MARITIME
REPORTER
AND
ENGINEERING NEWS

Caribbean Venture Initiates Roll-On/Roll-Off Service To Dominican Republic

(SEE PAGE 6)

JANUARY 15, 1969

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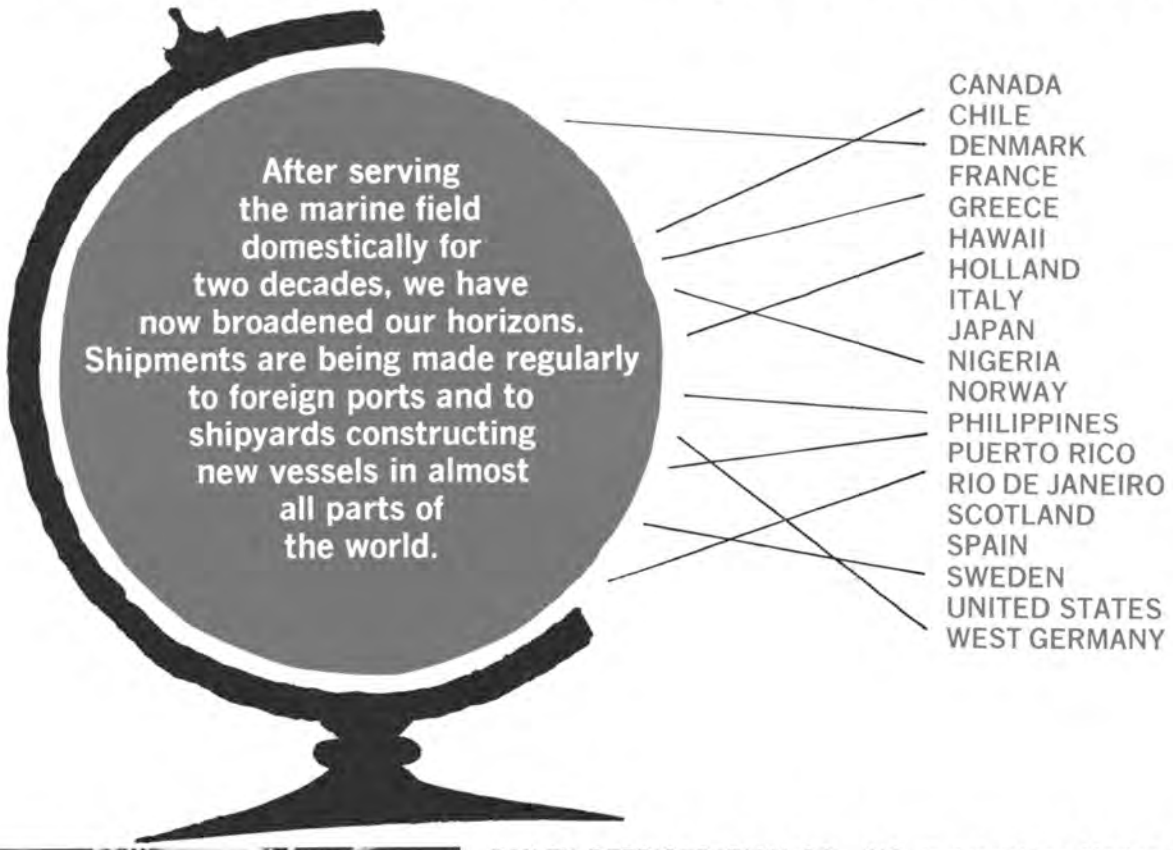

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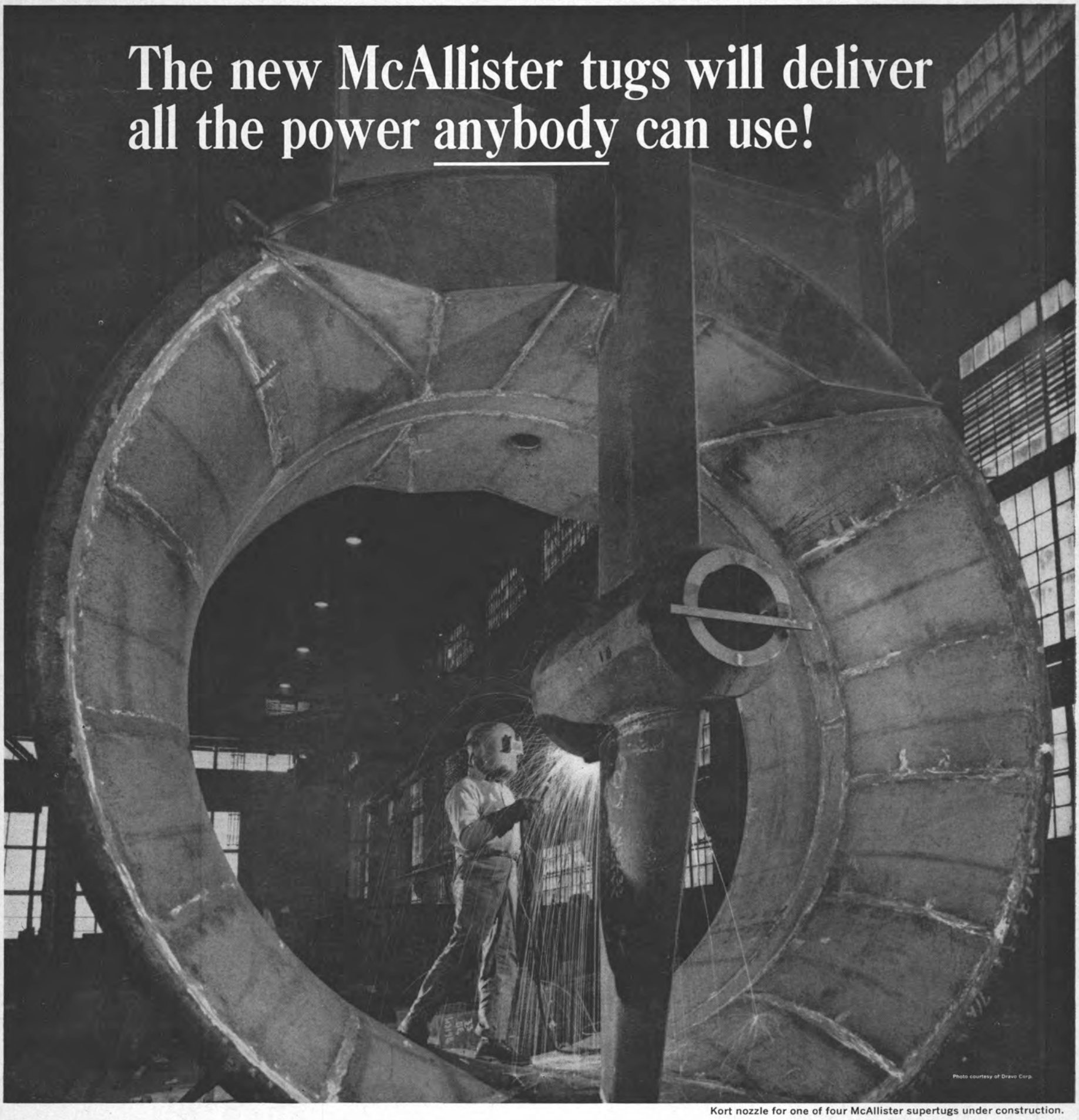

Kort nozzle for one of four McAllister supertugs under construction.

This "ring" is one of the reasons.

This 16-foot "ring" is called a Kort nozzle...and it adds literally 25 to 40% more thrust than the conventional open-propeller can deliver. And it adds maneuverability, too. In docking, undocking, towing, any harbor movement.

McAllister is adding *four more* of these high powered Kort nozzle type tugs in the multimillion-dollar expansion of its fleet. McAllister has the power to get your job done right.

