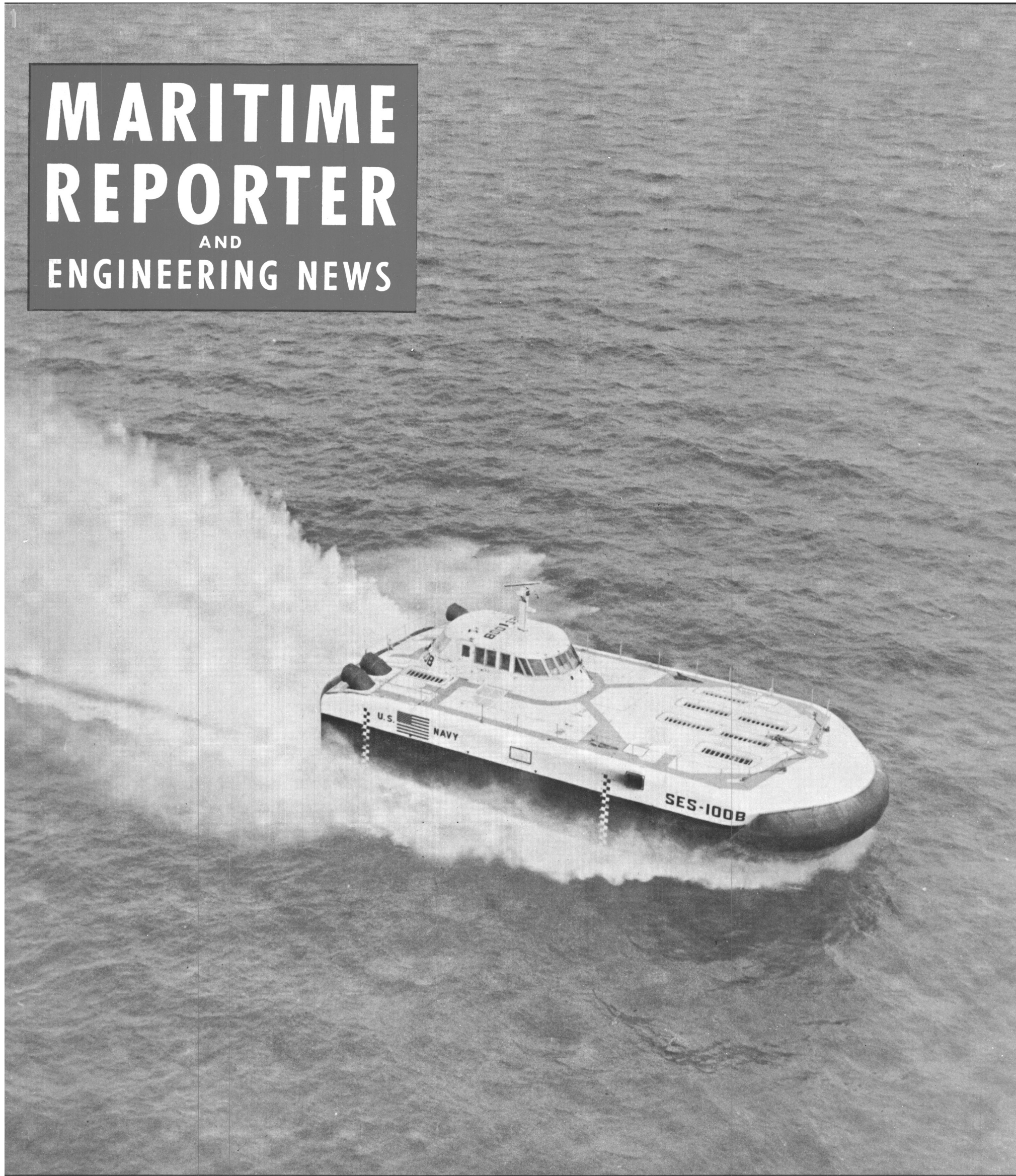


**MARITIME  
REPORTER**  
AND  
**ENGINEERING NEWS**



**U.S. Navy's Surface Effect Ship Powered By  
UAC/Turbo Power & Marine Systems Turbines  
Achieves Speed Of More Than 70 Knots**

(SEE PAGE 6)

**APRIL 1, 1973**

## 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.

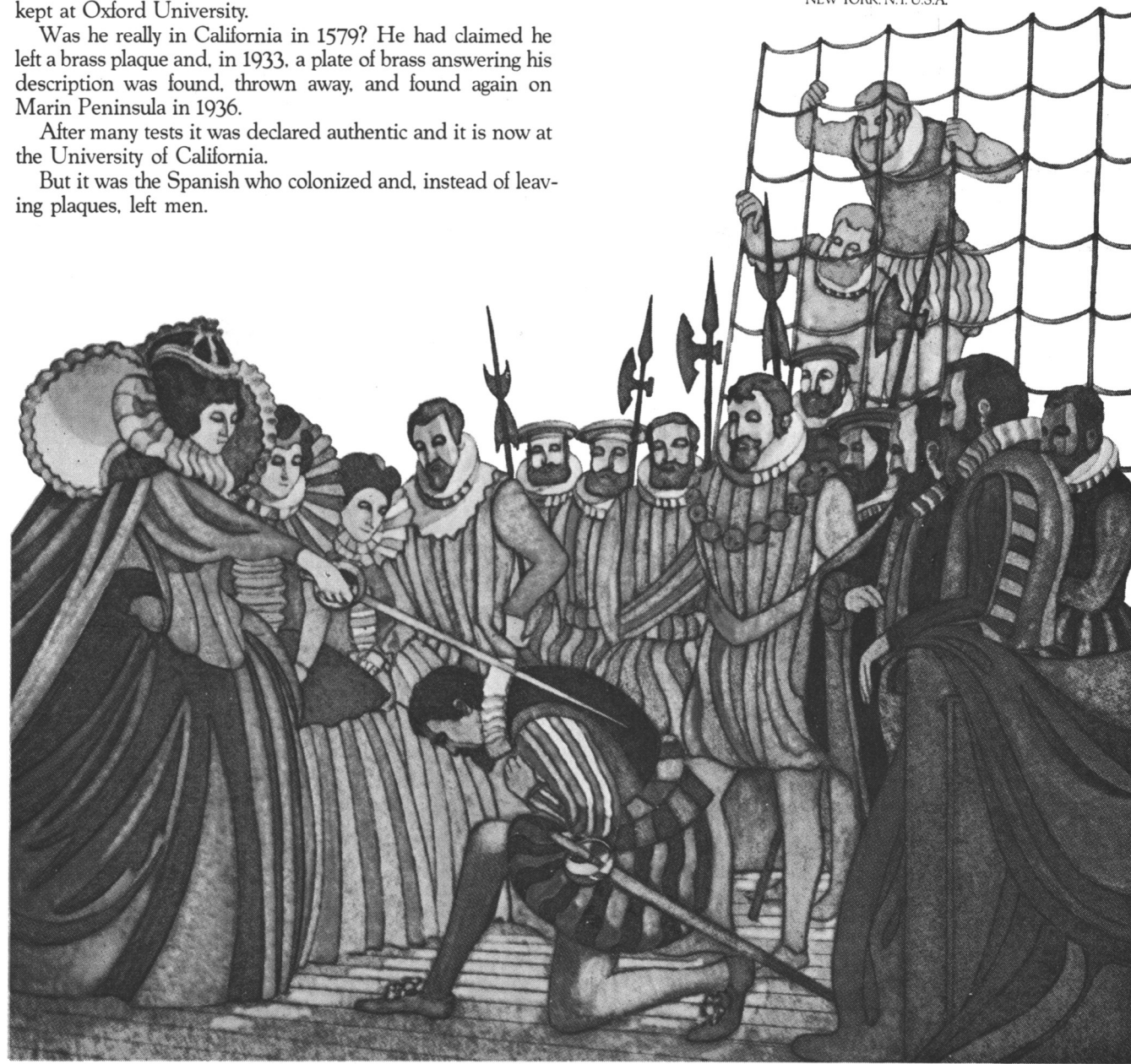
But it was the Spanish who colonized and, instead of leaving plaques, left men.

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.

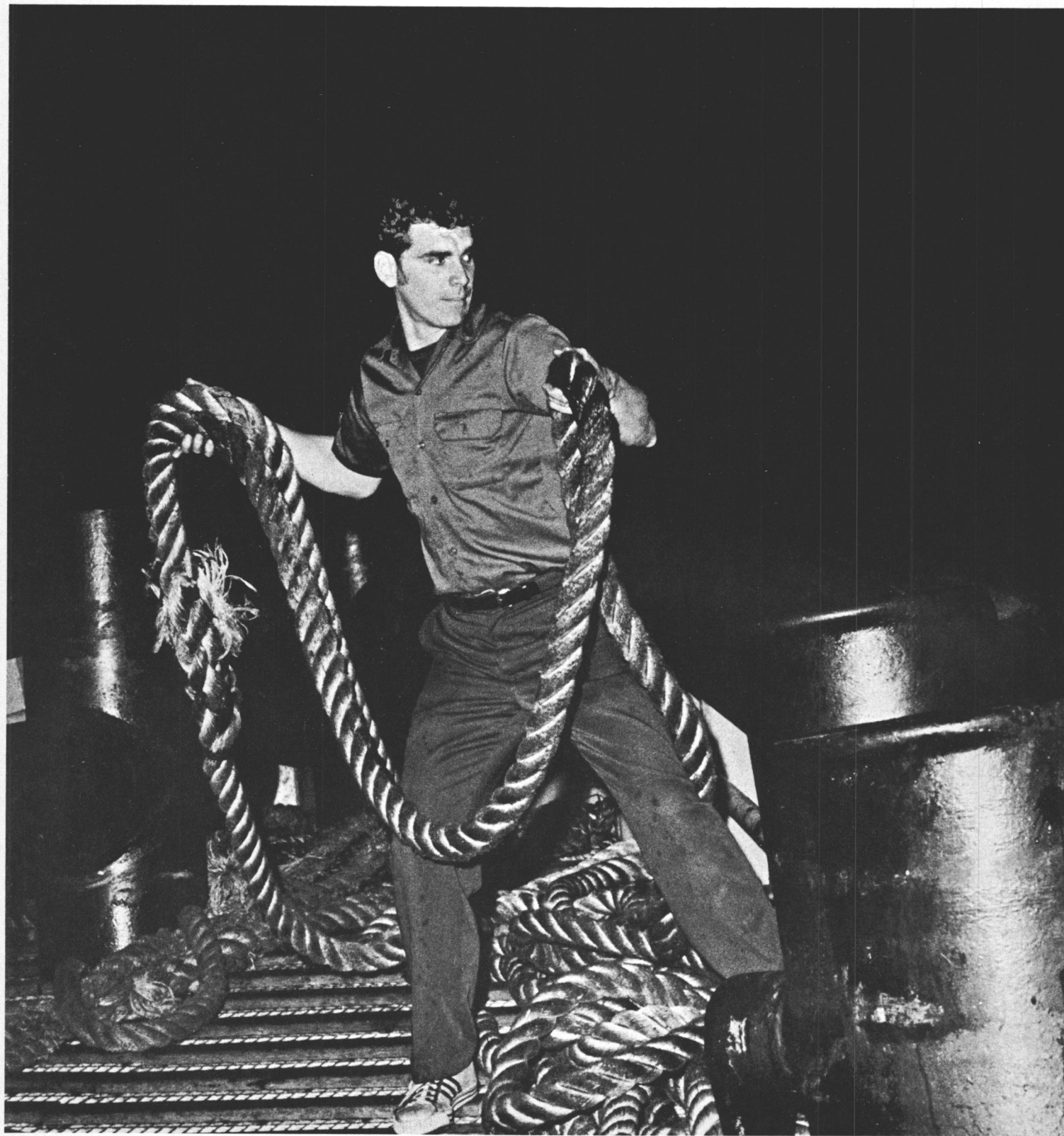
*This advertisement, prepared by Gulf Oil, a leading supplier of quality marine fuels and lubricants, is one of a series paying tribute to the great explorers of the sea. It is published in the interest of the shipping industry and those associated with it.*



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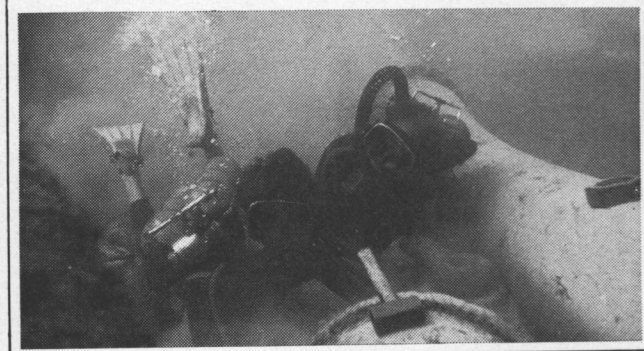
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### Appleton Machine Buys Marine Crane Rights From Cascade Corp.

Appleton Machine Co., Appleton, Wis., announced that it has bought the sales and manufacturing rights of the "Sea Lift" line of marine cranes from the Cascade Corp. of Portland, Ore. The agreement of the purchase was jointly announced by Vernon K. Lamberg, president of Appleton, and J.J. Barclay, president of Cascade.

Jule Baudhuin, vice president and general manager of the Iron Mountain, Mich.-based Marine Division of Appleton Machine, was placed in charge of the crane line, used on tuna seiners, offshore supply vessels, spud barges, and work boats. The cranes are also used for stores handling on oceangoing ships, and for hose handling operations.

### Twin City Shipyard Awarded Contracts For 40 River Cargo Barges

Firm orders for 40 river cargo barges valued at nearly \$5,000,000 with letters of intent for 20 additional barges have been received by Twin City Shipyard, Inc., St. Paul, Minn., even before its new fabrication facility in the Red Rock Industrial Park is operational.

John W. Lambert, president of the firm, said there is a growing demand for commercial cargo barges to haul coal, oil, grain and chemicals destined for domestic and foreign ports. He said he expects the entire output of the new facility—about 50 cargo barges per year—will soon be spoken for by various line haul firms plying the nation's waterways.

The new 85,000-square-foot facility is scheduled to become fully operational this month. It will be large enough (600 feet long and 140 feet wide) to accommodate four river cargo barges in various stages of fabrication. The plant will feature the most modern semi-automated shipbuilding equipment available in the world, Mr. Lambert added.

Twin City Shipyard, Inc., is a subsidiary of Twin City Barge & Towing Co., with headquarters in St. Paul. Twin City Barge has served the Twin Cities area since 1937 and Chicago since 1961. The company operates harbor towing, petroleum barge service and barge fleet service around these cities.

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## U.S. Navy's Surface Effect Ship



Data being collected during the SES-100B test and evaluation program is being applied to the preliminary design of a 2,000-ton operational prototype Surface Effect Ship for the U.S. Navy.

The U.S. Navy's SES-100B Surface Effect Ship test craft achieved a speed of more than 70 knots—a world record for this type of craft—during a recent test and evaluation mission on Louisiana's Lake Pontchartrain, north of New Orleans, La.

The experimental craft, designed and now being tested by the Bell Aerospace Division of Textron for the U.S. Navy's Surface Effect Ships Project Office, has been engaged in a test program which involved a gradual expansion of its performance envelope.

The speed in excess of 70 knots was accomplished on the fourth test run over a six-mile-long test course on Lake Pontchartrain. After earlier tests at lower speeds confirmed Bell engineers' predictions of craft performance, the high-speed test run was accomplished. The speed was recorded and verified by both on-board instrumentation and test equipment mounted on the support craft.

Although the test data still is being analyzed, Bell engineers reported that the craft performed flawlessly and in accordance with their predictions.

The six-man crew described the craft's stability during the high-speed run as excellent, and

said they had a very smooth ride throughout the mission.

The SES-100B, almost 78 feet long with a beam of 35 feet and weighing a little more than 100 tons, rides on a drag-reducing cushion of air contained by catamaran-style side hulls and flexible bow and stern seals. The air cushion is generated by eight lift fans driven by three marine gas turbine engines. When cruising, the center portion of the hull is clear of the water and the craft supported almost entirely by the air cushion with only the lower surfaces of the catamaran side hulls skimming the surface for stability and propulsion.

Propulsion for the craft is provided by three marine gas turbines which drive two semisubmerged controllable-pitch supercavitating propellers. The power transmission system features right-angle drives to the propellers, and the engines are cross-shafted for reliability and to permit cruising on a single engine.

The deckhouse sits near the stern of the craft and will accommodate the four-man operating crew and observers. The test craft instrumentation obtains both test and operating data for design confirmation and to predict the characteristics of even larger Surface Effect Ships.

## Marcona To Ocean Mine For Aragonite In Bahamas

The Honorable Carlton Francis, Minister of Development, Commonwealth of The Bahamas, has announced that subject to final approval by the Bahamian Government, an agreement has been reached between Marcona Corp. and Dillingham Corp. under which Marcona will lease the operating facilities of Ocean Industries Inc., a Dillingham aragonite mining subsidiary at Ocean Cay, Bahamas.

As part of the agreement, Marcona will also purchase for \$14.5 million the 70,000-dwt M/V Aragonite Islander, a self-discharging bulk carrier specifically designed for use in the aragonite trade.

Minister Francis said: "It appears that the agreement between these two companies will accelerate development of the aragonite business and, in so doing, further increase profits and financial benefits to the Bahamas in the form of royalties. The availability of additional capital investment and the bulk ocean transporting capabilities added by Marcona cannot but have a beneficial effect on this growing business."

Marcona Corporation is a San Francisco-based mining and shipping company primarily owned by NYSE-listed Cyprus Mines Corporation, and Utah International Inc. Dilling-

ham is a diversified, NYSE-listed corporation, headquartered in Honolulu and operating primarily in the Pacific Basin in the fields of maritime, property development, construction and resources.

Marcona president C.W. Robinson said: "We are extremely pleased with this opportunity. We believe that our experience in the mining, marketing and shipping fields will combine to enhance the future market for aragonite. In particular, we expect to open the large new market for this material in the beach restoration field, utilizing our patented Marconaflo slurry handling system."

Lowell S. Dillingham, chairman and chief executive officer, Dillingham Corp., said: "The agreements with Marcona are consistent with our expressed corporate objectives, particularly concentration on activities within the Pacific Basin. We expect Ocean Industries to continue to be successful, and our agreements provide for continued benefits to our shareholders during the proposed 13 year association or shorter period if Marcona exercises its option to buy during that period."

Aragonite, an exceptionally pure form of calcium carbonate, is used in cement making, as high-quality sand, and in the processing of lime, steel, glass and concrete products. The material is mined from a huge underwater deposit south of Bimini Island on the Great Ba-

hama Bank under provisions of a Crown Lease from the Bahamian Government. It is stockpiled on Ocean Cay, a 65-acre reclaimed island, and shipped to users on the U.S. Atlantic and Gulf Coasts and in the Caribbean.

The M/V Aragonite Islander will be renamed The Marcona Conveyor. In addition to its use for aragonite deliveries, the vessel will be employed by Marcona in a variety of other bulk commodity trades.

## IHC Holland-LeTourneau Marine Elects T.P. de Jooden President

R.L. LeTourneau has announced the election of T.P. de Jooden of Kinderdyk, Holland, to succeed him as president and chief executive officer of IHC Holland-LeTourneau Marine Corporation, Kilgore, Texas.

Mr. de Jooden is a managing director of IHC-Smit, one of the constituent companies of the Dutch-based IHC group, which is the controlling shareholder of IHC Holland-LeTourneau. He is a graduate in naval architecture of Delft University, and has more than 20 years of experience in shipyard management.

"The company is fortunate to have the benefit of Mr. de Jooden's extensive background in marine engineering," Mr. LeTourneau said.

The company's Ingleside, Texas, yard has now under contract the construction of three self-mobilizing jackup drill barges of 300-foot capability.

Mr. LeTourneau, a founder of the company, will remain as a director.

## Service Machine To Build Four Workover/Drilling Barges At A Cost Of \$4.8 Million

An application for Title XI insurance from Continental Illinois National Bank and Trust Company of Chicago in connection with four inland workover/drilling barges has been approved in principle by the Maritime Administration.

The four barges, which are estimated to cost \$4.8 million, will be constructed by Service Machine & Shipbuilding Corporation, Morgan City, La., and they will be chartered to Mallard Well Service, Inc.



ADMIRAL WILL HONORED: Vieri Traxler, Consul General of Italy, presents Adm. John M. Will, USN (ret.), with a citation naming him Grand Officer of the Order of Merit of the Republic of Italy at ceremonies at the consulate in New York. The admiral, former president and board chairman of American Export Lines, and a 40-year Navy veteran, was honored for the three years he served as president of the Italy-America Chamber of Commerce. Mr. Traxler, in his remarks, praised Admiral Will for working to foster a growing and continued healthy trade relationship between the United States and Italy, and "being a good friend" to all Italians. He noted that it is "a distinct pleasure" to award the admiral with the citation "because of the help and friendship he has given me." The admiral, who is presently with the Maritime Association of New York, is well-known in the entire shipping world. The honor is a highest ever accorded a foreigner. Besides the citation, he was given the ribbon and decoration he wears.

Maritime Reporter/Engineering News



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**\$112.8-Million Contract To Build Four Tankers Awarded To NASSCO**

National Steel and Shipbuilding Company (NASSCO), San Diego, Calif., has been awarded a contract to build four 89,000-deadweight-ton tankers for Third Group Inc. of Lake Success, N.Y. Total purchase price is \$112,800,000.

Delivery of the four vessels is

scheduled to take place from December 1975 through December 1976.

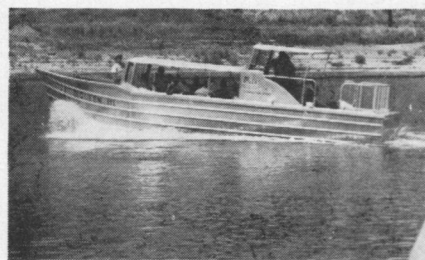
The agreement for the construction of the four tankers is subject to a number of conditions. Some of these are: the Maritime Subsidy Board granting construction and operating differential subsidies and financing guarantees; the filing of an environmental impact statement by the Maritime Subsidy Board, which could require additional pollution

abatement features on the vessels; and the purchaser's right to terminate the contract if it considers that any such additional features would make the vessels economically infeasible.

Designed by NASSCO as the "San Clemente Class" oil carriers, the vessels will be 892 feet in length, 106 feet in beam, and 62 feet molded depth (the maximum size that can transit the Panama Canal). Propulsion is by a geared steam turbine

plant which is capable of being operated continuously at 24,500 shp. The control system in the new 16-knot ships is of the latest design. Located in the engine room is a control console for the operation of the plant after manual start-up. Engine speed and direction can be controlled from a console on the bridge.

The new contract brings NASSCO's current backlog of work to be performed to about \$330 million, the highest level since its record backlog of \$334 million in 1966. National Steel and Shipbuilding Company is managed by Kaiser Industries Corporation and is equally owned by Kaiser Industries and Morrison-Knudsen Company, Inc.

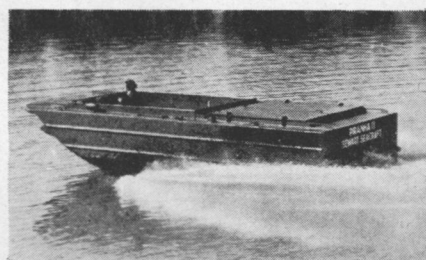
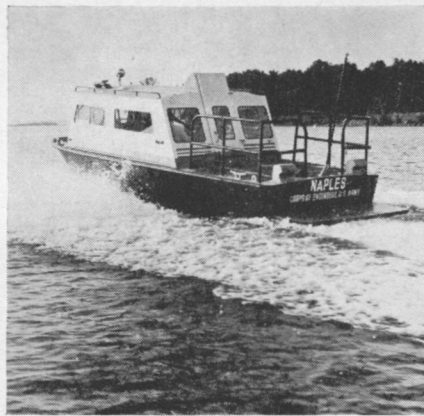


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How much does it cost for propeller, clutch, transmission and reduction gear repairs? JacuzziJet has no such parts!

In fact, just one moving unit—the stainless steel impeller assembly. And, the smooth, effortless power of jet propulsion noticeably reduces hull and engine vibrations which also helps to extend engine life.

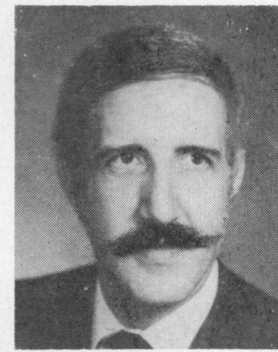
In over 3 million hours of service, it has been proven... JacuzziJet can save you liter-



ally thousands of dollars in operation costs.

Write or phone for complete details on jet propulsion... the system that has the muscle to perform under the toughest conditions—at lower cost. There is a JacuzziJet for any engine power requirement: turbine, diesel, or gas.

**Herman D. Tabak Accepts New Post At Zim Shipping Co.**



Herman D. Tabak

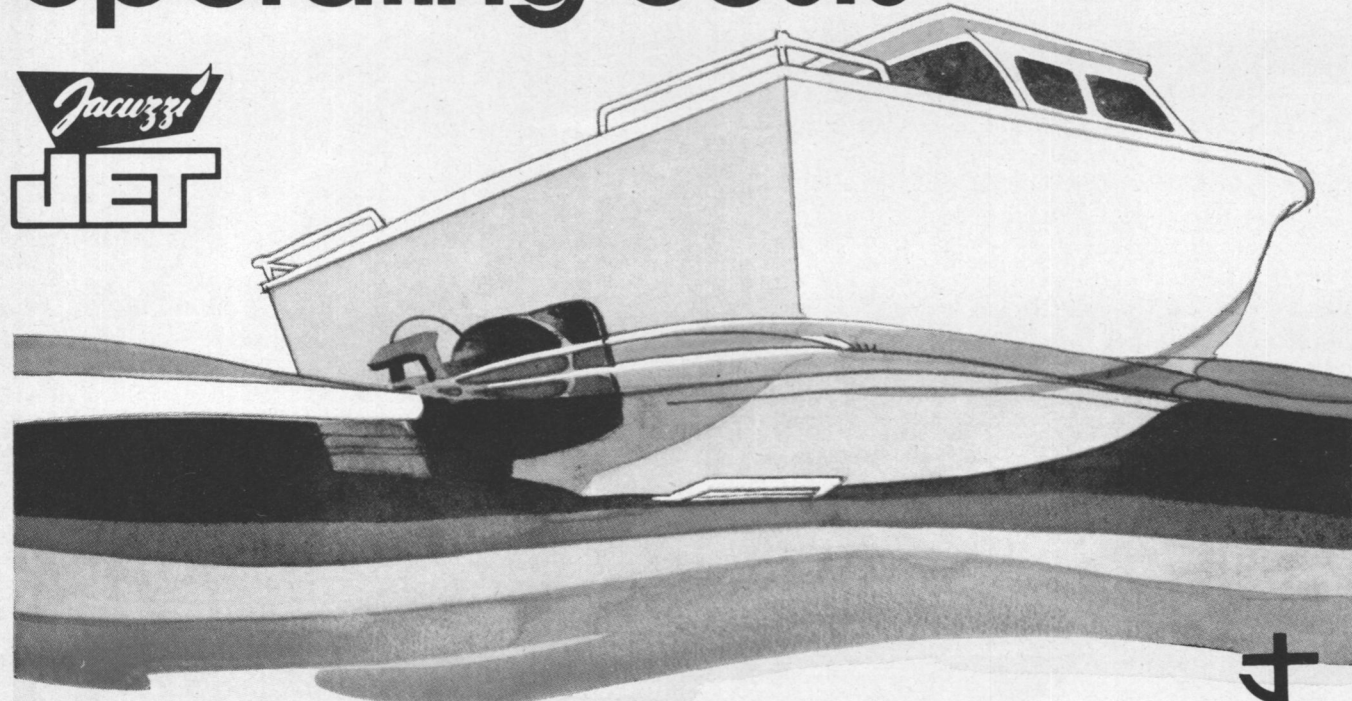
Herman D. Tabak, who had previously served as consultant in the capacity of special assistant to the president of Zim Container Service World Headquarters, has assumed the duties of assistant to Mordechai Chovers, president, Zim American Israeli Shipping Company, including Zim Container Service.

Mr. Tabak brings to his new assignment a background of 30 years of experience. His entire business career has encompassed every phase of transportation. He is a recognized authority in the field, especially in the relatively new area of intermodality, and includes among his credits: author of "Cargo Containers—Their Stowage, Handling and Movement," the standard internationally accepted work on containerization; U.S. national secretary of ICHCA; special consultant to United Nations IMCO; member of the national panel of the American Arbitration Association (as a marine container expert), and representative to the American National Standards Committee MH-1.

**JSL, Inc. Asks Title XI To Build Two Boeing Jet-Foil Passenger Boats**

A Title XI mortgage guarantee application has been filed with the Maritime Administration by JSL, Inc., Bellevue, Mich., in connection with building two Boeing jet-foil passenger boats for use in the Virgin Islands. The Boeing Corporation is considered to be the likely candidate to build the 250-passenger vessels, estimated to cost \$7,967,000, although no actual contract has been signed.

**A fish-eye view tells you why JacuzziJet cuts operating costs**



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**Chicago Bridge & Iron  
And Hitachi Form  
Company In LNG Field**

Hitachi Zosen (Hitachi Shipbuilding & Engineering Co., Ltd.) and Chicago Bridge & Iron Company, (CBI) of the United States have announced the formation on March 1, 1973, of Hitachi Zosen CBI Ltd., a joint venture incorporated in Japan.

One of the most urgent problems confronting the world today is the energy crisis.

