold** of the Naval Ship Engineering Center. His invitation for comments to the technical presentation drew a rather unpredictable response. **Scott Dillon** of the Maritime Administration and **John Hill** of NavSec had what can be generally assessed as positive comments. However, Dr. **K. Schoenherr,** former head of NSRDC, treated all present to an extensive and somewhat critical dissertation as to the merits of existing techniques that can evolve into most effective propeller designs.

The March meeting at the Washington Navy Yard Officer's Club brought to focus "Development and Testing of a Passive Moving Weight Roll Stabilizer."

POWERED BY AVCO LYCOMING: This is one of two Vosper Thornycroft VT-1 series hovercraft ferries which are now making history for the Avco Lycoming Division, Stratford, Conn. Having recently completed a trip to Malmo, Sweden, from Southampton, England, the VT-002 and VT-003 model ferries are the first Lycoming-powered hovercraft to make an international voyage. As of early March, they also became the world's first commercially operated hovercraft to be powered by U.S.-manufactured gas turbine engines. Under a contract with Vosper Thornycroft Ltd., of England, the two fast ferry craft are being chartered and operated over a 35-minute Malmo-to-Copenhagen crossing by Rederai Ab Centrumlinjen, a company in Sweden. The 270-passenger hovercraft will be in competition with hydrofoil and conventional hull ferries.

Shipbuilders Council Reelects Edwin Hood

Edwin M. Hood

Edwin M. Hood was reelected as chairman of the board of directors of the Shipbuilders Council of America, the national industry association composed of major builders and repairers of merchant and naval ships. He was reelected to a fourth term at the Council's 51st Annual Meeting held in Washington, D.C., and will continue as president, a post he has held since 1961.

Edward P. Ruddy and **Mrs. Beverly C. Kendall** were also reelected for another one-year term as secretary and treasurer, respectively. **Mrs. Kendall** has additional responsibilities as special assistant to the president and is one of the first women to achieve executive status in the U.S. shipyard industry. She was originally elected treasurer in 1964.

In his annual report to the membership of the Council, Mr. **Hood** foresees a steadily accelerating level of shipyard activity stemming from substantial requirements for naval and merchant ships to balance the nation's sea power resources.

Jackson Rope Names D. Philip Skaer II

D. Philip Skaer II

D. Philip Skaer II has been named vice president, marketing, by Jackson Rope Corp., Reading, Pa., Division of Aspro Inc. Announcement of the appointment was made by **John C. Sauer,** president of Jackson Rope.

Mr. **Skaer** was most recently general sales manager of Broderick and Bascom Rope Company, St. Louis, Mo. He had been with that company for the past 13 years. He is a graduate of Hamilton College, Clinton, N.Y., and holds a degree in political science. He has also undertaken graduate studies at Cornell.

Mr. **Skaer** is headquartered in Reading.

First Ship From IHI 800,000-Ton Dock

Tugs in background escort the ore/oil carrier Andros Storm from the new dock.

The Andros Storm, a 143,400-dwt ore/oil carrier, was recently launched at a new 800,000-dwt building dock of the Kure Shipyard of IHI (Ishikawajima-Harima Heavy Industries Co., Ltd.), Japan. Construction of the ship began in November 1971, and she is the first to be built at the new large dock. The vessel will be delivered to General Sea Transport Corporation, Greece, this month.

The construction of the 800,000-dwt dock (No. 3 Dock) is still in progress while shipbuilding is under way. Approximately 60 percent of the total construction work has already been completed. Two 300-ton cranes and one 200-ton crane have been installed along the dock. At present the dock measures about 1,148 feet in length, and by the spring of 1973 it will be further extended to approximately 1,673 feet.

Following the launching of the Andros Storm, the keel of the second vessel to be constructed at the new facility was laid. The second ship is a 155,000-dwt bulk/ore/carrier for Kawasaki Kisen Kaisha, Ltd., and Taiyo Kaium K.K., her joint owners.

Annual Offshore Technology Conference At Astrohall In Houston, Texas Set For May 1-3

A 200-paper technical program emphasizing the relationship between offshore development and environmental control, plus a 60,000-square-foot exhibits display will be part of the activities awaiting registrants at the Fourth Annual Offshore Technology Conference May 1-3, 1972, at the Astrohall in Houston, Texas.

The conference, which was founded in 1968, is jointly sponsored by nine international engineering and scientific societies and is recogized as the world's leading annual meeting on ocean research and technology.

Six of the 33 technical sessions at the 1972 OTC will be devoted to the problems associated with the protection of the environment during offshore exploration and development operations. The remainder of the program will offer a broad range of engineering and scientific subjects related to the development of the oceans. Scheduled session topics include waves and currents, wave structure interaction, ocean state prediction, marine geology, vessels, electronic navigation, techniques of offshore construction, design of offshore structures, legalities and insurance, drilling, the Arctic, and communications technology.

To complement the extensive technical program at the conference, some 400 of the world's leading offshore service and manufacturing companies will display their latest technological developments in a technical educational exhibits show. The 1971 conference featured a 560-booth exhibits display, and the exhibition at the 1972 OTC is expected to be even larger. Registration for the conference will open at 7:30 a.m. Monday, May 1, in the lobby of the Astrohall. The exhibits portion of the conference will be open from 8 a.m. to 6 p.m. on Monday and Tuesday, and from 8 a.m. to 5 p.m. on Wednesday. Technical sessions will be conducted from 10 a.m. to noon, and from 2 to 5 p.m. on Monday; from 9:30 a.m. to noon, and 2 to 5 p.m. on Tuesday; and from 9 a.m. to noon, and 1:30 to 4:30 p.m. on Wednesday.

Advance registration deadline for the Fourth Annual Offshore Conference is April 15, 1972.

The sponsors of the Offshore Conference include the American Institute of Mining, Metallurgical, and Petroleum Engineers (The Society of Mining Engineers of AIME, The Metallurgical Society of AIME, and The Society of Petroleum Engineers of AIME); The American Association of Petroleum Geologists; The American Institute of Chemical Engineers; The American Society of Civil Engineers; The American Society of Mechanical Engineers (Petroleum Division); The Marine Technology Society; The Institute of Electrical and Electronics Engineers (Aerospace and Electronics Systems Group, Communications Technology Group, and Geoscience Electronics Group); The Society of Exploration Geophysicists, and The Society of Naval Architects and Marine Engineers.

TECHNICAL SESSION TIMETABLE

MONDAY	TUESDAY	WEDNESDAY
Morning	**Morning**	**Morning**
Geoscience	Dredging, Production and Transportation	Analysis and Design of Offshore Structures
Generation of Waves & Currents	Ocean State Prediction	Communications Technology
Movement and Sorbent Cleanup	Drilling	Terminals
Production	Soil Mechanics	Marine Geology
Moorings	Safety in Offshore Resource Development on the Outer Continental Shelf	Legalities, Insurance, Economics and Environmental Control
The Offshore Environment		
Afternoon	**Afternoon**	**Afternoon**
Exploration and Sample Analysis	Oil Slick Detection and Containment	Electronic Navigation
Mechancial Cleanup Devices	Wave Theory	Offshore Environmental Quality Control
Wave Structure Interaction	Techniques of Offshore Construction	Arctic
Underwater Activities I	Vessels	Statistics of Waves
Pipelines	Underwater Activities II	Interaction of Structures and Foundations
Corrosion	U.S. and Canadian Governmental Safety Programs	

The 1972 OTC program committee is comprised of the following: **A.E. Woelfel,** Cameron Iron Works, chairman; **James A. Klotz,** Union Oil Co. of California, SPE of AIME; **J. Leslie Goodier,** Arthur D. Little, Inc., SME of AIME; **Robert Rothman,** Batelle Memorial Institute, TMS of AIME; **Alan Lohse,** Gulf Universities Research Corp., AAPG; **W.F. McIlhenny,** The Dow Chemical Co., AIChE; **Hudson Matlock,** The University of Texas at Austin, ASCE; **Ross Kastor,** Shell Development Co., ASME-Petroleum Division; **Ernest Kristler,** Lockheed Electronics Co., MTS; **Michael Sims,** National Oceanic and Atmospheric Agency, IEEE; **Sidney Kaufman,** Shell Development Co., SEG, and **Donald Frisby,** Armco Steel Corp., SNAME.

New Bern Shipyards Awarded Contract To Build Trawlers

Designed by Coast Engineering Company, the new trawlers have a large afterdeck working area.

Western Ocean Resources, Inc., Marblehead, Mass., has placed an order for two—with an option for two additional—75-foot offshore lobster trawlers with New Bern Shipyards, Inc., New Bern, N.C. The boats were designed by Coast Engineering Company, naval architects, Norfolk, Va., Hull Design No. CE-2114. The firm will also make inspections of construction for the owners.

The vessel is of all-steel construction, 75-feet overall length by 24-feet breadth and 12-feet 6-inch depth. The hull has a peak tank forward, storeroom, engine room, hold, bait and storage rooms and lazaret. The quarters are located in the enclosed forecastle, with the pilothouse on the forecastle deck. The afterdeck is arranged to present a clear large working area, with openings in the waist on the starboard side and in the stern to facilitate handling lobster traps. All deck machinery is hydraulic, operated from an enclosed jogging station located on the after starboard corner of the forecastle. The main engine is a Caterpillar D-343 335-horsepower diesel with a 6:1 Twin-Disc reverse/reduction gear. The generator is a "Lima" 30 kw 250 VAC driven by a Lister diesel engine.

The lobster hold is insulated and refrigerated by Therm-Air Manufacturing Company equipment. The bait room is refrigerated by Dunham-Bush equipment.

The vessels have hydraulic steering systems and davits designed by Coast Engineering Company and built by the shipyard. The power block and winch were manufactured by Hydro Slave, Inc. The trawlers are equipped with the latest Kelvin Hughes radar and loran, Konel Fathometers and scanners, and RF Communications radiotelephone. The fuel tanks will carry 5,000 gallons of fuel for long endurance operations.

ONE OF TWENTY-FIVE: Hitting the waters of the Ohio River at Dravo Corporation's boat yard near Pittsburgh, Pa., is a 200-by-35-foot barge that will carry grain and other dry bulk commodities on the Mississippi River System. It is one of 25 such Dravo-built barges put into service during the past year by the Peavey Company of Minneapolis, Minn., through its barge operation at Alton, Ill. All of the semi-integrated hopper barges have weather-tight lift-off covers to protect perishable cargo. With lift-off covers, more than 75 percent of each barge's cargo box can be exposed for simplified loading and unloading.

MA Contracts To Develop Laser Navigation System For Great Lakes Operation

Development of a unique laser navigation system to facilitate winter operations on the Great Lakes is the subject of a joint industry-Government program announced by the Maritime Administration.

According to Assistant Secretary of Commerce for Maritime Affairs **A.E. Gibson,** who heads the agency, the new ship-positioning system would fill the gap left during the winter months when ordinary floating aids to navigation, such as buoys, must be removed from the Great Lakes' narrow rivers and channels because of possible ice damage.

A contract for the development of the laser and associated equipment was awarded to Associated Controls and Communications of Lynn, Mass. Based on a method developed for docking mammoth supertanks, the proposed navigation system will involve the installation of a laser—a small, compact unit which emits a narrow, intense beam of invisible light energy—on each ship using the Lakes during the winter and the placement of small reflectors at strategic points along the shoreline. A small computer aboard the ships will convert the time interval between the signals and their return to an automatic display showing the ship's distance to the reflector and its speed of advance.

The laser pilot program is part of the Maritime Administration's contribution to the three-year multi-agency Federal project now under way to lengthen the Great Lakes navigation season, this being coordinated by the U.S. Army Corps of Engineers. The MarAd contract calls for Associated Controls to develop the laser and associated equipment and install them aboard one of the vessels in the United States Steel Corp.'s Great Lakes fleet for testing during the 1972 navigation season, Mr. **Gibson** stated.

Marcona And Cryolite Form Team To Explore Greenland Iron Ore

Marcona Corporation, San Francisco, Calif., and Kyrolitselskabet Oresund A/S, commonly known as the Cryolite Company, of Copenhagen, have signed a partnership agreement to explore, evaluate and possibly exploit a very large deposit of iron ore, located at Isua in Greenland, approximately 100 miles northeast of Godthab and at about the same distant south of the Arctic Circle.

A portion of the ore deposit estimated to contain 500-million tons of iron ore has been selected as the basis for a feasibility study. If results of the study are favorable, it is envisioned that after being concentrated, the ore would be shipped to customers in both the Eastern United States and Europe. The deposit lies within the boundaries of an exploration concession which is held by the Cryolite Company, and it was located in 1965 by that company's group of prospectors.

Marcona, headquartered in San Francisco, has a broad base of operations in the exploration, mining, processing, shipping and marketing of iron ore and other mineral commodities. The company, owned primarily by Cyprus Mines Corporation and Utah International Inc., also is the developer of the Marconaflo slurry handling system for bulk materials.

"We are delighted to be involved with Cryolite in this unique and promising venture. Based on the outcome of technical and economic analyses, this could well become an important new mineral development within the Atlantic basin," said **C.W. Robinson,** president of Marcona.

Vincent Petersen, president of Cryolite, said on the same occasion that he hoped that both the population of Greenland and the partnership would benefit from this project. He felt convinced that Marcona's extensive experience in this field of busines would be a valuable contribution to an objective evaluation of the Isua iron ore deposit.

J.W. Siebes To Head Expanded Marine Div. Of Sulzer Bros., Inc.

J.W. Siebes

J.W. Siebes has been elected vice president of Sulzer Bros., Inc., 19 Rector Street, New York, N.Y. 10006, and will be in charge of the newly expanded Marine Division.

For the past eight years Mr. **Siebes** has been manager of the Diesel Division, which handles sales and service of Sulzer engines and spare parts. That division has now been expanded to include gas turbines for marine applications, as well as controllable pitch propellers and bow thrusters from Sulzer's Escher Wyss subsidiary.

Ingalls Iron Works Co. To Build Tank Barges For DuPont/Twin City

Several barge contracts have been awarded Ingalls Iron Works Company, Decatur, Ala. E.I. du Pont de Nemours & Company, Wilmington, Del., has placed an order for a 249-foot by 42-foot by 12½-foot tank barge, as well as one 200-foot by 35-foot by 12-foot independent tank barge. Twin City Barge and Towing Co., St. Paul, Minn., has requested two tank barges measuring 299 feet by 54 feet by 14½ feet each.

Neris Shipping Opens Portland, Ore., Office

Neris Shipping Co. of New York City has opened a West Coast office in Portland, Ore., located at 4506 S.E. Belmont Street. The company is general agent in the United States and Canada for United Enterprises and Shipping, Ltd., which provides monthly service from Malaysia, Singapore, Hong Kong and Taiwan to West Coast and Eastern Gulf ports.

Francis X. McQuade Named I.T.O. President

Francis X. McQuade

Ralph E. Ablon, chairman of the board of the Ogden Corporation, has announced the assignment of **Durel J. Talbot** to the central management of the Ogden Corporation. In his new capacity, Mr. **Talbot,** who for the past 15 years has been president of International Terminal Operating Co. Inc. (I.T.O.), an Ogden Corporation subsidiary, will assist Ogden president **M. Lee Rice** in the administration of Ogden's transportation-related activities, which include I.T.O., Avondale Shipyards, Inc., and Ogden Marine, Inc. Mr. **Talbot** will remain on the Ogden board of directors.

Mr. **Talbot** will be succeeded as president of I.T.O. by **Francis X. McQuade,** who joined I.T.O. in 1966 with a background of experience in all levels of cargo-handling activity at the Port of New York, the North Atlantic range, and the Gulf of Mexico.

Mr. **McQuade** attended Grove City College in Pennsylvania and the New York University Graduate School. He is a member of the Whitehall Club and the Downtown Athletic Club. He has recently been heavily involved in the restructuring of the New York Shipping Association and has actively participated in the current labor negotiations.