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Peterson Sole Bidder On NSSC Tug Contract

Peterson Builders, Inc., Sturgeon Bay, Wis., was alone in submitting a bid on December 2 to the Naval Ship Systems Command, Washington, D.C., for the construction of six large harbor tugs, YTB-760 class, with a total price of $5,083,-500.

The bid was submitted under IFB N00024-69-B-0538.

Glendale Boat To Build Twin-Screw Towboat

Glendale Boat Works of Greens Bayou, Texas, has received a contract for the construction of a twin-screw towboat from undisclosed interests. This vessel will be powered with 900-total-bhp diesels and will have the following dimensions: 60 feet by 20 feet by 9 feet.

Sewart Seacraft Bid For Lobstering Boat Accepted By MarAd

A bid of $122,689 for the construction of a welded aluminum lobstering and crab fishboat for **Nicholas Rosa** of Brooklyn, N.Y., has been reported as acceptable by the Maritime Administration. The bid, the lowest received, was made by Sewart Seacraft Division of Teledyne, Inc. of Berwick, La.

According to **James Gulick,** acting maritime administrator, $71,000 was estimated as the cost of constructing the ship in Japan, the representative low cost shipbuilding center. The government will make up the difference of $51,689. The ship will be subsidized through the Department of the Interior.

Mitsui Awarded Second 215,000-Dwt Tanker By British Petroleum

British Petroleum Ltd. recently announced that it has ordered another 215,000-dwt tanker from Mitsui Shipbuilding & Engineering Co., Ltd. in Japan. According to BP, this brings to nine the total of this class of ship now on order for the BP group.

In addition to the two on order with Mitsui, the company has four on order with Mitsubishi Heavy Industries, one with the Kawasaki Dockyard, and two 240,000-ton tankers with the Chantier Navals de la Ciotat. The vessels are to be used mostly for crude oil trade with Japan, which is expected to involve total sales of more than six-million tons over a three year period, according to BP.

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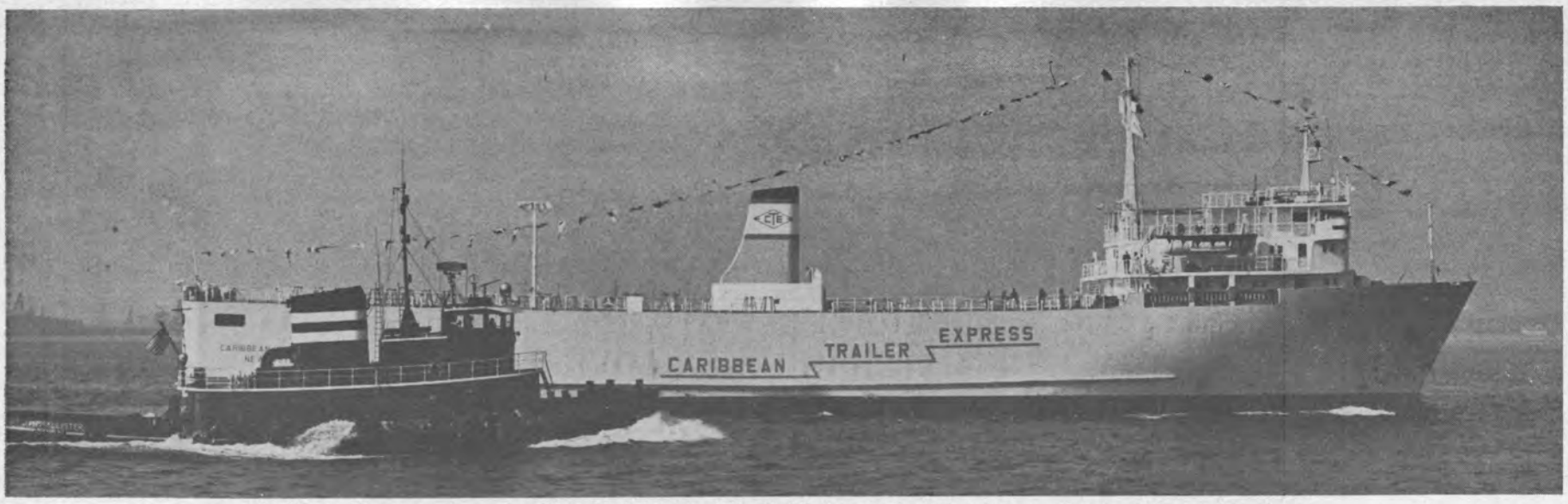
This 299' 9" self-powered barge, equipped with two F-7 450 h.p. Harbormasters, finds new maneuverability in handling big payloads in busy harbor, river, canal and lake operations.



Caribbean Venture welcomed to New York by tug J.M. McAllister which guided the new ship to its Staten Island pier.

First New York/Dominican Republic Roll-On Service Started With

MS Caribbean Venture

A new roll-on/roll-off cargo service between New York, Jamaica and the Dominican Republic was started in December. The initial service was inaugurated with the MS Caribbean Venture operating on a fortnightly schedule. In February, a sistership, the Caribbean Enterprise, will be delivered and the service increased to weekly.

The new and only such service out of New York was inaugurated by Caribbean Trailer Express Line. The vessels used in the operation are owned by Northumbrian Shipping Ltd. of London. Shipcraft Agency, Inc., New York, is acting as general agents for the ships.

The Caribbean Venture was specially designed for this type of fast turnaround operation. The Venture, as well as the Enterprise, were built by J.J. Sietas Shipyard, Hamburg-Neuenfelde, Germany. The Venture was completed late in 1968 and the Enterprise is scheduled for launching this month.

The Caribbean Venture is not a large ship. It was designed for this specialized type of operation where a shallow draft is advantageous and the amount of cargo available on a weekly basis is not large. However, a frequent, scheduled sailing service is important.

The type of cargo generated by this service was well represented on the first voyage. Southbound trailers contained general cargo and food products and a few automobiles were carried. Northbound, there were fresh fruits and vegetables from the Dominican Republic and Jamaica and local manufactured goods from Jamaica.

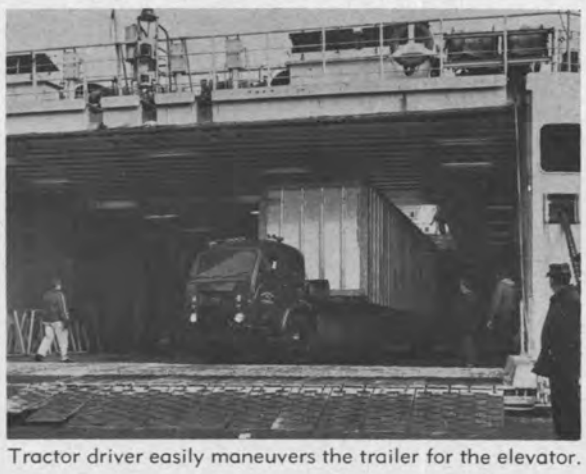
About 30 percent of the southbound freight is on a pier-to-pier basis, with the shipping line consolidating the cargo into trailers. Most of the northbound cargo will be pier consolidated. However, the operators do anticipate that there will be a substantial amount of railroad piggyback service at its Staten Island, N.Y. pier and have made provisions for handling it.

With this type of operation, it will be possible to transport heavy-wheeled equipment such as bulldozers, cranes, etc.

The capacity of the Venture is 51 forty-foot dry, liquid or refrigerated trailers, or the equivalent in other forms of wheeled vehicles. The ship also has two deep tanks, each capable of holding 180 tons of vegetable oils or chemicals.

(Continued on page 8)

Trailer being backed onto the main deck over stern ramp.



Tractor driver easily maneuvers the trailer for the elevator.

Trailer is unhitched from tractor on the elevator platform.

Elevator is raised to weather deck by operator at right.

Trailer arrives on weather deck for transfer to stowage.

Caribbean Venture prepares to sail on southbound voyage.

Load your Container handling problems...