Hitachi Zosen CBI Ltd. hopes to help work toward the solution of this gigantic problem by designing manufacturing, marketing and servicing (1) facilities and equipment for the transportation and storage of crude oil, LPG and LNG; (2) liquefaction and vaporization apparatuses, and (3) other plant equipment. The new company will draw upon the vast store of technology and resources of CBI and Hitachi Zosen.

From CBI, the new company will receive proprietary technology and

specialized knowledge in the fields of energy, cryogenics and the production of high temperature and high pressure vessels. Hitachi Zosen will provide facilities, distribution channels, goodwill, management, staff and technical personnel, and workers skilled in production and construction.

Hitachi Zosen CBI Ltd. will function in a spirit of mutual trust and cooperation based on the technology, specialized knowledge, personnel and facilities furnished by the two parent companies.

**Dravo Corporation's  
Engineering Works Div.  
Appoints Mortimer**



Niland B. Mortimer

Niland B. Mortimer has been appointed assistant general sales manager of the Engineering Works Division of Dravo Corporation, Pittsburgh, Pa. Mr. Mortimer, who has been manager of marine and systems sales for two years, will continue to be primarily responsible for sales management of the division's marine materials handling systems in the newly established position.

A graduate of the University of Pittsburgh in mechanical engineering, he joined Dravo in 1955, and is a registered professional engineer in Pennsylvania.

The company's Engineering Works Division designs and builds inland and coastal waterways marine equipment, heavy bulk materials handling systems equipment, and other specialized heavy machinery.

**Ocean Structures Study  
To Be Given Sept. 17-22  
At U of C—Berkeley**

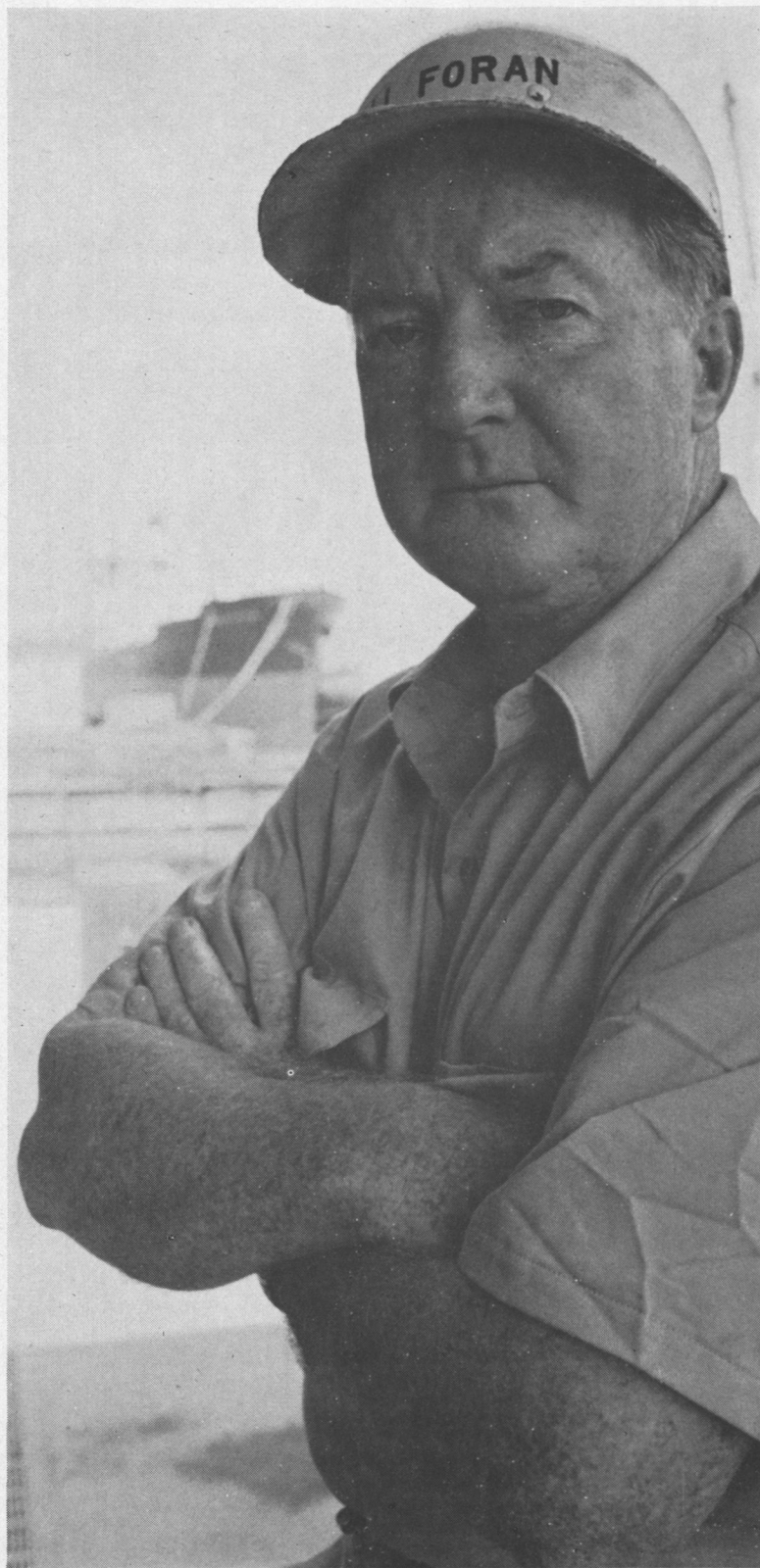
A concentrated six-day course, "Structures in the Ocean," dealing with the analysis, design, behavior and implementation of fixed and floating structures of steel and concrete in hostile seas, will be given September 17-22, 1973, by Continuing Education in Engineering and the College of Engineering at the University of California, Berkeley.

It is intended for professional engineers, offshore constructors, oceanographers, designers, engineering managers, and others. Topics will include the nature of hostile environments, the forces generated in them, and the gross response of structures exposed to them; optimal configurations for fixed and floating structures, including underwater storage vessels and caisson-type platforms; construction procedures and techniques, launching, mobility, behavior during transportation, installation, founding and sea-bottom conditions, stability, and safety.

The course steering committee consists of four Berkeley faculty members: Jack G. Bouwkamp, Ben C. Gerwick Jr. and Robert L. Wiegel, all professors of civil engineering, and J. Randolph Paulling Jr., professor of naval architecture.

Further details may be obtained from Continuing Education in Engineering, University of California Extension, Berkeley, Calif. 94720.

**Smokey the Bear he ain't.  
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**United States Lines  
Names Jack Watson  
VP-Administration**



Jack E. Watson

Jack E. Watson has been named vice president-administration for United States Lines, Inc., it was announced by Edward J. Heine Jr., president of the containership company.

Mr. Watson, who joined the company in 1946, has served as director of industrial relations since 1971. Previously, he was director of standards and controls, responsible for planning the company's container service to Europe and the Far East. In his newly created position, Mr. Watson is responsible for corporate administrative functions, as well as directing industrial relations.

For the first 15 years of his career, Mr. Watson served at sea, progressing from junior third officer to master. Following this, he was appointed assistant pier superintendent, and then became assistant to the company's general operating manager.

Mr. Watson is a graduate of the United States Merchant Marine Academy, and a member of the Defense Executive Reserve Unit of the United States Maritime Administration.

United States Lines operates a fully containerized Tricontinent service between Europe, the United States, Hawaii, Guam and the Far East, utilizing an all-modern fleet of 16 high-speed high-capacity containerships.

**Celanese Corporation  
Names Mansel Wiley  
Corporate Vice Pres.**

Mansel O. Wiley of Glenview, Ky., has been appointed a corporate vice president of Celanese Corporation, the New York-based chemical manufacturer. He will continue as president of Celanese Coatings and Specialties Company, the Louisville-based subsidiary of Celanese.

Mr. Wiley joined the Devco & Reynolds Company in Louisville in 1948 as a salesman, later moving to Detroit as automotive sales manager, and subsequently vice president of the automotive division. After Devco became a subsidiary of Celanese, Mr. Wiley was appointed general manager and group vice president of the company's automotive, industrial and marine division, which has headquarters in Louisville. He moved up to president of the company in 1970.

April 1, 1973

**P&O Group Orders  
Four LPG Vessels**

The U.K. shipping giant P&O has placed orders for four new ships costing about \$60 million as part of its gas fleet expansion program, it was announced in London. P&O's managing director, A. B. Marshall, said: "Our new orders will make P&O one of the largest independent owners of liquid petroleum gas (LPG) carriers in the world."

Currently, P&O already has three LPG carriers in service, but by the end of the current building program, they will have injected a capital investment of approximately \$325 million in their gas fleet.

The four new ships will be built in the U.K. and Norway—Swan Hunter will build an LPG carrier of 22,500-cubic-meters capacity for delivery in January 1975, the Norwegian Moss Verft will build a similar vessel of 22,000-cubic-meters capacity for July 1975, and two

31,000-dwt petroleum product carriers will be built by Horten Verft for May and August 1975.

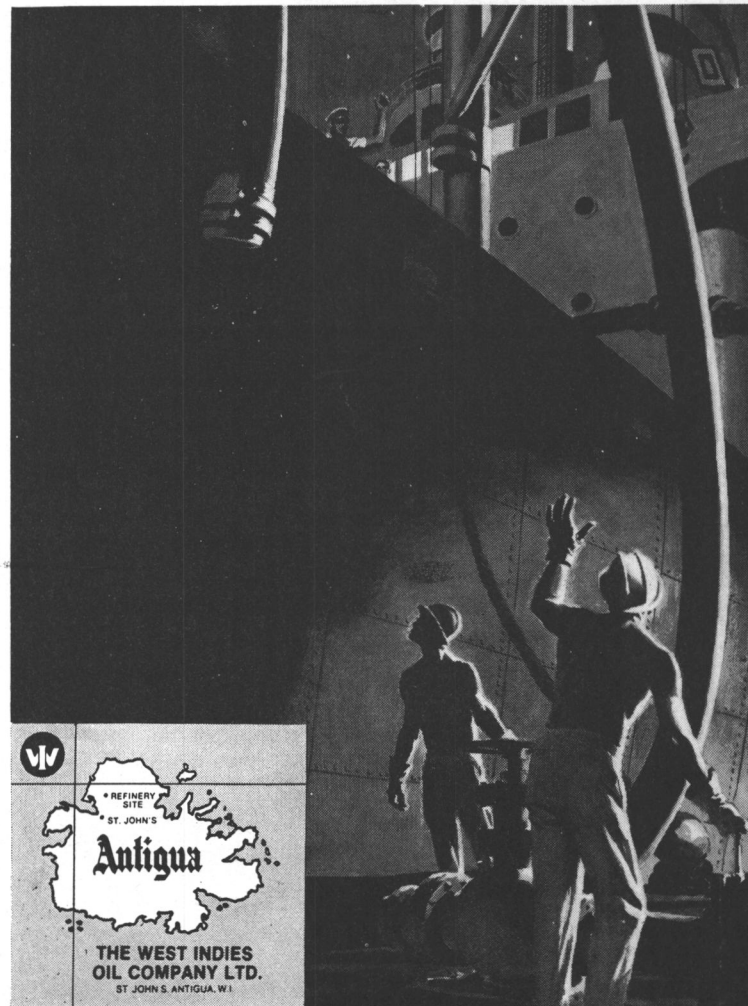
These orders follow the purchase of a second-hand LPG carrier with a 14,000-cubic-meter capacity from German owners.

Mr. Marshall commented: "The fleet will be engaged in international trades and is likely to be employed in carrying LPG to the U.S., where the demand for non-pollutant fuels is steadily increasing."

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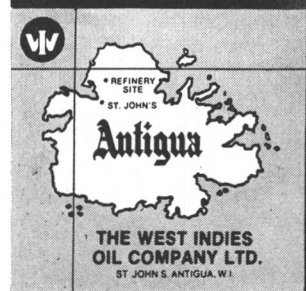


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## Segregated Ballast VLCCs

Peter M. Kimon, Ronald K. Kiss and Joseph D. Porricelli\*

Pollution is one of the critical problems facing the world today. In the marine industry alone there are seven forms of ship-generated pollution. These are: oil spills, intentional and accidental; sewage; garbage; laundry detergents; smoke nuisance; nuclear radiation, and hazardous cargo release.

This paper addresses only the first problem and that for only very large crude carriers. It has been estimated that nearly five-million tons of oil reaches the oceans by some means each year. Nearly 30 percent of this may be attributed to tankers. While other groups are striving to limit the influx due to other causes, the authors were part of a team in the United States whose principal objective was to investigate construction features which might reduce pollution due to tanker operations and accidents.

The Maritime Safety Committee of the Inter-Governmental Maritime Consultative Organization (IMCO) at its 23rd session stated the main objectives of the 1973 conference on Marine Pollution. One of these objectives was to achieve by 1975, if possible, but certainly not later than the end of the decade, the complete elimination of the willful and intentional pollution of the seas by oil and other noxious substances as well as the minimization of accidental spills.

The study of segregated ballast tankers was assigned to the United States as the lead country and Norway, Sweden, and the United Kingdom as associate countries by the Subcommittee on Marine Pollution.

The primary objectives of this study were twofold:

1. To evaluate the effect of design modifications on oil pollution abatement for a range of very large crude carriers (VLCCs); and,
2. To determine practical arrangements (designs) for a family of tankers with various segregated-ballast capabilities.

The study was divided into four major subdivisions:

1. Estimate of capital costs;
2. Estimate of operating costs;
3. Degree of effectiveness of pollution abatement; and,
4. Assessment of practical factors.

A family of eight designs of 250,000-dwt VLCCs formed the basis for the study. To provide indications of the effect of deadweight on design variations, two other base-line tankers were selected at approximately 120,000 and 500,000 dwt. A single alternative design was developed for both of these deadweights to indicate whether trends observed for the 250,000-ton ships were changed in any significant manner. The three basic designs are referred to as the 120 series, the 250 series and the 500 series.

\*Mr. Kimon, head, Research, Tanker Department, Esso International Division, Exxon Corporation; Mr. Kiss, Chief, Division of Ship Design, Office of Ship Construction, Maritime Administration, and Mr. Porricelli, Lt. Comdr., USCG, Merchant Marine Technical Division, Office of Merchant Marine Safety, USCG, presented the paper condensed here before a recent meeting of the Chesapeake Section of The Society of Naval Architects and Marine Engineers.

In each series, an existing design was selected as a basis for base-line dimensions and characteristics. The power level was held constant for all variations of a given deadweight and the specifications for the basic ship were modified only to the extent necessary to reflect changes required by the design changes to the configuration. Since draft is often the most severe limitation on tanker dimensions, the draft of all versions in each size group was kept the same as the base-line design. Increasing the amount of segregated ballast in excess of that normally carried by a large crude tanker resulted in excess freeboard. Excess freeboard would in all likelihood also result if deadweight were held constant instead of draft. Holding length and beam constant also, the depth was changed to provide the maximum cargo-deadweight capacity with varying amounts of segregated ballast capacity and cargo at 38° A.P.I. (Specific gravity of 0.8348.)

Twelve designs were developed to permit an estimate of capital and operating costs of each of the following:

1. Influence of the amount of segregated ballast capacity;
  2. Influence of protective features such as double bottoms, double sides, a complete double skin, and staggered (alternate) cargo and ballast wing tanks.
- The end result is a family of VLCCs considered to be sufficiently representative of actual designs for comparison purposes; they should not, however, be necessarily considered optimum.

Prior to determining the influence of the amount of ballast, the ballast requirements of each series had to be determined. The amount of ballast carried on board a tanker varies primarily with the ship's characteristics and weather conditions. The significant characteristics include bulbous bows, size, proportions and the ship's vibration and motion performance. But it is weather conditions which appear to have the most significant effect on the amount of ballast carried. In order to assess the frequency with which heavy weather is encountered in a typical large tanker trade route, log-book data were reviewed.

Because of the scatter in the data it was impossible to select a specific ballast condition for a 250,000 dwt tanker or any other series. Accordingly, it was decided to use two segregated-ballast cases for examination in this study. By considering a normal case of 45 percent full-load displacement and a heavy ballast condition at 60 percent it was possible to bracket the majority of ballast cases.

A family of eight ships, Figure 1, was developed in sufficient detail to establish construction costs for the 250 series. With the exception of depth, all ships have identical dimensions, displacement, hull form, accommodations and machinery, but different tank configurations and deadweights. The total segregated ballast capacities include ballast carried in the forepeak, the wing tanks, and other miscellaneous tankage. The base ship is similar to an existing vessel of about 250,000 dwt, 32,000 shp and a speed of 16.0 knots.

As shown in Figure 1, the arrangements

studies included placing ballast in double bottoms with heights of B/15 or greater, double sides, alternating wing ballast tanks, and combinations of these.

An end point design not shown in Figure 1 was considered, wherein both double bottoms and double skins were provided which met the IMCO damage assumptions of B/15 for bottom penetration and B/5 for side. The provision of B/15 and B/5 double bottom and double sides respectively requires that nearly 50 percent of the cross-section area be devoted to segregated ballast or void spaces. Retaining the design approach of only varying depth to regain cargo cubic capacity lost to ballast resulted in a design with an abnormal beam to depth ratio of 1.37. As a consequence, this design had deficient stability characteristics.

The design phase of this study was a joint effort of the American Institute of Merchant Shipping (AIMS), United States Coast Guard (USCG), Maritime Administration (MarAd), acting as Joint Study Sponsors, and the contractors, J.J. Henry Company and the American Bureau of Shipping. MarAd in consultation with AIMS and USCG prepared preliminary design information which was in turn forwarded to J.J. Henry Company for each tanker configuration. Based on that information, general arrangement plans, skeleton mid-ship sections, skeleton bulkhead scantling plans and cargo-oil and ballast piping diagrammatic plans were developed by the contractors. The American Bureau of Shipping reviewed the structural plans and determined scantlings acceptable for the purposes of this study.

Based upon information available from preceding studies, three major areas of cost differences appeared to exist:

1. Hull steel
2. Tank coatings
3. Cargo oil and ballast systems

The designs were developed so that primary attention was devoted to these major areas of cost difference.

Due to the time restriction imposed in preparing this study, it was not possible to optimize the structure on each design, and the resultant weights may not represent minimum weight designs. The steel weight to displacement ratio is about 0.11 for all three base ships. The highest ratios are 0.17 for the 120-C and 0.15 for the 250-C. The increases, in general, followed closely the variation in depth and structural complexity. The steel weight fraction decreases with deadweight, and for a given deadweight increases over the base ship as the ballast capacity increased or structural complexities such as double bottoms or double sides are added.

Since depth was increased on all variations of the base ship, it is not surprising to find that the steel weight increased or that this weight increase is largely in ordinary strength steel. This is due to the fact that as the depth is increased the requisite section modulus could be obtained with reduced scantlings in deck and bottoms, even to the extent that ordinary strength steel can be substituted for high tensile steel in some areas.

The length/depth (L/D) ratios of 120-A

and 250-A are 12.5 and 12.9 respectively, whereas this ratio on 500-A is 10.0. In general, the thickness of the deck and bottom shell plating decrease as the L/D ratio decreases. Therefore, as L/D is reduced from 12.5 or 12.9 it is possible to replace HTS steel with ordinary strength steel. In the case of the 500-A design, the L/D ratio was already very low, and it was not possible to replace high-strength steel by ordinary strength steel to any great extent.

The outfit weights for all designs fall in a narrow range between .08 and .11 of the total light ship weights with the lower values occurring on the deeper ships which experience appreciable increases in steel weight.

The longitudinal strength studies performed for 45-percent, 60-percent, and full-load displacements showed that all designs in each series required the same section modulus within a given series. As a result, all midship sections were designed to approximately standard ABS section modulus.

Using data from Japanese sources as representative and Government and industry experience in the field, the prices for each of the 12 designs in this study were estimated. These figures are shown in Table 1, and represent shipyard selling prices.

**Table 1—SUMMARY OF SHIPBUILDING PRICES**  
(Prices given in million dollars at Yen conversion of 308 to the dollar.)

Ship Category	1974 Price	Percent Increase Over Base Ship
250-A	37.3	0
250-IMCO	37.7	6.2
250-B1	40.1	8.7
250-B2	41.0	17.5
250-C	44.3	10.8
250-D	41.8	4.2
250-E1	39.3	9.8
250-E2	41.4	

Estimates of the cost differences in material and labor requirements and other direct and indirect costs established the prices for ships which departed from conventional designs. Labor requirements reflected adjustments for added complications in construction due to double bottoms and sides.

The estimates are based on the premises that shipyard experience and facilities are adequate to build any of these designs; that pricing of all designs are suitably related to make a contract for any one of them equally attractive to the shipyard; and that owners will no longer be restricted to only the conventional design but may choose one or more of the unconventional designs for quantity orders in the future.

As noted earlier, the study devoted primary attention to the major areas of cost differences. Other items such as ballast pumps, anchors and chain, hatches, manholes and gratings, and vertical inclined ladders were compared and priced to examine their significance.

#### Conclusions

The results show that additional segregated ballast capacity has helped significantly in improving oil outflow from normal operation. It is important to note, however, that the level of effectiveness in reducing oil outflows from operational as well as accidental pollution is strongly dependent on a number of the following:

1. The operational pollution effectiveness of the base ship design, i.e. the tank washing procedure, settling, and decanting;
2. The values of effectiveness assigned to double-bottom designs in mitigating operational pollution; and
3. The values of effectiveness assigned to the various designs in limiting accidental pollution. In this regard, it is important to note that none of the designs produce a high degree

of effectiveness against both strandings and collisions.

In general, it can be said that any of the design variations considered are an effective means to mitigate oil pollution resulting from normal tanker operations for normal ballast levels between 45 and 60 percent of full-load displacement. The cost effectiveness data for operational pollution suggest that the staggered wing version, 250-E1, is the best, followed by the double bottoms, 250-B1 and 250-B-2, and the double-bottom, double-side version, 250-C.

When overall cost effectiveness (including accidents) is considered, then the two double-bottom versions, 250-B1 and 250-B2, appear best, followed by the staggered-wing version, 250-E1, and then the double-skin version, 250-C. These rankings are somewhat dependent upon the relative magnitude of accidental pollution from strandings and collisions.

When the study was originally conducted, the assumption was made that the ratio of outflows from strandings to collisions was 2 to 1. Subsequent data and analysis have shown that this ratio appears now to be on the order of 4 to 1. The same study has shown

that annual oil outflow due to groundings, collisions and rammings is on the order of 81,000 tons per year, which compares well with the earlier assumption of 100,000 cubic meters. If these data were used, the double-bottom versions would be more effective, the double-skin only slightly less effective, while the double-side and staggered single-skin versions would have appeared significantly less effective.

Another important factor in making any decisions with respect to the overall effectiveness is the role of accident-prevention techniques. Many of these techniques are under study by various segments of the marine industry; for example, traffic-control schemes, improved maneuverability, shipboard anticollision devices, personnel training, etc. The super-positioning of such techniques upon the design variations in this paper is not possible and is beyond the scope of this paper. Nevertheless, there is little doubt that neither method of safeguard will be completely successful in itself. However, a combination of accident-prevention techniques and certain tanker-design features might provide the most effective alternative.

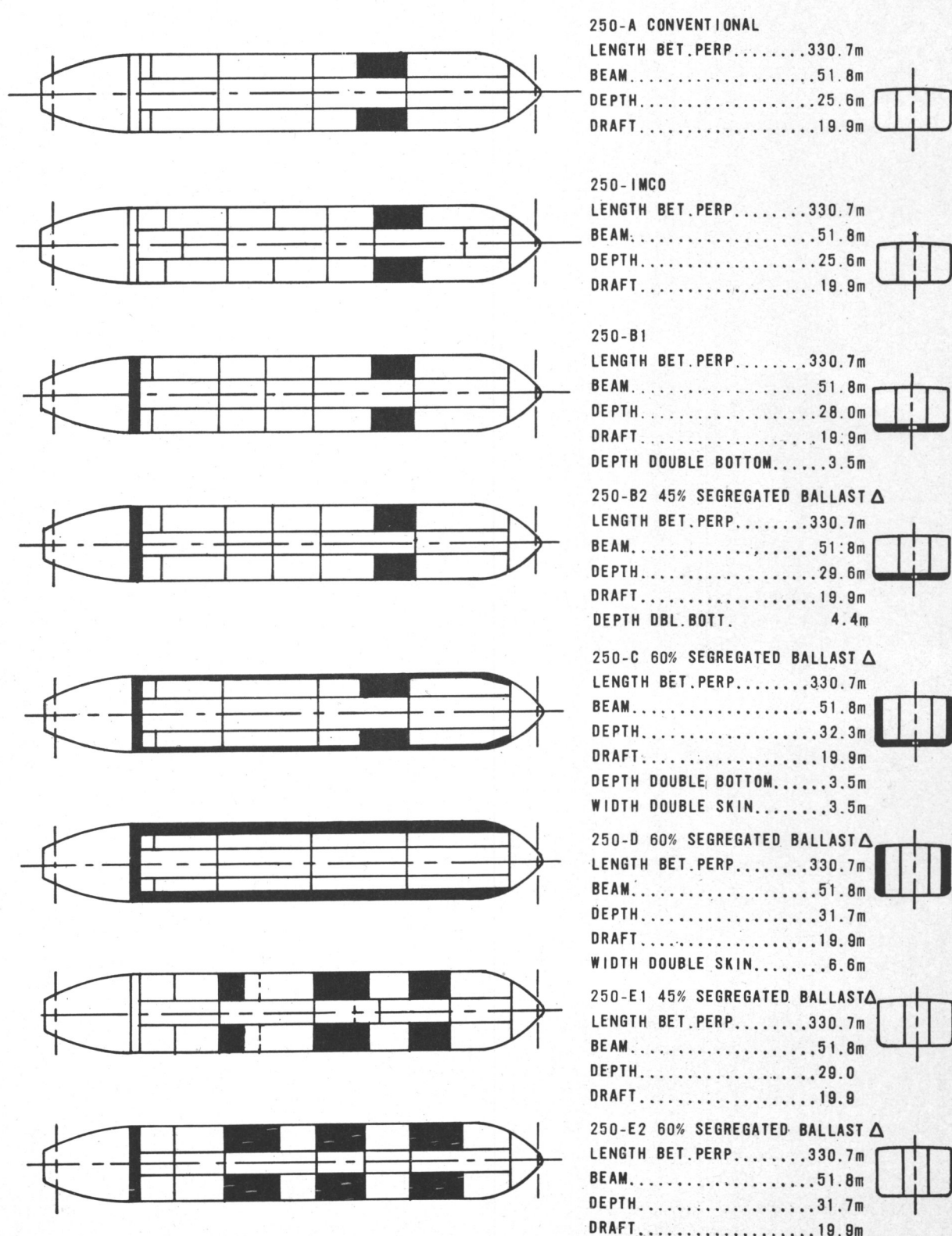


Figure 1—Ship Configurations Used for 250 Series of Tankers

### Turbo Power And Marine Receives Lockheed Contract To Power New Icebreaker

Turbo Power and Marine Systems, Inc. of Farmington, Conn., has been awarded a contract to supply a combined gas turbine and diesel propulsion system for the second new United States Coast Guard icebreaker. This contract, like the propulsion system contract for the first icebreaker, was awarded to TPM by Lockheed Shipbuilding and Construction Company of Seattle, Wash.

This new 400-foot 12,000-ton vessel will be the second in the class of the world's largest and most powerful icebreakers, and will be built by Lockheed under a letter of contract modification with the U.S. Coast Guard. It will be delivered early in 1976, while the first vessel in the class, the Polar Star WAGB-10, will become operational in 1974.

Under the contract, Turbo Power and Marine

Systems, Inc. will furnish three Pratt & Whitney Aircraft FT4 gas turbines for boost power. TPM will also furnish six diesel engines for cruise electric generators and motors, reduction gearing, and various engine room and bridge controls.

This new class of icebreakers will have one and one-half times the power of the Soviet Union's Lenin, presently the most powerful icebreaker afloat. Each ship will carry 165 men, including 10 scientists. These 400-foot vessels will have a beam of 83 feet 6 inches, and a design icebreaking draft of 28 feet. The maximum cruising range at 13 knots will be 28,275 miles, and the sustained sea speed under diesel power will be 17 knots. The ships will be able to break ice six feet thick at a continuous 3 knots, or ice up to 21 feet thick by ramming. Each icebreaker will carry two Sikorsky HH52A helicopters for scouting surveillance.