Mr. **McQuade** was recently elected the president of General Stevedoring Council, a worldwide organization which represents 24 countries.

International Terminal Operating Co. Inc. is a leading provider of marine container and breakbulk terminal facilities and services on the East Coast, with principal activities centered in the Port of New York, but also operating in Portland and Searsport, Maine; Baltimore, Md.; Boston, Mass.; Buffalo, N.Y.; Sunny Point, Wilmington, N.C.; Philadelphia, Pa.; Norfolk and Newport News, Va.; Camden, N.J., and Wilmington, Del.

IHC Holland Buys Interest In French Offshore Exploitation

Following their desire to be associated with future technological developments in the offshore oil industry, the IHC Holland group has acquired an interest in the French company DEEP (Groupement pour le developpement de l'exploration et de l'exploitation petroliere en eau profonde), which in turn holds 20 percent of the shares of the international consortium SEAL (Subsea Equipment Associates Limited). The other shareholders in the latter company are British Petroleum, Compagnie Francaise des Petroles (TOTAL), Mobil Oil, and Westinghouse.

SEAL is engaged in the research, development and commercialization of systems for offshore oil production at medium and great water depths.

A.L. Griffin, Inc. Sold To Three Portland Executives

A.L. Griffin, Inc., ship chandlery located at 21-25 Custom House Wharf, Portland, Maine 04112, has been purchased by three Portland businessmen.

The new owners are **Lawrence Caldwell, Richard Dyke** and **Henry Valente.** They also own Leavitt & Parris, Inc., manufacturers of canvas products for home, industry and marine for over 50 years, located on Commercial Street in Portland.

A.L. Griffin, the founder of the business, remains on with the firm. Mr. **Griffin** has been associated with the ship chandlery business for over 40 years. The company also continues to provide a full service to the area draggers.

Conference To Study Pollution Control In Marine Industries

The International Association for Pollution Control has scheduled a two-day conference on pollution control in the marine industries to be held in the Shoreham Hotel, Washington, D.C., on May 11 and 12, 1972. A well-rounded program has been planned with leaders in the field of pollution control taking part.

A general plenary session will be held during the morning of May 11 with Sen. **Allen Ellender** giving the keynote address. He will be followed by **Rodney Duncan,** Alcan Shipping Company, Montreal, Canada, speaking on "Present and Future International Laws, Regulations, Treaties, and Conventions" and Rear Adm. **W.M. Benkert,** USCG, discussing "Overview of Federal Environmental Laws and Regulations of Interest to the Marine Industry."

Concurrent sessions will be held on Thursday afternoon, May 11, and all-day Friday, May 12, in order to fully cover the subject. The sessions and subjects to be discussed will be:

Session 1 — "Government R&D for Waste Treatment—Present and Future," with Dr. **Charles Bates,** U.S. Coast Guard, serving as moderator, will be held on Thursday afternoon.

Session 2—"Environmental Considerations for Ports and Harbors," will also be held on Thursday afternoon with **Edward Langlois,** Maine Port Authority, serving as moderator.

Session 3—"Industrial Activities for Oil and Sanitary Waste Treatment Systems," with **Harold Bernard,** Environmental Protection Agency, serving as moderator, will be held Friday morning.

Session 4—"Laws, Regulations, and Enforcement," will be held on Friday morning with **Thomas F.P. Sullivan,** Washington attorney, serving as moderator.

Session 5 — "Survey of Solid Waste, Hazardous Materials, Air and Noise Pollution Activities in the Marine Field," will be held Friday afternoon with **D. Barry Dahm**, Cornell Aeronautical Laboratory, serving as moderator.

Session 6 — "Economic Factors Affecting Marine Pollution Control Markets," with **Joseph S. Ives Jr.,** LFE Corporation, serving as moderator, will be held on Friday afternoon.

The Thursday luncheon will be conducted as a seminar with **Robert N. Tomb,** Consultants Group Inc., acting as moderator.

The complete program with the listing of the individual papers and information on reservations may be obtained from the International Association for Pollution Control, Suite 700, 4733 Bethesda Avenue, N.W., Washington, D.C. 20014, or by telephone at Area Code 301, 657-2922.

Jack Seastrom Joins Jacuzzi Bros. Inc.

Jack Seastrom

Jack Seastrom has joined Jacuzzi Bros. Inc., Little Rock, Ark., as industrial sales representative in their marine jet department, it was announced by **George Regula,** manager.

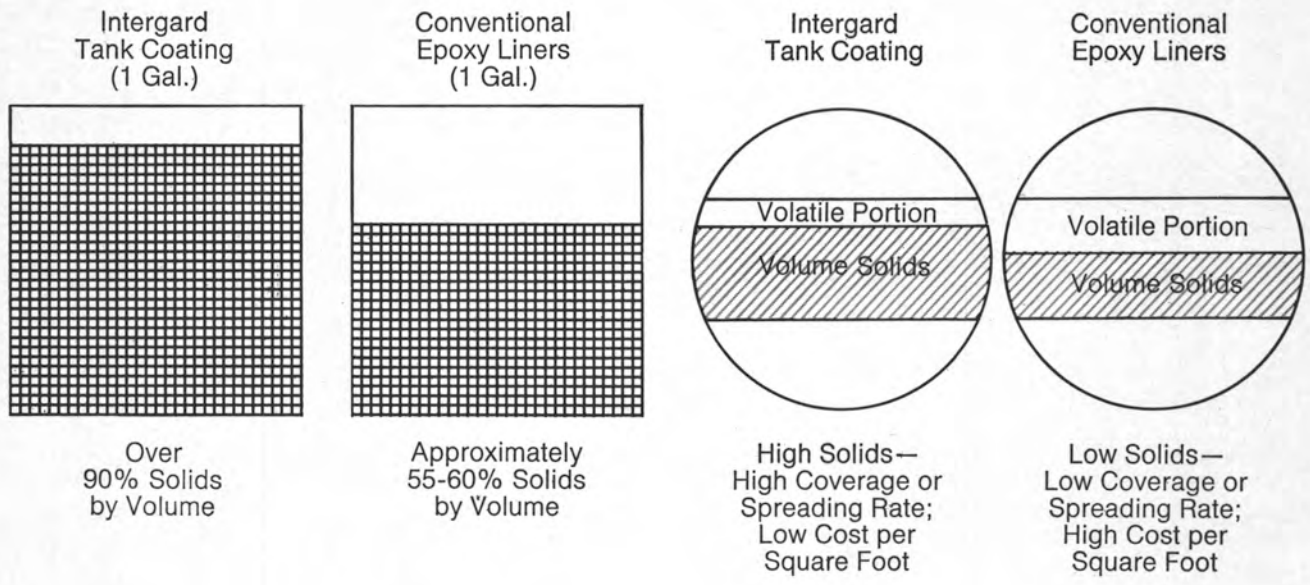
Mr. **Regula** said: "We are fortunate to have secured a man of **Jack Seastrom's** background and ability, and we're sure that his wide experience will prove advantageous in Jacuzzi's long-range program to continue to increase its share of industrial sales."

Mr. **Seastrom** comes to Jacuzzi from Kenner Boat Co., in Knoxville, Ark., where he was general sales manager for 11 years. Prior to this connection, he was a partner in a marine retail business in Waterloo, Iowa.

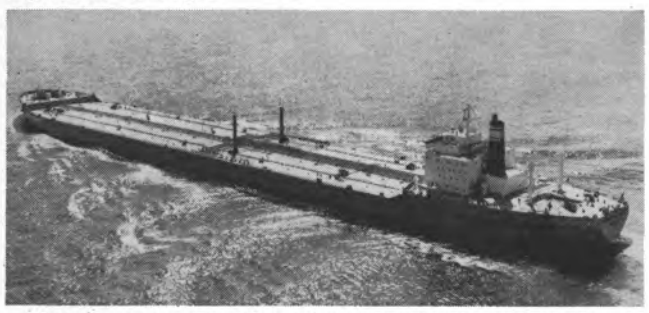
Mr. **Seastrom** majored in economics and business administration at the Northern University of Iowa. He has won a scholarship in yacht design from the National Association of Engine and Boat Manufacturers.

Intergard® Tank Coating Systems can save you as much as 35% in material costs.

Their high-volume solids are the reason why.



These illustrations tell the story. Using the volume solids of a coating is now widely accepted as the only meaningful method which will give a true estimate of the material costs on a square foot basis. And when you approach your jobs this way, you'll see why Intergard Tank Coatings can mean significant savings.



But there are a number of other reasons you should use them, too.

Intergard Tank Coatings are unique. Applied at over 90% solids, they provide maximum corrosion prevention in tanks, cargo holds, bilges and ballast tanks. They are characterized by terminal epoxy groupings which combine with the tank coating reactor to form a continuous coating of extreme durability, hardness and high gloss. This results in a porcelain-like finish so smooth and compact that most cargoes will not adhere, so only a minimum amount of clean-up and lay-up time is necessary before taking on the next cargo.

Intergard Tank Coatings, in addition to being approved for sophisticated cargo/ballast service, are also approved for potable water tanks and meet the requirements of other regulatory bodies for the carriage of edible products.

Intergard Tank Coatings are extremely economical to apply as only two coats are needed and special primers are not required since one coat acts as the priming coat for the other. Any voids or holidays are easily detected by color difference between the two coats.

Intergard Tank Coatings offer excellent adhesion to a variety of surfaces and unsurpassed tenacity to sand-blasted steel and most shop primers. They also provide high chemical and petroleum resistance, superior acid and alkaline resistance, excellent abrasion resistance, both fresh and salt water resistance, heat resistance and superior retained flexibility characteristics. An advantage in maintenance can also be realized because Intergard Tank Coatings can be readily butter-worthed or cleaned with a variety of detergents without danger of softening or damaging the coatings.

So for savings of 35% or more in material costs and for a top quality job, contact our nearest office for complete details on Intergard Tank Coating Systems, today.

International Red Hand
Marine Coatings

International Paint Company, Inc.
World's Largest Marine Paint Organization
21 West St., New York/220 S. Linden Ave., S. San Francisco/3915 Louisa St., New Orleans

Check the leadership score... for the one magazine providing your marine advertising with maximum sales power.

	MARITIME REPORTER /Engineering News	Marine Engineering/Log
CIRCULATION LEADERSHIP		
Largest total circulation to BUYERS (USA & Foreign combined)	★	
Largest American circulation to BUYERS	★	
Largest circulation to BUYERS on the U.S. Inland Waterways	★	
Largest circulation to non-buyers (shipyard laborers, men aboard ship, etc.)		★
Largest READER REQUEST circulation to shoreside BUYERS	★	
Largest total FREE, NON-REQUEST CIRCULATION		★
Largest READER REQUEST circulation to Foreign BUYERS	★	
EDITORIAL EXCELLENCE		
Largest amount of editorial material in 1971	★	
Largest number of technical and engineering features in 1971	★	
Consistently FIRST with the most important information	★	
Largest editorial staff	same	same
ADVERTISING LEADERSHIP		
Largest total amount of advertising space in 1971	★	
Largest amount of classified advertising	★	
Largest amount of marine industry advertising (Shipyards and Vessel Operating Companies)	★	
COST		
Lowest advertising rates	★	
Lowest cost per shoreside buyer	★	

Your 1972 marine advertising will be in the best of company ...and produce the best results in

MARITIME REPORTER AND **ENGINEERING NEWS**

107 EAST 31st STREET
NEW YORK, N. Y. 10016
MUrray Hill 9-3266 • 7 • 8 • 9

MEMBER BPA
Business Publications Audit of Circulation, Inc.

S.O.S.—Save On Slings

*K. Roger Moore

Slings are perhaps the most common yet least understood pieces of industrial equipment in use today

Each year an estimated several millions of dollars are needlessly spent to replace slings damaged by improper selection, faulty rigging or careless handling. The cost figures, though, don't begin to include the damage done to goods and the personal injury caused by unsafe slings.

After these costs begin to mount, operators quickly learn that the key to economy and safety lies in careful selection and maintenance of slings. By observing a few simple rules, they can extend the productive lifetime of any sling system and protect themselves from costly damages.

Sling Selection Important

With the wide range of sling materials and styles available today, the right sling can be matched with each lift job for maximum efficiency, economy and safety.

Fiber or synthetic rope slings are used for comparatively light loads or when a high degree of sling flexibility is required. They are frequently soft enough to prevent damage to the surface of finished materials but are easily damaged themselves by direct sunlight, rain and humidity. Once exposed to such weather conditions, it is often difficult to judge the amount of strength left in a fiber rope sling.

Chain slings have a high resistance to abrasion and are frequently used on high-temperature lifts in steel mills and foundries. Since just one weak link in a chain sling can cause failure, they require constant inspection and maintenance.

Wire rope slings combine the advantages of fiber rope and chain and can be used for any lift requiring safety, flexibility and high strength. Compared to fiber rope slings, wire rope slings are more predictable, more resistant to abrasion and are stronger, size for size.

Wire rope may develop kinks or broken wires when improperly handled, but these flaws are easily noticed. Chain slings may have structural flaws—detectable only by sophisticated metallurgical examination—which affect their strength capacity.

*Mr. **Moore** is a graduate of the University of Missouri, and is a registered professional engineer in Missouri. He is an associate member of the American Society of Mechanical Engineers and a member of both the Missouri Society and National Society of Professional Engineers. He is an application engineer for Union Wire Rope products, Armco Steel Corporation, Kansas City, Mo.

Operation Affects Service

Proper sling design and operation are necessary for maximum service and safety in any lift job. Operators should be aware of conditions that affect the performance of a sling system: shape and weight of load; potentially corrosive conditions, and age and condition of slings.

Beware—Sharp Edges

Whenever possible, slings should be rigged on a lift to prevent contact with sharp edges. Sharp edges can cause permanent damage from kinking and, in some cases, can actually cut a sling.

Saddles can be used to prevent contact with sharp edges. A sling saddle wraps the sling around a more gently rounded surface of the load, protecting both sling and load.

Slow & Easy

Loads should be lifted slowly and carefully to avoid temporary overstress of the sling. When slings with more than one leg are used, the load should be lifted in a level position. When the lift points are in the same horizontal plane, and the load is uniform, sling legs should measure equal lengths. The center of gravity of the load should be directly under the sling hook to equalize the loads on each leg of the sling.

If the lift points of the load must be below the center of gravity of the load, it is important to rig the lift so that the lift points are a sufficient distance away from the center of gravity to insure stability, so that the load doesn't tip.

Don't Use A Damaged Sling

Never use a corroded sling to lift any load. Corrosion restricts the free movement of wire rope strands and wires, and reduces the sling's ability to withstand shock loads, making it unsafe to use. Corrosion is prevented by adequate lubrication and storage of slings in dry, well-ventilated areas.

The hundreds of small wires in a wire rope sling may be damaged by abrasion against other objects. Abrasion can occur when a load is set on the floor without using elevator blocks. When one end of the sling is unhooked and pulled under the load, severe abrasion results.

Lifting a load when the sling is not securely attached to the load may also cause damage. The sling slides along the load until it catches on some protruding object or develops enough friction to stop. Meanwhile, the cutting and sliding motion severely abrades or cuts the sling.

Crushing is also a severe form of damage. It occurs when the sling is left laying unused on the floor where it can be run over by forklifts and other heavy equipment. Crushing may also occur when the sling contacts unprotected sharp corners or when a heavy load is set directly on it.

A damaged sling should be discarded immediately. It is unsafe for even the lightest loads.

Rigging Method Affects Operation

An efficient sling, like a well-fitted suit, should be individualized. A variety of sling end-fittings and arrangements can be combined to handle any particular load. When lifting unusual materials, special slings can be designed.

Sling design is based on the operating conditions which affect a particular lift: the weight of the load, the angle made by the sling and the load, the available overhead space and the necessity of turning over the load.

Depending on the weight of a load, a system ranging from one small sling to several larger ones may be required. When the weight is known, lift points are determined with respect to the load's center of gravity. The weight distributed to each leg of the sling can be determined, the sling angles calculated and a design specified.