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Our very talented 40-foot universal container chassis provides a simple solution to a wide variety of container-handling problems. It accommodates either 40-foot flat-bottom or tunnel-type containers—or two coupled 20-foot units. Dual position locking pins permit handling of both types and sizes of containers within an overall height of 12′ 6″. The new chassis also handles, with equal ease, all previous and current designs of USASI/ISO corner fittings. Ask your local Fruehauf man for free literature and complete specs. **Fruehauf Division, Fruehauf Corporation, 10943 Harper Avenue, Detroit, Michigan 48232.**

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U. S. Seaport Service Branches: Baltimore • Boston • Houston • Jacksonville • Kearny, N.J. • Los Angeles • Maspeth, Long Island • Miami • New Orleans • Norfolk • Philadelphia • Portland, Ore. • San Francisco • Seattle • Tampa • Complete container service facilities are also located at many inland Fruehauf Branches in the United States and Canada—as well as overseas.

MS Caribbean Venture—

(Continued from page 6)

Pilothouse console combines all ship operating functions.

The Venture has a length overall of 309 feet and a beam of 55 feet. Full load draft is 15 feet. The total deadweight tonnage is 2,300 tons.

Vehicles are loaded by way of a stern ramp, 45 feet wide and 14 feet long. The ramp is formed by the stern doors. The loading tractor backs the trailers onto the main deck and stows them. Special tiedown arrangements are provided in a grid pattern on the deck, so that all sizes of trailers or vehicles can be stowed.

For loading the weather deck, the trailer is moved onto an elevator. After being placed on the elevator, the tractor is unhitched and the elevator raises just the trailer to the weather deck. Here another tractor moves the trailer to its stowed position.

The hydraulically-operated elevator is of the scissor-action type so that there are no obstructions between the main deck and the weather deck. The elevator has a capacity of 33 tons.

Twin-screw propulsion is provided by two Deutz diesel engines, each developing 2,000 bhp. This power gives the Caribbean Venture a service speed of 16 knots.

Deutz Diesel main engines provide twin-screw propulsion.

Electrical power is supplied by three diesel-generator sets.

Chesapeake Section Reviews Oscillating Foil Propulsion

Principals at the December meeting of the Chesapeake Section, SNAME, were, left to right: **J. O. Scherer,** Hydronautics, Inc., author; **Robert Taggert,** Robert Taggert, Inc., Chesapeake Section chairman; **Owen H. Oakley,** Naval Ship Engineering Center, Chesapeake Section, executive committee, and **W. B. Morgan,** Naval Ship Research & Development Center, meeting moderator.

The Chesapeake Section of The Society of Naval Architects and Marine Engineers was presented an interesting paper on the "Performance of Oscillating Foil Propulsion Systems" by **J. O. Scherer,** senior research scientist of Hydronautics, Inc., at its December meeting.

In order to achieve practical levels of thrust, an oscillating foil propulsor must undergo large amplitude oscillations at relatively high frequency. The magnitude of the required oscillations is such that the classical small amplitude theories cannot provide adequate performance predictions for engineering purposes. The paper presented an analytical method for computing the forces and moments on a rigid foil of finite span undergoing large amplitude oscillations. The influence of foil stall and the induced slipstream were included.

The results of an extensive study were shown to be in good agreement with the theory.

Performance predictions for an oscillating foil propulsor suitable for use on a 15-knot, shallow-draft boat of 2,000-pound payload were presented. The results indicate that this type of propulsor can provide efficient shallow-water propulsion with a high degree of maneuverability.

A lively discussion followed the presentation. Of particular interest was a discussion by **Robert Taggert** of Robert Taggert, Inc., accompanied by slides, which commented on some parallels between the paper and studies which had been made concerning the means by which fish propel themselves.

The meeting, which took place at the Walter Reed Army Hospital Officers Club in Washington, D.C., was preceded by a social hour and dinner.

Barge Construction

American Ship Dismantlers Co., Portland, Oregon, is building a 2,000-dwt crane barge for Schnitzer Leasing, Inc., Portland, Oregon. Designated Hull No. 103, it will have dimensions of 180 feet by 45 feet by 12 feet.

Jeffboat, Inc., Jeffersonville, Ind., is to construct ten additional 1,500-dwt covered hopper barges for stock purposes. The dimensions of each barge will be 195 feet by 35 feet by 12 feet.

Lone Star Marine Salvage Co., Houston, Texas, is to construct nine deck cargo barges for the Corps of Engineers, Little Rock, Ark. Three of the barges will have dimensions of 80 feet by 24 feet by 6 feet; the remaining six will be 120 feet in length, 30 feet in beam and 6 feet in depth.

Norfolk Buys MA Terminal— Will Develop For Containers

A contract for the sale of the Maritime Administration Norfolk Terminal in Norfolk, Va., to the City of Norfolk has been signed, it was announced by the Maritime Administration, U.S. Department of Commerce. The City of Norfolk is to use the terminal as an open public marine terminal for the handling of intermodal and containerized cargo.

Under the terms of the sale, the City of Norfolk is to develop the terminal as a modern, intermodal interchange point to expedite the movement of containers by shippers, inland transportation carriers and ship operators. The terminal and warehouse facilities will be operated to foster development of the United States merchant marine, and the commerce of the United States, on an open basis, with each user receiving equal treatment, under customary port practices and established rate schedules.

The City of Norfolk has been operating the terminal under a lease, pending arrangements for sale, since July 1966.

The real estate to be transferred totals 538 acres and includes eight warehouses, two piers with transit sheds, open storage areas, parking lots, utilities, roads, railway trackage, marshalling yards, and miscellaneous small buildings and improvements. Use of substantial acreage in the terminal area will be reserved for the Army, Navy, the General Services Administration and the Maritime Administration.

The expected return to the government for the transferred facilities is approximately $11,600,000.

Navy Gives Uniflite Order For Hawser Handling Boats

The Naval Ship Systems Command has awarded Uniflite, Inc. a $118,132 contract for the manufacture of four 30-foot hawser handling boats.

Previous to this contract, Uniflite had built 24 similar boats for the Navy.

The hawser handling boat is used as a tender for submarine rescue ships. It can be either moored over a sunken craft, or serve as a shore boat.

Uniflite, Inc. of Bellingham, Wash., builds a line of 23- to 48-foot fiberglass pleasure cruisers and is a major supplier of fiberglass marine craft to the U.S. Government. The firm gained recent fame for the manufacture of more than 200 U.S. Navy river patrol boats now fighting in Vietnam, manufactured from a hull identical to their 31-foot pleasure cruiser.

CONTRACT SIGNING FOR AGOR—John Gilbride, right, president of Todd Shipyards Corporation, and Rear Adm. **Edward J. Fahy,** USN, commander of Naval Ship Systems Command, sign the contract for the construction of T-AGOR-16. The new 246-foot oceanographic research ship will have a catamaran hull. It will be constructed at Todd's Seattle (Washington) Division and is scheduled for delivery in the spring of 1971. The $13,950,000 fixed-price contract was awarded on the basis of competitive bidding.

The 8 great advantages when you Bunker Antigua

The Location

1. Antigua is strategic. It lies directly on several major shipping lanes saving you many hours of diversion compared to older Caribbean ports.

2. Our terminal is in Seasonal-Tropical Zone waters enabling you to maximize deadweight cargoes at loading ports. Draft is no problem.

The Equipment

3. Our equipment is designed for speed: pumping rates exceed 2,500 barrels an hour for larger vessels. Our average bunkering time for all vessels is under 6 hours based on a recent year's experience.

4. All grades of marine fuels and potable water are available day and night.

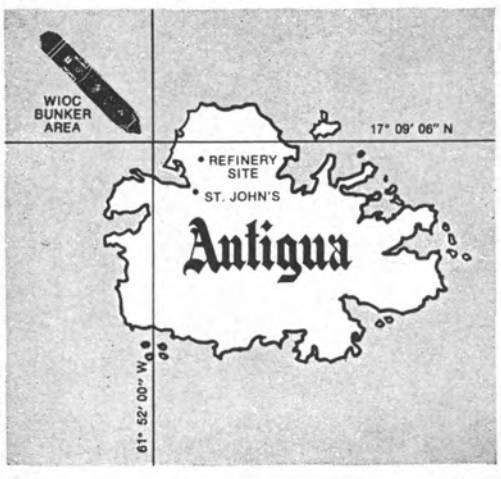
5. You can bunker: (1) by barge, (2) at the "Sea Island" Product Pier, or (3) at the off-shore submarine pipeline.