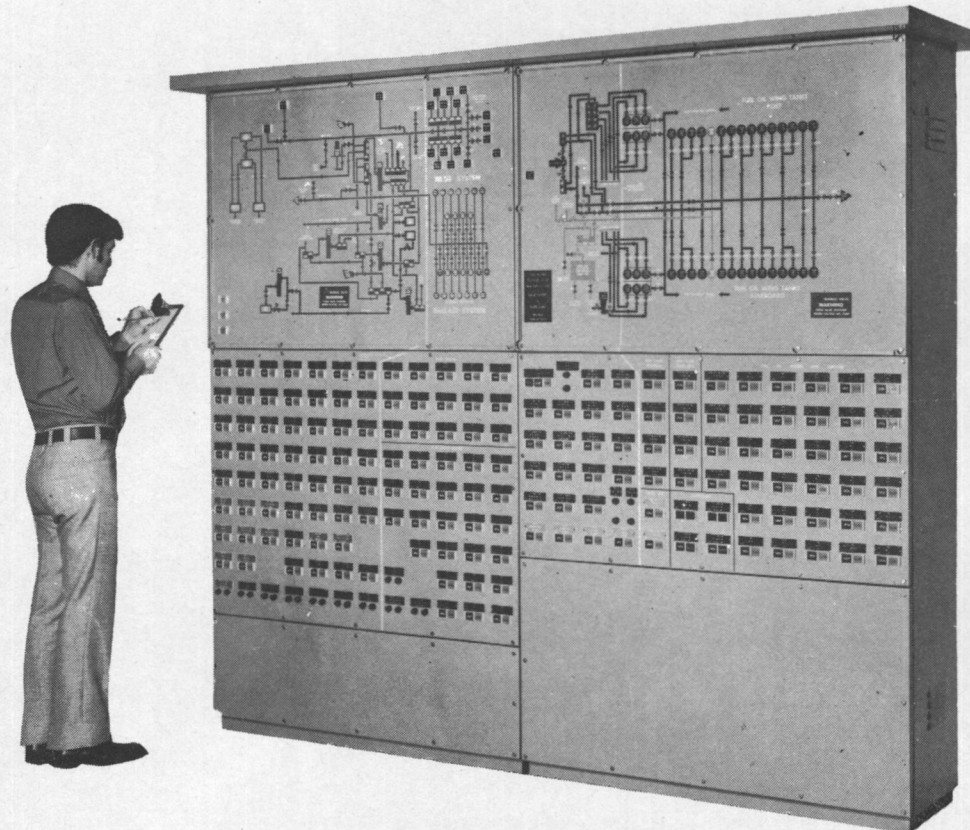
Under cruise conditions, each icebreaker will use six diesel engines to drive electric generators

which, in turn, will power electric motors to drive three controllable pitch propellers. Diesel power will also be used to break ice up to four feet thick. However, for thicker ice, the vessel will switch to gas turbine power. Each Pratt & Whitney Aircraft gas turbine will produce 20,000 shaft horsepower, giving the vessel a total of 60,000 gas turbine horsepower, although each turbine is rated to produce up to 25,000 shaft horsepower.

Lockheed engineers said this class of Coast Guard icebreakers will have a novel hull shape with a stronger structure, special steering innovations, an oceanographic system with a portable laboratory and data transmission systems, plus greatly improved living quarters for the crews. This new ship will be the Coast Guard's 11th icebreaker.

This new icebreaker will bring to 14 the number of U.S. Coast Guard vessels to use Pratt & Whitney Aircraft gas turbines. The Coast Guard has 12 high-endurance cutters in commission on the East and West Coasts. Turbo Power and Marine Systems, Inc., a subsidiary of United Aircraft Corporation, has, in the past decade, sold more than 900 P&WA gas turbines for use in electric power generation, natural gas transmission, the petrochemical industry, and marine service.

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### Aluminum Plate Shipped 6,000 Miles To Norway For LNG Supertanker

Aluminum Company of America has received its third order for 7,000,000 pounds of aluminum plate from Kvaerner Brug A/S, Oslo, Norway, for use in construction of six spherical tanks to be installed aboard a 125,000-cubic-meter-capacity liquefied natural gas (LNG) supertanker.

The entire 21,000,000 pounds of plate will be produced on the world's largest rolling mill, a 220-inch giant at Alcoa's Davenport (Iowa) Works.

The plate will be formed there into curved sections weighing up to 13,600 pounds each and shipped more than 6,000 nautical miles to Kvaerner's Moss-Rosenberg shipbuilding yard in Stavanger, Norway. Delivery will start this summer.

Commenting on Alcoa's growing role as a supplier to the LNG industry, George E. Herrman, corporate manager-LNG, said: "The 220-inch mill's capabilities and capacity reinforce Alcoa's position as the leading supplier of aluminum to the burgeoning LNG industry."

"Several LNG tank fabricators have already indicated that use of extra-wide and tapered plate produced by the 220-inch mill saves up to 20 percent of the welding required to fabricate spherical tanks."

Five of the 5083 alloy aluminum tanks to be installed in each ship will have an inside diameter of approximately 115 feet, while the sixth will measure nearly 99 feet. The plate shapes will be fabricated into seven ring sections, to be joined with horizontal welds. Two aluminum "polar caps" complete the spheres.

Special machined aluminum plate, seven inches thick, will be used for the tanks' equatorial sections. These sections are also part of the tank support system, unique to the Kvaerner spherical tank design.

Alcoa will also supply to Kvaerner all of the extruded aluminum stiffeners required for the tank skirt support ring. These shapes will be produced at Alcoa's Lafayette (Ind.) Works on a 14,000-ton-capacity extrusion press, one of few such facilities in the world.

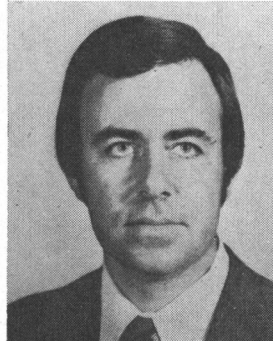
Welding electrode to assemble the tanks will be supplied by Alcoa's Massena (N.Y.) Operations.

The three LNG supertankers are being built for a shipping company owned by Gotaas Larsen Shipping, New York.

### International Paint Company Appoints Coycault And Siren



Stephen A. Coycault Sr.



E.D. Siren Jr.

Thomas M. Reinhardt, president, International Paint Company, Inc., recently announced the appointments of Stephen A. Coycault Sr. to West Gulf Coast sales manager, and E.D. Siren Jr. to Florida sales manager.

Mr. Coycault joined International's New Orleans staff in May of 1956 and held various sales and administrative positions until his transfer to Houston in July of 1964 as a Heavy Duty Marine and Interlux sales representative.

Mr. Coycault's duties will now include the sales and servicing of the entire west coast of the Gulf area for both the International Red Hand Marine Coatings and Interlux Yacht finishes.

Mr. Coycault is a member of The Propeller Club, The Society of Naval Architects and Marine Engineers, and The Houston Coatings Society. He is also active in community programs.

Mr. Siren joined International's New Orleans staff in December 1963 and served both the Interlux Yacht line and Heavy Duty Marine accounts until his transfer to Florida in December 1968, where he has also performed the same function for the company in southern Florida. Mr. Siren's responsibilities now cover the entire state of Florida for both the Interlux and Heavy Duty Marine sales.

Mr. Siren is a graduate of Southeastern Louisiana College with a degree in business administration, and he is a member of the Florida Propeller Club.

### Shaheen Natural Resources Plans 300,000-BBL Per Day Refinery In Newfoundland

Shaheen Natural Resources Company, Inc., under an agreement with the Newfoundland Government, will build a 300,000-barrel-per-day refinery costing \$308,500,000, at Come By Chance, Newfoundland.

The new refinery, which will be the largest in Canada, will adjoin a 100,000-barrel-per-day refinery under construction by Newfoundland Refining Company Ltd., a subsidiary of Shaheen Natural Resources, which is expected to commence production in August of this year.

The agreement, announced in St. John's, Newfoundland, by Premier Frank D. Moores, calls for construction, operation, and ownership of the refinery by Newfoundland-Edison Co., Ltd., a wholly owned subsidiary of Shaheen Natural Resources.

The agreement calls for Shaheen to provide \$40 million in equity capital. The Export Credit Guarantee Department of the British Government will advance \$190 million secured by issuance of first mortgage bonds, the remaining \$78.5 million will be supplied by the Newfoundland Government and secured by second mortgages.

As part of the pact, the Newfoundland Government will make available 1,177 acres of

crowd lands at Come By Chance on Placentia Bay, a half mile from where Newfoundland Refining is completing its installation. Cost of the land will be approximately \$1 million.

John M. Shaheen, president of Shaheen Natural Resources, said the installation, which will be the largest in Canada and one of the largest in the world, will refine Persian Gulf and North African crude oil and supply customers on the U.S. East Coast and Great Lakes, and a well-developed market in Europe.

Mr. Shaheen said the Come By Chance site, with its year-round ice-free port, will utilize the present oil dock which extends 3,400 feet into Placentia Bay. The dock, with 100 feet of water at its face, can take tankers up to 500,000 deadweight tons.

The new refinery, which is expected to take about 30 months to complete, will employ 3,000 men during peak construction, and is expected to have 700 permanent employees.

### \$25-Million Order For Reefer Vessels

As evidence of resurging demand for reefer-type cargoliners by U.K. shipowners, Blue Star has ordered two such vessels at a total cost of some \$25 million.

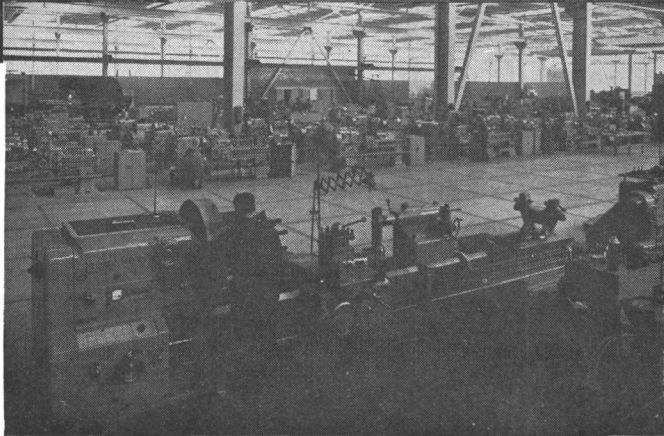
One of the vessels for the Vestey Food Group, which owns Blue Star, will be built by Smith's Dock, Teesside East Coast England, for delivery in December 1974, and the other is to be built by the Aker Group of Oslo, scheduled for delivery in March 1975.

Each vessel will have 9,700 gross tons, with 475,000 cubic feet bale space, a speed of 24 knots, and equipped for the carriage of all types of refrigerated cargoes.

The order, and Blue Star says that more are to be expected, follows the purchase recently of two reefer ships by Shaw Savill and building of four others for P&O's general cargo division.

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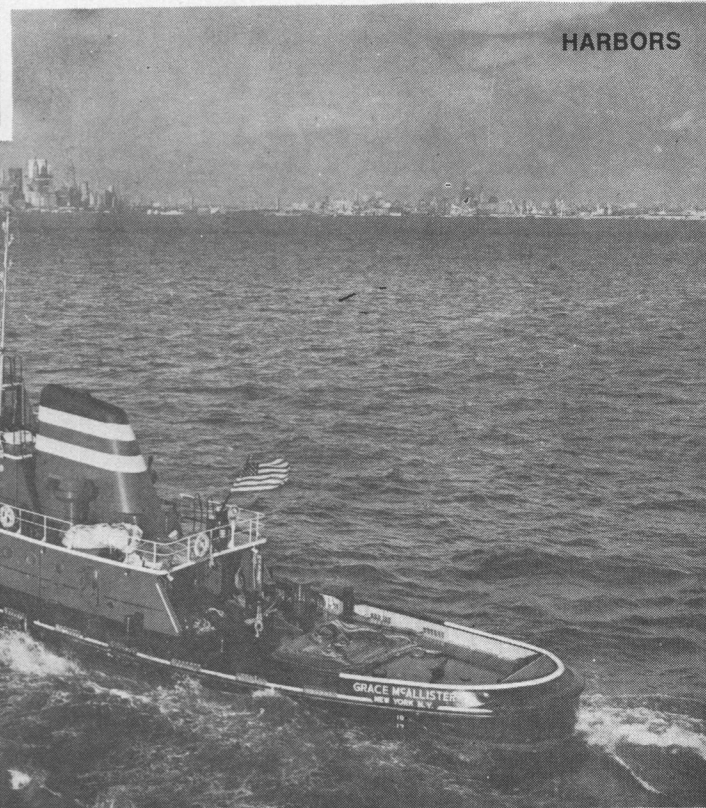
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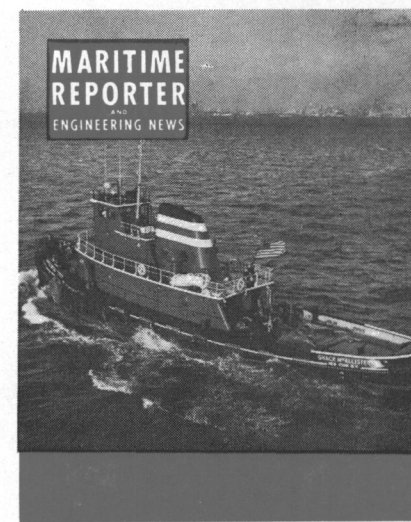
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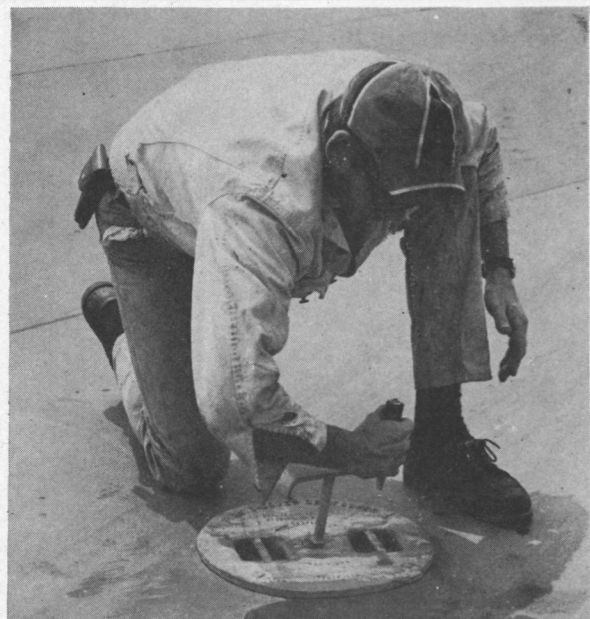
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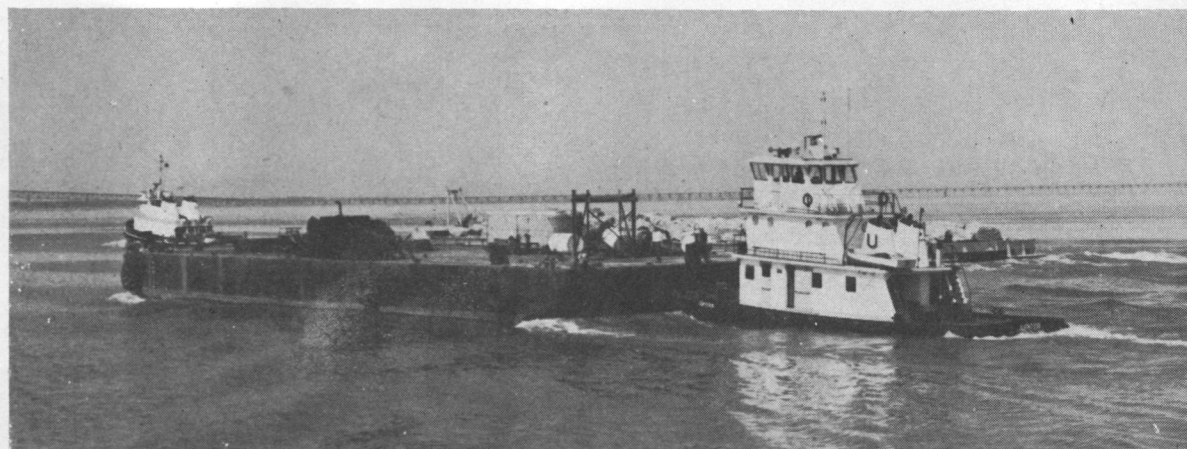
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## Umpqua Fleet Lowers Costs On Jetty Building Projects



The efficiency of its marine fleet allows Umpqua to bid successfully on far-flung jetty construction projects.

By integrating an efficient marine fleet with its construction and quarrying operations, an Oregon firm successfully bids a number of major jetty building projects along the Pacific Northwest coastline.

Umpqua River Navigation Co., a division of Bohemia Inc., relies on its fleet of two oceangoing tugs and a river towboat to transport rock economically from its quarry to the jetties. This, in itself, is hardly unique, but the distances involved in Umpqua's case do make it unique.

Umpqua has built jetties along the coast from Eureka, Calif. to Westport, Wash. All the rock for these projects comes from the company's quarry in Camas, Wash., on the banks of the Columbia River 10 miles east of the Portland-Vancouver area.

A combination of factors, including ideal rock formations in the quarry, its location on the bank of a navigable river, and efficient management and dependability of the marine fleet, makes it possible for Umpqua to utilize rock from the Camas quarry more economically than is possible from sources nearer the jetty sites.

The entire marine operation moves in cadence. It takes one shift at the quarry to load a 3,600-ton barge. Meanwhile, the towboat Jupiter is pushing a loaded barge on the one-day round trip from Camas to Astoria, Ore., at the mouth of the Columbia. There, one of the two oceangoing tugs picks up the loaded barge, while the other is enroute to Astoria with an empty.

Dependable equipment and efficient timing are vital to Umpqua's ability to move the rock economically over such great distances.

The two oceangoing tugs are the Bohemia and the Umpqua, sister ships built by Albina Engine & Machine Works in Portland—the Umpqua in 1966 and the Bohemia in 1970. Both are 95 feet by 28 feet by 14.5 feet, and rated at 188 gross tons.

The Bohemia is powered by twin 1,125-hp Caterpillar D399 Diesels through Lufkin RLS-2120 gears with 5:1 ratios to twin five-bladed stainless steel wheels. The keel-cooled V-16 diesels have Mathers controls and shaft brakes. Auxiliaries are two Cat D333 Diesels driving 125-kw EM generators. Accessory drives at the front of each auxiliary engine power hydraulic pumps.

The older tug, the Umpqua, is identical, except that it uses a pair of 850-hp Cat D398 Diesels driving through 5.11:1 Cat 3192 gears for main power.

The towboat Jupiter, built in 1966, has a pair of 565-hp Cat D379 Diesels with 4.34:1 Cat 3192 gears. Two Cat D311 Electric Sets provide auxiliary power.

Shuttling barges loaded with jetty stone is demanding on the boats and equipment. The Umpqua has already accumulated 21,000 hours, the Bohemia, 6,000, and the Jupiter 20,000.

Umpqua also owns the Juno, a twin-screw tug powered by a pair of Cat D343s, which supports

a sand and gravel operation on the Umpqua River. The company also uses two single-screw Cat-powered tugs in its logging operations.

The marine operation presently supplies rock to jetty projects at Gray's Harbor, Wash., and Tillamook Bay, Ore., where the south jetty is being extended 2,800 feet.

The oceangoing tugs tow at eight knots and cycle between Astoria and Tillamook Bay in about 16 hours.

Umpqua began business in the mid-19th Century with a steam-powered sternwheel ferry on the Umpqua River. They gradually moved into general towing and sand and gravel operations before diversifying into heavy construction in 1960. Bohemia Lumber acquired the firm in 1969.

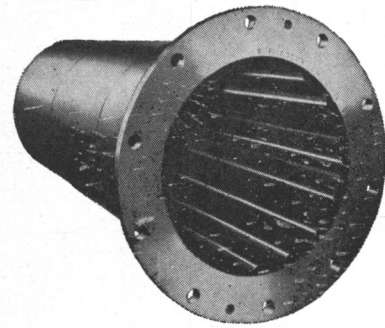
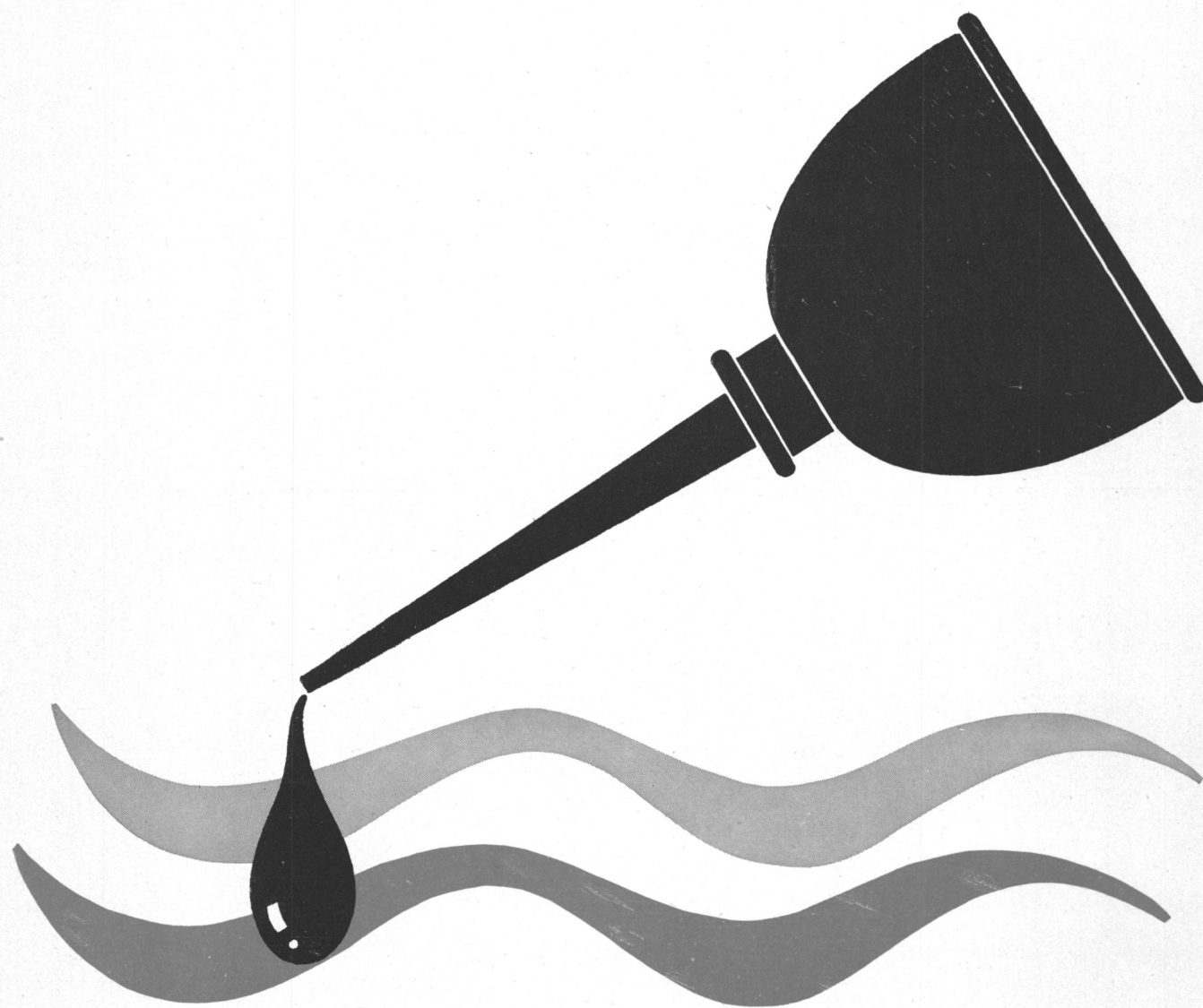
Besides their marine activity in support of jetty construction, Umpqua is also cooperating with the Environmental Fluid Dynamics Laboratory at Oregon State University on a special research project. They are building what is said to be the largest laboratory in the world, where the combined effect of wind and waves on jetties and artificial rock islands can be studied simultaneously. The jetties and rock islands used in the studies will be built to scale.

Bohemia Lumber and the Umpqua Division headquarters are in Eugene, Ore. O.H. Hinsdale is vice president of the Umpqua Division; John Schaefer, general manager; Buck Schaefer, John's father, is superintendent of the Camas quarry, and Dale Krug, equipment superintendent at Camas, is in charge of the marine fleet.

### Ducted Propellers Symposium To Be Held May 30-June 1

The program of papers for The Royal Institution of Naval Architects (RINA) Symposium on Ducted Propellers which is to be held on May 30, 31, and June 1, 1973, has been completed. Seventeen papers by authors from various countries will be presented. They will deal mainly with ducted propellers of the accelerating type suitable for use on VLCCs and similar ships. Virtually all aspects of these propellers will be considered, including design, performance, and structural strength. The Symposium will, therefore, appeal to a very wide audience.

Because of the large number of delegates expected to attend, arrangements have been made to hold the Symposium in the Glazebrook Hall at the National Physical Laboratory, Teddington. A final announcement giving the program and registration details will be made available in the near future. Non-members of the RINA may obtain full particulars on application to the Secretary of the RINA, 10, Upper Belgrave Street, London, SW1X 8BQ.



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**Maritime Fruit Orders  
258,000 VLCC From  
Scott Lithgow Group**

Maritime Fruit Carriers Company Limited announced it has ordered from the Scott Lithgow Group of the United Kingdom, one 258,000-deadweight-ton very large crude carrier to be delivered in 1975.

This order of supertanker tonnage is one of a series which Maritime Fruit Carriers, or its subsidiaries, have placed with shipbuilders around

the world since mid-1972 for large crude carrying capacity.

In two of its most recent orders, on January 30, 1973, Maritime Fruit Carriers announced that a British subsidiary ordered six 333,000-deadweight-ton VLCCs from Harland and Wolff Limited of Belfast, Northern Ireland.

On June 30, 1972, it was announced that its United States subsidiary, General Maritime Corporation, would time-charter three 265,000-dead-

weight-ton supertankers to be built by Bethlehem Steel Corporation.

In addition, on January 8, 1973, it was announced that Maritime had signed a letter of intent for General Maritime Corporation with Todd Shipyards Corp. for the construction by Todd of three 380,000-deadweight-ton supertankers, with an option for three additional such vessels.

Maritime Fruit Carriers Company Limited is a multinational organization specializing in refrigerated shipping and oil transportation.

**N.J. Marandino Named  
Senior Vice President  
Of Litton Industries**



Ned J. Marandino

Ned J. Marandino has been named a senior vice president of Litton Industries, it was announced by Litton president Fred W. O'Green.

Mr. Marandino was president of the Ingalls Shipbuilding Division with responsibility for Litton Shipbuilding activities in Pascagoula, Miss. He became president of Ingalls in 1969. His responsibilities increased last year when Ingalls was consolidated with the Litton Ship Systems Division, and he was named president of the new organization. He has been a corporate vice president since 1970.

Mr. Marandino joined Litton's Guidance and Control Systems Division in 1964, where he served as vice president and director of operations. Previously, he held senior management positions at Lockheed Missile and Space Division.

He is a native of New York City, where he attended Brooklyn College.

Ingalls Shipbuilding Division includes 168 acres of conventional and nuclear submarine construction and overhaul facilities and a 611-acre site specializing in series production of surface ships. Ships for both the U.S. merchant marine fleet and the U.S. Navy now are in production.

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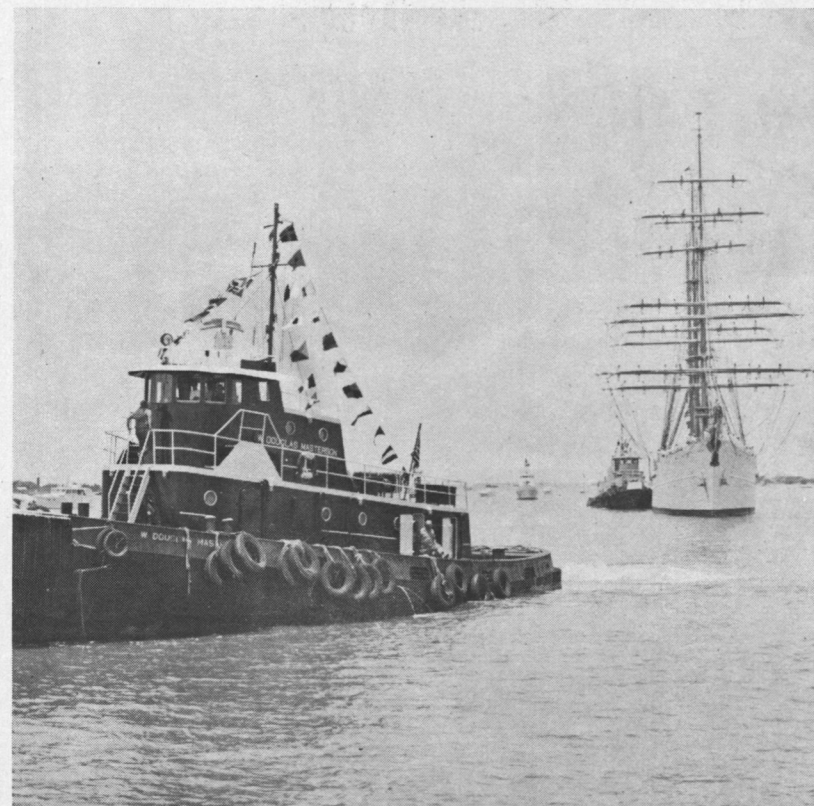
For more than 25 years now Vancouver Shipyards has been building, overhauling and repairing vessels of all sizes ranging from small pleasure craft to large ships and

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**Aschemeyer To Head  
Pacific Operations  
For Prudential-Grace**

Capt. Manfred H.K. Aschemeyer has been named operations manager for Prudential-Grace Lines Pacific Division office. His duties will include terminal operations in loading vessels from Vancouver, British Columbia to Long Beach, Calif. Additionally, he will oversee container maintenance and repair for Prudential-Grace Lines' West Coast service to Latin America.

Captain Aschemeyer graduated from the California Maritime Academy in 1963, and upon graduation sailed extensively on American-flag vessels until assuming a teaching position at the California Maritime Academy in 1969.

Captain Aschemeyer joined Prudential-Grace Lines in 1971 as freight traffic manager for the Lines' Long Beach office, and was promoted to assistant manager of that office last year.

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### Three Large Tankers Added To GATX Fleet

General American Transportation Corp. (GATX) has announced the purchase of three large tankers from Fred Olsen & Co., Ltd., Oslo, Norway, for \$25.5 million in cash.