Larger slings are needed as the sling angle with the vertical becomes excessive. Excessive sling angle is often a product of inadequate overhead space. When lack of overhead space is a problem, a spreader bar should be used to reduce the sling angle.

To prevent abrasion, never turn a load in a basket hitch. Instead, use a double choker hitch where the center of the rope passes over the hook for equalization of load weight. The load is then turned with a tight, secure rope.

Improved Handling Saves Slings

Most sling failure results from carelessness and abuse. It sometimes seems as though more slings are discarded because of abuse than normal wear. Several precautionary measures can be taken to improve sling service, reduce costs and ensure safe operation.

— Do not overload slings. When in doubt about overloading, use a sling with a higher lifting capacity to avoid accidents. A sling which has been overstressed may not appear damaged, but may fail on the next lift at a considerably lighter load. It should be discarded immediately.

— Avoid handling hot materials with slings.

— Avoid cutting slings on sharp load corners. Use sling saddles.

— Do not crush slings. Whenever possible, set the load on blocks. Pulling a sling from under a load causes abrasion and kinking.

— Avoid corrosion. Store slings in a dry, well-ventilated room. Exposure to moisture and acid fumes corrodes and weakens slings.

— Do not leave slings on the floor. Slings should be hung on wall hooks when not in use. If left laying on the floor, they will be damaged by heavy objects and equipment.

— Do not start or stop sling motion suddenly. Jerky movements increase the stress and distort the proportioning of weight on the sling.

— Do not ignore sling damage. Make periodic inspections of all slings.

Inspections Cut Operating Costs

Sling failures increase operating expenses — including equipment damage, disruption of job schedules and personal injury—far beyond the cost of an adequate inspection program and the occasional replacement of a sling.

Because there are several kinds of sling failure, an inspection program must be regular and thorough. In general, a sling should be replaced if there is any question about its safe operation. The cost of a new sling is small indeed compared to the cost of damaged goods and equipment or injured personnel.

Kinked and twisted slings should be discarded. A single broken wire may not be cause for concern, but it is wise to retire any sling that is questionable. Damaged sling eyes indicate the sling is ready for retirement.

Advice about safe use of slings is available from Union Wire Rope distributors throughout the United States. Armed with a few simple facts about the selection, operation, handling and inspection of slings, operators can reduce sling costs and enjoy more efficient and safe use.

Galveston Wharves Names L.B. Prino Jr.

L.B. Prino Jr.

L.B. Prino Jr., manager of the Galveston, Texas, office of Bay-Houston Towing Company, has been appointed to the board of trustees of the Galveston Wharves. The term of office is three years.

A veteran of 31 years with Bay-Houston Towing, Mr. **Prino** will join other board trustees in attempting to maintain an undiminished flow of commerce through the port while reconciling and accommodating water front activities with ecological needs.

Mr. **Prino** has been a lifelong resident of Galveston and is a member of the Galveston Propeller Club.

Sperry Systems Mgmt. Appoints Paul Vestigo Director Of Marketing

Paul W. Vestigo has been appointed director of marketing for the Sperry Systems Management Division, an operating unit of the Sperry Division of Sperry Rand Corporation. The appointment was announced by **Robert L. Wendt,** vice president of Sperry Systems Management Division.

A Sperry employee since 1939, Mr. **Vestigo** will be responsible for coordinating all marketing activities within the Systems Management Division. The division is the systems manager for the U.S. Navy's Polaris/Poseidon submarine navigation complex, and provides systems engineering and management for ship, submarine and aircraft weapons systems. In the marine, civil and industrial areas, the division's programs include ship navigation and collision avoidance systems, computerized traffic controls, health care systems, financial systems for brokerage offices, and law enforcement systems.

Prior to his present assignment, Mr. **Vestigo** was manager of western operations for the division's Ocean Systems Group. He was based in Vallejo, Calif.

During his Sperry career, Mr. **Vestigo** has had extensive manufacturing and engineering experience. In 1956, he was designated to head a new Sperry Rand facility, the then Sperry Utah Engineering Laboratory in Salt Lake City, Utah. Four years later he returned to Long Island as engineering manager on the Hustler program, and subsequently filled the same role in the MARS (Mobile Atlantic Range Stations) effort. He is a graduate of Cooper Union.

Richard M. Ettington Named President Of Worthington Pump Int'l

Richard M. Ettington

Richard M. Ettington has been named president of Worthington Pump International, Inc., a subsidiary of Worthington Corporation, it was announced by chairman **Edward C. Forbes.**

A 1947 graduate of Rensselaer Polytechnic Institute, with a bachelor's degree in mechanical engineering, Mr. **Ettington** was with Ingersoll Rand Co. from 1947 to 1966. He joined the Alco subsidiary of Worthington in 1967 and was elected a group vice president of Studebaker - Worthington and chairman and chief executive officer of MLW-Worthington in 1970, the company's Canadian subsidiary. His group also included Alco Spring Industries, Inc., Finserv Computer Corp. and Gamon-Calmet Industries, Inc.

Mr. **Ettington** will be located at Worthington Pump International's headquarters in Mountainside, N.J.

A worldwide pump company, Worthington Pump International is comprised of 16 decentralized autonomous pump operations, with facilities in Argentina, Australia, Brazil, Colombia, Japan, Mexico, Spain, Italy, England and Austria, as well as in the United States and Canada. The Worthington Corporation is a wholly owned subsidiary of Studebaker-Worthington, Inc.

Barber Steamship Promotes Three

The election of three assistant vice presidents was announced by **Edward J. Barber,** president of Barber Steamship Lines, Inc.

Anthony A. Cracchiolo of Staten Island, N.Y., is now assistant vice president in charge of traffic for Barber Lines Atlantic/Far East Service. **Francis W. Milne** of Rosedale, Long Island, N.Y., and **Harry J. Daly** of Kearny, N.J., have been appointed assistant vice presidents in charge of sales for Barber Lines homeward services from the Far East and East Africa, Mediterranean and Middle East/USA.

Seatrain Shipbuilding Appoints Wallace Price

Wallace W. Price

Wallace W. Price has been appointed assistant vice president of personnel, training and community relations at Seatrain Shipbuilding Corporation, Brooklyn, N.Y., according to an announcement by **Warren P. Pack,** president. Seatrain Shipbuilding Corporation is a wholly owned subsidiary of Seatrain Lines Incorporated.

Mr. **Price** joins Seatrain after seven years with Olin Corp. where he was most recently manager of procedures. From 1964 to 1966, he held the position of research specialist with Olin. Earlier, he served in the U.S. Army, retiring as a lieutenant colonel after 22 years of service. He was drafted into the Infantry in 1943 and served in both World War II and Korea.

Mr. **Price** received his bachelor of science degree from Southern Illinois University in 1942, and his master of science degree from Virginia State College in 1953, during which time he was an associate professor of military science and tactics. He has also had two years of legal studies at Eastern University and two years of doctoral studies at the University of Pennsylvania.

Norton, Lilly & Co. Opens Miami Office

John Griffith, chairman of the board of Norton, Lilly & Co., Inc., announced that the firm has opened a branch office at 530 Biscayne Blvd. in Miami, Fla., with **Harold D. Carl** as manager. Mr. **Griffith** said that the Miami office will function as port agents for Caribbean Trailer Express Line, and also as a port and managing agent for Seaway Lines, Inc.

Mr. **Carl's** shipping experience includes service both afloat and ashore with Matson Navigation Co. and as senior traffic officer in Holland with the United States War Shipping Administration.

Litton Industries Names DuBois And Kaufmann

Two senior staff assignments in the Defense and Marine Systems Group of Litton Industries were announced by **Fred W. O'Green,** executive vice president of Litton and head of the group.

According to the announcement, **R.H. DuBois** has been named vice president for planning, responsible for reviewing all planning activities associated with the group, and **Allen A. Kaufmann** has been appointed vice president for Defense and Marine Systems, with responsibility for coordinating contractual and Government requirements.

Mr. **DuBois** previously was program manager of Litton's DD-963 shipbuilding program and a vice president of Litton Ship Systems. Before joining Litton in 1967, he was deputy director of the Institute for Defense Analyses (IDA) Weapons Systems Evaluation Division. In an earlier position, he directed a study on strategic intelligence, reporting to President **Eisenhower** and the National Security Council.

He is a graduate of the U.S. Naval Academy, with a bachelor of science degree in electrical engineering, and he received the first degree awarded by the Naval Post-Graduate School in operations analysis. He also completed residency requirements for a Ph.D degree in mathematics at American University.

Mr. **Kaufmann** had been vice president and special assistant to the president of Litton's Guidance and Control Systems Division. He joined Litton in 1956 and was head of contracts administration and subsequently held other key management positions at Litton's Guidance and Control Systems Division. He is a graduate of the University of Minnesota.

Professional

J. L. BLUDWORTH
NAVAL ARCHITECT
TUGS
BARGES

608 N. Clear Creek Dr., Friendswood, Tex. 77546

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

BREIT ENGINEERING, INC.
441 GRAVIER ST.
NEW ORLEANS, LA. 70130
504-524-3575
NAVAL ARCHITECTS & MARINE ENGINEERS
MARINE SURVEYORS

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

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

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

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

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

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

DESIGNERS & PLANNERS
INCORPORATED
114 FIFTH AVENUE
NEW YORK, NEW YORK 10011
(212) 691-7770
NAVAL ARCHITECTS
MARINE ENGINEERS
P.O. BOX 1080
GALVESTON, TEX. 77550
(713) 502-1002

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

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

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

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

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

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

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

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

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

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

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

MARINE DESIGN INC.
NAVAL ARCHITECTS & MARINE ENGINEERS
Formerly Tams Inc., Established 1865
401 BROAD HOLLOW ROAD (Rt. 110)
MELVILLE, L.I., NEW YORK 11746
516 293-4336

TUGS, BARGES, WORK BOATS & CONVERSIONS

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

RUDOLPH F. MATZER & ASSOCIATES, INC.
NAVAL ARCHITECTS • MARINE ENGINEERS • MARINE SURVEYORS
RESEARCH & DEVELOPMENT
13891 ATLANTIC BOULEVARD
PHONE 904/246-6438
JACKSONVILLE, FLA. 32225
127 OCEAN SCIENCE CENTER
PHONE 305/848-5223
RIVIERA BEACH, FLA. 33404

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

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

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

ROBERT MOORE CORPORATION
MARINE ENGINEERS
350 Main Street, Port Washington, N.Y. 11050
(516) 883-7660
CONSULTANTS
Eastern Representatives:
STAR IRON & STEEL CO.
Tacoma, Washington
Custom Cranes & Hoists • Bridge, Gantry, Portal, Revolving, Container Handling

NICKUM & SPAULDING ASSOCIATES, INC.
Naval Architects and Marine Engineers
71 Columbia Street, Seattle, Wash. 98104
(206) 622-4954

OCEAN-OIL INTERNATIONAL ENGINEERING CORPORATION
P.O. Box 6173, New Orleans, Louisiana 70114, U.S.A.
NAVAL ARCHITECTS • MARINE ENGINEERS
Phone:
day or night
504/367-4072
504/366-9998

SYNCROLIFT
DRYDOCKS AND TRANSFER SYSTEMS
A Patented Product of
PEARLSON ENGINEERING CO., INC.
Naval Architects • Marine Engineers
P.O. BOX 8 • 8970 S.W. 87th COURT • MIAMI, FLORIDA 33156
PHONE: 305/271-5721 • TELEX: 051-9340 • CABLE: SYNCROLIFT

S. L. PETCHUL, INC.
Naval Architect - Marine Surveyor
8-D South New River Drive East
Ft. Lauderdale, Florida 33301 • (305) 525-4991

total FIBERGLASS services
• Nav. Arch./Engineering • Protypes, Models
• New Designs, Shipalts • Repair Surveys Conversions
SIDNEY MERRITT POLHEMUS
Ballouville Rd. RFD 2 Dayville, Conn. 06241

POTTER & McARTHUR, INC.
NAVAL ARCHITECTS — CONSULTING ENGINEERS
Design • Survey • Brokerage
R&D • Automation • EDP
Marine Management Systems
POMAR Workboats • Yachts
Tugboats • Ferries
SALES Marine Equipment
253 Northern Ave., Boston, Mass. 02210 617-542-0850

Underway Replenishment Highlights ASNE Meeting

At a recent dinner meeting, the Tidewater Chapter of the American Society of Naval Engineers presented an informative program in Intership Cargo and Fuel Transfer on the High Seas by Capt. **John Wells,** USN, of COMSERVLANT staff. Captain **Wells** was first commanding officer of the USS San Diego (AFS). Capt. **Bernie Lienhard,** USN, NavShips' Project Manager for Underway Replenishment, spoke on the subject from a management point of view. There was considerable discussion on the Navy's use of sliding padeyes versus cargo drop reels. Comdr. **Ted Nixon,** USN, of Military Sealift Command, Norfolk, spoke on the part played by MSC operated tankers which supply Navy oilers at sea.

At the meeting, the following officers were installed for calendar 1972: chairman, Capt. **J.S. Bethea,** USN (ret.), manager, quality assurance, Newport News Shipbuilding and Dry Dock Co.; vice chairman, Capt. **William McGarrah,** USN, Fleet Maintenance Officer, COMPHIBLANT. Councilors: Rear Adm. **D.H. Clark,** USN (ret.); Rear Adm. **E.H. Thiele,** USCG (ret.); **Jamie Adair,** USN, Commander, Norfolk Naval Shipyard; Rear Adm. **W.E. Howard,** USN (ret.); Capt. **R.F. Roche,** USN, Assistant Fleet Maintenance Officer, CINCLANT. Secretary, **R.S. Gray,** Chief Surveyor, SUPSHIP FIVE; Treasurer, Comdr. **T.J. Miklos,** USN, Fleet Maintenance Division, CINCLANT. Committee chairmen: program, Comdr. **T. Albee,** USN, engineering officer, Norfolk Naval Shipyard; publicity, Comdr. **J.A. Siebel,** USCGR, marine consultant; membership, **J.H. Hatfield,** chief planner, Norfolk Naval Shipyard; hospitality, **J.E. West,** quality assurance department, Newport News Shipbuilding and Dry Dock Co.

The meeting was held at the Breezy Point Officers Club, Naval Air Station, Norfolk, Va.

Gladding-Hearn Delivers Boarding Boat For Portland

The new boarding boat is the second delivered to the Portland, Maine Pilots Association by Gladding-Hearn.

Gladding-Hearn Shipbuilding Corporation has announced the delivery of a new 47-foot boarding boat to the Portland, Maine Pilots Association. This is the second vessel completed by the builders for this group and will serve as a standby boat to the Portland Pilot, delivered in 1969. The new craft was named Director after the famous schooner of the same name, which was the port's original pilot boat.

Statistics on the new boat are 47 feet in length, a 13-foot 6-inch beam, displacement of 18.4 tons, with a fuel capacity of 800 gallons. A speed of 15.8 knots was demonstrated during trials in Casco Bay. The hull is of welded steel construction using longitudinal framing system over web frames on 4-foot centers, and three watertight bulkheads provide four separate watertight compartments below decks. The superstructure, of 3/16-inch alloy 5086 aluminum is riveted to a coaming bar of type 316 stainless steel.

A single 40-inch diameter Federal Equipoise propeller is driven through a 3-inch diameter Armco 17-4PH stainless steel shaft by a Detroit Diesel 12V71 engine rated 480 hp at 2,300 rpm. The engine is cooled by a Fernstrum Model D-1648 "Grid Cooler" recessed into the hull.

Surrounding the boat at deck edge is Johnson rubber fendering using 6-inch D section at the areas of greatest impact and the DB-101 type elsewhere.