The Port Charges

6. Very low. Usually less than $130, including Agency fee.

7. The bunker site is in deep, calm and sheltered water.

8. There are several daily non-stop jet flights from New York for crew exchange, replacement parts and mail.



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Tenneco Appoints Ackerman President Of Newport News Ship

A series of top level management reassignments to strengthen the administration of Tenneco Inc.'s manufacturing operations was announced in Houston, Texas, by **N. W. Freeman,** Tenneco Inc. president and chief executive officer. The changes were effective January 1.

L. C. Ackerman has been named president and chief executive officer of Newport News Shipbuilding and Dry Dock Company of Newport News, Va. He joins **Donald A. Holden,** chairman of the board, in executive responsibility over that firm.

Thomas G. Cook succeeds Mr. **Ackerman** as president of Walker Manufacturing Company of Racine, Wis., moving up from vice-president and treasurer.

Both Newport News Shipbuilding, the nation's largest shipbuilder, and Walker Manufacturing, maker of automotive equipment, are wholly owned subsidiaries of Tenneco Inc.

Mr. **Freeman** described the new assignments as "the **result of the** projected continuing growth of Tenneco's manufacturing operations and the collateral increase in the complexities and burdens of administration."

Mr. **Ackerman** joins Newport News Shipbuilding after 16 years with Walker Manufacturing, including nearly three years as president. A native of Los Angeles, he received an A.B. degree in economics from the University of California at Los Angeles in 1940. He joined Walker Manufacturing in 1952 as sales representative and after promotions to product manager and marketing manager was named vice-president and general manager of Galt Metal Industries, Limited, a Canadian subsidiary, in 1958. He became vice-president of Walker Manufacturing's international division in 1963, vice-president of marketing in 1965, and president in 1966.

L. C. Ackerman

Mr. **Ackerman** will remain a director and member of the executive committee of Walker Manufacturing. He has been a director of Newport News Shipbuilding since last September, and also serves on the board of J.I. Case Company, in which Tenneco Inc. owns a 56 percent interest.

Mr. **Holden,** chairman of the board and an officer of the company, has had dual responsibility as chairman of the board and president of Newport News Shipbuilding since 1965. After graduating from the Massachusetts Institute of Technology with bachelor of science and master of science degrees, he joined the company in 1934. He became vice-president and a director in 1959, executive vice-president in 1960, and president in 1964.

He is a member of the board of directors of Tenneco Inc. and is also a director of the First & Merchants National Bank and of the Commonwealth Natural Gas Corporation, both of Richmond, Va.

The manufacturing operations of Tenneco Inc. are carried on principally by Newport News Shipbuilding, which was acquired by Tenneco Inc. last September, and by Walker Manufacturing and J.I. Case. They comprise one of Tenneco's six major business activities, which also include operations in chemicals, natural gas pipelining, oil, packaging, and land use.

NSSC Issues Contract To DeLaval Turbine

DeLaval Turbine, Inc., Trenton, N.J., is to receive a $1,976,631 fixed-price multi-year letter contract from the Naval Ship Systems Command (N00024-69-C-5254). The contract is for steam turbine generators including associated engineering services, technical data and reports.

Reduced Costs Are Possible With

Total Power Systems

R. S. Ramsey*

One of the major factors in successful transportation operations is the prime mover available and how it relates to the performance desired through reliability and economy of sustained operation. The automobile (including trucks and buses) is the largest form of transportation, and reached its high degree of development through mass production and its prime mover, the internal combustion engine, was the first prime mover of any type to be really mass produced in volume.

It was only natural that the diesel engine would follow the same course and today both medium and high speed diesels are mass produced for broad markets in the transportation and power generating industries.

New waterborne vehicles are placing a heavy load on their designers to provide efficient vessels for carrying the world's commerce on oceans, lakes, harbors and rivers. Some of the vessels are entirely new in concept and all of them are revolutionary even when compared to their latest predecessors. Many of the new vessels must be dual purpose or perform multi-functions. The powerplant for such a vessel must be a flexible system and its prime mover and transmission components will have to provide a total power facility. The designers and builders are facing a tremendous challenge in order to place these vessels in the operators' hands at a price that will insure the proper return on investment. To do this, they are looking to components and systems doing a similar duty in other industries. Where they find these components they are assured of a reliable proven product at the lowest possible cost.

Figure 1 illustrates the side view of a cargo-ship power unit where two 3,600 bhp diesel engines each drive through a generator into a twin-pinion, single-output reduction gear to supply 7,000 hp to a controllable-pitch propeller. Each diesel engine is mounted on a common base with its accessory module, ac-dc generator, and air clutch.

*Mr. **Ramsey,** manager of marine sales, Electro-Motive Division, General Motors Corporation, presented the paper condensed here at a meeting of the Great Lakes and Great Rivers Section of The Society of Naval Architects and Marine Engineers.

Both diesel-engine-unit common bases at the power takeoff end are supported on the common reduction-gear frame. The accessory end of the diesel units is supported by the ship's structure. The unit, as illustrated by Figure 1, is made up of a standard production diesel engine, a prefabricated engine accessory module, generator, and air clutches. The common reduction gear is of conventional design but is subject to variation in the housing configuration and reduction gear ratio to meet the ship designer's specific requirements. The diesel engine, accessory module, generator, and air clutches are volume produced and used extensively in several major industries and the marine industry.

Figure 2 follows from Figure 1 and illustrates by block diagram the total power system for a self-unloading cargo ship. A total of 14,000 shp is available for propulsion through two controllable-pitch propellers and four prime movers. When propulsion demands are reduced, in channels and harbors, one engine can be released from each propeller by deflating the air clutches. These engines can now supply electrical power from their generators to drive the bow and stern thruster motors. After the vessel is secured to the dock, all four engines are available to furnish electrical power from their generators to the ship's unloading machinery motors.

Programming of the ship's power has been kept as simple as possible without sacrificing maximum flexibility. Experience and equipment, borrowed from marine, oil drilling, locomotives, and electrical utility applications, assure this flexibility and keep the costs within practical limits. Controls consist of a central control panel, generator control cabinets for each power unit, a common motor control cabinet and an unloading control station. The central control station is a compact panel pushbutton type which can be located in either the pilothouse, engine room, or both.

The total power systems are put together from components used in several industries, thereby passing on to the user all the benefits each industry has developed. These benefits are: lowest possible first cost, proven reliability, lower installation and maintenance cost and minimum operational attendance.

The first cost of this power equipment, on a dollar-per-horsepower basis, has remained almost static for the last five years in spite of material and labor cost increases. The reasons for this are continual product refinement to take advantage of new materials, manufacturing methods, lubrication, and other technological advances.

Proven reliability and low maintenance advance together particularly when the components serve broad markets where vast field experience guides the engineers to the specific items that require further development.