T.M. Thompson, GATX chairman, said all three ships are presently in service and chartered by major oil companies to transport crude oil. The tankers will be operated by Marine Transport Lines, New York City, a subsidiary of GATX. The three tankers bring Marine Transport Lines' fleet to a total of 44 ships.

Mr. Thompson said the ships, re-named, are the Oswego Patriot of 99,000 tons deadweight capacity and built in Japan in 1965, the Oswego Courage, 91,000 tons and built in England in 1964, and the Oswego Harmony, 88,000 tons, built in Japan in 1966.

GATX provides major financial services worldwide, including the leasing of terminal facilities, ocean vessels, railcars and other capital equipment; construction and real estate financing; insurance and banking, and is a manufacturer of heavy industrial and transportation equipment.



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### San Diego Section Meets Aboard Star Of India



Participating in the meeting aboard the Star of India, left to right: M. Good, secretary-treasurer of the San Diego Section; D. Rodger, vice chairman; K. Reynard, speaker; Comdr. R. Bernhardt, USCG, papers chairman, and G. Uberti, Section chairman.

The February meeting for the San Diego Section of The Society of Naval Architects and Marine Engineers was held aboard the Star of India. The meeting, including a social hour and buffet dinner, was unique in that it was held aboard the oldest merchantman afloat.

Following dinner, Capt. Kenneth D. Reynard, master of the Star of India, gave a very interesting talk, including a slide presentation on the history of the Star of India and the job of restoring her to her present excellent seaworthy condition. After his talk, Captain Reynard gave the San Diego Section a personally guided tour of the ship,

including areas not normally seen by the average tourist. The Star of India has a length (on waterline) of 205 feet, a beam of 35 feet, and a total displacement of 1,197 tons. She was launched November 14, 1863, at Ramsey on the Isle of Man, as an iron-hulled full-rigged bark for service between England and India. After serving a varied career for some 60-odd years, the Star of India was purchased by the Zoological Society of San Diego in 1926 for the purpose of becoming a floating museum. Today, with the restoration on the Star of India complete, she serves as a booming tourist attraction and a source of pride to the people of San Diego.

### Eleven Japanese Banks To Finance New Port In Kingston, Jamaica

The Port Authority of Jamaica completed a \$14-million loan in New York with 11 Japanese banks to finance Phase One of the development of a 180-acre \$45-million transshipment free port in Kingston.

According to Alfred A. Rattray, chairman of the Port Authority of Jamaica and deputy chairman of the Jamaica Industrial Development Corporation (JIDC), the new port facility will have a far-reaching impact on the Jamaican economy.

The port's first two berths will be completed by the first quarter of 1974. Two more berths will be finished by the end of next year, ending the first phase of port development.

The containerized complex will include facilities for free port manufacturing and distribution, as well as facilities for transshipment of cargo to other destinations.

Mr. Rattray said: "We see this as a major step in providing Jamaica with total trade flexibility. We'll be able to handle any type of shipment or transshipment—containerized or conventional. We plan to install a number of 40-ton cranes, and are actively encouraging international industrial and trading firms looking to broaden the scope of their worldwide operations."

The new port will be built ad-

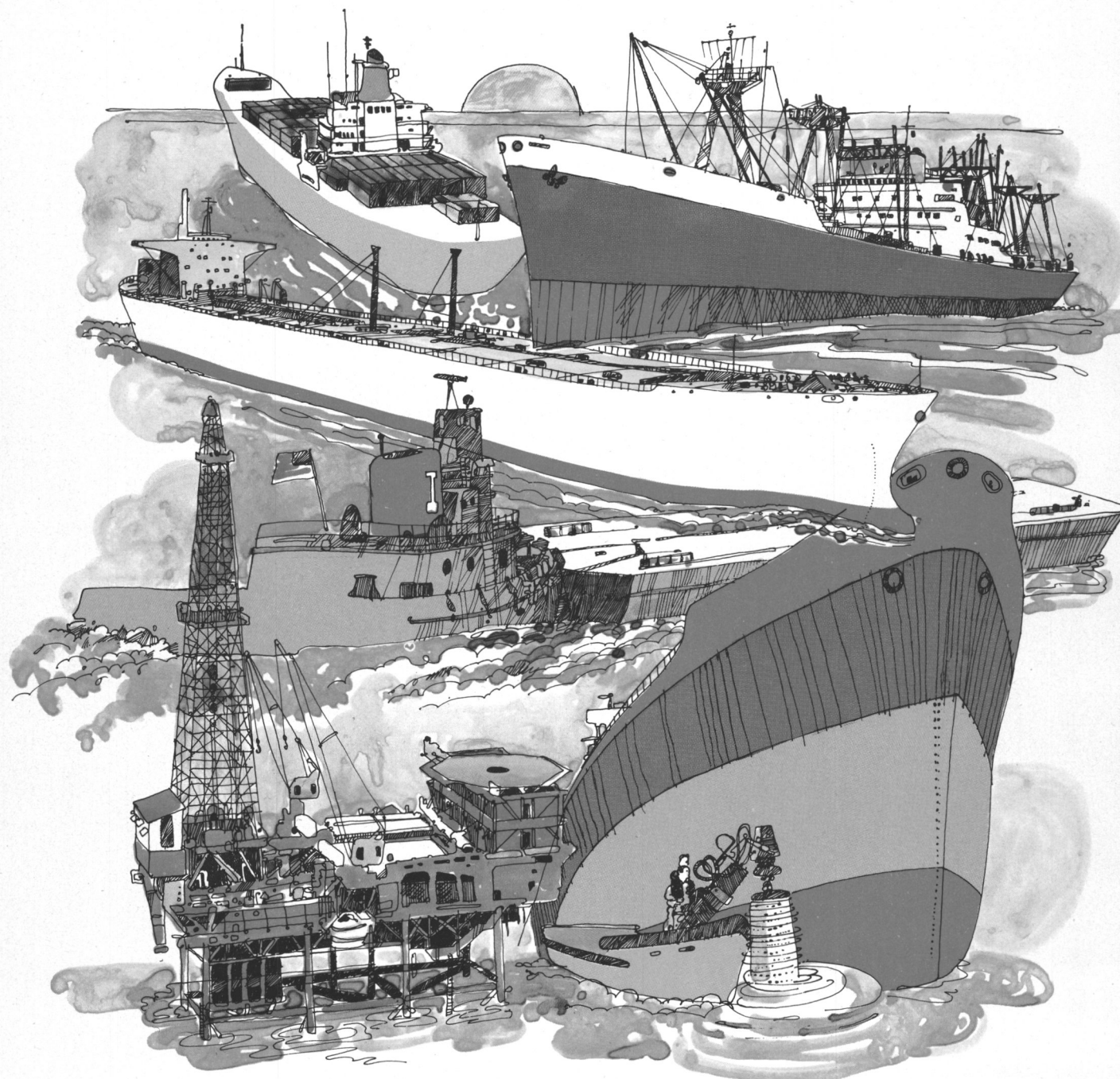
acent to the existing conventional port. Jamaica lies on direct sea lanes between North and South America. Because of its proximity to the Panama Canal, it is ideally suited for East-West trade.

The port will provide Jamaica with a redistribution capability, enabling nations to have their goods reshipped from Kingston to markets in other countries. Jamaica will serve as a centralized distribution center, with large shipments off-loading at the Kingston free port for redistribution in ports throughout the Caribbean, as well as North and South America.

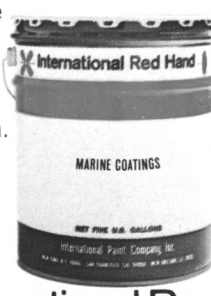
Jamaica's central location has become of great interest to the Japanese. The agreement between the Port Authority of Jamaica and the 11 Japanese banks is the third agreement between the two countries in the past four months. Four Japanese firms recently entered into an agreement with a Jamaican conglomerate to build a \$2.6-million galvanized steel plant. Mitsubishi International made Japan's initial entry into the Caribbean island last November by buying 10 percent of Industrial Commercial Developments Ltd., Jamaica's largest conglomerate.

Money for the project was raised through A.G. Becker & Co., Inc., of Chicago in association with Diawa Securities Co., Inc., a Japanese investment company, and the Nippon Fudosan Bank, Ltd. The agreement was signed in Japan, and the transaction was concluded in New York.

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### Pott Industries Reports Record Sales And Revenues

Pott Industries Inc., St. Louis, Mo., has reported record sales and revenues, net income, and earnings per share for the third consecutive year. Primary earnings in 1972 were \$3.73 per common share as compared to a restated \$3.09 per share for 1971, an increase of 21 percent. Fully diluted earnings were \$3.22 per common share in 1972, against a restated \$2.68 per share in 1971.

Pott consolidated sales and revenues were \$105,747,000 in 1972, which is the first year they have exceeded \$100,000,000. This represents an increase of 25 percent over the \$84,605,000 for 1971. Net income for 1972 was \$7,073,000 as compared to \$5,773,000 in 1971, an increase of 23 percent.

During the fourth quarter of 1972, the company said it had sales and revenues of \$25,451,000, net income of \$2,085,000, and primary earnings of \$1.08 per common share. For the

same period in 1971, Pott had sales and revenues of \$23,808,000, net income of \$1,977,000, and primary earnings of \$1.05 per common share as restated.

Richard P. Conerly, president, said that the 1972 results were accomplished, although the company was generally not permitted to raise its prices above base price levels during the year because of Phase II price controls. He said that under the recently announced Phase III regulations, the company's base period profit margin is higher than its present profit margin, which means that where competitive conditions permit, the company can raise its prices to reflect allowable cost increases so long as it does not exceed its base period profit margin.

Mr. Conerly said the company's marine-oriented businesses contributed about 73 percent of the company's sales and revenues and more than 90 percent of its net income in 1972. He said that conditions continue generally favorable in these businesses, and he expected

they would experience another good year in 1973. He said that while the company's Metal Fabrication and Distribution Group showed a substantial increase in sales in 1972, primarily because of the acquisition of Thermal Supply Inc. in March 1972, the earnings of that group declined for the year. Mr. Conerly attributed this primarily to lack of demand and severe competition that affected some companies within the group, and to the inability under Phase II controls to raise prices to reflect cost increases. He said that while some uncertainties remain, there are indications that conditions for this group will improve.

The company said that its board of directors at its meeting on February 28 authorized capital expenditures of \$27,000,000, of which some \$20,000,000 is expected to be spent in 1973 and the remainder in 1974. It also said that at a later date the company's directors are expected to approve additional capital expenditures for 1974. The company said that included in the authorized capital expenditures were 50 covered hopper barges for its inland waterways operations, which will be built in the company's own shipyards; more than \$10,000,000 for additional marine equipment for Gulf Mississippi Corporation, the company's subsidiary which services the offshore petroleum industry; and more than \$5,000,000 for the expansion and modernization of the company's shipyards.

At its meeting on February 28, the company's board of directors declared a quarterly dividend of 12½ cents per share on the company's common stock, payable March 30, 1973, to stockholders of record on March 16, 1973. The board also declared the regular quarterly dividends of 30 cents per share on the company's convertible preference stock and 25 cents per share on its preferred stock, payable March 30, 1973, to shareholders of record on March 27, 1973.

### Delaware Valley Section, ASNE Hears Technical Paper On 'Interference Control System'



Taking part in the meeting, left to right: J.S. Magrie, mechanical designer, J.K. McNeal, assistant manager R&D, and R.P. Kakad, systems analyst/programmer, authors; J.M. Ballinger, coordinator, and A.C. Brown Sr., Section chairman.

A paper titled "Interference Control System," by J.K. McNeal, R.P. Kakad, and J.S. Magrie, all three of Sun Shipbuilding & Dry Dock Co., Chester, Pa., was presented at the February 22 meeting of the Delaware Valley Section of the American Society of Naval Engineers.

Approximately 25 to 30 members heard this excellent paper which describes a computer-aided ship design system for eliminating interferences between machinery components, piping, ventilation, wireway systems, etc. The presentation included a demonstration of the use of the system, as it was illustrated in the appendix of the paper. A teletype terminal unit was used to communicate with a computer over the telephone network as a typical user might do.

This computer program was developed through Sun Ship's R&D organization for use by its engineering drafting organization to attempt to minimize interference between components in a particular machinery space design.



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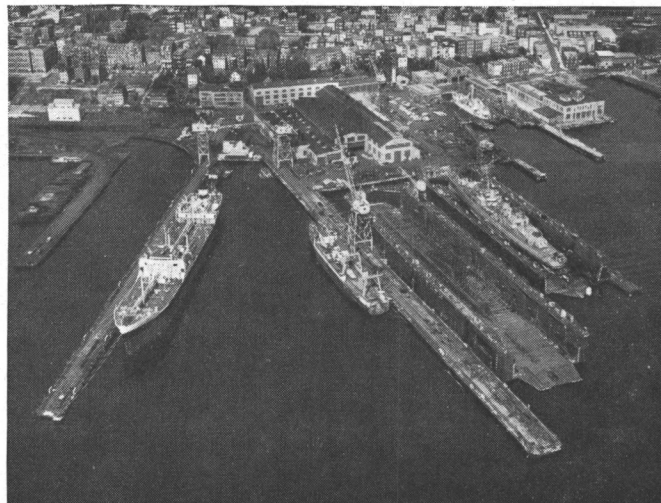
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The progress of every Boston job is closely supervised by the yard's top management team: (l. to r.) Gen. Supt. J. T. Cohan; Gen. Mgr. G. S. Hamilton; Asst. Gen. Mgr. W. J. Vance; and Chief Negotiator G. H. Jordan.

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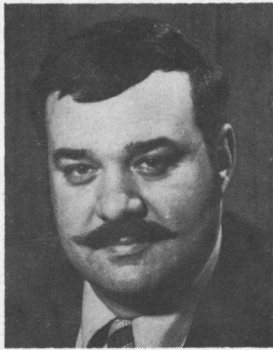


**Bethlehem Shipyards:**  
Dry Docks in Baltimore, New York, Boston, Los Angeles, and San Francisco Harbors, and at Beaumont, Texas.  
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In East Boston Harbor, our Boston Yard maintains the largest and most complete ship repair and conversion plant in New England. With three dry docks (to 20,000 tons' capacity), nearly 4,000 ft of pier berthing space, eight major shops, floating equipment for pier-side and anchorage repairs and tank cleaning—and a skilled, experienced staff—this yard handles the full range of ship repair and reconditioning work. Marine engine overhaul and repair service is one of the yard's specialties.

Boston is also active in non-marine work, handling such items as large steel fabrications, weldments, and piping and machining.

### Vincent Gerard Named Eastern Manager For Georgia Ports Authority



Vincent J. Gerard Jr.

M. Fred Whelan, director of trade development for the Georgia Ports Authority, has announced the appointment of Vincent J. Gerard Jr., as Eastern regional manager for the Authority, to be headquartered in New York.

Mr. Gerard is a native of Rutherford, N.J., and a 1960 graduate of St. Peter's College. Formerly sales manager of the Caribbean Trailer Express, Mr. Gerard's career, in all phases of transportation, dates back to 1962.

As Eastern regional manager, he will direct the sales promotion of the Georgia Ports, which involves the supervision throughout a 14 state area of the G.P.A.'s solicitation of freight moving in international trade.

The New York City office of the Georgia Ports Authority is located in Suite 4645, One World Trade Center, New York, N.Y. 10048.

### N-S-W Corp. Appoints Magnaquip Distributor

Magnaquip Inc., 329 Glen Cove Avenue, Sea Cliff, N.Y. 11579, has been appointed distributor in the northeastern states for the new "Slect-A-Torq" (TM) hydraulic torque wrench manufactured by N-S-W Corporation, 5601 Bintliff, Houston, Texas 77036.

The new power-driven hydraulic wrench is now being used by refineries, petrochemical plants, shipbuilders, utilities and manufacturers for making up and breaking out bolted connections quickly and safely. The Slect-A-Torq (TM) wrench utilizes rugged, compact, conveniently handled tools powered by a self-contained, portable hydraulic unit. Precise amounts of torque from 0 to 44,000 ft. lbs. can be pre-set at the power console, providing even, repeatable torque necessary to obtain absolute tightness in joints having studs up to 6 inches in diameter. Equally high torques can be applied to break out old, corroded nuts otherwise requiring heating, burning or chipping to remove. Tools can be operated remotely from the console under full local control without loss of torque or accuracy. Rigging or frames to support the tools are unnecessary. Operates on compressed air or 220/440 volt 3-phase electric current. Electric motor and controls are explosion-proof.

### BJ Rubber Products Awarded Portland Fender Contract

BJ Rubber Products has been awarded a contract to provide new "Controlled Buckling" style fenders for a container wharf to be built for the Port of Portland, Ore.

The new docking facility is a 1,800-foot-long two-berth container wharf for Terminal 6 of this port facility. Willamette-General of Port-

land is the contractor. Completion date is anticipated by mid-1973.

This new style of BJ® fender is especially designed for use with movable pilings to provide a heavy-duty protective frontal cushion for piers and wharves. Because of their unique buckling design, the fenders can absorb the tremendous energy forces of fully laden ships and barges, yet return to their original shape and setting after the force is removed.

Developed by the BJ Rubber Prod-

ucts group of Byron Jackson Inc., a subsidiary of Borg-Warner Corporation, these fenders utilize a special end plate design U.S. Pat. 3,677,017 for precise control of buckling. They are made of BJ Neolastic™ rubber, compounded to provide high resiliency and superior resistance to wear, abrasion and environmental conditions.

Engineering design on the new wharf was provided by Cornell, Howland, Hayes & Merryfield/Hill of Corvallis, Ore.

# Made

## First of seven 465,000 bbl LNG



### John V. Banks Named General Co-Chairman For AAPA Convention

John V. Banks, president and chief executive officer of National Steel & Shipbuilding Co., San Diego, Calif., was named as general co-chairman for the AAPA National Convention of 1973.

Delegates from all areas of the Western Hemisphere will visit San Diego when the American Associ-

ation of Port Authorities holds its annual meeting there this October.

According to **Dudley D. Williams**, current chairman of the Port Commission, the convention is expected to attract about 800. The AAPA is the largest group of its type in the world, and delegates are expected from Canada and Mexico, as well as coastal Central and South American countries.

Mr. Williams commented: "It is gratifying that men as deeply in-

involved with business and civic duties as **John Banks** can take the time to assist the port in sponsoring what we hope will be a highly successful convention for the Association."

In addition to the appointment of Mr. Banks of National Steel & Shipbuilding, Mr. Williams also announced other selections to the general committee. All are prominent local citizens and have already begun preparations for hosting the

hemisphere-wide convention. In addition to the general co-chairmen, Mr. Williams and Mr. Banks, others on the committee are **Gilbert Fox**, regional vice president and executive officer of the Bank of America; **William R. Hilton**, president, Yellow Cab Company; **Phil F. Franklin**, president, Franklin & Associates Advertising; **Robert N. Gadbois**, executive director, S.D. Convention & Visitors Bureau; **Stephen Cushman**, president, Cushman Tours; **Peter P. Fuller**, general manager, Sheraton-Harbor Island Hotel; **Thomas D. Hamilton Jr.**, Mayor of Chula Vista; **Rolland Mc-Neeley**, Mayor of Coronado; **Bert Stites**, Mayor of Imperial Beach; **Kile Morgan**, Mayor of National City, and **Pete Wilson**, Mayor of San Diego.

## For Japan. Tankers. All with nickel-alloy tanks.



The LNG tanker Gadinia. Built by Les Chartier de L'Atlantique at St. Nazaire, France. She went into service December, 1972. She has the low silhouette characteristic of membrane tankers.

The Gadinia, now in service between Malaysia and Japan, is the first of her class. Chartered by Coldgas Trading, the Gadinia and six new nickel stainless tankers will deliver 1,300,000,000 bbls. of LNG in 20 years. From the Shell Petroleum Company gas fields of Brunei, Malaysia, to Japan, 2500 miles away.

The other six will be in service by 1975. Four with flexible membrane tanks of 304L nickel stainless based on Gazocean design. The other two LNG tankers, based on Gaz-Transport's flat-membrane design, will be made with Invar\*36% nickel-iron alloy.

\*A Registered trademark of Societe Creusot-Loire (IMPHY)

### Cold facts on 304L nickel stainless.

304L has outstanding ductility at room temperature and at -160C (-256F). Plus the toughness essential for the flexible waffle membrane design. 304L provides demonstrated safety and service. 304L nickel stainless has proven itself in corrosive marine atmosphere, aboard ship, and in shipyards. It is readily available, produced by a large number of companies.

### High tightness welds.

304L is easy to weld. And the critical high tightness of the Gadinia's primary barrier demonstrates this excellent weldability. No gas concentrations in the inner barrier space could be detected by highly sensitive monitoring devices after trials.

### Not just the tanks are nickel alloy.

Like many of today's mammoth LNG tankers, the Gadinia has cryogenic piping, pumps, and valves of nickel-containing alloys. Alloys designed and proved to be tough and ductile at cryogenic temperatures. Like the inner tanks, they are highly resistant to corrosion, easily fabricated and welded.

Nickel alloys, right for cryogenics. For your own LNG tanker, of course, you also could choose 9% nickel steel. It all depends on your design requirements. INCO will be happy to supply you with more information on nickel-containing alloys for cryogenic service. Simply write Department #14-73, The International Nickel Company, Inc., One New York Plaza, New York, New York 10004.

## INCO

THE INTERNATIONAL NICKEL COMPANY, INC., NEW YORK

In Canada, The International Nickel Company of Canada, Limited/In England, International Nickel Limited, Thames House, Millbank, London SW1 P4QF, England.



John V. Banks

The convention will be headquartered in the Sheraton-Harbor Island Hotel, with activities beginning on Sunday, October 14, and continuing the remainder of that week.

The American Association of Port Authorities includes in its membership all major ports in the Western Hemisphere. Basic responsibilities of the Association are keeping the membership informed of legislative activities and industrial developments throughout the two continents.

### Seatrains Lines Names James J. Connolly VP

Seatrains Lines, Inc. has appointed **James J. Connolly** as vice president, finance and chief financial officer of Seatrain Lines, Inc., its was announced by **Howard Pack**, president. Mr. Connolly was formerly executive vice president, finance and director of Prudential-Grace Lines, Inc., and was previously senior vice president, finance of the U.S. Lines, Inc.

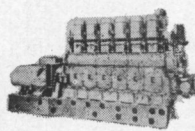
The company also named **Charles J. Hess** a corporate vice president, in addition to his duties as treasurer. Mr. Hess has been associated with the company since 1954.

Mr. Connolly, a certified public accountant, was associated with Price Waterhouse & Co. in New York for 10 years. He sailed in the merchant marine for five years, and also served in the submarine service of the U.S. Navy.

Mr. Connolly is a graduate of the University of Miami with a degree cum laude in finance and accounting. He is also a graduate of the school ship S/S John W. Brown.

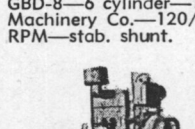
## DIESEL GENERATOR SETS

1



**250 KW DIESEL GENERATOR SET**  
ENGINE: Enterprise 12 x 15 DSG-6-4 cyl—450 RPM crank No. 50J. GENERATOR: Westinghouse 250 KW—120/240 VDC—1040 amps—450 RPM. Typical serial No. 35-10P-913. Complete with switch gear.

2



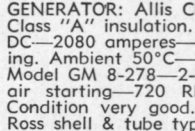
**EMERGENCY GENERATOR SUPERIOR 75KW 120/240 VOLT D.C. DIESEL GENERATOR SET**  
With switchgear. ENGINE: Radiator cooled Superior GBD-8-6 cylinder—1200 RPM. GENERATOR: Electric Machinery Co.—120/240 volts DC—316 amps—1200 RPM—stab. shunt.

3



**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.

4



**500 KW—120/240 VOLT DC DIESEL GENERATOR SET EQUAL TO NEW**  
GENERATOR: Allis Chalmers—Compound wound. Has Class "A" insulation. Output 500 KW—120/240 volts DC—2080 amperes—720 RPM—drip-proof—self-cooling. Ambient 50°C—temperature rise 40°C. ENGINE: Model GM 8-27B—2-cycle—Vee type—8½x10½—air starting—720 RPM. Complete with switchgear. Condition very good. Still aboard naval vessel. Has Ross shell & tube type lube oil & raw coolers—temp. control valve—shock mounts.

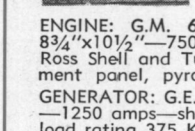
5



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

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

6

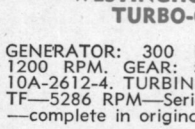


**300 KW DIESEL GENERATOR SET**

ENGINE: G.M. 6-27B—6-cylinder—2 cycle—8½x10½—750 RPM—with oil and water. Ross Shell and Tube Heat Exchangers. Instrument panel, pyrometer, etc. Vibro Isolators. GENERATOR: G.E. 300 KW—120/240 volts DC—1250 amps—shunt wound—continuous overload rating 375 KW—2 hours—55° Weight of unit approximately 26,000 pounds. Complete with shock mounts. Unit 13'2" long, 64" wide, 8' high.

## TURBO GENERATOR SETS

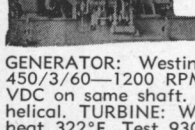
7



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

GENERATOR: 300 KW—240 VDC—1250 amps—1200 RPM. GEAR: 5286/1200—frame 8x15—serial 10A-2612-4. TURBINE: Frame C-325—225 PSI—397 TF—5286 RPM—Serial 10-A-2611-4. Wt. 16,700 lbs.—complete in original factory crate.

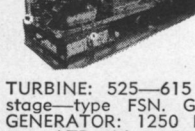
8



**WESTINGHOUSE 440/3/60 200 KW UNIT**

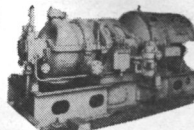
GENERATOR: Westinghouse 200 KW—250 KVA—450/3/60—1200 RPM—80% PF—with 40 KW—120 VDC on same shaft. GEAR: 9989/1200 RPM—double helical. TURBINE: Westinghouse—540 PSI—superheat 322°F. Test 930 PSI 800°TT. Also operate 615 PSI—850°TT.

9



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

TURBINE: 525—615 PSI—850°TT—7938 RPM—10-stage—type F31. GEAR: Single helix—7938/3600. GENERATOR: 1250 KW—450/3/60/3600—80 PF—type ATB with surface air cooler. Overload 25%—2 hours—1563 KW.



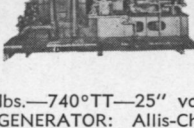
**UNUSED 300 KW G.E. 120/240 VOLT DC TURBO-GENERATOR SET**

10

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

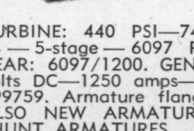
## 6 EQUAL-TO-NEW LATE TYPE 500 KW SHIPS SERVICE TURBO GENERATORS

11



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

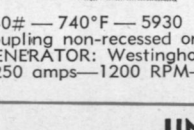
12



**AP2 VICTORY WORTHINGTON-MOORE CROCKER-WHEELER 300 KW UNIT**

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

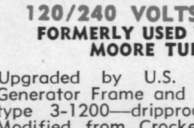
13



**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.

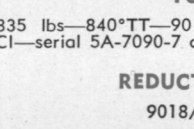
14



**UNUSED CROCKER-WHEELER 500 KW GENERATOR ENDS ONLY 120/240 VOLTS D.C.—1200 R.P.M. FORMERLY USED WITH WORTHINGTON-MOORE TURBINES & GEARS**

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

15



**FOR USE ON NEWPORT NEWS VESSELS—HULLS 480 to 541 CLASS—SIMILAR TO ESSO LIMA CLASS**

**400 KW WESTINGHOUSE TURBO GENERATOR**

TURBINE 835 lbs—840°TT—9018 RPM—instr. book 1430 CI—serial 5A-7090-7 and 5A-7090-8—6-stage.

REDUCTION GEAR 9018/1200 RPM

A.C. GENERATOR 400 KW—450/3/60/1200 RPM—rise 40°C—100% and 58°C—125%. In book 5442. Serial 35-35P792 and 45-35P792.

EXCITER 5.5 kW—125 volts—shunt wound—frame 6-83—44 amps.

KNOWN 'ROUND THE WORLD

**THE BOS**

313 E. BALTIMORE

Main Office: (301) 421-1111

## TURBINES & ROTORS

### MAIN PROPULSION

16

**BETH CLASS SERIES TURBINE—13,600 H.P.**

SPARROWS POINT 4400-4500 SERIES QUINCY 1600 SERIES HULLS

**28,000 GT/29,000 GT ONE H.P. TURBINE—BUILT 1949 600 LBS.—860°F—SHAFT HORSEPOWER 6150 AT 4773 RPM—SERIAL #1630-H-4**

17

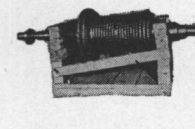
**6690 H.P. HIGH PRESSURE 7-STAGE TURBINE**

ORIGINALLY BUILT FOR ESSO CHRISTOBOL—NEWPORT NEWS 6690 H.P. AT 7862 RPM PRESSURE 835 LBS GAUGE TEMP. 840°F—SERIAL 83343

### FOR EMERGENCY USE

In an emergency, this HP turbine could substitute for Newport News built HP with piping and foundation change.

18



**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.

### 8500 H.P. G.E. TURBINE

19

G.E. Instruction book GE116263—from ex-Navy Victory. L.P.—8-stage—3509 RPM—77943 H.P.—8-stage—6159 RPM—77942.

WILL INTERCHANGE WITH INGALLS C3 HULL—442 CLASS AND SUN-BUILT C4 VESSELS

20

**NEW L.P. BLADE RINGS for large 8500 H.P. Victory**  
Joshua Hendy Westinghouse

21

**SPECIAL! 1 WESTINGHOUSE COMPLETE T-2 MAIN TURBINE**

PROFILE (UNSHROUDED) 6600 HP—435 PSI—750°F 28" VAC.—3720 RPM

Instruction Book 6893—Serial #2A-9361-21. The turbine rotor blades, stationary blading, diaphragms and nozzles are all in unusually good condition.