Accommodations are provided below for a crew of two and comfortable settees in the deckhouse for transient pilots. Cold climate comfort is assured by automotive type hot water heaters operating off the main engine cooling system while under way and by thermostatically controlled electric heaters when dockside. A defroster system is arranged for the forward pilothouse heaters and a KIM "Hot Start" block heater installed to maintain engine temperature when tied up.

Philadelphia Section SNAME 22nd Annual Dinner-Dance

The Philadelphia Section of The Society of Naval Architects and Marine Engineers will hold its 22nd Annual Spring Dinner-Dance on May 13, 1972, at the Marriott Motor Hotel on City Line Avenue, Philadelphia, Pa.

The affair will be held in the new and luxurious Commonwealth Ballroom, a magnificent addition to the Marriott's Convention Center.

Tickets are available by contacting **Joseph J. Kleschick,** c/o General Electric Company, 3 Penn Center Plaza, Philadelphia, Pa. 19102.

Cargo Hold Ventilation Subject Of Bulletin Available From SNAME

Although cargo transport via containership or barge-carrying vessel is vogue, a substantial portion of all cargoes still moves via breakbulk carrier. Inside their holds, forklift trucks operating on gasoline or liquefied petroleum gas (LPG) during cargo handling operations in port have often created the need for supplementary ventilation to protect personnel from the dangers of carbon monoxide emissions.

The Society of Naval Architects and Marine Engineers Technical and Research Bulletin #4-14, "Guide for Supplementary Ventilation in a Ship's Cargo Hold When Using Internal Combustion Engines," endeavors to provide a technical basis from which ship operators and stevedoring firms can determine what additional ventilation, if any, is required over the ship's normal ventilation. The essence of this bulletin is a simple nomograph for calculating the cubic-feet-per-minute ventilation requirements for each truck in operation when the truck full load engine speed, engine displacement and carbon monoxide emission rate are known. Typical forklift truck engine data and emission rates are given.

Tests to determine carbon monoxide emission rates, average engine speed during actual cargo handling operations, and natural ventilation rates in cargo hold with an open hatch were conducted to develop this nomograph and are described in the bulletin.

Panel 0-31 (Cargo Handling) of The Society of Naval Architects and Marine Engineers Technical and Research Program established the testing program with the cooperation of the National Bureau of Standards, the Maritime College of the State University of New York and numerous industrial organizations, which led to the preparation of the guide. The nomograph represents a consensus of the opinion of the technical experts composing the panel, which includes ship operators, terminal operators, naval architects, Federal Government representatives and others. Such widespread industry representation is typical of the Society's Technical and Research Program.

The new T&R Bulletin #4-14 is available through The Society of Naval Architects and Marine Engineers, 74 Trinity Place, New York, N.Y. 10006, at $3.50 per copy. Members of the Society may obtain this bulletin at a price of $3 per copy, which includes postage via third class mail in the United States and as "printed matter" in all other countries. Shipments will be insured at an additional charge only if requested.

Raytheon Establishes West Coast Facility And Names Agent In South

John H. Diffenderfer

Raytheon Company has established a new sales and service headquarters to serve its marine electronic equipment customers in northern California and Nevada.

The facility at 1707 64th Street, Emeryville, Calif., will stock Raytheon's full line of radars, radiotelephones and antennas, direction finders, loran receivers, and Fathometer depth sounders. A complete inventory of replacement parts will also be carried to serve more than 30 dealers in the area.

John H. Diffenderfer has been named regional manager. He will continue to serve as manager of Raytheon Service Company's facility in Emeryville, which provides installation and service support for electronic equipment aboard commercial and Government vessels.

Prior to his Raytheon Service Company appointment, Mr. **Diffenderfer** was a partner in Martronics Company, a retail dealership specializing in marine electronic sales and service.

The company also announced that Lee Associates, Orlando, Fla., has been appointed southeastern agent for Raytheon Company's complete line of oceanographic instrumentation. Lee will handle the firm's products in the states of North Carolina, South Carolina, Tennessee, Georgia, Alabama, and Florida.

Rampmaster Marine Equipment Division Names Richard Weiby

Richard B. Weiby

Richard B. Weiby has been named production superintendent of the Marine Equipment Division of Rampmaster Incorporated, Fort Lauderdale, Fla., **Robert B. Davis Jr.,** president of Rampmaster, recently announced.

Mr. **Weiby** joins Rampmaster after 13 years with Fore River Shipyard in Quincy, Mass., where he was concerned with production development in the engineering department. Mr. **Weiby** will be in charge of production and the development of marine equipment designs at Rampmaster, Mr. **Davis** said.

"Our Marine Division has grown so rapidly the past year, it has been necessary to increase the personnel and enlarge the physical plant, Mr. **Davis** added.

Rampmaster manufactures all types of materials handling equipment as well as gangways, accommodation ladders, pier stands, safety treads and grating in the Marine Division.

CONSULTEC Appoints R.B. Marusich Director Western Operations

Robert B. Marusich has been appointed director of CONSULTEC, Inc., Western Operations Division, in San Diego, Calif.

CONSULTEC, Inc., a subsidiary of NUS Corporation, is based in Rockville, Md., where its staff of engineering consultants work closely with the Department of Defense and other Government agencies in the fields of management systems, environmental planning, naval architecture and marine engineering.

Mr. **Marusich** has been with the San Diego Division of CONSULTEC since 1969. Previously, he was with the Autonetics Division of North American Rockwell Corporation, where he supervised engineering systems for marine navigation activities. He will head up a consulting staff in San Diego that will offer the same capabilities that are presently available in the Washington, D.C., area.

NUS Corporation, headquartered in suburban Washington, D.C., has operations in six U.S. cities as well as in four foreign countries. NUS provides diversified services in the fields of nuclear energy, pollution control, systems analysis, environmental engineering, urban planning and water management. NUS stock is traded publicly in the over-the-counter market.

Seatrain Shipbuilding Uses Computer Service To Construct Tankers

Seatrain Shipbuilding Corp. is using the computer services of McDonnell Douglas Automation Company in the construction of a new class of 230,000-dwt supertankers at the old Brooklyn Navy Yards, it was announced by **Robert L. Harmon,** executive vice president, commercial, of the McDonnell Douglas divisional company.

Seatrain Shipbuilding Corp. is a new and growing subsidiary of Seatrain Lines, Inc., owner and operator of a huge fleet of oceangoing tankers and container cargo ships.

According to Mr. **Harmon,** a computer in the Long Beach data center of McDonnell Douglas Automation Company automatically determines the height and location of adjustable metal pins that align and support sections of the hull during welding. "With this automated technique," Mr. **Harmon** said, "Seatrain is able to prepare hull sections for welding faster than previously possible."

The computer program that performs this service is MERMAID, an on-line system developed by McDonnell Douglas Automation Company specifically for the shipbuilding industry.

McDonnell Douglas Automation Company, St. Louis, Mo. 63166, is also studying new methods of plate tracking and scheduling for Seatrain, Mr. **Harmon** said.

ASNE Flagship Section Meeting Held In College Park, Maryland

Shown at the College Park meeting, left to right: **Bob Taggart;** Capt. **John Rasmussen,** and Capt. **Fred Hooper,** George Washington University (ret.).

A technical session for ASNE-Flagship was recently held at the Interstate Inn, located in College Park, Md. The topic was "Ship Design for Readiness," and the guest speaker was Capt. **John E. Rasmussen,** USN. As noted by the evening's moderator and Flagship chairman, **Bob Taggart,** the turnout for the meeting was exceptional. **Don Stevens** of NavSec further stipulated that rising attendance reflects a constant effort on the part of the council to search out interesting topics to be presented.

At present, Captain **Rasmussen** is Head, Ship Systems Engineering and Design, NavSec. In his topic, "Ship Design for Readiness," the captain discussed the many NavSec contributions to fleet readiness. Detailed consideration was given to steps taken to design reliability and maintainability into a ship. Finally, he discussed the means utilized to effectively estimate success and the means of making improvements.

IHI DELIVERS GIANT ORE CARRIER: A 164,644-dwt ore carrier, the Chidori San Maru, was recently completed by the Aioi Shipyard of IHI (Ishikawajima-Harima Heavy Industries Co., Ltd.) for Mitsui O.S.K. Lines, Ltd. and Osaka Shipping Co., Ltd., her shipowners. The approximate measurements of the vessel, which is the world's largest ore carrier, are 959 feet in overall length, 915 feet in length b.p., 146 feet in width, 80 feet in depth, and 59 feet in draft. She is equipped with a 30,400-bhp IHI-Sulzer 8RND 105 type diesel engine developing a service speed of 15.4 knots at full load. Complement is 26 persons. Remote control and automation systems have been widely adopted throughout the ship, especially for the engine section. A quick-acting system has been employed for the cargo hatch covers for the first time in Japan. The new ship will be assigned to the Japan-Port Hedland, Australia route.

SNAME Hawaii Section Hosts Annual Ladies' Night

Among the participants at the Hawaii Section meeting were, left to right: Capt. **Kenneth Wilson,** USN, Commander, Pearl Harbor Naval Shipyard, Section chairman; **Mrs. Wilson; Bill Woods,** social scientist, University of Hawaii, co-presenter of the program, and **Miss Peggy Lucas,** Tektite II Aquanette from Makai Range, Oahu, Hawaii.

Another successful and well-attended Annual Ladies' Night was hosted by the Hawaii Section of The Society of Naval Architects and Marine Engineers on February 8, 1972, at the Ala Moana Banquet Hall.

Papers chairman Dr. **Ludwig Seidl** planned an informal program to interest the ladies. **Joe Hanson,** oceanographer, assisted by **Bill Woods,** social scientist, presented a history of the Hawaiian Island Chain from an ecological standpoint. With the help of a prepared program, using a tape recorder, slide projector and sound movies, Mr. **Woods** conducted the members and guests on an aerial, ground level and underwater tour through time, to show how the islands emerged from the sea and how the ancient Hawaiians developed a stable ecological system long before Captain **Cook** brought the impact of Western "civilization."

Underwater movies were shown of Kaneohe Bay on Oahu's windward shore in a "before and after" sequence. At present, Kaneohe Bay is some six feet shallower due to silt run-off from windward land grading practices. The siltation and sewage effluent have also killed many acres of coral and underwater organisms, thus creating a very unattractive and decaying ecological system within the bay. The presentation was of more than just passing interest to the Society members present, due to the increasing emphasis on control of shipboard-originated effluent and waste discharge. Some of the Pearl Harbor Navy members have already been involved in waste treatment studies in connection with the Navy's program of pollution abatement in Pearl Harbor, which once had beds of fine edible oysters.

Pictured during the meeting, left to right: **Joe Hanson,** oceanographer, presenter of the program, and Dr. **Ludwig Seidl,** ocean engineering department, University of Hawaii, papers chairman.

During the short discussion period some questions were raised as to whether the deterioration in Kaneohe Bay was reversible. Mr. **Hanson** stated that no real solution is known and that some thought had been given to cutting a canal across Mokapu peninsula to cause a flushing action. However, he felt that such a canal should be fitted with gates so as to stop the experiment if it caused adverse effects in the area.

American Master Mariners Hold Annual Dinner Meeting

The annual dinner of The Council of American Master Mariners, Inc. was held at the New York Yacht Club. Rear Adm. **A.B. Engel,** USCG (ret.), Superintendent of the U.S. Merchant Marine Academy at Kings Point, N.Y., was guest speaker.

Capt. **James M. Maley,** past president and chairman of the nominating committee, nominated the following captains, who were re-elected to serve for the year 1972 by the members present: Commodore **John W. Anderson,** honorary president; Capt. **Stephen M. Seledee,** president; Capt. **Robert J. Wall,** 1st vice president; Capt. **Otto Meyer,** 2nd vice president, and Capt. **Kenneth C. Torrens,** treasurer.

A report of Council activities during the previous year was read by Capt. **Robert Murray,** executive secretary.

The Council of American Mariners, Inc., is a nonprofit association of persons having common professional interest and whose purpose it is to promote proper training for officers and men concerned in the operation of American merchant vessels; to encourage worthy and economically justifiable improvements in harbors, port facilities and waterways, and to promote the prosperity of the American merchant marine.

MARINE SPECIALTIES ACQUISITION WANTED

Well financed, established manufacturer of Marine Values wants to expand its line. Would like to buy small to medium size company now making similar equipment. Prepared to pay cash or any other desired terms. Ideal situation for owner who wants to retire.

Box 401 Maritime Reporter/Engineering News
107 East 31 Street New York, N.Y. 10016

CHIEF NAVAL ARCHITECT

Manufacturer of coastal and inland Marine vessels has immediate opening for Chief Naval Architect. Excellent opportunity for mature and aggressive graduate engineer with proven ability to direct entire engineering department. Salary commensurate with experience . . . excellent benefits. Send resumé to

Box 403

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

MARINE LOFTSMAN/ MODEL MAKER!

Good opportunity for loftsman . . . with complete understanding of shipbuilding . . . interested in training as Programmer in Computer Aided Design Section.

N.Y. based corporation offers liberal salary and benefits
REPLY IN CONFIDENCE

Box 405 Maritime Reporter/Engineering News
107 East 31 Street New York, N.Y. 10016
An Equal Opportunity Employer

FOR SALE

Marine and Industrial Plant fully equipped for Turbine-Diesel and Voyage Repairs . . . Located in Brooklyn near Waterfront.

John B. Swift, Inc.
9015 - 5th Avenue
Brooklyn, N. Y. 11209
212/745-0700

Marine Transportation Economist, specializing in Tankers and integrated tug-barge systems but including dry bulk commodities. Sixteen years experience included feasibility studies, business development and negotiation, chartering and operations management, and administrative supervision. Detailed resume and references upon request.

Box 302 Maritime Reporter/Engineering News
107 East 31 Street New York, N.Y. 10016

FOR SALE

ONE NEW FULLY LINED 24" DREDGE PUMP KINGSBURY JOURNAL AND THRUST BEARINGS, BEARING SUPPORT STRUCTURE, 78" DIAMETER IMPELLERS COMPLETE WITH SHAFT AND THRUST SHAFTS WITH FLEXIBLE COUPLINGS ATTACHED, ALSO SPARE PARTS FOR PUMP.

Box 406 Maritime Reporter/Engineering News
107 East 31 Street New York, N.Y. 10016

WANTED Director of Marketing

East Coast manufacturer of marine electronic equipment desires experienced marketing director, who will supervise and control the estimating and sales staff; increase the firm's sales volume through his own direct efforts; and perform market analysis for new product development.

We prefer a man with marine sales experience who has dealt with naval architects and shipyards.

Reply, in writing, stating experience and salary requirements, to

Box 402 Mariitme Reporter/Engineering News
107 East 31 Street New York, N.Y. 10016

MARINE SALES ENGINEER

Shipyard located in Pittsburgh, Pennsylvania area has an opening for an aggressive sales engineer. Should be familiar with design and construction of river barges and have some knowledge of diesel towboat construction. Education and previous experience will be considered. Please send resume, including salary requirements in confidence to:

President
Hillman Barge & Construction Company
P. O. Box 510
Brownsville, Pennsylvania 15417

The American Ship Building Company

requires

HULL DRAFTSMEN

with at least three years experience in hull steel and outfitting. Write:

THE AMERICAN SHIP BUILDING COMPANY
400 Colorado Ave., Lorain, Ohio 44052
Att: Vice President, Engineering

DICTIONARIES WEBSTER

Library size, 1971 edition, brand new, still in box. Cost new: $45.00.

Will Sell for $15

Deduct 10% on orders of 6 or more.

Mail to

NORTH AMERICAN LIQUIDATORS
1450 Niagara Falls Blvd.
Dept. W
Tonawanda, New York 14150

C.O.D. orders enclose $1.00 good will deposit. Pay balance plus C.O.D. shipping on delivery. Be satisfied on inspection or return within 10 days for full refund. No dealers, each volume specifically stamped not for resale. Please add $1.25 postage and handling. New York State residents add applicable sales tax.