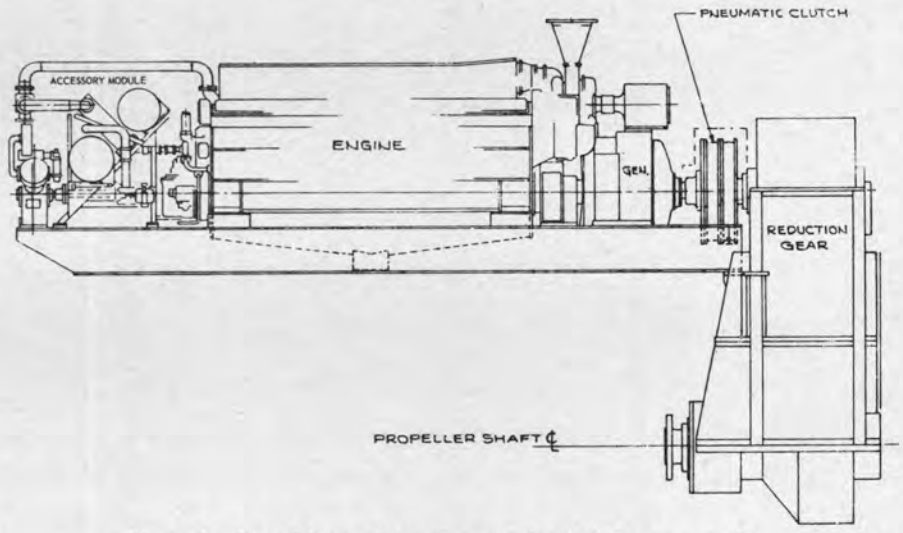


Figure 1—Propulsion and power generation unit for a cargo ship.

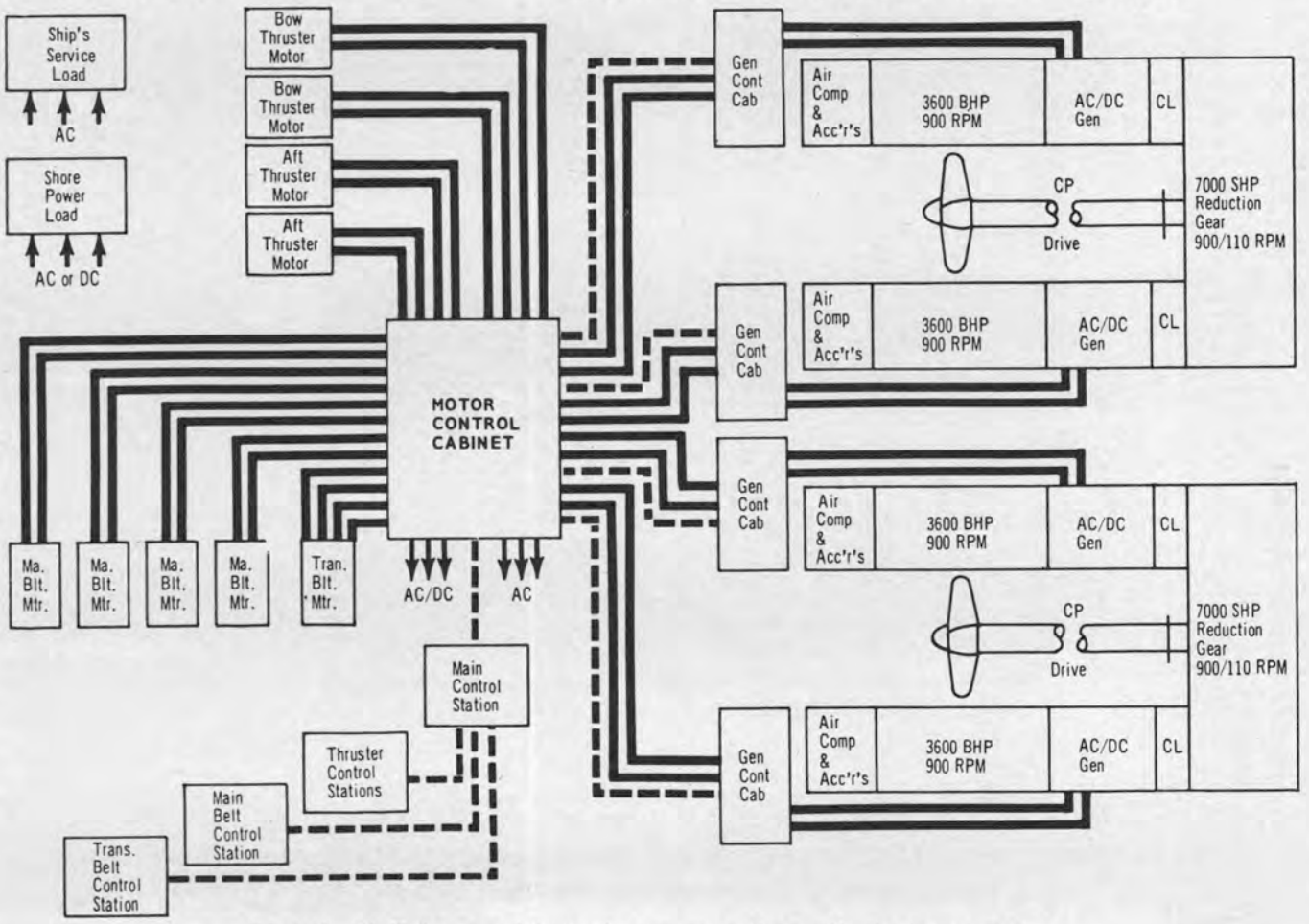
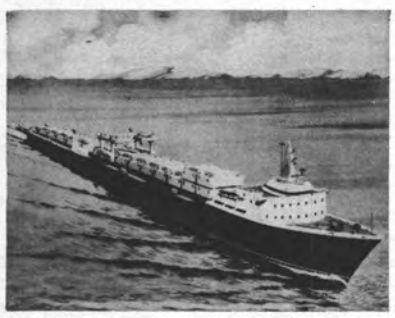


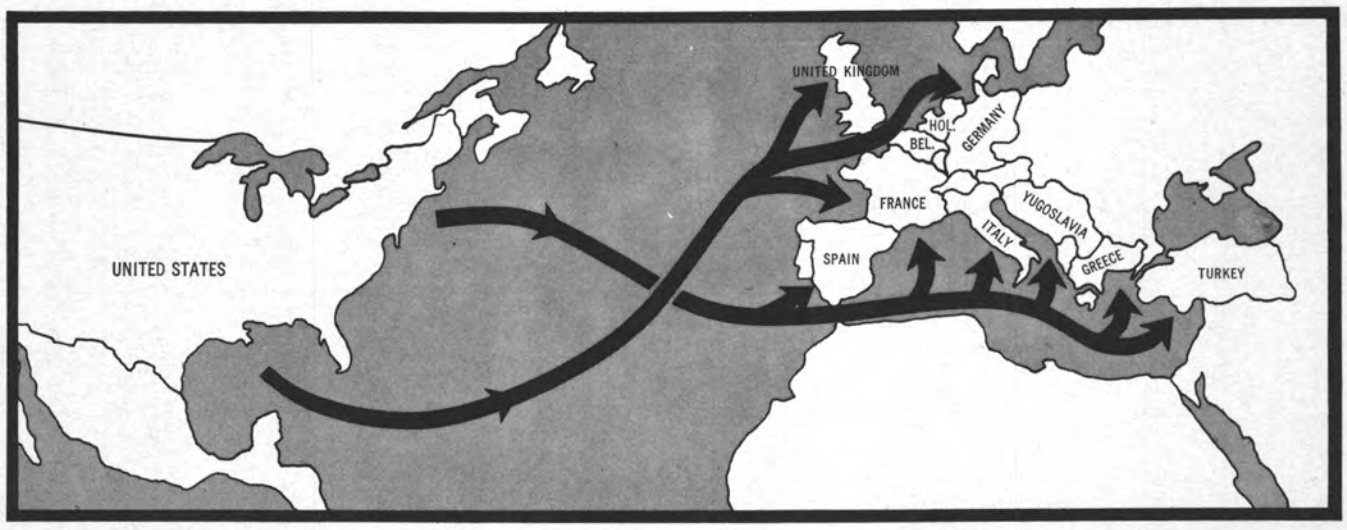
Figure 2—Block diagram of the total power system for a self-unloading cargo ship.