IMMEDIATE DELIVERY—WITH ABS

# ON METALS CO.

RE ST. • BALTIMORE, MD. 21202

39-1900 Marine Dept.: (301) 355-5050

**22**

**NEW 8500 H.P. G.E. TURBINES**  
**H.P. & L.P.**  
 L.P.—8-stage—3509 RPM  
 H.P.—8-stage—6159 RPM  
 Interchange Ingalls C3

**23**

**T2-SE-A1 MAIN PROPULSION ROTOR — G.E.**  
 Large Schenectady — serial 77418—reconditioned Bethlehem Steel 1970—all stages magnafuxed.

**24**

**2 COMPLETE T-2 G.E. TURBINES**  
 #61818 and #61834—large Lynn—all stages magnafuxed.  
**ROTOR WILL INTERCHANGE WITH ELLIOTT MAIN TURBINE**

**25**

**9500 H.P. G.E. — C-3 OR VICTORY**  
 H.P.—8-stage—6159 RPM—serial 62043  
 L.P.—8-stage—3509 RPM—serial 62042  
 G.E.I. 16263

**26**

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

**27**

**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 throttle valve

**28**

**G.E. 8500 H.P. REDUCTION GEAR FOR LARGE AP3 VICTORY & C3**  
 MD-48A—8500 HP—6159/3509/763/85 RPM.

**29**

**ALSO 6000 H.P. VICTORY AP2 REDUCTION GEAR**  
 Westinghouse 4A-1640.

**30**

**T-2 TANKER UNUSED—4 UNITS AVAILABLE AUX. G.E. TURBO GEN. ROTORS**  
 DORV — 325M — 5645 RPM—for 525 KW G.E.

## PUMPS

**31**

**INGERSOLL-RAND BRONZE CARGO PUMPS ONLY**

Bronze Ingersoll-Rand 10GT cargo pumps only—without turbine. 4500 GPM at 125 lbs—2-stage—14"x12".

## CARGO PUMP TURBINES

**32**

**WHITON**  
 Direct drive—type BDS—500 HP—835 lbs at 0° superheat. Exhaust 12" Hg. Will operate at 455 PSIG—599° TT—4 PSI exhaust. Can be used with 10GT Ingersoll-Rand pumps.

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

**33**

**COFFIN TYPE D.E.B. TURBO FEED PUMP**

CAPACITY: 350 GPM—2600' total head. Steam 845 PSIG—temp. 575°F TT—exhaust 42 PSIG—HP 396—RPM 8030—rated design 10,000 RPM. Serial #51-143-37. Suitable for Tankers 25,000 GT and up.

**34**

**UNUSED DELAVAL 24.5 H.P. LUBE OIL PUMP**  
 Turbine-driven main lubricating oil pumps—vertical rotary with horizontal worm geared turbine drive. 575± Steam pressure—5000 RPM—15± back pressure. GEAR: 5000/1035 RPM. PUMP: 550 GPM at 50 PSI—suction lift 10.0'. Suitable for Fletcher Class Destroyer. DD 445 Class.

**35**

**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. DD 445 Class Fletcher.

**36**

**FIRE & BUTTERWORTH PUMP**  
 Warren Pump—450 gallons Per Minute—449 ft—71 HP—type 3-TL-2 TURBINE: 71 HP—545 PSI—540° TT—15 lbs G exhaust—3500 RPM. Reconditioned.

**37**

**NEW TURBINE DRIVEN FIRE AND GENERAL SERVICE PUMP**  
 Allis-Chalmers 6x5 pump, type SKH—1200 GPM—125 PSI—3500 RPM. Coppus turbine type TF-22-2½—3500 RPM. 273±—50° superheat.

**38**

**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.

**39**

**UNUSED DD445 CLASS WORTHINGTON TURBINE-DRIVEN FEED PUMP**  
 Worthington—drawing SL-5043—425 GPM—1675' total dynamic head, 5000 RPM—3-stage—double suction. Flanged 4½" inlet—4" outlet. Powered by Sturtevant steam turbine—282 HP—590 PSI. For Fletcher DD-445 Class Destroyers.

**40**

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

## MISCELLANEOUS

**41**

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

**42**

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

**43**

**DUPLEX MAGNETIC OIL STRAINERS**  
 4"—5"—6" sizes immediately available.

**44**

**BETHLEHEM LOW-PRESSURE SINGLE EFFECT DISTILLING UNITS WITH AUTOMATIC FEED WATER CONTROL**  
 Model S-1-10E—10,000 gallons per day clean tube capacity. Tube nest steam pressure 5 PSI. With brine pump and distillate pump. Units have Weir automatic feedwater controls—salinity indicator, etc.

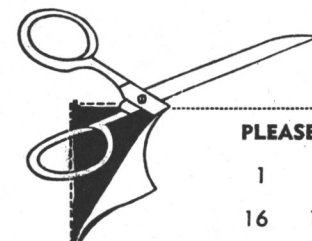
**45**

**UNUSED 1135 SQ. FT. C.H. WHEELER CONDENSER**  
 20" Ex. inlet—5½" Cu-Ni tubes—with or without air ejector.

**46**

**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 & Fawcett clutch. Port and starboard. Gear output 400 RPM. Suitable for Dredge Pumps.

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



PLEASE SEND INFORMATION ON THE FOLLOWING: (Please circle items) 4/1/73

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														

NAME..... COMPANY.....  
 ADDRESS..... POSITION..... PHONE.....  
 CITY..... ZONE..... STATE.....

### Colt Industries Appoints Nidenberg



Herbert W. Nidenberg

Herbert W. Nidenberg has joined Colt Industries as vice president and general manager of the Colt Industries' Business Resource Center located in Beloit, Wis. This activity will supplement the present technology skills of the predecessor organization, the Beloit Research Center. The appointment was announced by Philip Wallach, group vice president for Colt Industries.

"In his new position, Mr. Nidenberg will be primarily concerned with the investigation of new products and business expansion. Mr. Nidenberg's experience and success in a variety of industrial and business positions are particularly appropriate to the organization's new role," Mr. Wallach commented.

Prior to joining Colt Industries, Mr. Nidenberg was associated with the Burndy Corporation in Norwalk, Conn., where he was manager of manufacturing, and held key management positions in equipment development and military product operations. He holds an engineering degree from Polytechnic Institute of Brooklyn, and a master's degree in management from Rensselaer Polytechnic Institute.

Mr. Nidenberg has also held various executive positions with General Electric Company and Consolidated Diesel Electric Company. He was also a co-founder of United Fleximation, a company organized to engineer, manufacture and market an industrial "robot" concept.

### Drew Promotes Burke, Johnson And Morris

Dr. E.A. Savinelli, president, Drew Chemical Corporation, 701 Jefferson Road, Parsippany, N.J., has announced the following promotions: **Raymond M. Burke**, appointed vice president and general manager of the Marine Division; **Richard C. Johnson**, appointed assistant vice president and manager, International Operations, and **Frederick Morris**, appointed assistant vice president, director of marine sales, Europe.

Mr. Burke is a graduate of St. Peter's College, where he received his bachelor of science degree in chemistry, and Stevens Institute of Technology, where he was awarded his master of science degree in marketing. Mr. Burke joined Drew

in 1962 as director of market research. In his new position, he will have complete profit and loss responsibility for the Marine Division on a worldwide basis. He will continue to report to **A.G. Giudice**.

Mr. Johnson is a graduate of Rensselaer Polytechnic Institute with a degree in chemical engineering and holds a master's degree in business administration from Harvard Graduate School. Mr. Johnson joined Drew in 1967 and was formerly

director of Drew Chemical Nederland B.V., based in Rotterdam. In his new position, he will be responsible for all the administrative functions of Drew subsidiaries. He will report directly to Mr. Giudice.

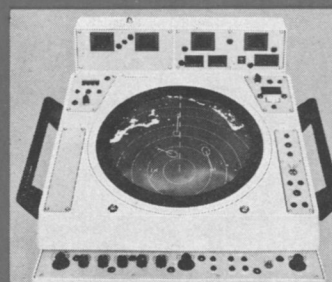
Mr. Morris will be responsible for coordinating all the Marine Division sales and development activities in the United Kingdom, Europe and Africa. Mr. Morris joined Drew in 1964 and was formerly

director of Drew Chemical (U.K.) Ltd., based in London. He has an extensive background in the marine industry and holds a Certificate in Competency for Steam and Motor Vessels issued by the British Board of Trade.

Drew Chemical Corporation, a subsidiary of United States Filter Corporation, New York, is a major supplier of products and services for water management and specialty chemicals.

# Sperry puts it all together.

## Anti-Collision



**COLLISION AVOIDANCE SYSTEM**  
Potential collisions, safe courses shown immediately. Uses live radar presentation with computer-generated avoidance information.

## COLLISION THREAT ASSESSMENT

Low-cost attachment for standard radar, with two operational modes—autoplot or Sperry's unique Threat Assessment plot.



## Doppler Sonar Systems

### DOPPLER DOCKING

High resolution display of vessel movement relative to the bottom in fore/aft and port/starboard directions, both bow and stern to enhance safe docking of large vessels.



### DOPPLER SPEED LOG

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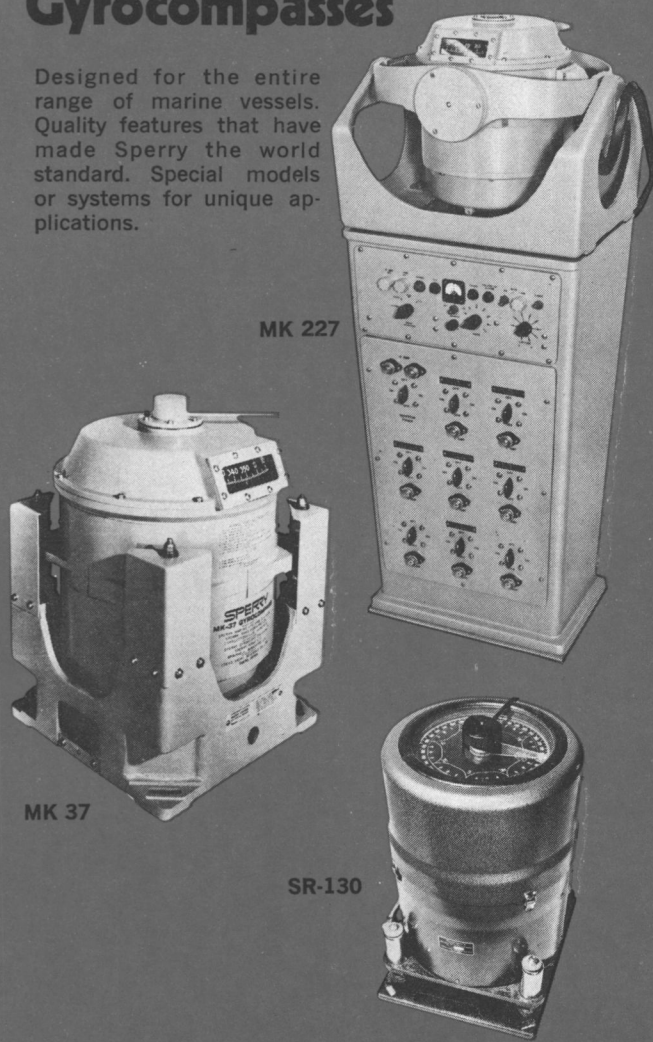
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Designed for the entire range of marine vessels. Quality features that have made Sperry the world standard. Special models or systems for unique applications.



### E.M. Hood Reports Record Backlog For U.S. Shipyards

The backlog of work in American shipyards is today at a record peacetime level.

Included in a report at the 52nd Annual Meeting of the Shipbuilders Council of America, in Washington, D.C., on March 7, Council president **Edwin M. Hood** summarized the pattern of activity in 1972 as follows:

"More than \$3 billion in new contracts for the construction of merchant and naval vessels were placed with American shipyards in 1972, and at year end, the combined industry backlog was estimated at \$5.7 billion—a record peacetime high. The aggregate value of shipbuilding and ship repairing performed by privately owned and commercially operated shipyards during 1972 approximated \$3 billion. Another \$1.1 billion in U.S. Navy shipwork was done in

Government-owned and operated naval shipyards."

However, he cautioned, "these satisfying developments do not necessarily suggest an enduring boom. Requirements for new ships, and thus prospects for shipbuilding in the immediate years ahead, are increasingly difficult to forecast, and will be largely determined by capital costs, cargo movements, national policies, budgetary considerations, labor-management stability, shipper confidence in

U.S.-flag shipping, and investor interest."

With regard to prospects for the construction of tankers for the importation of oil and liquefied natural gas to supplement domestic resources, Mr. Hood spoke of "related problems": "The scope of national policy; the adequacy of existing port facilities; the feasibility of offshore deep-water terminals; the effects of pollution control, and the share to be transported in U.S.-flag U.S.-built vessels. Answers may not be easy, nor prompt, just as a final decision pertaining to the Trans-Alaskan Pipeline System (TAPS) has been virtually in a comatose state for more than two years."

Meanwhile, he said: "The economics of shipbuilding and ship repairing in the United States are undergoing change. The impact of inflation is universal—costs for wages, materials and services continue upward. Profits continue to leave much to be desired. Controversy continues to surround the final pricing of many contracts. In addition, the continual impact of new occupational health and safety requirements, shipyard workmen's compensation rates and environmental standards is expected to further distort the differential between U.S. and foreign costs."

"Despite ponderables and imponderables in the present situation," Mr. Hood added, "U.S. shipbuilders nonetheless remain optimistic about the future. Investments in capital improvements have continued, and more are planned. Improvements in management, marketing, personnel and production techniques have been diligently pursued, and gains in productivity have been accomplished."

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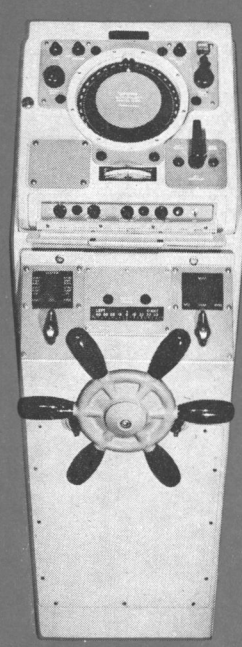
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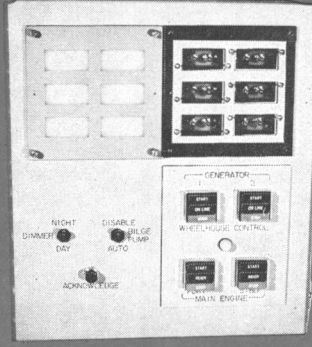
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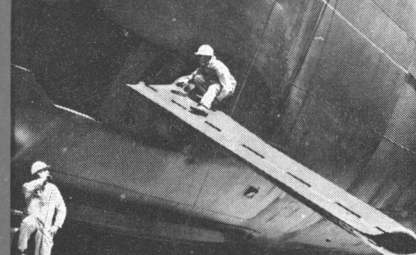
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### Commercial Transport Affiliate Of ACBL Elects Carl Olson VP

The election of **Carl Olson** as vice president of Commercial Transport Corporation, an affiliate of American Commercial Barge Line Company, has been announced at the companies' general offices in Jeffersonville, Ind.

The announcement was made by **Floyd H. Blaske**, chief executive officer of the Inland Waterways Services Division of Texas Gas Transmission Corporation, of which American Commercial Barge Line Company (ACBL) and Commercial Transport Corporation (CTC) are parts.

As vice president, Mr. Olson has executive responsibility for CTC's dry bulk sales. He formerly was director of dry bulk sales. The dry bulk sales operation has to do with producing for his company affreightment of dry bulk commodities other than coal and grain. Included are ores, minerals, fertilizers and other commodities.

A native of Marion, Ill., Mr. Olson has been with ACBL and CTC the last two years. He has been engaged in barging operations since 1956, first with A.L. Mechling Barge Line, and from 1967 until 1971 with Mid Valley Towing Company.



**CADSHIP Graphics Terminal  
Cuts Costs Of Computer  
Designed Ships' Hulls**

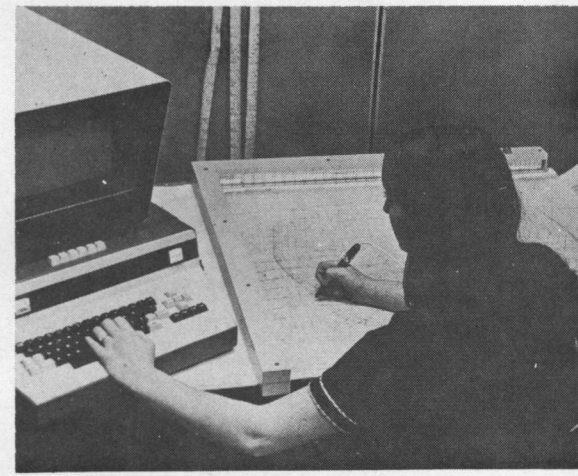
CADCOM, Inc., of Annapolis, Md., recently delivered the first of its unique CADSHIP Graphics Terminals to the U.S. Coast Guard. CADSHIP is considered revolutionary because it is the first low-cost interactive computer graphics terminal designed specifically for the marine industry; it reduces the cost of ship design, while saving time and permitting the designer to investigate many more alternatives than ever before.

CADSHIP is used to digitize the body plan of a ship hull and to transmit all of this information into a computer for analysis and design. A designer simply traces lines from a

drawing describing the hull geometry, receives a pictorial representation of his tracing on a TV-like graphics display, and sends the data to a computer. The computer now "understands" the exact physical shape and form of the ship and performs all of the standard hydrostatic, structural, and stability calculations required to assess the integrity of the design.

The Coast Guard version of CADSHIP—officially designated "Ship Review System (SRS)"—is being used to review designs submitted for certification by shipbuilders. The SRS acts as a graphics input terminal to the U.S. Navy's Ship Hull Characteristics Program (SHCP), which is available on the USCG's CDC-3300 computer. After the hull form is transmitted from SRS, the program computes the characteristics which a naval

architect requires to analyze a ship design—hydrostatic properties, shear and bending moment as functions of loading and assumed wave profile, floodable length, intact stability, and damage stability.



CADCOM's CADSHIP Graphics Terminal.

At a recent dedication ceremony of the Ship Review System, Rear Adm. W.F. Rea III, Chief of the Office of Merchant Marine Safety, stated that the system "enables a Coast Guard naval architect to input a ship's offsets . . . and review the resulting hull characteristics in approximately two hours." He noted that prior to CADCOM's installation of the SRS, "the field offices had to wait about two weeks for receipt of data." Admiral Rea further stated that the computer costs have also been greatly reduced: "The average (computer) cost per ship review was \$300, but now the cost has been reduced to below \$100."

Dr. John C. Gebhardt, CADCOM's director of technology, announced that the design version of CADSHIP is now available to the marine industry, along with the SHCP program. The system can be connected to a customer's own computer or to a time-sharing service. CADCOM's president, Dr. Charles O. Heller, stated that the CADSHIP Graphics Terminal is presently being marketed to the international shipbuilding community, and discussions are in progress with various shipbuilders, naval architecture firms, classification societies, and Government agencies.

For more detailed information write to: CADCOM, Incorporated, 2024 West Street, Annapolis, Md. 21401.

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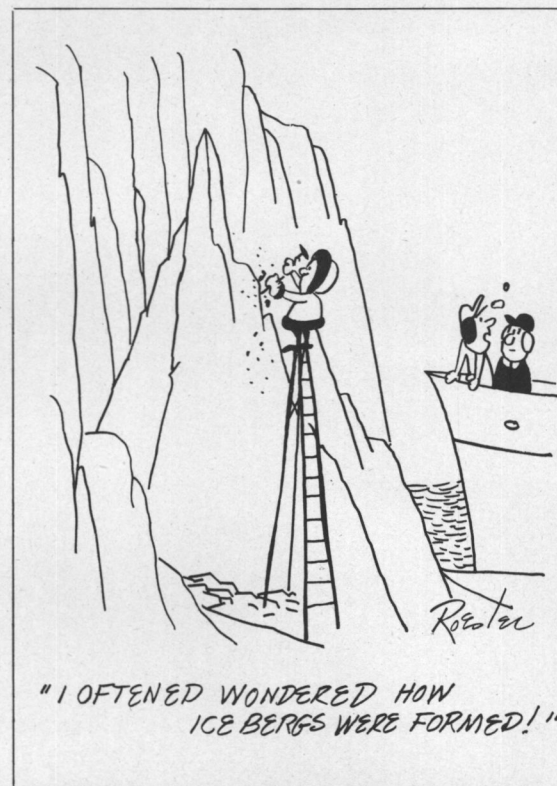


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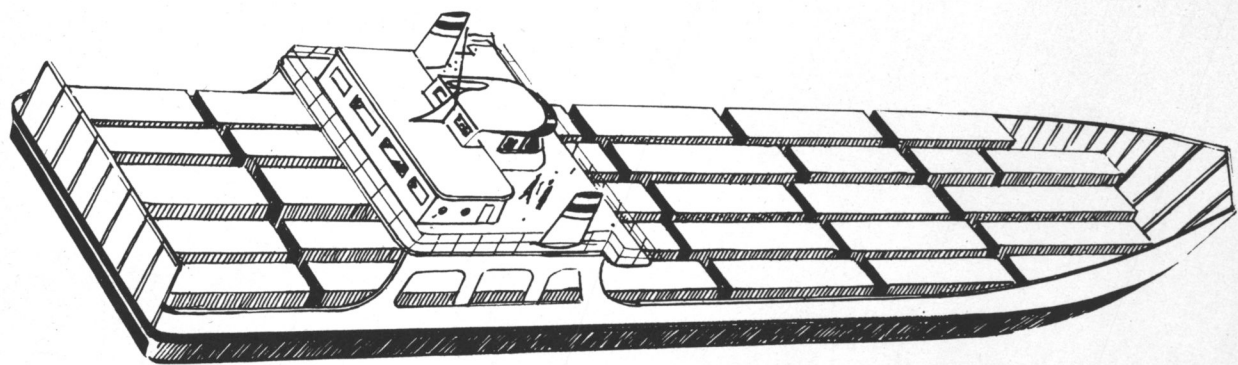


Maritime Reporter/Engineering News

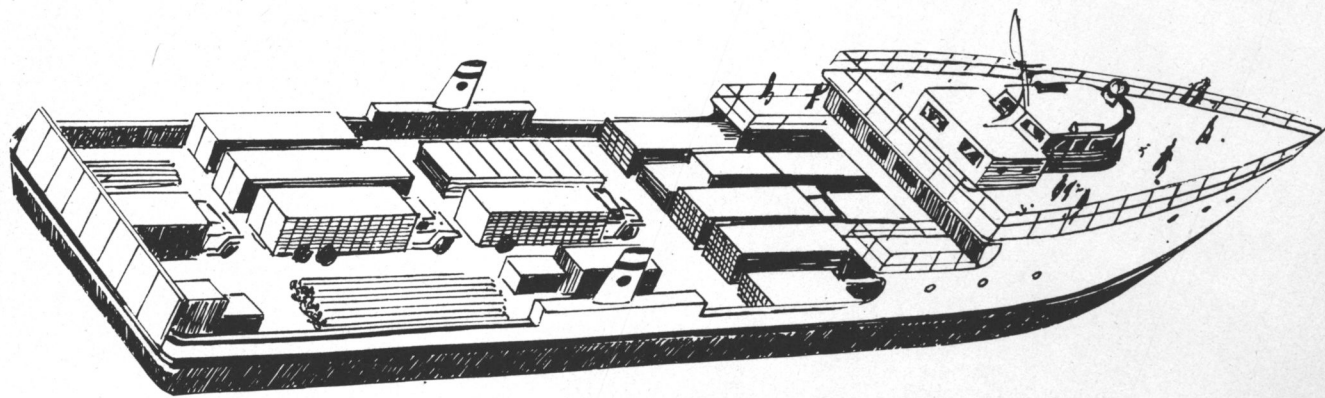


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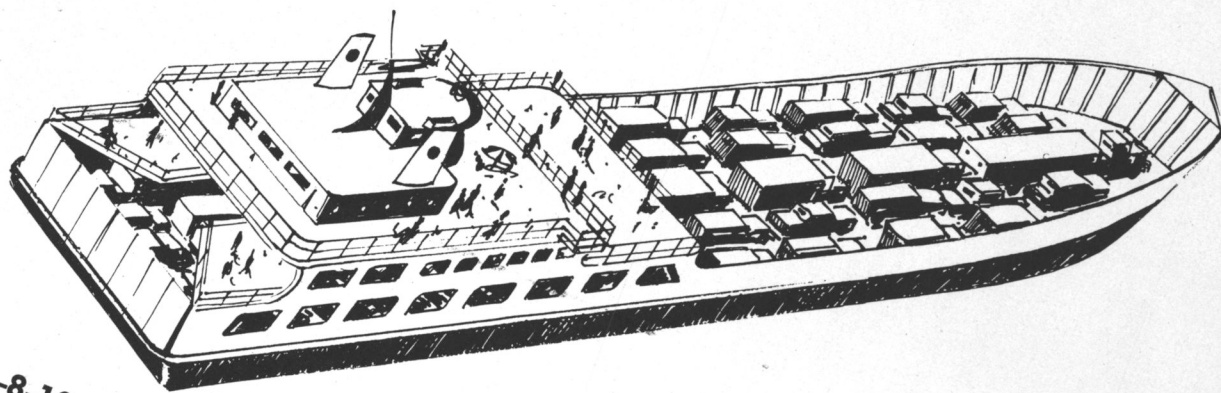
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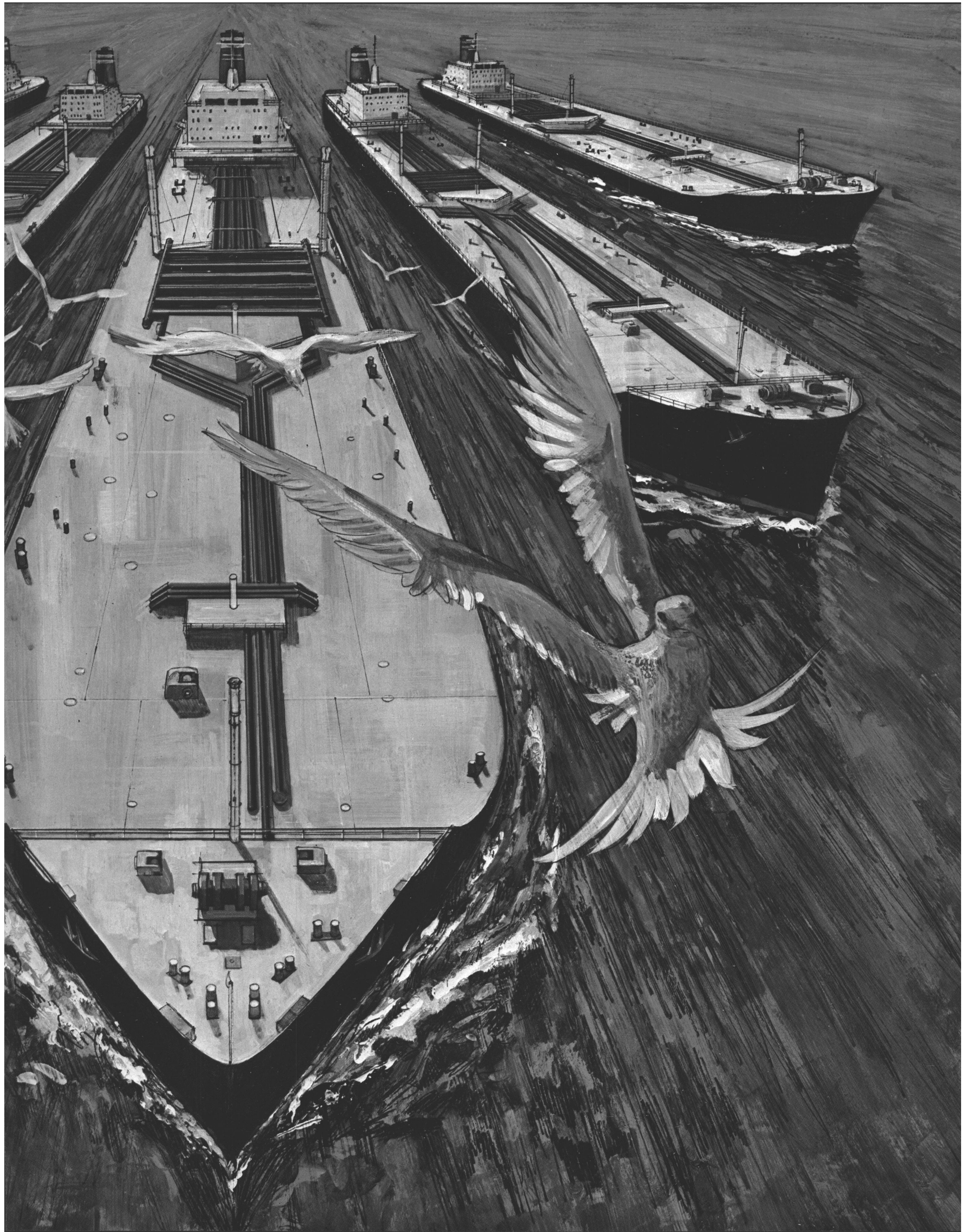
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# Ducted Propeller Applications

## Current Investigations Into Ducted Propellers Indicate A Worthwhile Potential Performance Advantage For A Broad Range Of Ships

Leonard Meyerhoff, John G. Hill and Stanley Meyerhoff\*

The ducted propeller is now understood to have unique advantages. Appreciable power reductions are seen in the literature, indicating that an important advance for marine-propulsor design may be developing. Because numerous ducted-propeller configurations exist, each with a possibly different hull interaction, there is increasing suspicion that the full potential has not been explored.