SOLD Through your CHANDLER

99.99+% pure ZINC For Cathodic Protection

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

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

Unusual Pump Offering

(3) BYRON-JACKSON PUMPS

Ideal for HYDRAULIC DREDGING, PUMPING OR JACKING

Each Pump 1500 GPM, 3920 Ft. Head (1735 PSI), Size 6"x12¼", 8 Stage, 3600 RPM

These Pumps may be connected in series to give you a total of 5200 PSI

Stainless lined; suitable for sea water service

AVAILABLE WITH OR WITHOUT

(3) 2000 HP General Electric 6600 volt, 3 phase, 60 cycle, 3600 RPM motors

Used approximately 3 years; available at a fraction of current replacement price.

Drawings, curves and photographs available.

LURIA BROTHERS & Company, Inc.
130 Presidential Boulevard North
Bala Cynwyd, Pa. 19004
(215) 664-9800

EQUIPMENT now being removed from V4-M-A1 TUGBOATS

8—1170 HP diesels, Enterprise 350 RPM, each with magnetic clutch. Each 2 diesels acting upon 1—Universal gear 2.654:1

6—1170 HP diesels, Superior 325 RPM, each with magnetic clutch. Farrel Birmingham gear 2.47:1

10—200 kw diesel generators G.E. 240 V DC, 321 HP, Atlas Imperial 600 RPM

5—150 kw diesel generators G.E. 240 V DC, 233 HP, Atlas Imperial 600 RPM

9—15 kw emergency generators 240/120 V DC Hercules diesels

MOTOR GENERATORS:

9—Input: 62.4 HP 230 V DC stab shunt
Output: 41.9 kw 230 V DC compound wound

9—Input: 30 HP 230 V DC G.E.
Output: 20 kw 120 V DC

ALSO: 1—75 ton Clyde Whirley crane

2—175 HP 230 V DC 230 RPM motors

Pumps, air compressors, oil purifiers, capstans, 1½" anchor chain, steering engines, machine tools.

Hugo Neu & Sons, Inc.
45 NASSAU STREET NEW YORK, N.Y. 10005
(212) 732-1334

MARINE COATINGS COMPANY

in the General New York area seeks sales oriented person for possible partnership. No investment needed, but this could be a most profitable opportunity for someone with right connections seeking to be independent.

Box 404 Maritime Reporter/Engineering News
107 East 31 Street New York, N.Y. 10016

ZIDELL EXPLORATIONS, INC.

(503) 228-8691
3121 S.W. Moody
Portland, Ore. 97201
Telex: 36-0503

MARINE EQUIPMENT VALUES

AXIAL FLOW FANS

Rebuilt Guaranteed LaDel, STURTE-VANT etc.

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

EXAMPLE LISTING:

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

SPERRY GYRO COMPASSES

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

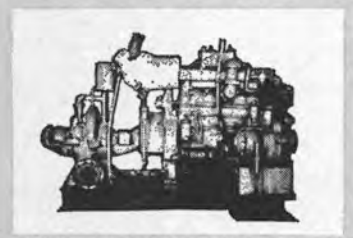
MARINE DIESEL ENGINES

GM 12-567A

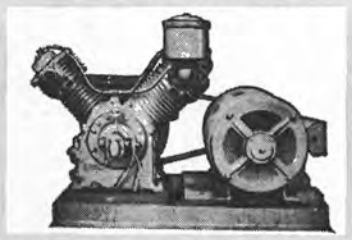
4—GENERAL MOTORS Diesel Engines —Model 12-567A, 900 HP, 744 RPM, 3 port, 3 starboard, each complete with Falk Reverse Reduction Gear, 2.48:1 ratio.

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

FIRE PUMPS AIR COMPRESSORS



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



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

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

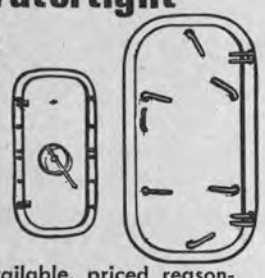
2—INGERSOLL-RAND, Size 4x1½x 3½, 10 CFM, 600 PSI, with Diehl Motor, 7½ HP, 120 Volts DC.

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

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

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

Steel Watertight DOORS



Used, Good Condition, Trimmed Frames.

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

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

CARGO HOISTER BLOCKS

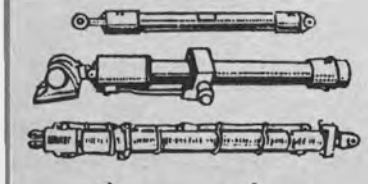
5 ton rated, Steel, as removed from surplus ships. Manufactured by: Young, Draper, etc., 12" & 14" sizes.

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

Electro - Mechanical STEERING GEAR

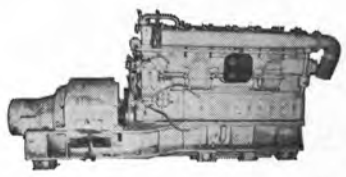
1—SPERRY No. 2, 5 HP, 230 Volts DC, complete with Steering Winch, Controller Panel, Ballast Resistor, Electro-Mechanical Steering Stand —with Steering Wheel (with Pull-out Knob).

HYDRAULIC CYLINDERS



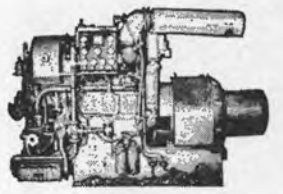
Bore	Overall Stroke	Rod Diameter	retracted length	Action
10"	12"	3.75"	45½"	double
10"	26"	3.75"	58½"	single
2"	8"	1½"	20"	double
2.5"	15"	1.12"	25½"	double
3"	8"	1.37"	15½"	double
6"	8'	4"	144"	double
13"	9'7"	5½"	14'	double

MARINE DIESEL GENERATORS



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

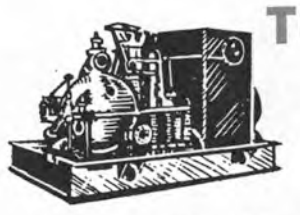
6—SUPERIOR Diesel Engines . . . Model GBD8 Marine, 150 HP, 1200 RPM, 8 cylinder, with Delco Generators, 100 KW, 120/240 DC.



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

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

TURBINE GENERATORS



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

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

3—GENERAL ELECTRIC, Type ATB-2, 1250 KW, 440/3/60.

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

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

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

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

FALK REDUCTION GEARS

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

STERN ANCHOR WINCHES

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

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

Contact: Ralph Ingram...ZIDELL Explorations, Inc...Phone: 503 / 228-8691...Telex: 36-0503

BARGES
ON THE SPOT

FOR CHARTER
Steel Deck Barges

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

ALSO AVAILABLE:
Hopper—Offshore—Oil and Spud Barges

FOR SALE
Six 195' x 35' x 9½' Deck Barges

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

---

1 Clark Lift (Squeeze Clamp)
Model C-80 Butane
Hyratork Transmission

1 Paper Clamp
Model B—8—180°
Capacity 4700 lbs.
Both Recently Reconditioned

OCEANIC OPERATIONS CORP.
Oceanic House
21 WEST MAIN STREET
OYSTER BAY, N. Y. 11771
Telephone 516/922-0600

Generator For Marine Engine Use
2-1500KW 3-phase AC 450V 1875KVA Nordberg powered FS-138-HSC exchanger cooled, complete units, beds and pumps, 3,200 hp.
Sanchez Towboat 617 (994-8018) (992-4249) (997-9505)

---

(6) T-2 TYPE LIFEBOATS
ROW, 22' L, 7'6" B, 31 PERS, ROTTMER
RECENTLY REMOVED FROM ACTIVE VESSELS
UNDER U.S.C.G. CERTIFCATE.
Contact **E.C. SAVAGE, Box 24025, Oakland, Calif.**

BARGES FOR LEASE
ON GULF COAST OF FLORIDA

MISENER BARGE AND BOAT RENTAL, INC.
St. Petersburg Beach, Florida 813-360-7033

WILL TRADE FOR SMALL CARGO SHIP
99-yr. leasehold interest valued at $200,000, consisting of 9-acre Marina in Ft. Lauderdale, Fla. Now paying 10%, with projection of 15% return on future shopping and apt. complex.
CAPT. G. D. WORSLEY
1435 SE 15th STREET FT. LAUDERDALE, FLA. 33316

TWO POSITIONS OPEN
IN PUERTO RICO
Must be Bi-lingual Spanish-English with experience in Latin American country. Branch manager needed with thorough knowledge of business, sales and management. Marine salesman also needed with experience in sales, cargo handling, etc. Send resume to Edward Quest, c/o Florida Wire & Rigging Works, Inc., 2500 N.W. 39th Street, Miami, Florida 33142.

FOR RENT
Manitowoc Lift Cranes
Model 2900 70 ton
Model 3900 100 ton
A.C.R. EQUIPMENT CO.
19615 Nottingham Road, Cleveland, Ohio 44110
216/531-8000

MATCHED PAIR DIESEL ENGINES

900 H.P.
G.M. 12-567A
with Falk reverse and reduction gear

ENGINE: 12-567A — 8½x10 — VEE type — 2-cycle — 747 RPM—electric starting—serial Nos. 1041 & 1060. GEAR: Falk Air Flex—reverse & reduction—2.48:1 forward—2.52:1 reverse. Units just removed from Navy LST 551.

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

STEAM ANCHOR WINDLASSES

Merchant & Naval Vessels
2 HYDE NO. 12
For 2-11/16" chain—12" x 14". Spur geared—horizontal engine—reverse valve. Bethlehem 1954 Class 29,000 lbs.—Quincy & Sparrows Point. Will handle 2 anchors of 16,345 lbs. on 2-11/16" chain at 30 FPM.

2 FOR NAVY A.O. VESSELS
TYPE T3-S2-A1
Similar to "Chuckawan"
Mfg. by American Engineering — 13x14 — for handling 13,000 lb. anchors. Wildcat centers 6'3". Location Baltimore, Maryland and Seattle, Wash.

T-2 WINDLASSES
AH&D Model S-505—for 2-5/16" chain. Engine 12x14—operating weight 42,700 lbs. Recently removed from T-2 Tanker Roanoke at Williamette Shipyard, Portland, Oregon. Complete, good condition.

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

UNUSED BITTS

Single bitts—6" diameter—24½" long—8" wide. Not shown is 90° bracket. While they last.
BUY IN QUANTITY
$14.50 EACH

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

Link Belt Small Boat Winch

GEAR BOX: Link Belt—size DM-30—68 RPM output—ratio 25.63:1. MOTOR: Westinghouse type CS—style 7C4894—frame 225Y — class 1 — 2 HP—1720 RPM — 220/440/60/3—5.6/2.8 amps. With push button starter and magnetic controller. Wt. 320 lbs—duty 800 lbs @ 68 FPM.
$347.50

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

FOR AUTOMATIC REMOTE OPERATION OF UNMANNED BARGE, SHORE LOCATIONS etc.

Two Practically New
600 C.F.M. GARDNER-DENVER
ROTA-SCREW ROTARY AIR COMPRESSORS

Model SP-600-DB—mfg by Gardner-Denver—600 CFM @ 100 lbs. Full load 1800 RPM—no load 1100 RPM. Water cooled. Engine is Caterpillar D-333—4½x5½—with electric starting. 6-Cyl. turbo charged. NOTE: These units were used to remotely operate anchor windlasses on unmanned barges. They have all automatic 24 volt electrically controlled air valves for low oil alarm, water temperature, shut down and starting service, and can be left for long periods of time unmanned. Complete with large air receiver, made by Elliott-Brandt-w.p. is 150 lbs test 500 lbs—shell ¼"—heads ⅜"—head radius 36". Dimensions: approx. 14' 6" long by 42".

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

---

20 KW 120/240 SINGLE PHASE A.C.
NORDBERG 'POWER CHIEF' DIESEL GENERATOR SETS

$2250 Ea.

2 Available. Kato 20 KW 120/240 single phase AC Gen. driven by 30 HP Nordberg 2-cylinder diesel engine—4½" bore—5½" stroke—4-cycle —1800 RPM—167 cu. inch displacement. Electric starting. Panel boards have Regohm voltage regulator. Panel is rigged for automatic standby control.

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

NEW 7" RADIUS PANAMA CHOCKS

(Meet Panama Regulations)
With Extended Legs for Welding to Deck
IMMEDIATE DELIVERY FROM STOCK

Clear opening 10" x 14"—7" radius. Use as double or single bow chock. OAL 28" on base — OAW 14¾" — cast steel.

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

NATIONAL METAL'S CURRENT T-2 INVENTORY

MANY OTHER ITEMS NOT LISTED • ALL ITEMS FURNISHED WITH A.B.S. OR LLOYDS'

TURBOGENERATORS

525 KW GENERAL ELECTRIC AUXILIARY TURBOGENERATOR UNIT

Complete with L.O. Cooler. **Turbine:** General Electric 525 KW, Type DORV-325M, 5645 RPM. **Reduction Gear:** General Electric Type S-162-D, 5645/1200 RPM, single helical. **Generators::** General Electric. (1) Type ABT, 3 phase, 400 KW, 450 VAC, 1200 RPM. (2) Type MPC, 75 KW, 110 VDC, 1200 RPM, Exciter. (3) Type MPLI, 55 KW, 120 VDC, 1200 RPM, Generator. (4) Auxiliary DC generators.

538 KW WESTINGHOUSE TURBOGENERATOR UNIT

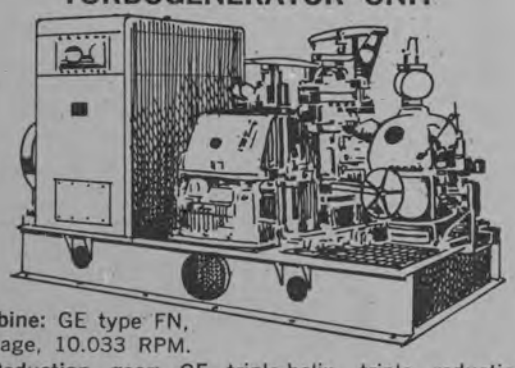
Complete with L.O. Coolers and exciters. **Turbine:** Westinghouse 538 KW, 5010 RPM. Inlet pressure 435 psi. Temp. 750 degrees F.TT. Exhaust pressure 28½ hg vac. **Generators:** (1) 400 KW, 450 VAC, 3 pole, 60 cycle, PF 80%, 1200 RPM, ship's service. (2) 32.5 KW, 125 VDC, 1200 RPM, variable voltage exciter. (3) 110 KW, 125 VDC, 1200 RPM, constant voltage generator. (4) 5 KW, 125 VDC, 1200 RPM, ship's service Generator-Exciter. **Reduction Gear:** Ratio 5010/1200 RPM.

535 KW GENERAL ELECTRIC TURBOGENERATOR UNIT

Complete with L.O. Coolers and exciters. **Turbine:** General Electric Mfg. drawing P-8453535, 3 stages, type DORV-325, 5645 RPM, rating 535 KW, inlet pressure 590 lbs., Superheat 325 degrees F., exhaust pressure 1¾ ABS. **Reduction Gear:** General Electric, type S-162-D, Class, 535 KW, Mfg. dwg, T-8453535, 5645/1250 RPM. **Generator:** General Electric, Dwg, T-8453535, type ATB-976, KNA 500, 450 volts AC, 3 phase, 60 cycle, 400 KW, 642 amps, 1200 RPM, PF .8, Frame 976, Exciter 120 volts DC. Control panel: General Electric, Dwg. 6367270, Type XF-100492, 6 circuits, 450 volts AC.

★★ ALSO AVAILABLE!! ★★

600 KW GENERAL ELECTRIC TURBOGENERATOR UNIT



Turbine: GE type FN, 6-stage, 10.033 RPM.

Reduction gear: GE triple-helix, triple reduction, 10033/1200 RPM. **Generator:** GE type ATI, 600 KW, 6-pole, 0.8 pf, 450 VAC, 3 phase, 60 cycle, 1200 RPM. **Exciter:** GE type MPLI, 7.5 KW, 120 VDC, direct connected. **Air cooler:** Surface type, for generator, complete with control panel.