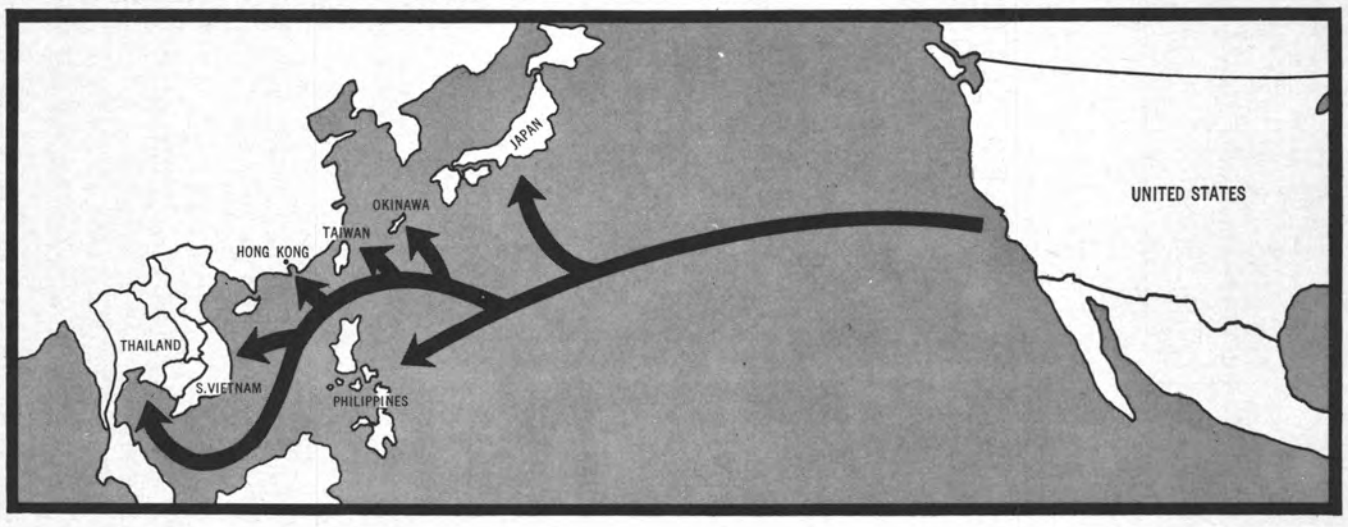


LASH TRADE ROUTES

3 continents, 18 countries

13 LASH ships now under construction to serve the areas below. LASH service begins this year.





LASH LIGHTER CONSTRUCTION

A total of 1200 LASH lighters are already being built to serve initial LASH trade routes. Photos at left were taken at one lighter assembly line.

The LASH System is the most flexible, most advanced cargo container system in production today. Its ability to transport cargo in lighters (floating containers) or standard over-the-road containers in an unmatched advantage for ship operators. The LASH System provides all trading nations—whether their economies are highly industrialized, agricultural or developing —the same high efficiency of cargo transportation.

LASH SYSTEMS, INC. *SUITE 1414, 225 BARONNE ST., NEW ORLEANS, LOUISIANA, U.S.A.*

U.S. Lines Elects Bachko Vice-President

Nicholas Bachko

The election by the board of directors of **Nicholas Bachko** as vice-president of the Department of Corporate Planning and Development of the United States Lines was announced by **John J. McMullen,** president of the steamship company.

In his new position, Mr. **Bachko** will be in charge of formulating for management long-range plans for developing and expanding the company's activities in ocean as well as intermodal systems of transportation. His responsibilities will continue to include supervision of the company's vessel replacement program as well as coordination of activities related to the company's current transition into containerization.

Mr. **Bachko** was graduated from the United States Merchant Marine Academy in 1942 and served as an engineer aboard United States Lines' ships during World War II before joining the shore establishment of the company in 1945 as port engineer.

In 1948, he was selected to serve as resident engineer for the company, in charge of contruction of the superliner United States in Newport News, Va., and was principal liaison for the company with the Maritime Administration, the shipyard and the designer during the three-year building period of the superliner.

When United States Lines began its huge vessel replacement program in 1962, Mr. **Bachko** was named manager of new construction and helped to plan and design the company's new fleet of high-speed cargo liners. He also played a major role in designing the characteristics of six full container-liners, four of which joined the company fleet last year and two of which will be completed early this year.

Anderson To Head Funch Edye & Co.

C. N. Anderson has been appointed president of Funch Edye & Co. Inc., according to a recent announcement made by the firm. Mr. **Anderson** assumed the presidency upon the resignation of **T.J. Roydan,** who will continue to serve the firm in a consultative capacity.

Funch Edye & Co. is a ship brokerage and agency firm with offices in New York City.

M. L. Rice Appointed President Of Ogden

M. Lee Rice

The appointment of **M. Lee Rice** as president of the Ogden Corporation was announced by **Ralph E. Ablon,** chairman of the board and chief executive officer. Mr. **Ablon** has also served as president of the corporation since 1962.

Mr. **Rice** joined Ogden Corporation in 1967, as senior vice-president, and in May of 1968 was elected to the Ogden board of directors. He has served as a member of the executive committee of the board of directors, and as chairman of the corporation's operations committee.

Mr. **Rice** holds numerous patents in the fields of advanced technology. He came to Ogden from Atlantic Research Corporation, where he had been president from 1962 to 1967. A graduate of Western Maryland College summa cum laude, he joined Atlantic Research in 1950. He was named director of ARC's Applied Sciences division in 1954, and was elected a vice-president of the firm in 1958.

Chiefly a shipbuilding, metals and metals related company with sales of $398-million in 1962, when Mr. **Ablon** assumed its leadership as chairman and president, Ogden's base of operations was rapidly expanded and diversified to include foods and food service, technology products, marine terminal operations and engineered transportation services, resources and real estate development.

The company's sales, which reached $815-million in 1967, will approach the $1-billion level for 1968.

Sweden Building Container Terminal South Of Stockholm

A container terminal is to be built at Oxelosund, on the coast south of Stockholm, Sweden, according to a decision by the Grangesberg Company which is the predominant user of the port for shipments of iron ore from its mines in Central Sweden and other cargoes.

To provide space for the container terminal, the present quay for general cargo will be lengthened by about 328 feet, at a water depth of 33 feet, and a special quay 82 feet long will be built for roll-on/roll-off traffic. A 35-ton crane will handle containers of up to 40 feet. Storage facilities will cover a large area.

The terminal will come into use at the beginning of 1970.

Burmeister & Wain Receives Orders For Eighteen Ships In 1968

Burmeister & Wain's series of bulk carriers of 50,500 dwt appears to be a continuous success. For the ninth time the yard has booked an order for a ship of this description, placed by Rederiaktieselskabet "Mascot", of the Arthur H. Mathiesen group, Oslo.

There is already one 50,500-dwt bulk carrier for Arthur H. Mathiesen under construction at the B&W yard, ordered a year ago. Since then, B&W has made efforts to secure new orders, and with the two ships for the Oslo owners the result is, in all, 18 shipbuilding contracts in the course of 12 months.

In spite of the steadily and rapidly increasing staff, the production capacity of the yard is already completely booked for two years ahead, so that new orders can only be accepted for delivery after that time.

These 18 contracts include five ships of the 50,500-ton series, viz. two for A. P. Moller, one for Polish Steamship Company, plus the two now on order for Arthur H. Mathiesen, Oslo.

West Coast To Guam Containership Service Inaugurated By PFEL

A new containership service between the San Francisco Bay area and Guam was inaugurated January 8, when the Guam Bear made its maiden voyage from Universal Terminal, Alameda, Calif., according to an announcement made by **Leo C. Ross,** president of Pacific Far East Line, Inc.

The containership Guam Bear will be followed in the service by its sistership, the Hawaii Bear. Both ships were C-4 troopships that were converted by Todd Shipyards in Alameda to carry in excess of 400 standard-size 8-foot by 8-foot by 20-foot containers capable of carrying dry cargo and/ or refrigerated cargo. These ships will also have limited breakbulk space for handling unitized cargo and vehicles.