In recent years ducted propellers have been installed on several large commercial ships, naval destroyers, and even torpedoes—and numerous large commercial installations are now under construction or being planned.

As seen from Table 1, the ducted-propeller applications must surely rank high among the largest overall propulsor sizes in use today. General reasons for these installations include power reductions, smaller propeller size, the opportunity which the duct affords for propulsor flow control, better utilization of wake inflow, improved blade loading, and the potential for reducing propeller-excited vibration.

The highest commercial ship speed today with a ducted propeller is about 17 knots. The highest speed considered for the ducted propeller in this paper is 33 knots. It is the authors' opinion that use at even higher speeds will be possible with excellent performance.

Superior performance with good economic benefits is an important motive today for the ducted-propeller commercial-ship application. For example, published trial data for the 215,000-dwt tanker Golar Nichu with a ducted propeller shows about a 0.35-knot speed increase compared with a sistership having a conventional open propeller. The propeller diameter is 25.6 feet for this ducted system compared with the 26.9 feet of the corresponding open propeller. Published reports indicate reduced vibration and improved maneuverability. A recent investigation shows improved stopping ability compared with an open screw on a model 100,000-dwt single-screw tanker. A power saving of 5 to 10 percent is anticipated for the 131,450-dwt tanker Kronoland.

\*Mr. L. Meyerhoff, research director, and Mr. S. Meyerhoff, engineering manager, both with Eastern Research Group of New York, N.Y., and Mr. Hill, marine engineer and naval architect in private consulting practice, presented the paper abstracted here before the Annual Meeting of The Society of Naval Architects and Marine Engineers.

Table 1—Survey of Some Ducted-Propeller Installations

Type and Name	DWT	SHP	Speed Knots	Duct Dia. Ft.	Inflow Pattern
Destroyer USS Witek	3,520	60,000	35	9.2	decelerating
Destroyer Escort USS Glover	3,500	35,000	27	13.0	decelerating
Cargo Ship Komsomol	8,260	5,200	16.2	15.0	accelerating
Bulk Carrier Ralph Misener	25,000	9,600	14	21.3	accelerating
Tanker Kronoland	131,450	25,000	16.7	27.3	accelerating
Tanker Golar Nichu	215,000	30,000	16.6	30.8	accelerating
Torpedo U.S. Mark 48	1.6	low	high	1.75	decelerating

Reports of large power reductions (higher propulsive coefficients), mostly measured under laboratory conditions, are beginning to dominate the growing ducted-propeller literature.

Naval ducted-propeller applications may have other priorities, such as quietness, lower noise related to vibration, and delay of blading cavitation; even here, however, good economic performance would also be needed.

The present use of the large ducted propeller is noted mainly for high-block-coefficient ships which have high wakes. This places the ducted propeller in an operating regime where it has always shown advantages. The high wakes of such ships lead to a reduced efficiency for the open propellers; to obtain an improvement requires large open-propeller diameters and low rpm. Consideration of open-propeller design for "megaton" tankers shows the same tendencies, where diameters approaching 40 feet are predicted with triple screws and low rpms.

For high-speed containerhips, concern arises regarding draft limits on the open propeller diameter and its ability to absorb increasing power per shaft. By using a duct to modify the inflow, possibilities occur to permit increased power absorption for a given diameter as well as improved blading cavitation delay.

It is worth noting that the use of a duct offers the ancillary opportunity of ship maneuverability control by deflecting the propeller jet. Substantial control forces are possible. One alternative to the steering duct is, possibly, the use of a fixed duct with moveable jet deflectors, forming part of the duct contour in the undeflected position. Similarly, a ship pitch-quenching possibility exists for use in rough seas by means of appropriately oriented jet deflectors driven cyclically in a special relation to the ship pitching motion.

These diverse considerations may be viewed as interesting developments for a propulsor historically applied to low-speed towing. The resurgence of ducted-propeller technology is gradually furnishing informative test data and an emerging ability to calculate flows by new computer methods.

Despite increasing attention, much of the available ducted propeller literature is concerned with open-water test data. However, wake operation is of prime interest and the literature offers little design selection aid and does not indicate whether the known ducted-propeller performance gains are the best obtainable.

Hull-propulsor interaction must surely be influenced differently by inflow patterns ranging between acceleration and deceleration. For example, if the inflow is not accelerated, thrust deduction should be attenuated, leading to a hull efficiency increase and, presumably, a large power reduction.

It is therefore reasonable to ask whether the ducted-propeller potential is known for modern ships. Toward this goal the paper introduces Type-1 and Type-2 ducted propellers, which seem "generic" for wake use.

Type 1 (accelerating inflow). Flow rate and duct inlet diameter are the same as a corresponding open propeller to permit use of available open-propeller wake-fraction and thrust-deduction values.

Type 2 (unchanging inflow). Flow rate and duct inlet diameter are obtained from nominal wake-fraction values.

Considerable information on wake and thrust-deduction coefficients are available from open-propeller experience. A similar use of this information would be advantageous for guiding predictions of ducted-propeller performance possibilities.

Ducted propellers can be designed to produce a range of inflows between acceleration and deceleration. Consider from within this range two median systems. One system is an accelerating type with an inflow identical to a corresponding open propeller for the same ship; the other is the unchanging inflow type which leaves the nominal inflow wake unaltered, as if the ducted propeller was not present.

This paper predicts the performance for a wide range of hull forms and speeds. Single- and multiple-shaft cases are considered. Available towing-tank data furnish the basic hull characteristics for the studies. Propulsive coefficients ehp/dhp are estimated from relations derived for Types 1 and 2 ducted systems; comparative performance tendencies are shown with corresponding open-propeller data obtained from model propulsion tests, Table 2.

Results to be seen consistently indicate a power-saving potential with the ducted propeller. Flexibility of machinery selection is indicated from the allowable combinations of rotor diameter and rpm. The general superiority predicted for Type-2 ducted propellers appears to be a new development in terms of power-reduction potential.

While duct construction is outside the scope of this paper, some pertinent facts can be noted. Ducted propellers in the form of Kort nozzles have been in use for many years—particularly on towboats, where the shaft horsepower is in the order of several thousand and the application is for increased bollard pulls. Ducts generally are fabricated of steel plates and shapes.

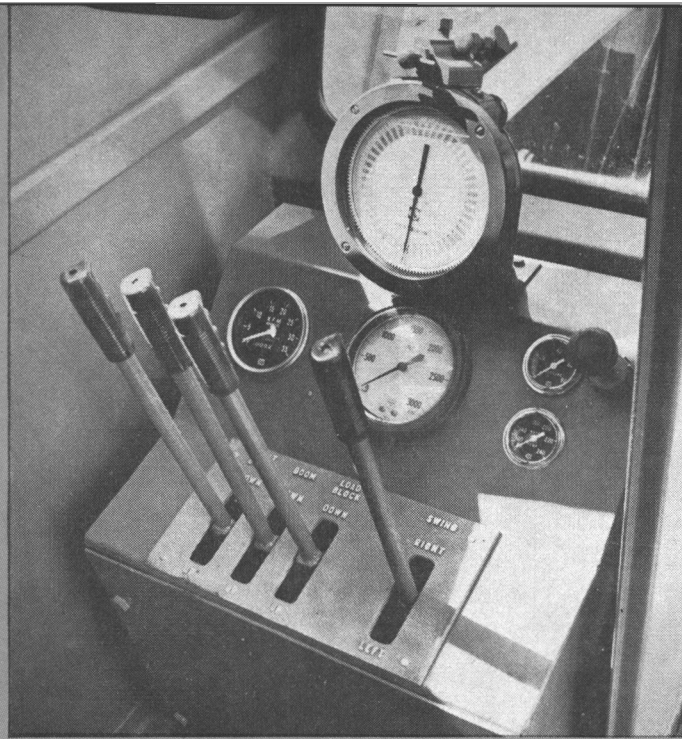
The first large-power ducted propellers known to the authors are the twin-shaft units installed on the destroyer USS Witek, each rated at 30,000 shp. These ducts were made in three sections: the inlet, the rotor, and the exit-nozzle section containing stator vanes. Each section, made from a number of bronze castings welded together to form a ring, was bolted to the adjacent section.

When a similar ducted propeller was authorized for the single-shaft destroyer escort type, USS Glover, the decision was made to construct the nozzle as a welded unit, with some castings, but mostly rolled plates of Superston 40.

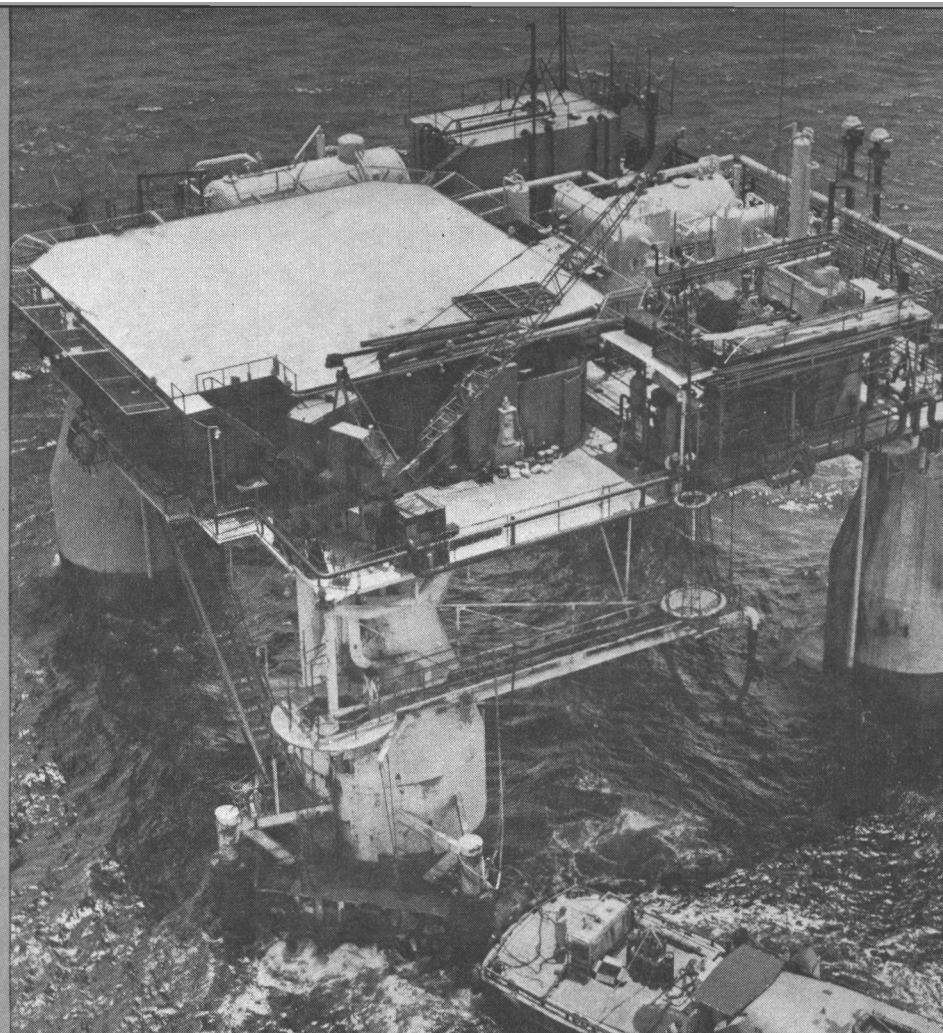
Table 2—Hull Applications Studied

Hull	Tons	Speed Knots	No. of Screws	Block Coeff.	EHP
Series 60	26-47,000	23-14	1	0.6-0.8	6-26,000
Cargo	18,000	25.5	1	0.53	21,000
Container	38,520	25.5	1, 2	0.56	31-32,000
Container	41,000	33	1, 2	0.54	82-84,620
Tanker	136,000	19.25	1, 2	0.78	30,800
Tanker	500,000	16	1, 2, 3	0.85	47,000
Tanker	750,000	16	1, 2, 3	0.85	60,000
Tanker	1,000,000	16	1, 2, 3	0.85	72,000

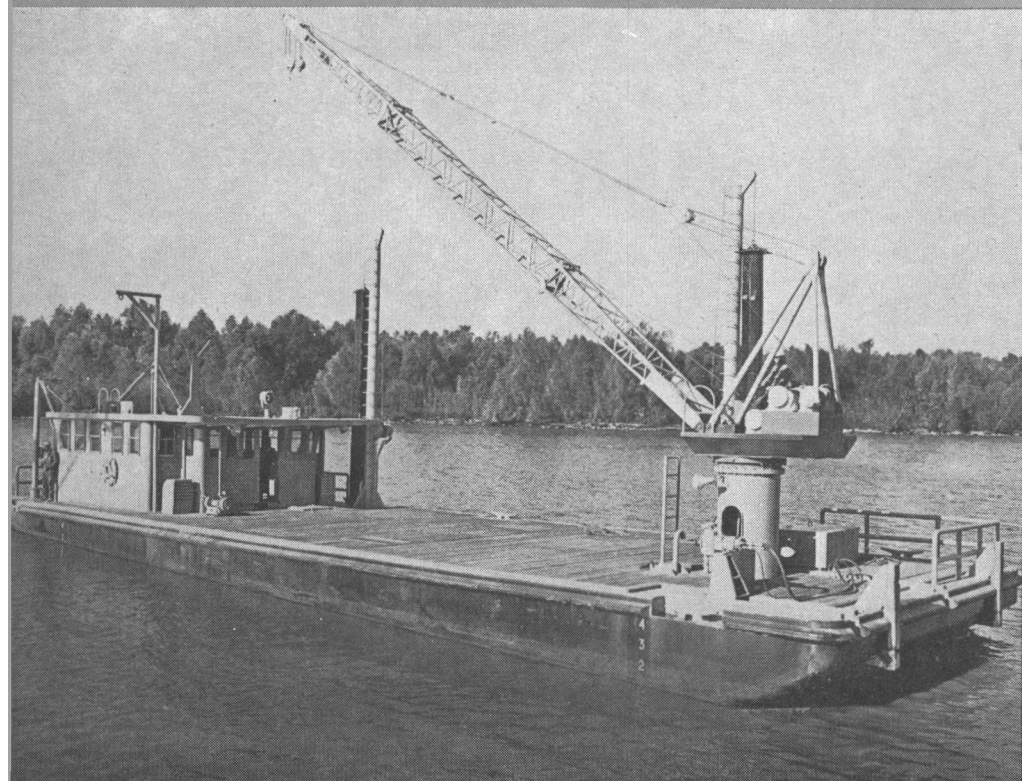
Maritime Reporter/Engineering News



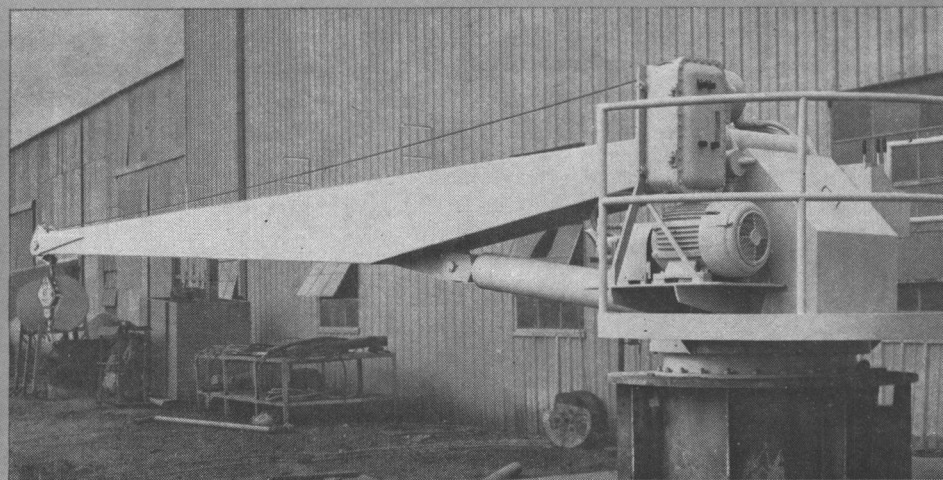
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### Shipbuilders Council Elects Officers And Board Of Directors

The following senior executives of the United States shipbuilding industry were elected to the board of directors of the Shipbuilders Council of America at its 52nd Annual Meeting in Washington, D.C., on March 7, 1973:

L.C. Ackerman, Newport News Shipbuilding and Dry Dock Company, Paul E. Atkinson, Sun Ship-

building & Dry Dock Co., John V. Banks, National Steel & Shipbuilding Co., Reid S. Byers, The Ingalls Iron Works Company, Thomas J. Defoe, Defoe Shipbuilding Company, John T. Gilbride, Todd Shipyards Corporation, James F. Goodrich, Bath Iron Works Corporation, Edwin Hartzman, Avondale Shipyards, Inc., J.T. Hayward, General Dynamics Corporation, Joseph Lieb, Maryland Shipbuilding & Drydock Co., J.R. Maumenee, Alabama Dry Dock & Shipbuild-


ing Co., R.E. Minglehoff, Savannah Machine and Shipyard Co., R.W. Naye, Jeffboat, Inc., Fred W. O'Green, Litton Industries, Inc., C.A. Patten, Dravo Corporation, Edward Renshaw, St. Louis Ship, Division of Pott Industries, Inc., John L. Roper II, Norfolk Shipbuilding & Dry Dock Corp., George M. Steinbrenner III, The American Ship Building Co., James J. Sugrue, Jacksonville Shipyards, Inc., and Walter F. Williams, Bethlehem Steel Corporation.

Results of mail ballot, announced on that occasion, included the election of the following allied industries officials who will serve on the Council's board for a period of one year: Bernard J. Bannan, Western Gear Corporation, William C. Freeman, marine department, Combustion Engineering, Inc., and A. H. Van Wormer, Sperry Rand Corporation, Vickers Marine and Ordnance Division.

Officers elected for the coming year are: chairman of the board, Edwin M. Hood; secretary, Edward P. Ruddy; treasurer, Beverly C. Kendall. Regional vice presidents: East Coast, James F. Goodrich; Gulf Coast, Edwin Hartzman; Great Lakes, Thomas J. Defoe; West Coast, John V. Banks, and Inland Rivers, R.W. Naye.

Mr. Hood will continue as the Council's president, a nonelective post. Mrs. Kendall also serves as special assistant to the president.

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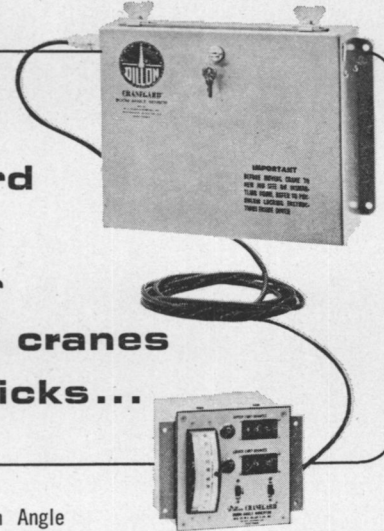
Compact system warns operator visually and audibly when preset load limit is approached. If desired, adjustable limit controls will also turn off equipment power. Complies fully with OSHA Federal Regulations and SAE Recommended Practices. System accuracy is within  $\pm 1/2\%$  of full range! Available for cranes with load ratings as high as 400,000 pounds. Easily installed. Will also weigh unknown loads.

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### Versatile Bulk Carrier Delivered By NKK

The Zwijndrecht, a 66,000-deadweight-ton bulk carrier, has been delivered to her owner, Shipping Company Zwijndrecht N.V. of Netherlands Antilles, at the Tsurumi Yard of Nippon Kokan (NKK), Japan's only integrated shipbuilder-steel-maker-fabricator.

NKK's New York shipbuilding department said the vessel was built to a standard design for 66,000-dwt-class bulk carriers of the company-developed Panamax type, the maximum vessel size capable of transiting the Panama Canal.

The ship design features adoption of nine, instead of the seven holds conventional on regular Panamax carriers. Design of the smaller holds affords improved stability in rough seas. The vessel can therefore haul iron ore, as well as coal and grain.

The Zwijndrecht carries the Automatic Control System for Unattended Engine Room certification by the American Bureau of Shipping.

The vessel's overall length is 734.9 feet; length between perpendiculars, 702.1 feet; breadth molded, 61.4 feet, and draft, 44.5 feet. The Sumitomo Sulzer 6RD90 main engine developing 15,000 bhp at 122 rpm gives the 34,000-gross-ton ship a service speed of 16.1 knots.

### Belcher Oil Company Names New Officers

The election of new corporate officers for Belcher Oil Company of Miami, Fla., has been announced by E.N. Belcher III, president of the firm.

The officers named include Gary G. Williams Jr., equipment sales and service, and James E. Cashon, marine sales, who were elected vice presidents. Stanley E. Brink was elected secretary, and Robert L. Dent was named treasurer.

In addition to fuel oil and equipment, Belcher Oil Company supplies asphalt, bunkers, and provides tug service to ships and barges and tank trucks.

**Blount Marine Signs Contract To Build 122-Ft. Passenger Ferry**

Blount Marine Corporation announces the signing of a contract with Island Commuter Corp., Falmouth, Mass., for the construction of a 122-foot passenger ferry to operate between Falmouth and Martha's Vineyard, Mass.

The new 500-passenger vessel is the second Blount vessel to be purchased by Island Commuter. They have operated the M/V Island Queen in the same service since 1963.

Delivery is scheduled in the fall of 1973.

**Litton Industries And Navy Disagree On Unilateral Price**

Litton Industries has announced that the U.S. Navy has made a unilateral decision to pay a total estimated contract price of approximately \$948 million for the construction of five Landing Helicopter Assault ships now under construction at Litton's Ingalls Shipbuilding Division.

Litton Industries' Ingalls Shipbuilding Division and the Navy are \$108 million apart in the negotiation of a final fixed price to produce five LHA ships. This difference represents the cost of work and schedule delays caused by actions of the Navy and not included in the original scope of the contract.

The Navy has refused to recognize these obligations, and has made a unilateral decision of \$948 million for the total price of the five ships.

In a statement, Litton president Fred W. O'Green said: "The Navy's unilateral price is unreasonable and unrealistic, and the company intends to aggressively seek an equitable settlement of this continuing dispute through any and all legal remedies, if necessary."

The Navy's unilateral decision on the LHA contract also provides for a revised delivery schedule, and establishes March 1, 1973, as the effective date for converting to progress payments for future compensation. Failure of the unilateral decision to recognize the Navy's responsibility for costs and delays establishes a repayment to the Navy of approximately \$55 million during the next 90 days. Litton believes such a repayment is not due, and will oppose the Navy's claim.

The revised LHA delivery schedule ranges from March 14, 1975, for LHA-1, to December 17, 1976, for LHA-5.

The unilateral price of \$948 million includes a target and ceiling price of \$795.3 million for the five ships, and approximately \$153 million in estimated escalation payments for the cost impact of inflation on the program.

"During lengthy negotiations," Mr. O'Green said, "Litton reviewed all aspects of the LHA program with the Navy, and offered a total fixed price of \$1,056 million which included all estimated escalation payments,

costs related to the cancellation of four ships, and all the changes arising from Navy actions and their expected cost impact on the program, which runs through 1976."

It is Litton's belief that the difference between the company's final offer of \$1,056 million to complete the LHA program and the Navy's unilateral price of \$948 million is the minimum Government obligation which Litton will recover.

The LHA program is one of two

major U.S. Navy shipbuilding contracts at Litton. The 30-ship DD-963 destroyer program, which has a ceiling price of \$2.2 billion plus escalation, is currently ahead of schedule and within contract cost projections. The new LHA schedule will not delay the delivery schedule of the DD-963 destroyer program, which is due for completion in 1978.

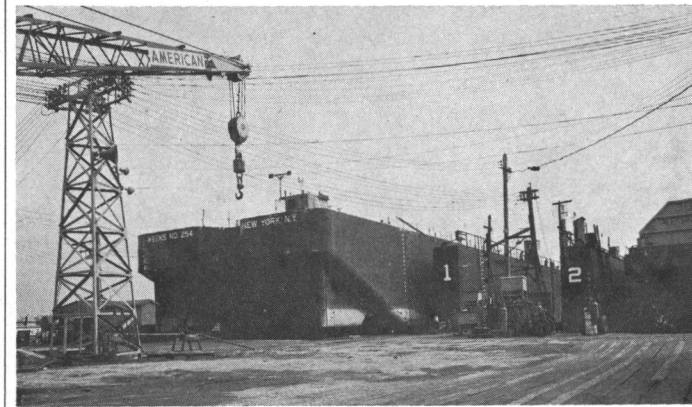
In his statement, Mr. O'Green said: "The basic reason an agreement could not be reached was the Navy's

unwillingness to recognize its full legal obligations under the contract, and the fair price which it must eventually pay for the ships.

"The Navy asked us to accept an unrealistically low price and to give up our rights to pursue compensation for numerous Navy changes and delays, which we would not do.

"We, of course, will challenge the Navy's decision in the courts, if necessary, to achieve an equitable settlement."

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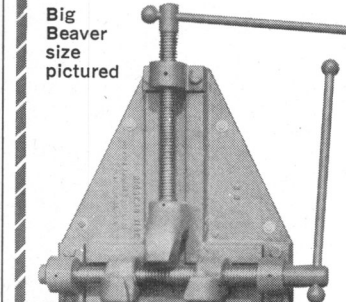
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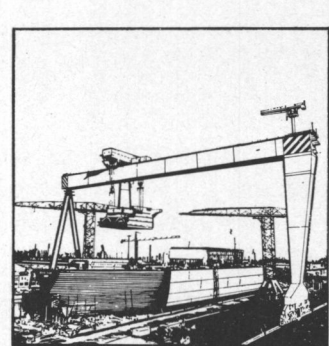
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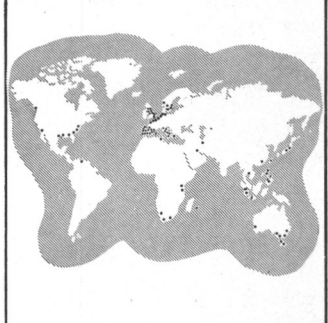
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**Sperry Vickers Names Robert H. Breeden**



Robert H. Breeden

Sperry Vickers has announced the appointment of **Robert H. Breeden** as an engineering manager at its Troy, Mich., Administrative and Engineering Center.

Mr. **Breeden**, a five-year Sperry Vickers employee, will have primary responsibilities for the design and development of hydraulic products for marine applications.

A graduate of the University of Virginia with a bachelor's degree in mechanical engineering, and John Hopkins University with a bachelor's degree in physics, Mr. **Breeden** was previously a senior project engineer in Sperry Vickers marine engineering department.

**Sea Containers Buys New Containerships**

Sea Containers Inc., a leading international leasing company for marine cargo containers, container cranes and containerships, will take delivery in late 1973 of two containerships of new design to be built in the Far East. The announcement was made by **James B. Sherwood**, president, who indicated the ships would each be capable of carrying 196 containers of 20-foot length at a speed of 12 knots, and would be called "deck-ships." The vessels, which do not have hatches, would offer very economical transportation of containers over short sea routes, and will contain an on-board container crane.

Mr. **Sherwood** also announced that a \$192,000 arbitration award had been confirmed by a New York court against an affiliate of a major U.S. ship line for failure to pay rentals on leased equipment.

"Part of the award will be treated as ordinary income for 1972," Mr. **Sherwood** said, "and our results for calendar 1972 should be made public sometime during the week of March 19."

"With all of the recent concern about currency parity changes," Mr. **Sherwood** added, "I would like to make it clear that Sea Containers should suffer no adverse effect, and in fact has just recently made a considerable profit from the return of a German mark deposit on the cancellation of a new Tarros 302 ship which was being built in a German shipyard. A technical difficulty developed with this particular ship, but the order will most likely be replaced in the near term with a Far East shipbuilder."

**General Dynamics Electric Boat Div. Names George Roos**

**George W. Roos** has been named director of industrial relations and management engineering at the Electric Boat Division of General Dynamics, Groton, Conn. He replaced **D.C. Wilkens**, who is retiring.

**Francis W. McNally** has been

appointed manager of labor relations and **Donald Carlson** manager of personnel and compensation. Both will report to Mr. **Roos**.

Mr. **Roos**, who joined the division in 1957, had been director of management engineering since November 1972. From 1968 to 1972, he was manager of change control. A 1953 graduate of Iona College in New Rochelle, N.Y., Mr. **Roos** is a four-year Navy veteran.

Mr. **McNally** had been manager

of wage and labor relations since 1969 at General Dynamics' Stromberg-Carlson subsidiary in Rochester, N.Y. A 1961 graduate of Villanova University, he joined Stromberg-Carlson in 1966.

Mr. **Wilkens** had been director of industrial relations at Electric Boat since 1965. He was director of industrial relations at the company's Convair Division in San Diego, Calif. for 20 years before joining Electric Boat.

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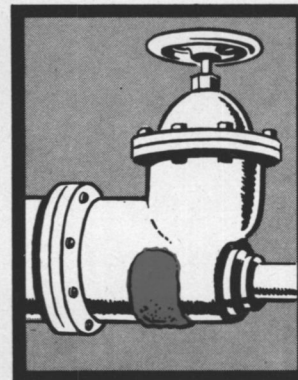
versatile kit is standard equipment aboard thousands of ocean-going ships.