MAIN MOTOR FOR T2

Gen. Elect. #5690714 Type TSM-80, 6000 HP, 90 RPM, form H.L., 2300 Volts, Amps. arm. 1160, P.F. 1.0, KVA 4625 Phase 3 cycle 60, Exciter volts 120, amps field 390 contin. @ 60°C. rise.

5400 KW MAIN GENERATOR

General Electric, S/N 79938, Marks 6937958 G-4, 5F-1690-2, 164-M.

PUMP UNITS

CARGO STRIPPING PUMP

(Steam) Worthington, vertical duplex, double acting, size 14" x 14" x 12", speed 46 ft./min., 700 GPM, 150 psi operating pressure.

MAIN FEED PUMP

Pump: Coffin Turbo Pump Co., single stage, centrifugal, size CG-12A, 6980/7030 RPM, 240/280 GPM, 254/280 HP, 6" x 3", 750 psi @ 1760 ft. head, complete with turbine.

MAIN FEED PUMP

Coffin, turbine drive, Type F, 7200 RPM, 200 GPM, 150 HP, 150 psi w 1329 ft. head.

MAIN CIRCULATING PUMP

Pump: Ingersoll Rand, type 24 VCM, single stage, double suction centrifugal, 585 RPM, 16,500 GPM against TDH 25 ft. @ 30 psi, 26" x 24". **Motor:** General Electric, Model 5K633AP1, Frame N-6336-B, 585 RPM, 440 volts AC, 191 amps, 3 phase, 60 cycle, complete with controller.

MAIN CIRCULATING PUMP

Pump: Ingersoll Rand, type 24 VCM, size 24", 585 RPM, 14,000 GPM @ 25 ft. TDH, 26" x 24", operating pressure 15 psi. **Motor:** Westinghouse, Model CS, Frame 876C, 125 HP, 585 RPM, 440 volts AC, 159 amps, 3 phase, 60 cycle, complete with controller.

MAIN CARGO PUMP UNIT

Pump: Ingersoll Rand, type 2 stage horizontal, size 6-GTM, 1750 RPM, 2000 GPM, 12" x 12", 100 psi @ 280 ft. head. With motor.

FUEL AND LUBE OIL PUMP

Pump: Quimby, size 2½ head screw, 1200/600 RPM, 15 GPM @ 325 psi disch. press. **Motor:** General Electric, Model 5KF364PP1, Frame 364, 7.5/3.75 HP, 1160/580 RPM, 440 volts AC, 10/9.7 amps, 3 phase, 60 cycle, complete with controller.

LUBE OIL SERVICE PUMP

Pump: Quimby, Type vertical rotex, size 4-B, 1150 RPM, 175 GPM @ 60 psi with 20 ft. head, 6" x 5". **Motor:** General Electric, Model 5KF365AJX1, Frame 365, 5 HP, 1170 RPM, 440 volts AC, 20 amps, 3 phase, 60 cycle, complete with controller.

MAIN CONDENSATE PUMP

Pump: Ingersoll Rand, size 2VHM, 1760 RPM, 180 GPM @ TDH 165 ft., 5" x 2", disch. press. 67 psi. **Motor:** General Electric, Model 5KF365AJN-1, Frame 365V, 20 HP, 1765 RPM, 440 volts AC, 3 phase, 60 cycle, 25.5 amps, with controller.

AIR COMPRESSORS

COMBUSTION CONTROL AIR COMPRESSOR UNIT

Compressor: Ingersoll Rand, type 30, Model 253 x 5, 20 CFM at 100 psi, 600 RPM. **Motor:** General Electric, Model 5KG254B2782, Frame 254, Type K, 440 volts, AC, 7.5 amps, 3 phase, 60 cycles, 5 HP, 1723 RPM, complete with controller and switch.

SHIP SERVICE AIR COMPRESSOR UNIT

Compressor: Ingersoll Rand, Type 30, Model 5 x 5 x 4, 545 CFM at 100 psi, 750 RPM. With motor and base.

VALVES

Gate: 10", 12", 14", 16", 20" and 24"
Angle: 12", 14" and 18" **Crossover:** 16"
High suction: 26" **Low suction:** 26"

TURBINE ROTORS

5400 KW GENERAL ELECTRIC TURBINE ROTOR

ABS, 6275-31, AB-142-WD-8-10-44, 1701461 T8604259, 6275-31 67-KU-102032, A853BY 21 Jan. 1967.

525 KW GENERAL ELECTRIC TURBINE ROTOR

S/N 60137, ABS 71-LA-12430-624 A624 B, Reconditioned April 21, 1971.

5400 KW WESTINGHOUSE TURBINE ROTOR

ABS report 66KU11942 A853B, 6 Sept., 1966, Marks: 6275-45. AB-142 WD9-30-44, 170-1467, 8604259-1, 6275-45.

5400 KW WESTINGHOUSE MAIN TURBINE (Profile type):

5400 KW ELLIOTT TURBINE ROTOR

ABS, 67-LA9644-830, AB-JCB-3-31-67, 9013039-9230P1, 66-KU-11895, A853 1071941, AB142 WDG-4-45.

MISCELLANEOUS T-2 EQUIPMENT

MAIN AIR EJECTOR

Main air ejector, Graham Mfg. Co., type 2 stage twin, size 163B, capacity, 65 PPH of air (220 GPM cont. @ 79°F.), oper. press. 150 PPH.

MAIN CONDENSER END

Graham (waterbox).

MAIN CONDENSER END

Westinghouse (waterbox).

MAIN CONDENSER END

Westinghouse (return head).

AUXILIARY CONDENSER END

Graham (waterbox and return head), surface condenser, size 1500 sq. ft., S/N 2915, Design press Shell 15-Tubes 25, Test press Shell 30-Tubes 50.

TAIL SHAFTS

ABS 59-S1768-AB810
Reconditioned, ABS 70-LA-11901-946

RUDDER WITH STOCK (complete)

SEND NOW FOR NEW 1972 CATALOG

HUNDREDS OF OTHER ITEMS ALSO AVAILABLE!

* * * * * * * * * * * * * * * * * *

National Metal AND STEEL CORP.

691 New Dock Street, Terminal Island, California 90731
Area Code (213) 775-3321 • Telex: TWX 213-548-0990

* * * * * * * * * * * * * * * * * *

BUYERS DIRECTORY

AIR CONDITIONING AND REFRIGERATION—REPAIR & INSTALLATION
Bailey Refrigeration Co., Inc., 74 Sullivan St., Brooklyn, N.Y. 11231
Carrier Air Conditioning Co., Carrier Parkway, Syracuse, N.Y. 13201
Union Carbide Corp., Linde Div., 270 Park Ave., N.Y., N.Y. 10017

ANCHORS AND ANCHOR CHAINS
Baldt Anchor, Chain & Forge, P.O. Box 350, Chester, Pa. 19016
Lockstadt Co., Inc., 179 West 5th St., Bayonne, N.J. 07002

BEARINGS
BJ Marine Bearings, a Borg-Warner Industry, P.O. Box 2709, Terminal Annex, Los Angeles, Calif. 90054
Glacier Metal Co. Ltd., Alperton, Wembley, Middlesex, England.
Johnson Rubber Co., Marine Division, Middlefield, Ohio 44062
Lucian Q. Moffitt, Inc., P.O. Box 1415, Akron, Ohio 44309
Waukesha Bearings Corp., P.O. Box 798, Waukesha, Wis. 53186

BOILERS
Babcock & Wilcox Co., 161 E. 42nd Street, New York, N.Y. 10017
Combustion Engineering, Inc., Windsor, Connecticut 06095

3OW THRUSTERS
Bird Johnson Co., 883 Main St., Walpole, Mass. 02081
Murray & Tregurtha, Inc., 2 Hancock St., Quincy, Mass. 02171

BUNKERING SERVICE
Gulf Oil Trading Co., 1290 Ave. of the Americas, N.Y., N.Y. 10019
Independent Petroleum Supply Co., 1345 Ave. of Americas, New York, N.Y. 10019
Refineria Panama, S. A. 277 Park Ave., New York, N.Y. 10017
The West Indies Oil Co., Ltd., St. John's Antigua, W. I.

BURNERS—Oil
Todd Products, Div. of Todd Shipyards Corp., Brooklyn, N.Y. 11231

CABLE ELECTRIC MARINE
Anixter-Harbor, Inc., 1050 Aladdin, San Leandro, Calif. 94577
Anixter-Netherands, Utrecht Gebouw, Coolsingel 75, Rotterdam 3002, Netherlands
Anixter-New York, 300 Executive Blvd., Elmsford, N.Y. 10523
Anixter-New Orleans, 315 Notre Dame, New Orleans, La. 70130
L. F. Gaubert & Co., 700 So. Broad St., New Orleans, La. 70150

CLUTCHES, GEARS & BRAKES
Amarillo Gear Co., 517 No. Polk St., Amarillo, Texas 79105
Eaton Corp., Industrial Drive Division, 9919 Clinton Rd., Cleveland, Ohio 44111
Wichita Clutch Co., Inc., Wichita Falls, Texas 76307

COATINGS—Protective
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144
Devoe & Raynolds Co., Inc., Subsidiary Celanese Coatings Co., 414 Wilson Ave., Newark, N.J. 07105
Enjay Chemical Company, 60 West 49th St., New York, N.Y. 10020
Farboil Company, 90 West St., N.Y., N.Y. 10006
Patterson-Sargent, P.O. Box 494, New Brunswick, N. J.
Spee-Flo Co., 4631 Winfield Rd., Houston, Texas 77039

CONTAINERS—CONTAINER HANDLING SYSTEMS
Ameron Corrosion Control Div., Brea, Calif. 92621
Lighter Aboard Ship, Inc., 225 Baronne St., New Oreans, La. 70112
Paceco, Div. Fruehauf Corp., 2350 Blanding Ave., Alameda, Calif. 94501
Star Iron & Steel Co., 326 Alexander Ave., Tacoma, Wash. 98421

CONTAINER LASHINGS & COMPONENTS
W. W. Patterson Co., 830 Brocket St., Pittsburgh, Pa. 15233

CONTROL SYSTEMS
Galbraith-Pilot Marine Corp., 600 Fourth Ave., Brooklyn, N.Y. 11215
General Electric Industry Control Dept., Salem, Virginia
Henschel Corporation, 14 Cedar St., Amesbury, Mass. 01913
Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.

CORROSION CONTROL
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144
Radiator Specialty Co., 1400 Independence Blvd., Charlotte, N.C. 28205

CRANES—HOISTS—DERRICKS—WHIRLEYS
ASEA Marine, Rep. in U.S.A. by Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Conrad-Stork, Div. Stork-Werkspoor, P.O. Box 134, Haarlem, Holland
Hoffman Rigging & Crane Service, 560 Cortlandt St., Belleville, N.J. 07109
Kocks Pittsburgh Corp., Four Gateway Center, Pittsburgh, Pa. 15222
M.A.N. Maschinenfabrik Augsburg-Nurnberg AG, Werk Augsburg, West Germany
Paceco, Div. Fruehauf Corp., 2350 Blanding Ave., Alameda, Calif. 94501
Star Iron & Steel Co., 326 Alexander Ave., Tacoma, Wash. 98401

CRANE LOAD INDICATORS
Trans-Sonics, Inc., P.O. Box 326, Lexington, Mass. 02173

DECK COVERS (METAL)
Lockstad Co., Inc., 179 W. 5th Street, Bayonne, New Jersey 07002
Marine Moisture Control Co., 449 Sheridan Blvd., Inwood, N.Y. 11696

DECK MACHINERY—Cargo Handling Equipment
ASEA Marine, Rep. in U.S.A. by Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Fukushima, Ltd., 4 Yonbon-Cho, Chiyoda-Ku, Tokyo, Japan. (U.S. Rep. Alfred Conhagen, Inc., 172 Lyndhurst Ave., Staten Island, N.Y. 10305)
Garrett Corp., 9851 Sepulveda Blvd., Los Angeles, Calif. 90009
Markey Machinery Co., Inc., 79 S. Horton St., Seattle, Wash. 98134
Nashville Bridge Co., P.O. Box 239, Nashville, Tenn. 37202
Pacific Pipe Co., 49 Fremont St., San Francisco, Calif. 94080
Red Fox Machine & Supply Co., P.O. Drawer 640, New Iberia, La. 70560
A. G. Weser, Seebeckwerft, 2850 Bremerhaven 1, Germany
Western Gear Corp., Heavy Machinery Div., Everett, Wash. 98201

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

DIESEL ENGINES
Alco Engine Div., White Industrial Power, Inc., 100 Orchard St., Auburn, N.Y. 13021
Bruce GM Diesel, Inc., 180 Route #17 S. at Interstate 80, Lodi, N.J. 07644
Caterpillar Tractor Co., Industrial Div., 100 N.E. Adams St., Peoria, Ill. 61602
Colt Industries Inc., Power Systems Div., Beloit, Wisc. 53511
Electro-Motive Division General Motors, La Grange, Illinois 60525
Fiat, Turin, Italy, U.S.A. 375 Park Ave., New York, N.Y. 10022
George Engine Co., Inc., P.O. Box 8, Harvey, La. 70038
Golten Marine Co., Inc., 160 Van Brunt St., Brooklyn, N.Y. 11231
M.A.N. Maschinenfabrik Augsburg-Nurnberg AG, Werk Augsburg, West Germany.
H. O. Penn Machinery Co., 1561 Stewart Ave., Westbury, N.Y. 11590
Sulzer Brothers, Ltd., Winterthur, Switzerland

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

DOORS—Watertight—Bulkhead
Overbeke-Kain Co., 209 Aurora Rd., Bedford, Ohio 44014
Pioneer Industries, 401 Washington Ave., Carlstadt, N.J. 07072
Walz & Krenzer, Inc., 20 Vesey St., New York, N.Y. 10007

ELECTRICAL EQUIPMENT
Arnessen Electric Co., Inc., 335 Bond St., Brooklyn, N.Y.
Galbraith-Pilot Marine Corp., 600 4th Ave., Brooklyn, N.Y. 11215
Merrin Electric, 162 Chambers St., New York, N.Y. 10007
Oceanic Electrical Mfg. Co., Inc., 159 Perry Street, N.Y. 10014
Pauluhn Electric Mfg. Co. Inc., P.O. Box 12805, Houston, Tex. 77017

EVAPORATORS
Bethlehem Steel Corp., Shipbuilding, 25 B'way, N.Y., N.Y. 10004

FITTINGS & HARDWARE
Nashville Bridge Co., P.O. Box 239, Nashville, Tenn. 37202
Robvon Backing Ring Co., 675 Garden St., Elizabeth, N.J. 07207

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

GALLEY RANGES
Elisha Webb & Son Co., 136 So. Front St., Philadelphia, Pa. 19106

HEATERS—Ship
Todd Products, Div. of Todd Shipyards Corp., Brooklyn, N.Y. 11231

HULL CLEANING & BLASTING
Key Engineering, 12502 Woodthorpe Lane, Houston, Texas 77024
Vacu-Blast Corp., Box 885, Belmont, Calif. 94002

HYDRAULICS
Bird Johnson Co., 883 Main St., Walpole, Mass. 02081
Bond Hydraulic Equip. Service, Inc., 117 Monroe St., Hoboken, N.J. 07030
Universal Hydraulics, Div. of Ohio Brass Co., 4500 Beidler Road, Willoughby, Ohio 44094
Vickers, M&O Div., Troy, Mich. 48084

INSULATION—Marine
Bailey Carpenter & Insulation Co., Inc.,74SullivanSt.,Bklyn,N.Y.11231

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

MACHINERY MONITORS
Bently Nevada Corp., P.O. Box 157, Minden, Nevada 89423
IRD Mechanalysis, Inc., 6150 Huntley Rd., Columbus, Ohio 43229