The new containership service will give shippers express sailings between the San Francisco Bay area and Guam every 16 days, in addition to the service offered by conventional vessels.

Texas Transport Names Blanco Traffic Manager Of Latin American Div.

J. Daniel Culpepper, vice-president and general manager (North Atlantic) of the Texas Transport and Terminal Co. Inc., has announced the appointment of **Mariano R. Blanco** as general traffic manager of T.T.T.'s Latin American Division with headquarters in New York.

Mr. **Blanco** has been affiliated with the shipping industry in the United States and Venezuela since 1953 and will direct the Venezuelan Line activities for T.T.T.

McVeigh & Schmidt Names R. J. Kehoe VP

Richard J. Kehoe

The marine and industrial supply firm of McVeigh & Schmidt, Inc., has announced that **Richard J. Kehoe** has assumed the post held by the late **James McVeigh,** and has been named vice-president.

Mr. **Kehoe** has for many years been a specialist in pioneering the latest technical developments and establishing new sales areas in the wire rope industry to the marine trade.

Following his graduation from Colgate University in 1932, Mr. **Kehoe** went with the Grace Line, entering the purchasing department. He has since been divisional sales manager of Paulsen-Webber Cordage Corporation, vice-president of Sunbury Wire Rope Company and sales manager for the DiMattina Supply Company. He also headed the R.J. Kehoe Machinery and Equipment Company.

Mr. **Kehoe** is a member of the Propeller Club of New York, the Rotary Club of New York, and is secretary of the Marine Sales Association. He is a trustee of the Eastchester Historical Association and a member of the Westchester Village Officials Association of which he is a past president.

Mr. **Kehoe** will be responsible for the expansion of McVeigh & Schmidt's sales of industrial and marine supplies and will make his headquarters at their 74 Warren Street office and warehouse in New York City.

Sperry Gyro Names D. M. McLean Manager Of Public Relations

The appointment of **Donald M. McLean** as manager of public relations for the Sperry Gyroscope Division of Sperry Rand Corporation, Great Neck, N.Y., was announced by **Carl Knorr,** vice-president of marketing for the division. He replaces **Herb Doherty,** who resigned.

Mr. **McLean,** formerly manager of public relations for the Sperry Systems Management Division, joined Sperry in 1965 as a public information representative. He transferred to Sperry Systems Management Division in 1967.

Prior to joining Sperry, Mr. **McLean** served as managing editor of Marine Engineering/Log. He graduated from the U.S. Merchant Marine Academy in 1951 with a B.S. degree and holds a license as chief mate, any oceans, any tonnage.

...back to the salt mine

Back to Baja, Mexico for another barge-load of salt to be towed to Vancouver Island.

But the cargo might be anything . . . limerock, chips, hogged fuel, pulp and paper, petroleum products.

And we might be hauling it anywhere in the world for you. Like we do for every major industry in British Columbia.

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National Steel Launches Second LST— Lays Keel For Another In 17-Ship Program

Dignitaries at the launch-keel laying ceremonies included, left to right: Rear Adm. **Richard R. Pratt,** USN, commander, Amphibious Training Command; Capt. **John M. Danielsen,** USN, force chaplain, Amphibious Force Pacific Fleet; Rear Adm. **William W. Behrens Jr.,** USN, commander, Amphibious Group One; **Robert H. Michel,** congressman; **Robert Lehnhausen,** mayor of Peoria, Ill.; Rear Adm. **Gayle T. Martin,** USNR, representing commander, Naval Ship Systems Command; **Miss Laurie Michel,** maid of honor; **Mrs. Michel,** sponsor, and **John V. Banks,** Nassco executive vice-president.

The USS Peoria (LST-1183), a new design tank landing ship was launched recently from the ways of National Steel and Shipbuilding Company, San Diego, Calif. Within minutes after the Peoria was launched a keel section was laid for a sistership, the USS Tuscaloosa.

Mrs. Robert H. Michel, wife of Illinois' Representative **Robert H. Michel,** was the new ship's sponsor. Her daughter, **Miss Laurie Michel,** served as maid of honor.

The main speaker at the launching was Rear Adm. **Richard R. Pratt,** USN, commander, Amphibious Training Command. Others participating included Capt. **John M. Danielsen,** USN, force chaplain, Amphibious Force, Pacific Fleet; **John V. Banks,** Nassco executive vice-president, and **John M. Murphy,** Nassco vice-president, sales.

Immediately following the launching, Rear Adm. **William W. Behrens Jr.,** USN, commander, Amphibious Group One, laid the keel for a sister LST, the USS Tuscaloosa.

The USS Peoria slides down the ways and into the water at recent Nassco launching.

The new design LSTs, unlike earlier ones, will have destroyer type bows. Vehicles may be loaded or off-loaded over the bow by means of a 112-foot-long one-piece, aluminum landing ramp that extends forward and lowers on a pontoon causeway or a beach, depending on water depth and beach gradient. When stowed the ramp rests on the main deck forward between guide tracks attached to the inboard side of two permanently installed derrick arms protruding over the bow. A stern ramp—which also serves as a watertight stern closure when retracted—is designed to launch or retrieve amphibian craft from the open sea. It can also be put to use as a vehicular bridge between the ship and various utility landing crafts (LCUs) or a pier. The 522-foot vessels will also be faster, brawnier, and more beach efficient than their predecessors. Propulsion will be provided by six diesel engines developing a total of 16,000 shp.

The Peoria is the second in a series of 17 new tank landing ships started under a $250-million Navy contract with Nassco.

Vernitron Acquires Two Shipping Firms

Vernitron Corporation has agreed in principle to acquire all the outstanding stock of Commerce Tankers Corporation and Empire Ship Agents and Brokers Inc., it has been announced. Among other assets, the companies operate two American-flag tankers carrying oil and grain cargoes.

The shareholders will receive about $10-million in Vernitron common stock for the two companies, according to the announcement. Commerce and Empire will continue to operate under present management as a wholly-owned subsidiary of Vernitron. The principal shareholder of the two ship firms is **Milton Philalas,** who is also president of Commerce Tankers.

Butterworth System Elects H. R. DeWitt Vice-President-Sales

The board of directors of Butterworth System, Incorporated, Bayonne, N.J., has elected **Harland R. DeWitt** to the office of vice-president-sales.

Mr. **DeWitt** will continue to serve as sales manager of the Marine Sales Department of Esso International, Inc. He has accepted his new office in order to assist Butterworth in the introduction of a wide range of newly developed marine operation and maintenance products worldwide to dry cargo, passenger and tanker fleets.

Butterworth System, Inc. and its affiliate in the United Kingdom, J. G. Edmiston & Co., Ltd., is well-known for such products as the Butterworth (SEREP) oil/water separator; the Lav-Jet; their Type "K" and "Super K" tank cleaning machines and the "SCAMP" (Submerged Cleaning and Maintenance Platform).

Todd Acquiring Engineering Firm

Todd Shipyards Corporation has announced agreement in principle, to acquire Designers & Planners, Inc., New York, a naval architectural and marine engineering concern specializing in the design of containerships and oceanographic research vessels.

John T. Gilbride, president of Todd, said the additional capability represented by Designers & Planners would be needed in Todd's day-to-day operations and expected construction and conversion programs.

He added that Designers & Planners, which has offices in New York and in Galveston, would continue to operate independently and serve all segments of the maritime industry.

Jeffboat Names Toupin Director Of Personnel

Leo R. Toupin

Leo R. Toupin has been named director of personnel for Jeffboat, Inc., Jeffersonville, Ind., **R. W. Naye,** president of the company, has announced.

A native of Canada, Mr. **Toupin** received his degree in administration and engineering practices before coming to the United States. After a venture in professional hockey with the Toronto Maple Leaf Organization, he was employed by the Celanese Corporation's Canadian subsidiary—Canadian Chemical Corporation.

Prior to joining Jeffboat in 1967 as assistant director of personnel, he was the labor relations and safety supervisor for Titanium Metals Corporation in Henderson, Nev.