The M-5 kit contains Plastic Steel® A, B, and SF, and several other proven epoxy- and urethane-based materials. Instructions in 8 languages. Plastic Steel A is approved under U.S. Navy Specification MIL-C-15202 for filling and repairing corroded metal ship hull surfaces.

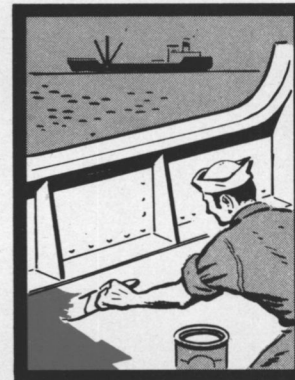
The M-5 Marine Repair Kit is available from Devcon Distributors in major ports throughout the world. Check list on opposite page. For complete description of M-5 kit and repairs you can make, send for free Devcon Bulletin MR-2.



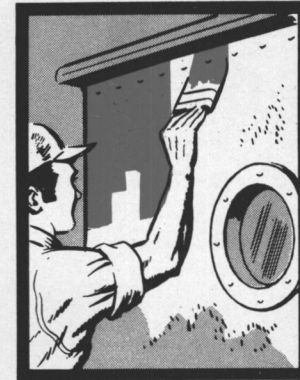
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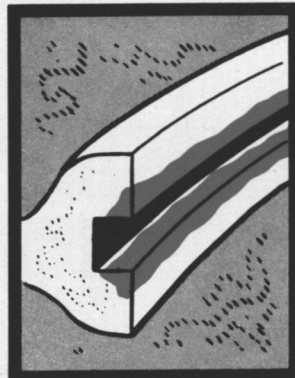
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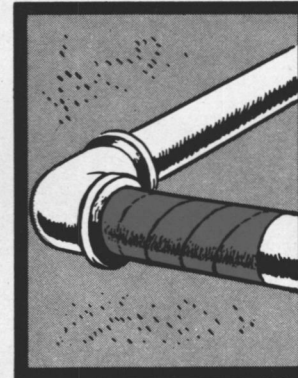
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## Fourth Quarter Of 1972 Shipbuilding Returns Reported By Lloyd's

The revival in the United States shipbuilding industry apparent from Lloyd's Register's report for the September quarter of 1972 continued into the following quarter, according to the international ship classification society. Ships under construction here, together with those on order but not commenced,

totalled 2,899,542 gross tons at the end of December. This is 309,440 tons more than the previous quarter.

Apart from Communist China and Russia, for which details are not available, there are building in the world 1,916 merchant ships of 24,350,507 gross tons, which is 581,487 tons less than the last quarter, and is the first decrease since September 1971.

The decline in the demand for

new tonnage, which had been prevalent during 1972 and is currently reflected in the reduction of tonnage under construction, was halted in the latter weeks of the year by a remarkable upsurge of new orders. More than 10,000,000 tons of shipping was contracted for in December alone.

The possibility of further reevaluation of the yen, together with improvements in the tanker market, are responsible for owners taking

up berth space in Japan well into 1976. Swedish and West German yards also booked orders for huge tankers.

Tankers represent 66.8 percent, bulk carriers 21.2 percent, and general cargo 6.7 percent of the total order book.

7,365,746 gross tons of shipping of which keels have already been laid are being built under the supervision of surveyors of Lloyd's Register of Shipping.

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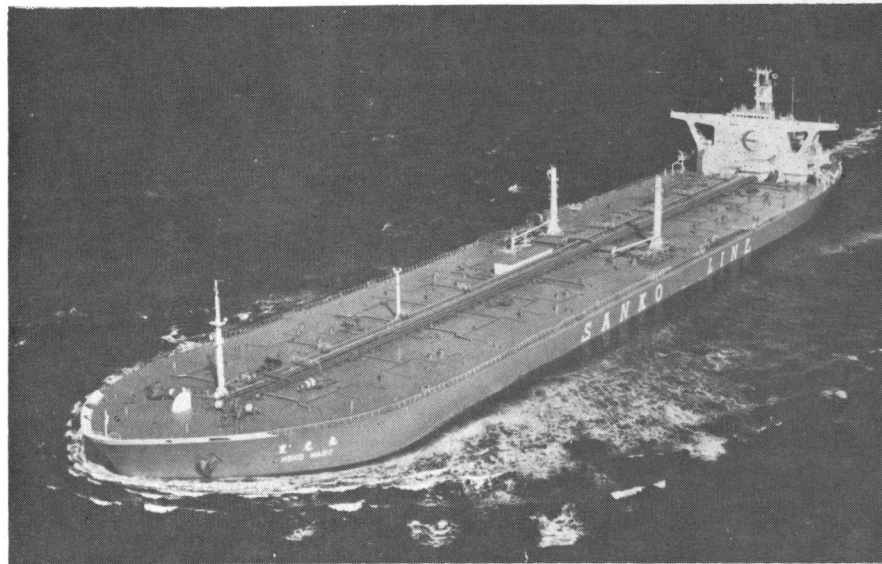
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For names of other distributors,  
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April 1, 1973

## Hitachi's Sakai Yard Delivers 235-Type Tanker



The Hoko Maru will be placed in service between Japan and the Persian Gulf.

The 235-Type tanker Hoko Maru for The Sanko Steamship Co., Ltd., which had been under construction at Hitachi Zosen's Sakai Shipyard, was completed and delivered to her owner on February 26, 1973.

This ship is one of the standard-type ships developed by Hitachi Zosen. Five of this type, including the Hoko Maru, were completed, and four more are scheduled for completion by the end of 1974.

The 237,800-dwt tanker has the following approximate measurements: length between perpendiculars, 1,017 feet; breadth, 174 feet,

and depth, 82 feet. She is powered by a Hitachi UA-360-type steam-turbine main engine with a maximum output of 36,000 hp, delivering a trial speed of 16.303 knots.

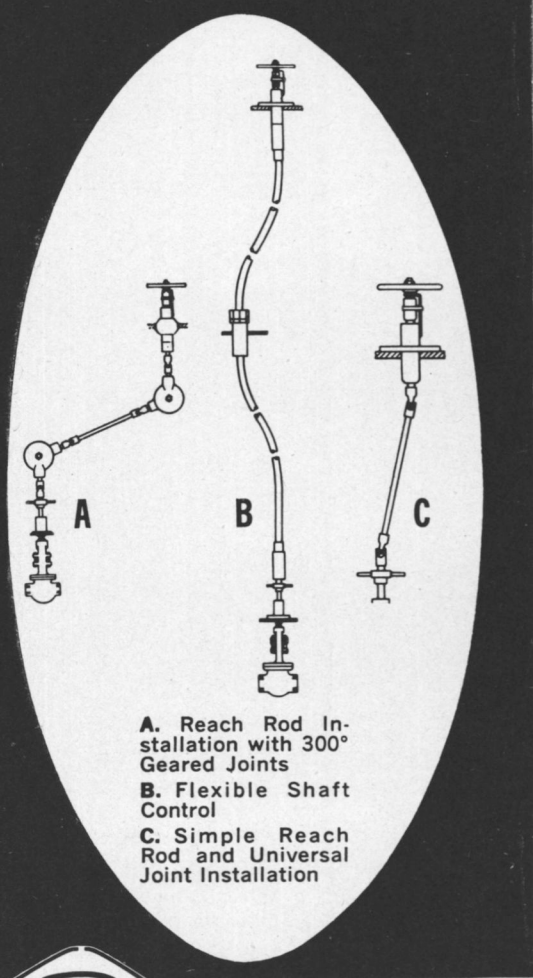
The Hoko Maru is equipped with an eductor stripping system to improve unloading efficiency; a fixed tank cleaning system, as well as conventional portable devices; an inert gas system, and, for corrosion protection, the inside of the cargo oil tanks are coated with tar epoxy paint, and the cargo oil pipes are made of anticorrosive cast steel.



**PORT ENGINEERS ELECT NEW OFFICERS:** Shown above at a meeting recently held at the Downtown Athletic Club, New York City, are the newly elected officers of The Society of Marine Port Engineers New York, N.Y., Inc. Seated, left to right: **William P. Towner**, 2nd vice president; **Philip A. Donahue**, president, and **Joseph Thelgie**, 1st vice president. Standing, left to right: **Harry H. Hunt**, secretary-treasurer; **L. Paul Ackermann**, steering committee chairman; **Harlan T. Haller**, a director; **John C. Fox Jr.**, chairman of the board; **Edward English**, program and entertainment committee chairman, and **John Antonetz**, papers and technical committee chairman.

41

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**A/S Jotron Elektronik Appoints Arnessen Marine**

A/S Jotron Elektronik has appointed Arnessen Marine Systems, Inc. agent for their line of Electronic Life Rescue Equipment.

A/S Jotron Elektronik has developed a complete line of Electronic Life Rescue Equipment for use on board lifeboats, life rafts, and all types of survival craft. The equipment works on the aircraft emergency frequencies 121.5 and 243.0 Mhz, which are in common use in search and rescue operations.

The Tron-1B is a buoyant emergency position-indicating radio beacon, with a range of approximately 200 nautical miles. It is automatically activated as soon as it contacts the water. Signals are transmitted simultaneously on the two above-stated civil and military aviation distress frequencies. The continuous transmission time of the unit is between 48 to 90 hours, depending on the condition of the battery. The magnesium-type battery has a three-year storage life.

The Tron-2 buoyant emergency transceiver communication set has a range of approximately 120 nautical miles, and permits voice communication between the party in distress and the aircraft on the 121.5 Mhz Civil Aviation Mayday frequency and, alternatively, on the 123.1 Mhz working frequency channel by just one flick of the main switch. The mercury battery of this unit has a storage life of two years and can be tested and replaced without special tools.

Tron-3 is a distress light for individual use for positioning and discovery of the persons afloat. The operating life is nine hours continuously, or approximately 18 to 20 hours if used 50 percent of the time. The visibility of the distress light is up to 13 nautical miles on a clear night. The battery of the distress light has a storage life of two years.

All of the above-mentioned equipment has been

approved by Norske Veritas, and more than 1,000 units have been delivered on board of all types of ships since it has been introduced to the marine market during 1970-71.

For additional information, contact Arnessen Marine Systems, Inc., 55 West 39th Street, New York, N.Y. 10018.



**SISTER BOAT TO FOLLOW:** The construction of a running mate for the Thousand Islander (shown above), was announced by her designer, John O'Neil of Marine Design Associates, Inc. in Palm Beach, Fla. The new vessel, as yet unnamed, will be a near-sister to the Thousand Islander. Both vessels are of aluminum construction, and are 100 feet in length with a 22-foot beam. The owners and operators of the Thousand Islander, Ganoque Boat Lines of Ganoque, Ontario, made the decision to build the new vessel after her sister's successful first season carrying sightseeing passengers in the St. Lawrence River's picturesque Thousand Islands area. Built by her owners, the Thousand Islander was completed and placed in service in the short time of eight months after the ground-breaking of their construction facility. Mr. O'Neil, present at her trials, expressed satisfaction with the care exercised by her builders, as did the Canadian Department of Transport's Steamship Inspection Division who classed the vessel for carrying 350 passengers. "We were particularly pleased by her performance," he said. "Her three Caterpillar D343-TA diesels gave her a speed of 17 knots, at their continuous rating of 1,800 rpm." Ganoque Boat Lines anticipate completion of their new boat by late spring, in time for the 1973 tourist season.

**WHO'S GRIFFITH MARINE?**

After ten years serving the Port of New York with sales and service of electronic communications and navigation equipment, even some of our best customers and friends don't know our total capability. So, we've taken this means to explain who we are and what we can do.

Griffith Marine was founded in 1963 by Noel Griffith, a former shipboard radio officer, and a talented engineer-technician-salesman. Jim Chapman, an astute business manager—and now president—joined him a year later in a partnership which lasted seven years.

The company grew into a national distributor for C. Plath navigational equipment. National distribution of radar and other equipment followed. Noel Griffith's sudden and untimely death in March of 1971 necessitated changes in the operation of the company. Pulling back from national distribution, we became a regional "direct-to-user" operation.

Beside Plath, we took on equipment manufactured by Kelvin Hughes, Intech, Micro Instrument, Communications Associates, Brooks Seafarer, Collins, Roytheon, Standard Radio, ITT Mackay and Radiomarine among others. We also became service agents here for Radio Holland and Hokushin.

From many diverse individuals, including three competitors, Jim Chapman has welded a capable and enthusiastic organization. Bob Armstrong became service manager when he joined his sales and service operation with Griffith in 1970.

In October, 1971, Geoff Tellez combined his commercial marine operation with Griffith and headed up sales. He has 25 years in the marine field, including (like Noel Griffith) five years as a shipboard radio officer. In addition to writing books and articles on marine equipment, he has held various sales, technical and management positions with RCA Radiomarine, Litton, Pye Corporation of America, and Canadian Marconi.

Hugh Hayes, a well known thirty year veteran with Radiomarine Corporation, and former sales manager, joined Griffith as sales manager in August, 1972. His knowledge of equipment supplied to vessels over the years is proving extremely helpful to our customers.

Ray Yturrappe is the third member of our sales force. He joined us in January 1973. Having "messed around" in boats most of his life, he is an experienced seaman and is well versed in the use of navigation and communications equipment.

Now you know our background. But, you really won't know us until you try us. Next time you have a problem in marine communications, navigation or electronics, call us. You'll be glad you got to know us better.

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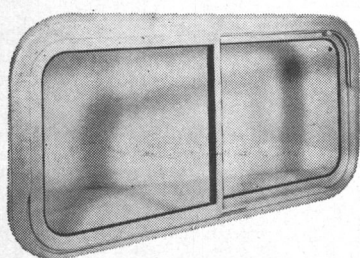
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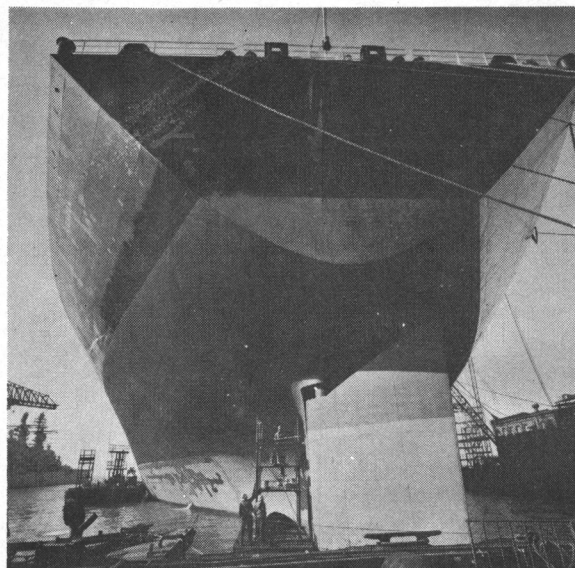


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**Lloyd's Register Approves Deep Diving Equipment**

The Ocean Engineering Department of Lloyd's Register has approved the plans for four 55-ton cylindrical diving bells and their associated three-lock compression chambers (2 m. diameter x 7.95 m. long) to be manufactured by Drass of Milan, Italy. They form part of package units, each comprising a compression chamber, lifting equipment, and diving bell designed for operation at water depths up to 700 feet.

Surveyors from the Milan office of Lloyd's Register will survey these diving bells and compression chambers during construction at the Zingonia Works of Drass near Milan. The pressurized diving units are equipped with all necessary life support systems, communications, and a special helium gas recovery system. Integral anchor guide lines are operated by constant tension winches. Communication lines and life support gas and power leads are combined into an umbilical cord fed from the surface and maintained at a constant tension.

In addition to the work on diving systems, the Ocean Engineering Department is to publish Draft Rules and Guidance Notes for the Construction, Classification and Inspection of Submersibles, and later this year will publish Provisional Requirements for the Routine In-Water Surveying of Ships. The Society has cooperated with the Ministry of Defence (Navy Department) and several large tankers in experiments to test underwater survey techniques.

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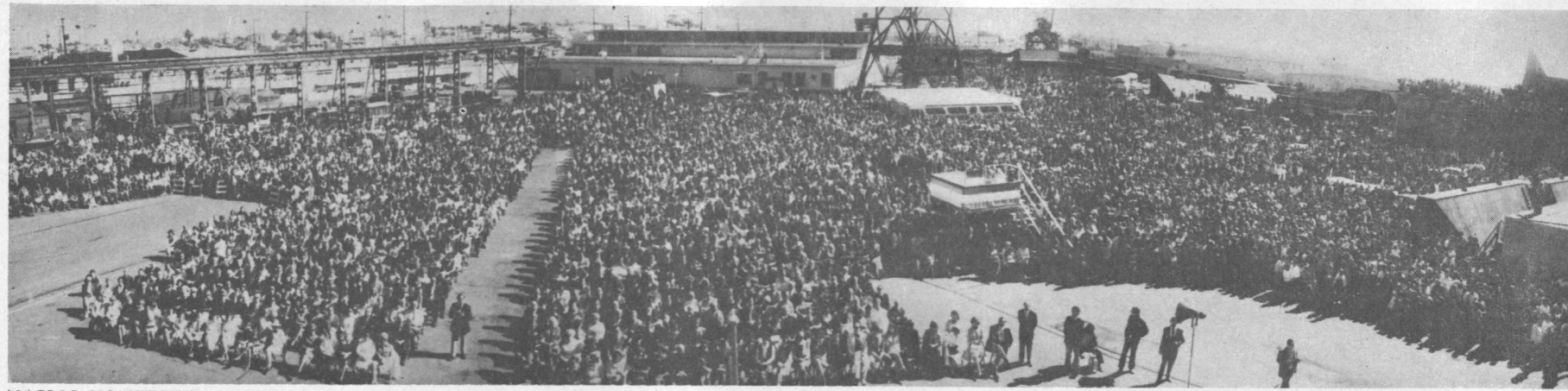
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**NASSCO HOMETOWN ROOTERS:** An unusually large gathering of spectators assembled to witness the recent launching of the oil/bulk/ore carrier, the S/S Ultramar, at National Steel and Shipbuilding Company, San Diego, Calif. The largest ship ever to be built on the West Coast, the Ultramar is the first of two NASSCO-designed San Clemente class

OBOs to be built for Aries Marine Shipping Company of Lake Success, N.Y. (See cover story, March 15, 1973 issue of MARITIME REPORTER/Engineering News.) As far as can be ascertained, over 8,000 people were in the audience to view the colorful ceremonies. Immediately following the launching, the keel was laid for a sister ship, the S/S Ultrasea.

### SNAME Announces Committee Chairmen

Phillip Eisenberg, president of The Society of Naval Architects and Marine Engineers, has announced the following committee chairmen for 1973:

**Committee on Applications**—chairman, Prof. Edward V. Lewis, director of research, Webb Institute of Naval Architecture, Glen Cove, N.Y.

**Committee on Awards**—chairman, Ludwig C. Hoffmann, consultant, McLean, Va.

**Annual Banquet Committee**—chairman, Charles A. Narwicz, Container Division, United States Lines, Inc., New York, N.Y.

**Committee on Budget and Endowments**—chairman, Rear Adm. Albert G. Mumma, USN (ret.), Chairman, Commission on American Shipbuilding, and past president of the Society, Short Hills, N.J.

**Annual Dinner-Dance Committee**—chairman, Preston H. Hadley Jr., vice president, Gibbs & Cox, Inc., Hyattsville, Md.

**Committee on Finance and Audit**—chairman, John A. Livingston, chairman of the board of trustees, Webb Institute of Naval Architecture, Glen Cove, N.Y.

**Committee on Journal of Ship Research**—chairman, Ralph D. Cooper, Program Director, Fluid Dynamics, Office of Naval Research, Department of the Navy, Arlington, Va.

**Committee on Marine Technology**—chairman, E. Scott Dillon, Assistant Administrator for Operations, Maritime Administration, Washington, D.C., and vice president of the Society.

**Committee on Membership**—chairman, Lester Rosenblatt, president, M. Rosenblatt & Son, Inc., New York, N.Y.

**Committee on Nominations**—chairman, Daniel D. Strohmeier, past president of the Society, Scarsdale, N.Y.

**Committee on Papers**—chairman, Capt. Jack A. Obermeyer, USN (ret.), manager, Construction and Technical Development Division, Marine Department, Texaco, Inc., New York, N.Y.

**Committee on Pension Plan**—chairman, Douglas C. MacMillan, assistant to general manager, Gen-

eral Dynamics/Quincy Shipbuilding Division, Quincy, Mass., and honorary vice president of the Society.

**Committee on Publications**—chairman, A. Dudley Haff, technical manager, Central Technical Division-Shipbuilding, Bethlehem Steel Corporation, Sparrows Point, Md.

**Committee on Public Relations**—chairman, John R. Blackeby, secretary, American Bureau of Shipping, New York, N.Y.

**Committee on Scholarships**—chairman, Capt. Robert E. Stark, USN (ret.), Gibbs & Cox, Inc., New York, N.Y.

**Committee on Sections**—chairman, Monroe D. Macpherson, Esso International Company, a Division of EXXON Corporation, tanker department, New York, N.Y.

**Steering Committee for the 1973 Spring Meeting**—chairman, Jean E. Buhler, naval architect, J.B. Hargrave Naval Architects, Inc., West Palm Beach, Fla.

**Technical and Research Steering Committee**—chaired by Barton B. Cook Jr., vice president and assistant group manager, DeLaval Turbine, Inc., Trenton, N.J., includes the chairmen of the following committees:

**Ship Production Committee**—chairman, Daniel M. Mack-Forlist, marine consultant, Dobbs Ferry, N.Y.

**Marine Systems Committee**—chairman, Capt. Richards T. Miller, USN (ret.), manager, ocean engineering, Oceanic Division, Westinghouse Electric Corporation, Annapolis, Md.

**Hydrodynamics Committee**—chairman, Robert C. Strasser, director of research, Newport News Shipbuilding and Dry Dock Company, Newport News, Va.

**Hull Structure Committee**—chairman, Thomas M. Buermann, executive vice president, Gibbs & Cox, Inc., New York, N.Y.

**Ships' Machinery Committee**—chairman, William O. Nichols, chief engineer, Central Technical Division - Shipbuilding, Bethlehem Steel Corporation, Sparrows Point, Md.

**Ship Technical Operations Committee**—chairman, Thomas J. Sartor Jr., assistant marine superintendent, Farrell Lines, Inc., New York, N.Y.

### Pacific Sea Transport Applies For Title XI To Build 3 Hydrofoils

A Title XI loan guarantee has been filed with the Maritime Administration to build three Boeing hydrofoils by Pacific Sea Transportation Ltd., a subsidiary of Kentron Hawaii Ltd. The new hydrofoils will cost about \$5.1 million each.

The vessels will be used in the Hawaiian Islands and will carry 190 passengers. No contract for constructing these boats has been awarded.

### \$8-Million Order Given Burton Ship To Build 5 Tug/Supply Vessels

Under terms of a \$3.5-million Export-Import loan, an order has been received by Burton Shipyard Inc. of Port Arthur, Texas, for the construction of five tug/supply vessels, parts and services, for Zodiac S.A. The financing of the \$8.8-million transaction will be aided by the Victoria (Texas) Bank & Trust Co.

The vessels will be used in the North Sea and the Persian Gulf serving oil drilling rigs.

### First Of Ten In Dravo's New Viking Line



The first Viking shown splashing into the Ohio River was built for the Alter Company.

The first vessel in Dravo Corporation's new Viking line of towboats was launched on March 2 from the company's marine ways at Neville Island on the Ohio River near Pittsburgh, Pa. This 4,200-horsepower vessel, designed and built for The Alter Company of Davenport, Iowa, is the first of 10 Vikings that have been ordered from Dravo since the new line was introduced last summer. Total value of the 10 vessels is more than \$17 million.

Included are two 10,100-horsepower "Super Vikings" which will be the most powerful towboats in the world, six 5,600-horsepower units and two 4,200-horsepower boats. All will be 140 feet long and 42 feet wide except the "Super Vikings," which will be 190 feet by 54 feet. The Dravo-built tow-

boats will be operated by carriers transporting a wide variety of bulk and liquid cargoes throughout the Mississippi-Ohio Rivers and the Gulf Intracoastal System.

According to Charles A. Patten, vice president and general manager of Dravo's Engineering Works Division, the river industry's tremendous demand for the new line of towboats is due to the Viking's unusual balance of speed, power and maneuverability, which operators need to handle increasing barge tonnages efficiently and profitably.

Dravo is one of the top three river barge and towboat builders in the United States. In 1972, the company launched a record of 302 barges, and logged marine equipment sales in excess of \$55 million, some \$20 million higher than its 1971 record of \$35.8 million.

**SNAME Chesapeake Section Hears Paper On  
'Sea Trials—Some Recommended Practices'**



Pictured at the SNAME Chesapeake Section meeting are (left to right): **E. Scott Dillon**, Acting Assistant Administrator for Operations, MarAd; **Charles Zeien**, vice president, J.J. Henry Co., Inc.; **Raymond Wermter**, NSRDC; **John J. Nachtsheim**, Chief, Office of Ship Construction, MarAd; **Seth Hawkins**, vice chairman of the Chesapeake Section; **Robert L. Jack**, MarAd, author; **Laskar Wechsler**, Technical Director, NAVSEC, and **Richard Douglas**, senior engineer, Bethlehem Steel Corporation.

The Chesapeake Section of the Society of Naval Architects and Marine Engineers held the fifth meeting of its 1972-73 technical program on February 13, 1973, at the Walter Reed Army Medical Center Officers Club in Washington, D.C.

Following the social hour and dinner, which were enjoyed by approximately 115 members and guests, vice chairman **Seth Hawkins** opened the meeting by welcoming those in attendance and commented that the large turnout of the membership during the year was a reflection of the excellent selection of papers, and congratulated **Ronald K. Kiss**, former chairman, papers committee. The present chairman of the papers committee, **John Heffernan**, Bethlehem Steel, has accepted this challenge and is still accepting nominations for papers for next year's technical program.

After completing other normal Section business, vice chairman **Hawkins** introduced the moderator of the technical session, **John J. Nachtsheim**, Chief, Office of Ship Construction, Maritime Administration. Because the sea trials of a new ship represent the culmination of several years of efforts by literally thousands of people, from preliminary design through construction, Mr. **Nachtsheim** introduced this paper as the final test to insure that the ship had achieved the objectives and goals of its designers and owners and was ready to enter into the competitive world. He introduced the author, **Robert L. Jack**, as a graduate engineer who has had 15 years of sea trial experience, eight of which were as the Chairman, MarAd Trial Board. The title of his paper is "Sea Trials—Some Recommended Practices."

Mr. **Jack** opened his discussion by stating that SNAME was publishing a new Technical & Research Bulletin C2, Code for Sea Trials, which is a very comprehensive document which consolidates, simplifies and updates the previously published SNAME codes on this subject. It has been exceptionally well done by Panel M-19 and has

covered many of the recommendations that the author has had in mind for some time for inclusion in a paper such as this. However, after a careful review of the final draft of Bulletin C2, Mr. **Jack** believes there are still many "do's" and "don't's" that are not properly a part of a document of that kind but, nonetheless, must be observed if meaningful trial results are to be obtained. The contents of the paper and his verbal discussion covered trial areas, such as scheduling events, trial supervisor, shaft calibration and torsion meters, fuel oil meters, radiometric equipment, fuel analysis, fuel rate calculations, correlation with model tests, etc.

The wide diversity and geographic locations of the discussers indicated the common interest with which sea trials affect our industry. The discussers were **Charles Zeien**, vice president, J.J. Henry Co., Inc.; **Richard Douglas**, Bethlehem Steel, Sparrows Point; **Quentin Robinson** and **C.J. Wilson**, Naval Ship Research and Development Center; **John Breeden**, Friede & Goldman; **Robert Giblon**, president, George G. Sharp, Inc.; **James Steadman**, Ingalls Shipbuilding Division, and **Chester Long** and **Hannon Burford**, Newport News Shipbuilding and Dry Dock Co.

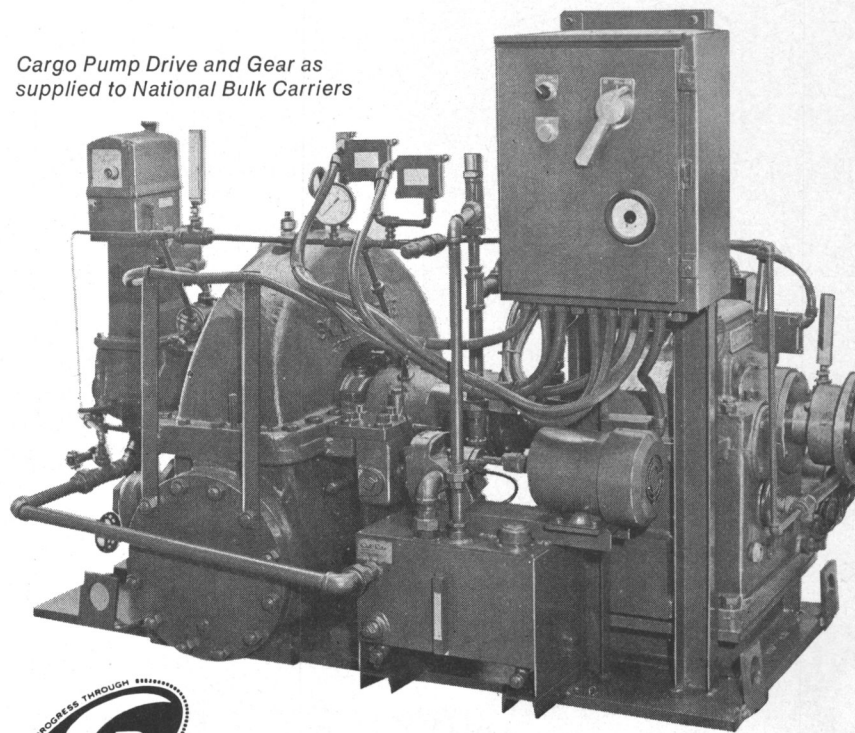
It was the consensus of opinion of those in attendance that Mr. **Jack's** paper should be appended as a supplement to SNAME T&R Bulletin C2 and be required reading for all those in the profession directly or indirectly concerned with conducting official sea trials.