MARINE DRIVES—GEARS
Philadelphia Gear Corp., Schuylkill Expressway, King of Prussia, Pa. 19406
Western Gear Corp., Industrial Products Div., P.O. Box 126, Belmont, Calif. 94003

MARINE NAVIGATION EQUIPMENT & AIDS
American Hydromath Co., 55 Brixton Rd., Garden City, N.Y. 11530
Edo Western Corp., 2645 So. 2nd St., W. Salt Lake City, Utah 84115
EPSCO, Inc., 411 Providence Highway, Westwood, Mass. 02090
Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913
Iotron Corp., 5 Alfred Circle, Bedford, Mass.
ITT Decca Marine, Inc., 386 Park Ave. South, New York, N.Y. 10016
Magnavox Navigation Systems, 2829 Maricopa St., Torrance, Cal. 90503
National Marine Service, 1750 So. Brentwood Blvd., St. Louis, Mo.
Radiomarine Corp., 20 Bridge Avenue, Red Bank, N.J. 07701
Raytheon Co. Marine Products, 676 Island Pond Rd., Manchester, N.H. 03103
Sperry Marine Systems Div., Charlottesville, Va. 22901, Division of Sperry Rand Corp.
Star Lifeline, Ltd., 1148 W. 15th St., No. Vancouver, B.C., Canada
Teledyne Hastings Raydist, P.O. Box 1275, Hampton, Va. 23361
Tracor, Inc., 6500 Tracor Lane, Austin, Texas 78721

MARINE EQUIPMENT
Nicolai Joffe Corp., P.O. Box 2445, 445 Littlefield Ave., So. San Francisco, Calif. 94080
Merrin Electric, 162 Chambers St., New York, N.Y. 10007
Metritape, Inc., 77 Commonwealth Ave., West Concord, Mass. 01742
Peltz Brothers, Inc., 3499 Inventors Road, Norfolk, Va. 23502
Stow Mfg. Co., 225 Shear St., Binghamton, N.Y. 13902
Vokes Filter Div., (Cardwell Machine Co.), Cardwell and Castlewood Rd., Richmond, Va. 23221

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

MARINE INSURANCE
Adams & Porter, Cotton Exchange Bldg., Houston, Texas
Midland Insurance Co., 29 Broadway, New York, N.Y. 10004

MARINE PROPULSION
Buehler Corp., 9000 Precision Drive, Indianapolis, Ind. 46236
Combustion Engineering, Inc., Windsor, Connecticut 06095
General Electric Co., Marine Turbine & Gear Dept., Lynn, Mass. 01910
General Electric Co., Gas Turbine Dept., Schenectady, N.Y. 12305
Murray & Tregurtha, Inc., 2 Hancock St., Quincy, Mass. 02171
Port Electric Turbine Div., 155-157 Perry St., New York, N.Y. 10014
Radiation International, Inc., 405 Watertown Rd., Thomaston, Conn. 06787
Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Terry/Whiton, P.O. Box 350, New London, Conn. 06320
Western Gear Corp., Precision Products Div., P.O. Box 190, Lynwood, Calif. 90262

MARINE RADIO COMMUNICATIONS EQUIPMENT
Collins Radio Co., M/S 407-321, Dallas, Texas 75207
Communication Associates, Inc., 200 McKay Road, Huntington Station, N.Y. 11746
Electro-Nav, Inc., 555 Fifth Ave., New York, N.Y. 10017
Hose McCann Telephone Co., Inc., 524 W. 23rd St., N.Y. 10011
ITT Decca Marine, Inc., 386 Park Ave. South, New York, N.Y. 10016
Lorain Electronics Corp., 2307 Leavitt Road, Lorain, Ohio 44052
Radiomarine Corp., 20 Bridge Ave., Red Bank, N.J. 07701

NAVAL ARCHITECTS AND MARINE ENGINEERS
J. L. Bludworth, 4030 Wynne St., Houston, Texas
Breit Engrg. Inc., 441 Gravier St., New Orleans, La. 70130
Coast Engineering Co., 711 W. 21st St., Norfolk, Va. 23517
Crandall Dry Dock Engrs., Inc., 238 Main St., Cambridge, Mass. 02142
Cushing & Nordstrom, 50 Trinity Place, New York, N.Y. 10006
Arthur D. Darden, Inc., 1040 International Trade Mart, New Orleans, La. 70130
Sharp DeLong, 29 Broadway, New York, N.Y. 10006
Design Associates, Inc., 3308 Tulane Ave., New Orleans, La. 70119
Designers & Planners, Inc., 114 Fifth Ave., New York, N.Y. 10011
M. Mack Earle, 103 Mellor Ave., Baltimore, Md. 21228
Christopher J. Foster, 14 Vanderventer Ave., Port Washington, N.Y. 11050
Friede and Goldman, Inc., 225 Baronne St., New Orleans, La. 70112
Gibbs & Cox, Inc., 21 West St., New York, N.Y. 10006
John W. Gilbert Associates, Inc., 58 Commercial Wharf, Boston, Mass. 02110
Morris Guralnick, Associates, Inc., 583 Market St., San Francisco, Calif. 94105
J. J. Henry Co., Inc., 90 West St., New York, 10006
Hydranautics, 6338 Lindmar Dr., P.O. Box 1068, Goleta, Calif. 93017
James S. Krogen, 1460 Brickwell Ave., Miami, Fla. 33131
Littleton Research and Engrg. Corp., 95 Russell St., Littleton, Mass. 01460
Robert H. Macy, P.O. Box 758, Pascagoula, Miss. 39567
Marine Consultants & Designers, Inc., 308 Investment Insurance Bldg., Corner E. 6th St. & Rockwell Ave., Cleveland, Ohio 44114
Marine Design Inc., 1180 Ave. of Americas, N.Y., N.Y. 10036
Marine Design Associates, P.O. Box 2674, Palm Beach, Florida
Maritech, Inc., 38 Union Sq., Somerville, Mass. 02143
Rudolph F. Matzer & Associates, Inc., 13891 Atlantic Blvd., Jacksonville, Fla. 32225
John J. McMullen Associates, Inc., 1 World Trade Center, New York, N.Y. 10048
George E. Meese, 194 Acton Rd., Annapolis, Md. 21403
Metritape, Inc., 77 Commonwealth Ave., West Concord, Mass. 01742
Robert Moore Corp., 350 Main St., Port Washington, N.Y. 11050
Nickum & Spaulding Associates, Inc., 71 Columbia St., Seattle, Wash. 98104

Ocean-Oil International Engrg. Corp., P.O. Box 6173, New Orleans, La. 70114
Pearlson Engineering Co., Inc., 8970 S.W. 87th Ct., Miami, Florida 33156
S.L. Petchul, Inc., 8-D So. New River Drive East, Ft. Lauderdale, Fla. 33301
Sidney Merritt Polhemus, Ballouville Rd., RFD 2, Dayville, Conn. 06241
Potter & McArthur, Inc., 253 Northern Ave., Boston, Mass.
M. Rosenblatt & Son, Inc., 350 Broadway, New York, N.Y. 10013 and 657 Mission St., San Francisco, Calif.
George G. Sharp, Inc., 100 Church St., New York, N.Y. 10007
T. W. Spaetgens, 156 West 8th Ave., Vancouver 10, Canada
R. A. Stearn, Inc., 100 Iowa St., Sturgeon Bay, Wisc. 54235
Richard R. Taubler, 44 Court St., Brooklyn, N.Y. 11201
H. M. Tiedemann & Co., Inc., 74 Trinity Pl., New York, N.Y. 10006

OILS—Marine—Additives
Esso International Inc., 15 West 51 St., New York, N.Y. 10019
Ethyl Corp. Marine Div. Perolin Co., New York, N.Y. 10001
Gulf Oil Trading Co., 1290 Ave. of Americas, New York, N.Y. 10019
Humble Oil & Refining Co., Humble Building, Houston, Texas 77002
Mobil Oil Corp., 26 Broadway, New York, N.Y. 10004
Refineria Panama, S. A., 277 Park Ave., New York, N.Y. 10017
Shell Oil Co., 1 Shell Plaza, Houston, Texas 77002
Texaco, Inc., 135 E. 42nd St., New York, N.Y. 10017

PAINT—Marine—Protective Coatings
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144
Devoe & Raynolds Co., Inc., Subsidiary Celanese Coatings Co., 414 Wilson Ave., Newark, N.J. 07105
Enjay Chemical Co., 60 West 49th St., New York, N.Y. 10020
International Paint Co., 21 West St., New York, N.Y. 10006
Mobil Chemical Company, Metuchen, N.J. 08840
Patterson-Sargent, P.O. Box 494, New Brunswick, N. J.
Sylva-Gard Co., Ltd., 67 Crockford Blvd., Scarborough, Ontario, Can.
Woolsey Marine Industries Inc., 201 E. 42nd St., New York, N.Y. 10017

PETROLEUM SUPPLIES
Independent Petroleum Supply Co., 1345 Ave. of Americas, New York, N.Y. 10019
Refineria Panama, S. A. 277 Park Ave., New York, N.Y. 10017
Shell Oil Co., 1 Shell Plaza, Houston, Texas 77002
Texaco, Inc., 135 E. 42nd St., New York, N.Y. 10017
The West Indies Oil Co., Ltd., St. John's, Antigua, W. I.

PLASTICS—Marine Applications
Ameron Corrosion Control Div., Brea, Calif. 92621
Hubeva Marine Plastics, Inc., 390 Hamilton Ave., Bklyn, N.Y. 11231
Philadelphia Resins Co., 20 Commerce Dr., Montgomeryville, Pa. 18936

POLLUTION CONTROL
Enjay Chemical Co., 60 West 49th St., New York, N.Y. 10020
Uniroyal, Inc., 10 Eagle St., Providence, R.I. 02901

PORTS
Port of Galveston, P.O. Box 328, Galveston, Texas
Jacksonville Port Authority, 2701 Talleyrand Ave., Jacksonville, Fla.

PROPELLERS: NEW AND RECONDITIONED
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans La. 70150
Bethlehem Steel Corp., Shipbuilding, 25 Broadway, N.Y., N.Y. 10004
Bird-Johnson Co., 883 Main Street, Walpole, Mass. 02081
Coolidge Propeller Co., 1608 Fairview Ave. E., Seattle, Wash. 98102
Escher Wyss Gmbh, P.O. Box 798, Ravensburg, Germany
Federal Propellers, 1501 Buchanan Ave. S.W., Grand Rapids, Mich. 49502
Ferguson Propeller, 1132 Clinton St., Hoboken, N.J. 07030

PUMPS
Coffin Turbo Pump/FMC Corp., 326 So. Dean St., Englewood, N.J. 07631
Colt Industries, Inc., Fairbanks Morse Pump & Electric Div., 3601 Kansas Ave., Kansas City, Kansas 66110
Goulds Pumps, Seneca Falls, N.Y. 13148
Houttin-Pompen N. V. Sophialaan 4, Utrecht, Holland
Worthington Corporation, Harrison, New Jersey 07029

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

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

ROPE—Manila—Nylon—Hawsers—Wire
American Mfg. Co., Inc., Noble & West Sts., Brooklyn, N.Y. 11222
Cating Rope Co., 309 Genesee St., Auburn, N.Y. 13022
Columbian Rope Co., 309 Genesee St., Auburn, N.Y. 13022
Du Pont Co., Room 31H1, Wilmington, Delaware 19898
Jackson Rope Corp., 9th & Oley, Reading, Pa. 19604
Samson Cordage Works, 470 Atlantic Ave., Boston, Mass. 02210
Tubbs Cordage Company, P.O. Box 709, Orange, Calif. 92669
Wall Rope Works, Inc., Beverly, N. J. 08010

RUBBER PRODUCTS—Dock Fenders, Hose, Life Preservers
Hughes Bros., Inc., 17 Battery Pl., New York, N.Y. 10004
Schuyler's Engineered Products Co., Box 87, Staten Island, N.Y.

RUDDER ANGLE INDICATORS
Electric Tachometer Corp., 68th & Upland Sts., Phila., Pa. 19142
Galbraith-Pilot Marine Corp., 600 Fourth Ave., Brooklyn, N.Y. 11215
Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913
Hose McCann Telephone Co., Inc., 524 W. 23rd St., N.Y. 10011
Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.

SEALS
Syntron, Div. FMC Corp., 398 Lexington Ave., Homer City, Pa. 15748

SEARCHLIGHTS
Snelson Oilfield Lighting Co., 1201 E. Doggett St., Fort Worth, Texas 76104

SEWAGE DISPOSAL
Seapax, Inc., 3645 Warrensville Center Rd., Cleveland, Ohio 44122

SHAFT REVOLUTION INDICATOR EQUIP.
Electric Tachometer Corp., 68th & Upland Sts., Phila., Pa. 19142
Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913

SHIPBREAKING—Salvage
The Boston Metals Co., 313 E. Baltimore St., Baltimore, Md. 21202
Levin Metals Corp., P.O. Box 398, Point Station, Richmond, Cal. 94807
National Metal & Steel Corp., 1251 New Dock St., Terminal Island, Cal. 90731
Zidell Explorations, Inc., 3121 S. W. Moody St., Portland, Ore. 97201

SHIP BROKERS
Hughes Bros., Inc., 17 Battery Pl., New York, N.Y. 10004
Mowbray's Tug and Barge Sales Corp., 21 West St., N.Y., N.Y. 10006
Oaksmith Boat Sales, Inc., Fisherman's Terminal, Seattle, Wash. 98119

SHIPBUILDING STEEL
Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh, Pa. 15219
Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042
Bethlehem Steel Corp., 25 Broadway, New York, N.Y. 10004
Huntington Alloy Products, Div. International Nickel Co., Inc., Huntington, W. Va. 25720
International Nickel Co., 1 New York Plaza, New York, N.Y. 10004
United States Steel Corp., P.O. Box 86, Pittsburgh, Pa. 15230