**Ellicott Machine Corp.  
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The U.S. Army Engineer District, Philadelphia Custom House, 2nd and Chestnut Streets, Philadelphia, Pa. 19106, has awarded Ellicott Machine Corp., 1611 Bush Street, Baltimore, Md., a contract for one self-propelled dump barge. The amount of the award is \$377,894.

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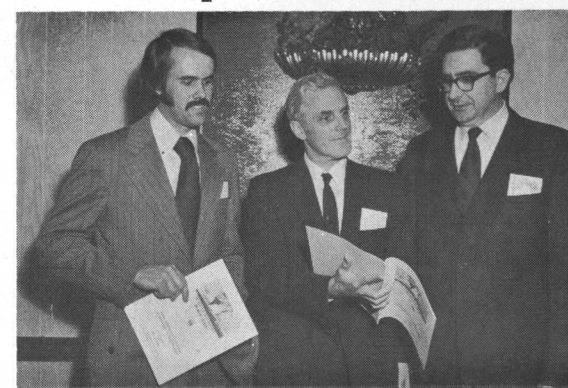
**Waukesha Bearings Identifies Worldwide Marine Service**

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A second brochure, Catalog W-4A, is a fully descriptive and illustrated brochure on line shaft bearings for ship propulsion systems. Treated within the literature are three different types of bearings—self-aligning, non-aligning and journal—as well as lubrication systems that include ring, disc, and forced oil methods. Also covered are detailed dimensions for all shaft sizes from 14 inches to 36 inches in diameter.

For a copy of the brochures or further information, contact Eric A. Dow, Waukesha Bearings Corporation, Box 798, Waukesha, Wis. 53186.

**Hampton Roads Hears Paper On Main Propulsion Shafting Eccentricity Considerations**



Principals shown at the meeting are, left to right: J.E. Ancarrow Jr., Newport News Shipbuilding and Dry Dock Company; J.B. Montgomery, chairman, papers committee, and R.L. Harrington, also of Newport News Shipbuilding.

The Hampton Roads Section of The Society of Naval Architects and Marine Engineers convened at the Commodore Country Club, Kempsville, Va., on February 15, 1973, with more than 100 members and guests in attendance.

R.L. Harrington and J.E. Ancarrow Jr. of Newport News Shipbuilding and Dry Dock Company, co-authors, presented a paper on "Main Propulsion Shafting Eccentricity Considerations."

Mr. Harrington holds a BME degree from North Carolina State University, a master's degree in naval architecture and marine engineering from the University of Michigan, and an MBA degree from William and Mary. Mr. Ancarrow received his BME degree from the University of Virginia, and an MME degree from Virginia Polytechnic Institute.



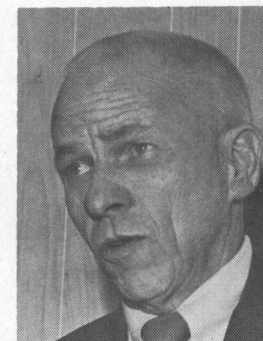
S. Fielding



J. Toohey



R.P. Pike



C. Hanson

Their paper described existing criteria to establish eccentricity tolerances on propulsion shafting and concluded that many of the required tolerances for naval shafting are unnecessarily restrictive, whereas those specified for merchant vessels are not sufficiently restrictive to assure satisfactory performance. Cost criteria for establishing tolerances and methods available for straightening propulsion shafting were included in this excellent paper.

Discussers were S. Fielding, formerly with the Maritime Administration; J. Toohey, Bethlehem Steel Corporation; R.P. Pike, National Forge; C. Hanson, U.S. Steel, and R. Yohe, American Bureau of Shipping.

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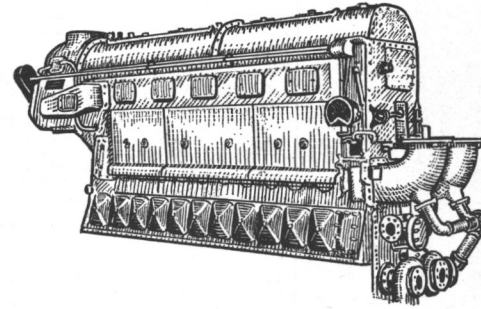
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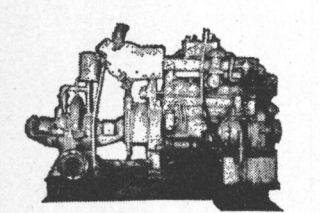
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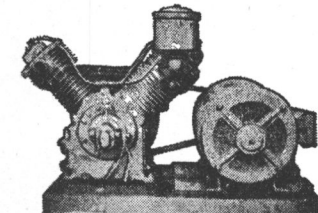


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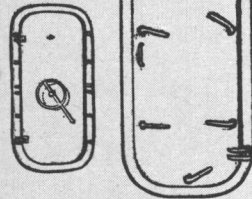
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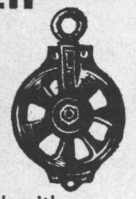
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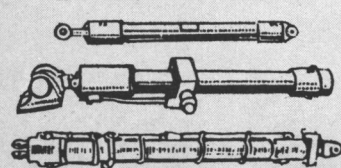
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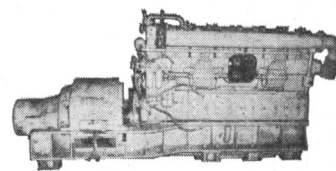
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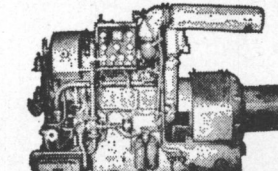
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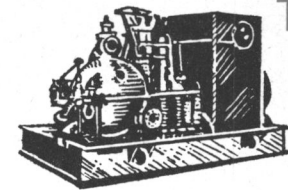
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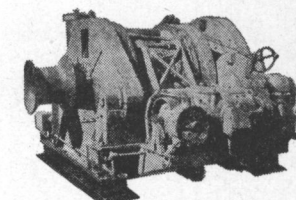
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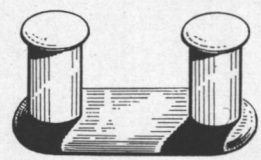
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MODEL: SP 1200, 2-Stage,  
Dry Type  
OPERATING PRESSURE: 100 psi  
R.P.M.: 1850  
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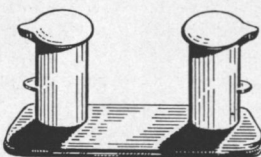
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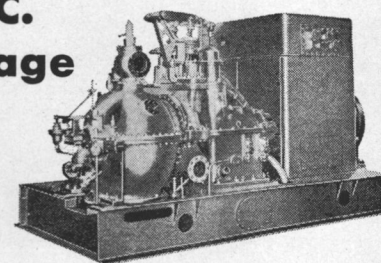
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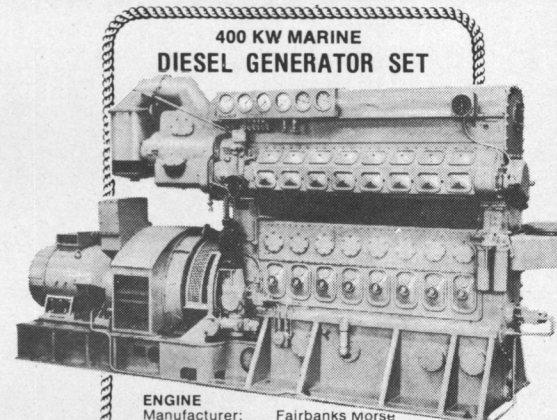
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ENGINE  
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Model: 38F5-14, opposed piston  
RPM: 1200  
Cylinders: 8  
Rotation: Left hand  
(CCW from drive end)

GENERATOR  
Manufacturer: Westinghouse  
Capacity: (500 KVA) 400 KW  
Voltage: 450 (3-phase, 60-cycle)  
Amperes: 641  
RPM: 1200  
Exciter: Direct mounted

Total Weight: 21,000 lbs.  
Condition: UNUSED

**PECK EQUIPMENT COMPANY**  
3500 ELM AVENUE, PORTSMOUTH, VA. 23704  
TELEX 82-3469 PHONE (703) 399-4071

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NEW YORK  
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DISTRIBUTION

### 1500 KW GENERAL ELECTRIC TURBO GENERATOR SETS

**TURBINE:** 420/618 PSI 825/850° Total Temperature Type FN4-FN30 11 Stage 8145 RPM GEI-19320

**GEAR:** Type S195A 8145/1200 RPM  
**GENERATOR:** 1500 KW 450 V 3 Ph 60 Cy .8 PF 1200 RPM Continuous 2340 KVA 2 Hrs Type ATI-HL

Four Units Available, Complete with Board, Condensers, Air Ejector and Condenser and Condensate Pumps. Removed from CRUISER ROANOKE. In Like New Condition.



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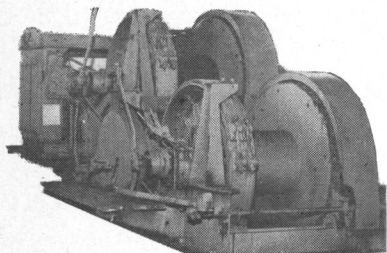
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Phone: 201/867-7025

OVER 25 YEARS' EXPERIENCE

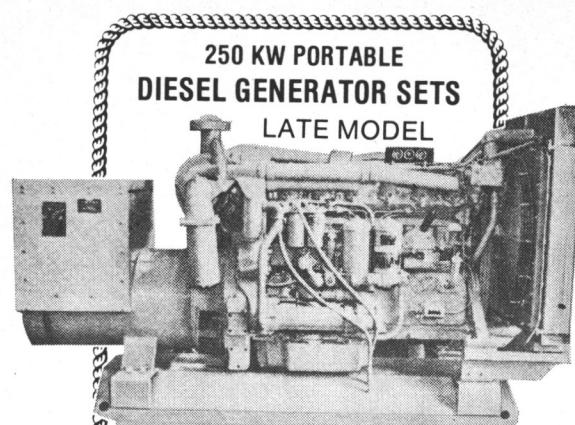
## SKAGIT DOUBLE DRUM WATERFALL WINCH



Model G-160—type 2M—serial 160A5—diesel driven by GM 6-71 with TRA-76R 4-speed transmission type 2 M1A6—forward and reverse. LIPE 14-2 clutch. LINE PULL RATING: 30,000 lbs. on both drums simultaneously at a line speed of 60 FPM on the outer layer of cable and 25 FPM on the first wrap. DIMENSIONS: drum flange 60"—barrel 24"—barrel length 30". DRUM CAPACITY: 5000 ft. of 1" cable with 2" of free flange or 5938 ft. of 1" cable using full drum capacity. UNIT DIMENSIONS: OAL 188 1/2"—OAW 123"—OAH 104"—foundation centers 63". Equipped with front and rear drum friction devices; front and rear drum brakes; 2 bypass; pedestal foot brakes; ratchet & pawls; gear shifters; throttle control; clutch controls.

**THE BOSTON METALS COMPANY**

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539-1900 (301) 355-5050



### 250 KW PORTABLE DIESEL GENERATOR SETS LATE MODEL

**ENGINE:**  
MFG: Caterpillar (1970)  
MODEL: D 343  
R.P.M.: 1800  
CYLINDERS: 6  
**GENERATOR:**  
CAPACITY: (312KVA) 250KW  
VOLTAGE: 120/208/230/460  
3 Phase, 60 Cycles  
AMPERES: 835/784/392  
TOTAL WEIGHT: 9500 pounds (prox)  
CONDITION: 4500 hours  
average operating time. Purchased new, well maintained, excellent running condition.  
Automatic Safety Shutdown for:  
\* Low Oil Pressure  
\* High Water Temperature  
\* Over-speed  
Turbocharged • Radiator Cooled  
Skid Mounted • Shrouded

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### NEW 7" RADIUS PANAMA CHOCKS

(MEET PANAMA REGULATIONS)  
With extended legs for welding to deck. IMMEDIATE DELIVERY FROM STOCK.

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### T2 "MISSION SANTA CRUZ" TANKER HULL

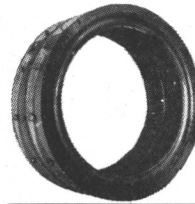
Excellent for Grain or Oil Storage

141,286 BBL—OAL 523'—Beam 68'—Draft 39' 3". For oil storage, grain storage, drill barge conversion, etc. For details, contact H.B. Chait, V.P. at:

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### 30" CLUTCH DRUM TIRES FOR FALK GEAR



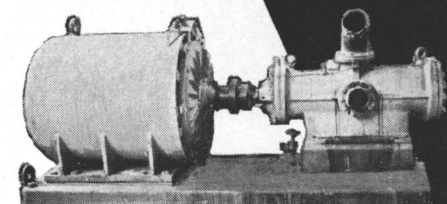
700 to 1000 HP. Unused surplus. Type MO-165-099—built originally for use on F.S. vessels and DPC tugs.

\$475 each

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## FUEL OIL TRANSFER PUMPS



Used, overhauled,  
good condition

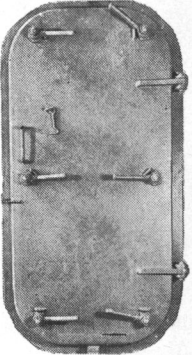
4-DeLaval horizontal Screw, 700 GPM, 150 PSI, 1180 RPM, with Continental Motors, 100 HP at 1190 RPM, 440/3/60, constant torque, continuous duty, Frame NF746F.

Contact Ralph Ingram

**ZIDELL**  
EXPLORATIONS, INC.

3121 S.W. Moody Ave., Portland, Oregon 97201  
Phone: 228-8691, Code 503 — Telex: 36-0503

## NEW WATERTIGHT DOORS



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

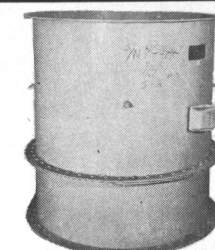
SIZE	NET WT.	PRICE
26"x48"	250 lbs.	\$225.00
26"x60"	300 lbs.	\$269.50
26"x66"	320 lbs.	\$297.50
30"x60"	330 lbs.	\$345.00

EACH DOOR

IMMEDIATE DELIVERY

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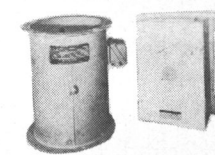
### UNUSED 30,000 CFM AXIAL FANS

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

### OTHER AVAILABLE AXIAL FLOW FANS

#### 115 VOLTS DC

4000 CFM/5000 CFM/6000 CFM/10,000 CFM/12,000 CFM



**230 VOLTS DC**  
Unused 2000 CFM 20AF—mfg. by Joy—.75 HP motor—3450 RPM—3.4 amps—.5" static—.15" ID—17" flange

ALSO

8000 CFM/10,000 CFM/35,000 CFM

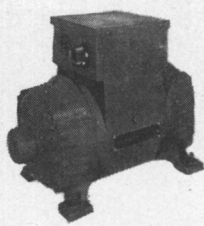
#### 440 VOLTS AC

1000 CFM—Buffalo A1A4W5—3/4 HP—440/3/60/3450  
2000 CFM—220/440/3/60—1.5 HP/3400 RPM

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## M.G. SETS

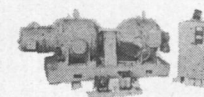


APPROX. 1/2 KW  
110/1/60 M.G. SET  
NEW—UNUSED

INPUT: 115 VDC—6.1 amps—3600 RPM. AC OUTPUT: 425 watts—4.55 amps—110/1/60. Ball bearing. 13 7/8" long—7 9/16" wide—10 1/2" high. Has radio noise suppression filter. Net wt. 58 lbs—83 lbs packed for shipping.

**\$89.50 EACH**

UNUSED—10 KW—120/1/60 M.G. SET



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

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

**3.7 KW Reconditioned M.G. SET**

115 VDC Input — 115/1/60 Output

Manufactured by Century. Reconditioned—4 bearing ball bearing. MOTOR: 5 H.P.—115 volts DC—38 amps—1800 RPM—60°C continuous. GENERATOR: 3.7 KW—4 KVA—115 volts—60 cycle—single phase—0.85 PF—1800 RPM—34.8 amps.

**RECONDITIONED CONTINENTAL  
220 D.C. TO 120/1/60 A.C.**

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

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**Attention: Offshore Contractors, Dredgers!**

**1200 KW—525 Volt DC DIESEL SET**

Completely Self-Contained on Railroad

Flat Car—Ex-Navy Emergency Unit

GENERATOR: Allis-Chalmers — 525 VDC — 2200 amps—750 RPM—self-ventilating—horizontally split casing. DIESEL: G.M. 16-278A—8 3/4" x 10 1/2" — 1700 BHP—720 RPM. Unit includes control panel & switches—excitation sets—aux. lighting generator driven by GM 2-71 2-cyl. 4 1/2" x 5 engine at 1200 RPM. Generator is 120 VDC. Also included are silencers and mufflers.

**ALL MOUNTED ON FLATCAR WITH STANDARD TRUCKS AND WHEELS—56 1/2" GAUGE**

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

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**UNUSED 375 G.P.M. ALLIS-CHALMERS PUMP**



Bronze—375 GPM @ 40' head—4" suction—3" discharge. Motor: 5 HP—115 volts DC—40 amps.

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

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Ocean-Oil International Engr. Corp., P.O. Box 6173,

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**PROPELLERS: NEW AND RECONDITIONED**  
 Avondale Shipyards, Inc., P.O. Box 52080, New Orleans La. 70150  
 Bird-Johnson Co., 883 Main Street, Walpole, Mass. 02081  
 Coolidge Propellers, 1601 Fairview Ave. East, Seattle, Wash. 98102  
 Escher Wyls 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**  
 Colt Industries, Inc., Fairbanks Morse Pump & Electric Div., 3601  
 Kansas Ave., Kansas City, Kansas 66110  
 Goulds Pumps, Seneca Falls, N.Y. 13148  
 Houttuin-Pompen N. V. Sophialaan 4, Utrecht, Holland  
 Incauzzi Bros., Inc., 11511 New Benton Highway, Little Rock,  
 Arkansas 72204  
 Worthington Corporation, Harrison, New Jersey 07029

**RATCHETS**  
 W. W. Patterson Co., 830 Brackett St., Pittsburgh, Pa. 15233

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

**ROPE—Manila—Nylon—Hawser—Wire**  
 American Mfg. Co., Inc., Noble & West Sts., Brooklyn, N.Y. 11222  
 Cutting Rope Co., 309 Genesee St., Auburn, N.Y. 13022  
 Columbian Rope Co., 309 Genesee St., Auburn, N.Y. 13022  
 Du Pont Co., Room 3141, Wilmington, Delaware 19898  
 Jackson Rope Corp., 918 & Oley, Reading, Pa. 19604  
 Wall Rope Works, Inc., Beverly, N. J. 08010

**RUDDER ANGLE INDICATORS**  
 Golbraith-Pilot Marine Corp., 600 Fourth Ave., Brooklyn, N.Y. 11215  
 Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913  
 Hose McCann Telephone Co., Inc., 524 W. 23rd St., N.Y. 10011  
 Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of  
 Sperry Rand Corp.

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

**SCAFFOLD BOARDS**  
 Hommet Corporation, Southern Extrusions Division, P.O. Box 40,  
 Magnolia, Arkansas 71753

**SEWAGE DISPOSAL**  
 Babcock & Wilcox Co., 161 East 42nd Street, New York, N.Y. 10017  
 Jered Industries, Inc., 1300 S. Coolidge Rd., Birmingham, Mich. 48008  
 Koehler-Doyton, Inc., P.O. Box 309, New Britain, Conn. 06050  
 LaMere Industries, Inc., 277 N. Main Street, Walworth, Wis. 53184

**SHAFT REVOLUTION INDICATOR EQUIP.**  
 Electric Tachometer Corp., 68th & Island Sts., Phila., Pa. 19142  
 Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913

**SHIPBOARD VENTILATION**  
 Coppus Engineering Corp., P.O. Box 457, Worcester, Mass. 01613

**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**  
 Agenor, P.O. Box 1465, Maracaibo, Venezuela  
 Hughes Bros., Inc., 17 Battery Pl., New York, N.Y. 10004  
 Nowbry'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**  
 Arco Steel Corp., 703 Curtis St., Middletown, Ohio 45042  
 Bethlehem Steel Corp., 25 Broadway, New York, N.Y. 10004  
 Huntington Alloy Products, Div. International Nickel Co., Inc.,  
 Huntington, W. Va. 25720  
 International Nickel Co., 1 New York Plaza, New York, N.Y. 10004

**SHIPBUILDING—Repairs, Maintenance, Drydocking**  
 Astilleros Espanoles, S.A. Zurbaron, 70, Madrid 10, Spain  
 Avondale Shipyards, Inc., P.O. Box 52080, New Orleans La. 70150  
 Barbour Boat Works, Inc., P.O. Box 1069, New Bern, N.C.  
 Bellard, Crighton & Cie, P.O. Box 2074, Route des Docks, 59, Dun-  
 Kirk, France  
 Bellard Murdoch S. A., Kottendijkdijk Westkaal 21, Antwerp, Belgium  
 Bertram Marine, Division of Whittaker, 3663 N.W. 21 Street,  
 Miami, Fla. 33142  
 Bethlehem Steel Corp., Shipbuilding, 25 Broadway, N.Y., N.Y. 10004  
 Blount Marine Corp., P.O. Box 360, Warren, Rhode Island 02885  
 Bludworth Shipyards, Inc., Box 5426, Cypress St., Brady Island,  
 Houston, Texas 77012  
 Brodogradiliste "SPL" P.O. Box 107, Split, Yugoslavia  
 Canrod Industries, P.O. Box 790, Morgan City, La. 70380  
 Curacao Drydock, Inc., P.O. Box 153, Willemstad, Curacao, N.A.  
 Dillingham Corp., P.O. Box 3288, Honolulu, Hawaii 96801  
 Devcon Corporation, Endicott Street, Danvers, Mass. 01923  
 Dravo Corporation, Neville Island, Pittsburgh 25, Pa.  
 Empresa Nacional Bazan, 65 Castellano, Madrid 1, Spain  
 Equipment Systems, Inc., A Microdot Co., P.O. Box 95,  
 Port Deposit, Md. 21904  
 Equitable Equipment Co., Inc., P.O. Box 8001, New Orleans, La. 70122  
 General Dynamics, Electric Boat Division, 99M Eastern Point Road,  
 Groton, Conn. 06340  
 General Dynamics, Quincy Division, Quincy, Mass. 02169  
 Gotaverken American Corp., 39 Broadway, New York, N.Y. 10006  
 Haiter 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, 64 E. Bay St., Jacksonville, Fla. 32203  
 Jeffboat, Inc., Jeffersonville, Ind. 47130  
 Kawasaki Dockyard Co., 8 Kaigan-dori, Ikuta-ku, Kobe, Japan  
 Kelse Marine, Inc., P.O. Box 268, Galveston, Texas 77550  
 Kockums Malmo, Fack, Malmo, Sweden  
 Litton Industries, 9920 W. Jefferson Blvd., Culver City, Calif. 90230  
 Lockheed Shipbuilding and Construction Co., 2929 16th Avenue,  
 S.W., Seattle, Wash. 98134

**Marathon Manufacturing Company**  
 Marathon LeTourneau Offshore Company, 1700 Marathon Building,  
 610 Jefferson, Houston, Texas 77002  
 Marathon LeTourneau Gulf Marine Division, P.O. Box 3189, Brownsville,  
 Texas 77520  
 Marathon LeTourneau Marine Division, LeTourneau Rural Station,  
 Vicksburg, Mississippi 39180  
 Marathon LeTourneau Offshore Pte., Ltd., P.O. Box 83, Taman Ju-  
 rong Post Office, Singapore 22, Singapore  
 Marathon Shipbuilding Company, P.O. Box 870, Vicksburg, Miss.  
 39180  
 Marathon Shipbuilding Company (U.K.) Ltd., Clydebank Banbarth-  
 shire, G81-11B, Scotland  
 Marine Engineering & Construction Co., Inc., 1664 Tchoupitoulas St.,  
 New Orleans, La. 70130  
 Maryland Shipbuilding & Drydock, P.O. Box 537, Baltimore, Md. 21203  
 Matton Shipyard Co., Inc., P.O. Box 428, Cofoes, New York 12047  
 Mitsui Shipbuilding & Engng. 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.  
 Newport Ship Yard, Inc., 379 Thomas St., Newport, R.I. 02840  
 Northwest Marine Iron Works, P.O. Box 3109, Swan Island, Port-  
 land, Oregon 97208  
 Nuclear Service & Construction Co., Inc., 9256 Warwick Blvd.,  
 Newport News, Va. 23607  
 O.R.N. (officine Alleanza) e Riparazioni Navil Genoa, Italy  
 Odense Steel Shipyard Ltd., P.O. Box 176, DK-5100 Odense, Denmark  
 Paccco, Div. Fruehauf Corp., 2350 Blanding Ave., Alameda, Calif.  
 94501  
 Pearson Engineering Co., P.O. Box 8, Kendall Branch, Miami, Fla.  
 33156  
 Perth Amboy Dry Dock Co., Perth Amboy, N.J. 08862  
 Peterson Builders, Inc., 334 So. 1st Ave., Sturgeon Bay, Wis. 54235  
 St. Louis Shipbuilding—Federal Barge, Inc.,  
 611 East Marceau, St. Louis, Mo. 63111  
 Saseba Heavy Industries Co., Ltd., New Ohtemachi Bldg., Chiyoda-  
 ku, Tokyo, Japan  
 Savannah Machine & Shipyard Co., P.O. Box 787, Savannah, Ga.  
 31402  
 Sembawang Shipyard (Pte) Ltd., P.O. Box 3, Sembawang, P.O.  
 Singapore, 27  
 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  
 Swedish Shipbuilding Association, Fack S-402 70, Gothenburg 8,  
 Sweden  
 Teledyne Seawort Aircraft, 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, Fort Everglades, Fla. 33316

**SHIP MODEL BASIN**  
 Incorporated, Laurel, Maryland 20810

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

**SHIP STABILIZERS**  
 Matitech, 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**  
 Babcock & Wilcox Co., 161 East 42nd Street, New York, N.Y. 10017  
 Combustion Engineering, Inc., Windsor, Connecticut 06095

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

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

**TOWING—Salvage, Lightering, Barge Chartering**  
 Bay-Houston Towing Co., 805 World Trade Bldg., Houston,  
 Texas 77002  
 Bouchard Transportation Co., Inc., 25 West Barclay St., Hicksville,  
 L.I., N.Y. 11801  
 Curtis Bay Towing Co., Mercantile Bldg., Baltimore, Md. 21202  
 Henry Gillen's Sons Lightering, 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  
 McAllister Bros., Inc., 17 Battery Pl., New York, N.Y. 10004  
 McDonough Marine Service, P.O. Box 26206, New Orleans, La.  
 Morton Towing & Transportation Co., Inc. One World Trade Center,  
 Suite 5325, New York, N.Y. 10048  
 L. Smit & Co., 11 Broadway, New York, N.Y. 10004  
 Siderman & Young Towing Co., 329 World Trade Center, Houston,  
 Texas 77002  
 Turcotte Coastal and Harbor Towing Corp., 1752 Shore Parkway,  
 Brooklyn, N.Y. 11214

**VALVES AND FITTINGS—Hydraulic—Safety Flanges**  
 Dover Corp./Norris Division, P.O. Box 1729, Toledo, Ohio. 74101  
 Hubava Marine Plastics-Lining, 435 Hamilton Ave., Brooklyn, N.Y.  
 11231  
 Marine Moisture Control Co., 449 Sheridan Blvd., Inwood, N.Y. 11696  
 Mesco Marine Co., 900 Fairmount Ave., Elizabeth, N.J. 07027  
 Mesco Telectronics, Inc., 5 Central Ave., Clifton, N.J. 07011

**WELDING EQUIPMENT**  
 Tweco Products, Inc., P.O. Box 666, Wichita, Kan. 67201

**WIRE ROPE**  
 Arco Steel Corp., 703 Curtis St., Middletown, Ohio 45042  
 Bethlehem Steel Corp., Bethlehem, Pa. 18016  
 Macwhyte Wire Rope Co., 2959 14th Ave., Kenosha, Wis. 53140  
 United States Steel Corp., P.O. Box 86, Pittsburgh, Pa. 15230

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


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 FIRE & GENERAL SERVICE PUMP**



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 TAILSHAFTS  
 RUDDERS**

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 T2-SE-A1 T2 Tanker Jacksonville, Fla.

**TAILSHAFTS—Reconditioned A.B.S.**  
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 T2-SE-A2 Mission Tanker Baltimore, Md.  
 T2-SE-A1 T2 Tanker Baltimore, Md.  
 BETHLEHEM Sparrows Point 29,000 Ton Hull 4518,  
 13600 HP @ 109 RPM. (Unused) Baltimore, Md.

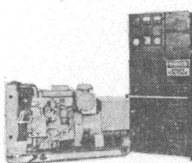
**RUDDERS—Reconditioned & Unused**  
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 T2-SE-A2 Mission Tanker Baltimore, Md.  
 T2-SE-1 T2 Tanker Baltimore, Md.  
 C-1MAV-1 (unused)

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