SHIPBUILDING—Repairs, Maintenance, Drydocking
Astilleros Espanoles, S.A. Zurbano, 70, Madrid 10, Spain
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans La. 70150
Beliard Murdoch S. A., Kattendijkdok Westkaai 21, Antwerp, Belgium
Bethlehem Steel Corp., Shipbuilding, 25 Broadway, N.Y., N.Y. 10004
Blount Marine Corp., P.O. Box 360, Warren, Rhode Island 02885
Brodogradiliste "SPLIT", P.O. Box 107, Split, Yugoslavia
Conrad Industries, P.O. Box 790, Morgan City, La. 70380
Dillingham Corp., P.O. Box 3288, Honolulu, Hawaii 96801
Dravo Corporation, Neville Island, Pittsburgh 25, Pa.
Equipment Systems, Inc., A Microdot Co., P.O. Box 95, Port Deposit, Md. 21904
Equitable Equipment Co., Inc., P.O. Box 8001, New Orleans, La. 70122
General Dynamics, Electric Boat Division, 99M Eastern Point Road, Groton, Conn. 06340
General Dynamics, Quincy Division, Quincy, Mass. 02169
Gotaverken American Corp., 39 Broadway, New York, N.Y. 10006
Grafton Boat Co., Inc., Grafton, Ill. 62037
Halter Marine Services, Inc., Route 6, Box 287H, New Orleans, La. 70126
Havre de Grace, Havre de Grace, Md.
Hillman Barge & Construction Co., Grant Bldg., Pittsburgh 19, Pa.
Hongkong & Whampoa Dock Co. Ltd., Kowloon Docks, Hong Kong
Ishikawajima-Harima Heavy Industries Co., Ltd., 15 William St., New York, N.Y. 10005
Jacksonville Shipyards, 644 E. Bay St., Jacksonville, Fla. 32203
Jeffboat, Inc., Jeffersonville, Ind. 47130
Kawasaki Dockyard Co., 8 Kaigon-dori, Ikuta-ku, Kobe, Japan
Kelso Marine, Inc., P.O. Box 268, Galveston, Texas 77550
Kockums Malmo, Fack, Malmo, Sweden
LISNAVE, P.O. Box 2138, Lisbon, Portugual
Litton Industries, 9920 W. Jefferson Blvd., Culver City, Calif. 90230
Lockheed Shipbuilding and Construction Co., 2929 16th Avenue, S.W., Seattle, Wash. 98134
Maryland Shipbuilding & Drydock, P.O. Box 537, Baltimore, Md. 21203
Matton Shipyard Co., Inc., P.O. Box 428, Cohoes, New York 12047
Mitsui Shipbuilding & Engrg. Co. Ltd., 6-4, Tsukiji 5-chome, Chuo-ku, Tokyo, Japan
Mitsubishi Heavy Industries, Ltd., 5-1 Marunouchi 2-chome, Chiyoda-ku, Tokyo, Japan
Monark Boat Co., P.O. Box 210, Monticello, Ark. 71655
National Steel & Shipbuilding Corp., San Diego, Calif. 92112
Newport News Shipbuilding and Dry Dock Co., Newport News, Va.
Northwest Marine Iron Works., P.O. Box 3109, Swan Island, Portland, Oregon 97208
Nuclear Service & Construction Co., Inc., 9296 Warwick Blvd., Newport News, Va. 23607
O.A.R.N. (officine Allestimento e Riparazioni Navi) Genoa, Italy
Odense Steel Shipyard Ltd., P.O. Box 176, DK-5100 Odense, Denmark
Paceco, Div. Fruehauf Corp., 2350 Blanding Ave., Alameda, Calif. 94501
Pearlson Engineering Co., P.O. Box 8, Kendall Branch, Miami, Fla. 33156
Perth Amboy Dry Dock Co., Perth Amboy, N.J. 08862
St. Louis Shipbuilding—Federal Barge, Inc., 611 East Marceau, St. Louis, Mo. 63111
Sasebo Heavy Industries Co., Ltd., New Ohtemachi Bldg., Chiyoda-ku, Tokyo, Japan
Sembawang Shipyard (Pte) Ltd., P.O. Box 3, Sembawang, P.O. Singapore, 27
Star Shipyards, Ltd., 61 Duncan St., New Westminster, Vancouver, B.C., Canada
Sumitomo Shipbuilding & Machy. Co., Ltd. 2-1 Ohtemachi 2-chome, Chiyoda-ku, Tokyo, Japan
Teledyne Sewart Seacraft, P.O. Box 108, Berwick, La. 70342
Todd Shipyards Corp., 1 State St. Plaza, New York, N.Y. 10004
Tracor/Mas, Inc., P.O. Box 13107, Port Everglades, Fla. 33316

SHIP MODEL BASIN
Hydronautics, Incorporated, Laurel, Maryland 20810

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

SHIP STABILIZERS
Maritech, Inc., 38 Union Sq., Somerville, Mass. 02143
John J. McMullen Associates, Inc., 1 World Trade Center, New York, N.Y. 10048
Sperry Marine Systems Div., Charlottesville, Va. 22901, Division of Sperry Rand Corp.

STEAM GENERATING EQUIPMENT
Combustion Engineering, Inc., Windsor, Connecticut 06095

STEVEDORING
M. J. Rudolph Corp., 8 Sackett St., Brooklyn, N.Y. 11231

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

TOWING—Salvage, Lighterage, Barge Chartering
Bay-Houston Towing Co., 805 World Trade Bldg., Houston, Texas 77002
Curtis Bay Towing Co., Mercantile Bldg., Baltimore, Md. 21202
Henry Gillen's Sons Lighterage, West End Ave., Oyster Bay, N.Y. 11771
James Hughes, Inc., 17 Battery Pl., New York, N.Y. 10004
Interstate Oil Transport Co., 214 Transportation Center, Six Penn Center Plaza, Philadelphia, Pa. 19103
Jackson Marine Corp., P.O. Box 1087, Aransas Pass, Texas 78336
McAllister Bros., Inc., 17 Battery Pl., New York, N.Y. 10004
McDonough Marine Service, P.O. Box 26206, New Orleans, La.
Moran Towing & Transportation Co., Inc., 17 Battery Place, New York, N.Y. 10004
L. Smit & Co., 11 Broadway, New York, N.Y. 10004
Suderman & Young Towing Co., 329 World Trade Center, Houston, Texas 77002
Turecamo Coastal and Harbor Towing Corp., 1752 Shore Parkway, Brooklyn, N.Y. 11214

VALVES AND FITTINGS—Hydraulic—Safety Flanges
Bettis Corp., 3100 Fall at Grand Blvd., Houston, Texas 77021
Hubeva Marine Plastics-Lining, 435 Hamilton Ave., Brooklyn, N.Y. 11231
Marine Moisture Control Co., 449 Sheridan Blvd., Inwood, N.Y. 11696
Mesco Tectonics, Inc., 5 Central Ave., Clifton, N.J. 07011

WELDING EQUIPMENT
Tweco Products, Inc., P.O. Box 666, Wichita, Kan. 67201

WIRE ROPE
Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042
Bethlehem Steel Corp., Bethlehem, Pa. 18018
United States Steel Corp., P.O. Box 86, Pittsburgh, Pa. 15230

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

MARINE SERVICES
by Bethlehem

REPAIR, RECONDITIONING, AND CONVERSION
All types and sizes of vessels. Fast, dependable service in American harbors.

PIERSIDE AND ANCHORAGE REPAIRS

TANKER CLEANING
With specially outfitted barges and tugs. Shorebased plants in New York and Baltimore harbors.

DIESEL ENGINE AND TURBINE SERVICE
Approved repairs and spare parts for B&W, Doxford, Fiat, Stork, and Mitsubishi diesels, Napier turboblowers, and Stal-Laval and Bethlehem turbines.

SPECIAL PRODUCTS
Centralized engine control systems. Deck and engine auxiliary machinery parts.

Fresh water distillers, flash-type and submerged-tube. Condensers and parts.

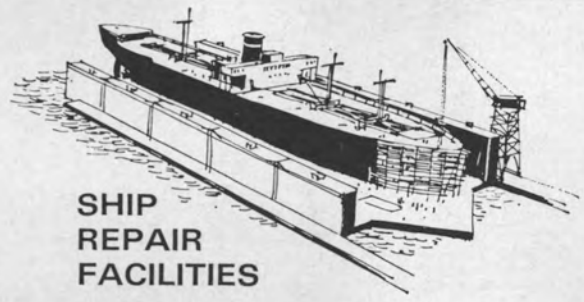
Universal mooring chocks. Rudders, stern frames, tubes, and bushings.

Propeller and line shafts. Steel castings. Sheet metal, pattern, and machine work. Fabricated steel and weldments.

CENTRAL TECHNICAL DIVISION
Research and development for the marine industry. Engineering design.

BETHLEHEM STEEL
Shipbuilding

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



SHIP REPAIR FACILITIES

BALTIMORE HARBOR
Baltimore Key Highway Yard
4 drydocks to 22,000 tons
Baltimore Fort McHenry Yard
1 graving dock

NEW YORK HARBOR
Hoboken Yard
4 drydocks to 26,000 tons

BOSTON HARBOR
Boston Yard
3 drydocks to 20,000 tons

SAN FRANCISCO HARBOR
San Francisco Yard
3 drydocks to 65,000 tons

LOS ANGELES HARBOR
San Pedro Yard
2 drydocks to 22,000 tons

BEAUMONT, TEXAS
Beaumont Yard
1 drydock, 17,500 tons

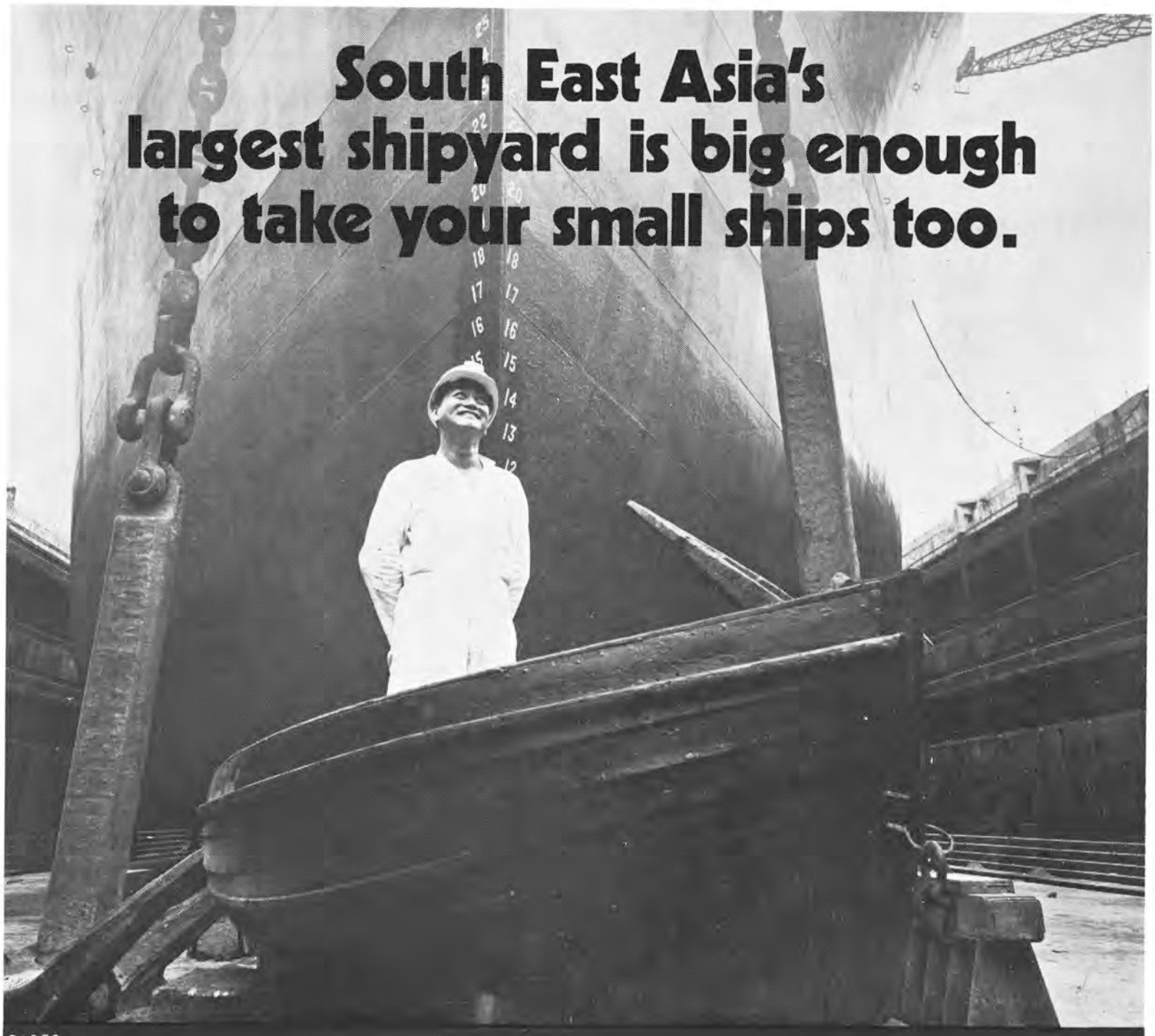
SHIP-BUILDING FACILITIES

SPARROWS POINT, MD.
Sparrows Point Yard
1 basin 1200 x 200 ft plus 5 ways to 830 ft.
Merchant ships, naval auxiliaries, and all types of special purpose vessels. Jumboizing and conversion.

BEAUMONT, TEXAS
Beaumont Yard
2 sidelaunching ways over 800 ft each.
Offshore mobile drilling platforms, workover rigs, and oil production and storage facilities. Barges. Jumboizing and conversion.

SAN FRANCISCO, CALIF.
San Francisco Yard
1 way for construction up to 550 ft.

SINGAPORE
Bethlehem Singapore Private Limited
Facilities for building offshore drilling, production, and storage facilities. Miscellaneous fabrication.



S1356

Sembawang Shipyard Singapore goes for small ships in a big way.

When you're small, nobody wants you – or so you might think, but Sembawang cares about you. You too can benefit from the expertise and engineering skills of the largest and best equipped shipyard east of Suez and west of Japan. No matter how small you are.

Dry dock of 100,000 tons, 5 floating docks from 1,000 to 30,000 tons, 1524 metres of berthing with 12.2 metres depth of water alongside – 22 hectares of back-up facilities and our new slop disposal plants. Cranage 152.4 metric tons maximum lifting capacity.

Sembawang Shipyard (Pte) Ltd.

Sembawang Post Office Box No. 3, Singapore 27. Tel. 592121 (10 lines).
Cables: Semdock Singapore. Telex: Semship RS 21345.
Managing Agents: SWAN HUNTER (INTERNATIONAL) LTD.

Agent in New York: Midland Marine Brokerage Inc., 17 Battery Place, New York, N.Y. 1004. Tel: 212-944-6720 Telex 232081

Where in the world are your ports o' call?

Amercoat Marine Coatings are there*

Wherever you sail you'll find an Amercoat Marine Coating Specialist available to serve you.

Need reliable and economical protective coatings? You'll find that our man has available the complete line of Amercoat and Dimetcote Marine coatings . . . from tough bottom systems to superstructure topcoats . . . from inorganic and organic zincs to epoxies, vinyls, alkyds, acrylics, chlorinated rubbers and phenolics.

Need fast answers? You'll find that he has the practical know-how to help you solve your marine corrosion problems. And at costs that are actually lower than those of lesser coatings.

Finally, need quick delivery? You'll find that he can provide that too . . . from a world-wide network of conveniently located warehouses.

Where in the world are your ports o' call? With Amercoat Coatings it really doesn't matter. The Amercoat Marine Coating Specialist is ready and waiting to serve you. Call him today or write for further information.

Ameron

CORROSION CONTROL DIVISION

Home Office: BREA, CALIFORNIA 92621

*

LOCATION	PHONE
UNITED STATES	
Baltimore	(609) 667-4600
Boston	(617) 542-5750
Corpus Christi	(713) 623-4635
Houston	(318) 436-7295 or (713) 644-5662
Jacksonville	(813) 839-7706
Los Angeles	(714) 529-1951
Mobile	(205) 344-5185
New Orleans	(504) 834-8791
New York	(212) 349-0114
Norfolk/Newport News	(703) 622-7254
Philadelphia	(609) 667-4600
Portland	(503) 289-7170
San Diego	(714) 529-1951
San Francisco	(415) 425-3331
Seattle	(415) 425-3331
AUSTRALIA	
Brooklyn, Victoria	314-0722
BRAZIL	
Rio de Janeiro	(021) 252-9057
CANADA	
Burlington, Ontario	(416) 637-5691
CHILE	
Santiago	381-552
COLOMBIA	
Barranquilla	51960
ENGLAND	
Croydon, Surrey	1686-8581
FRANCE, HOLLAND, BELGIUM	
The Hague, Holland	83-65-05
GERMANY (SOUTHERN)	
Frankfurt	(0949) 611-721232
GERMANY (NORTHERN)	
Hamburg	(0949) 411-344076
GREECE	
Athens	881049
ITALY	
Naples	310626
JAPAN	
Yokohama	(045) 681-1861
MEXICO & CENTRAL AMERICA	
Tlalnepantla, Edo de Mexico	5-65-34-11
MIDDLE EAST HQ	
Rome	853-578
NETHERLANDS ANTILLES	
Aruba	2444
NORWAY	
Oslo	415693
PANAMA	
Panama	61-7353
PERU	
Lima	29-9350
PHILIPPINES	
Quezon City	62-12-61
PORTUGAL	
Lisbon	63166
SINGAPORE	
Jurong, Singapore	651019
SOUTH AFRICA	
Pinetown, Natal	74369
SPAIN	
Madrid	2618989
TAIWAN	
Taipei	573177
VENEZUELA	
Caracas	34.21.68
WEST INDIES	
Trinidad	78561

Coatings Stocked in Most Locations