Jeffboat is an integral part of the Inland Waterways Services Division of Texas Gas Transmission Corporation.

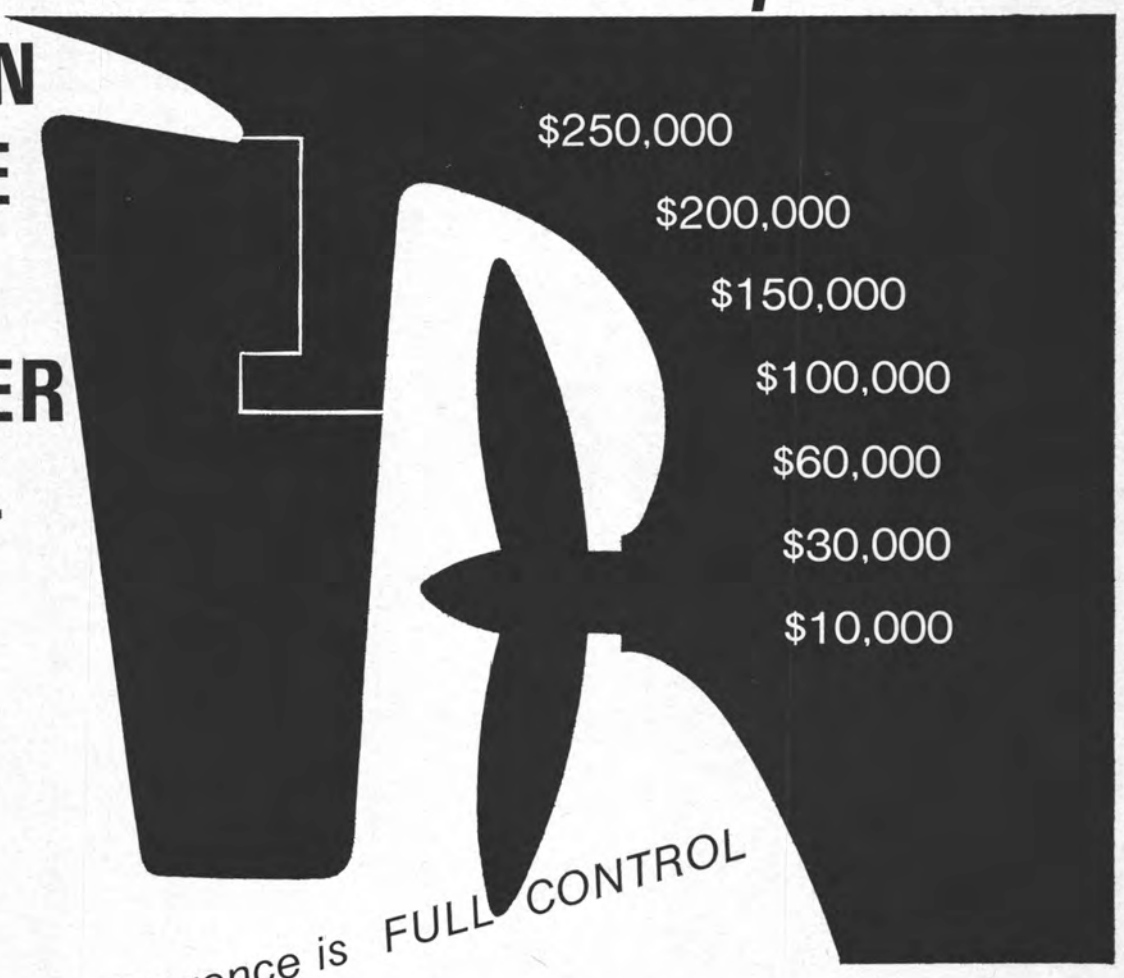
Naess Shipping Names Two Vice-Presidents

The Naess Shipping Company, Inc. of New York, N.Y., has announced the appointments of **H. E. Petersen** as vice-president in charge of the Bulk Carrier Department and **S. A. Jensen** as vice-president in charge of the Tanker Department.

SAN FRANCISCO MARITIME LEADERS happily acknowledge their election as the 1969 officers of the San Francisco Bay Region Marine Exchange, left to right: **Robert E. Mayer,** re-elected president, (Pacific Coast sales manager of Todd Shipyards Corp.); **Rae F. Watts,** treasurer (San Francisco Port director); **Chr. Blom,** first vice-president (president of Overseas Shipping Co.); **Edward D. Ransom,** second vice-president (partner, Lillick, McHose, Wheat, Adams and Charles), and **E. L. Bargones,** third vice-president (president, Transpacific Transportation Co.). **Robert H. Langner** will continue to serve as secretary and manager. The maritime leaders will guide the service and development programs of the 120-year-old Exchange, including operation of its shipping intelligence and navigational center, 'red tape' cutting efforts, and channel and harbor improvements.

You can save with GOL/SEAL

STERN TUBE and RUDDER SEAL



The one big difference is FULL CONTROL

Golten alone has the answer to seal failure caused mainly by heat and friction. By incorporating fully automatic and manual control of temperature and pressure on the frictional surface of the seal, the unique, patented design of GOL/SEAL has solved the problem.

The sealing surface of the seal is maintained by a head press of oil on the diaphragm. An additional oil back pressure supplied to the face of the seal offers volume for cooling and a balanced pressure on all anti-friction surfaces. This pressure, pre-engineered at the factory, will not vary throughout the life of the seal.

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Philadelphia Gear And Propulsion Systems Combine Capabilities

Propulsion Systems, Inc., Port Washington, L.I., N.Y., has announced that it has joined with Philadelphia Gear Corporation, King of Prussia, Pa., to create one of the largest and most complete marine propulsion systems capabilities in the United States.

The action follows a successful two-year trial program during which Philadelphia Gear Corp., in addition to producing marine gear drives of its own design, worked with Propulsion Systems in the manufacture of a variety of marine products including controllable-pitch propellers, bow thrusters, rotary vane steering gears, and control systems.

The announcement also included the names of a new board of directors and company officers for Propulsion Systems, Inc. Board members named are **R. C. Ball,** president of Philadelphia Gear Corp.; **R. S. Dobbs,** vice-president of Philadelphia Gear Corp.; **W. T. Brown,** vice-president/manufacturing of Philadelphia Gear Corp.; **P. K. Wennberg** and **O. Wennberg** of Propulsion Systems, Inc., and **A. M. Liaaen** of A. M. Liaaen, A.S., Aalesund, Norway.

New officers named by Propulsion Systems are **P. K. Wennberg,** president; **U. Hornsyld,** vice-president; **E. Foster,** treasurer, and **B. Daiker,** secretary.

The association combines Philadelphia Gear's resources and 75 years of experience in the manufacture of power transmission equipment with Propulsion System's 13 years of technical experience in marine propulsion systems design, engineering and service. Further, Liaaen's 32 years of controllable-pitch propeller design and manufacturing experience in Europe is now available to United States consumers.

Advanced computer propeller design programming, developed by Liaaen in Europe, will be integrated with Philadelphia Gear's computer facilities. The result will be a 100 percent domestic design, engineering, manufacturing, and testing capability covering complete marine propulsion and steering systems from propeller blades to steering gears including all stress, torsional, and reliability analyses for propellers, shafting, gears, gear boxes, bearings—all marine propulsion components.

Philadelphia Gear's extensive manufacturing facilities at King of Prussia, Pa., will be used to produce the majority of the marine propulsion components. The facilities include a completely equipped pattern shop; one of the largest capacities for precision cutting, heat treating, and gear grinding in the United States, and a new facility for fabricating gear-drive housings. Major testing facilities, including a spin test bed with two large diesel power-plants, are also located at the King of Prussia facility.

The service organizations of both corporations will be coordinated and expanded to provide coverage of all marine builders and operators.

New Tank Temperature Data Sheet From MMC

The Marine Moisture Control Company has recently issued a data sheet on its tank temperature indicator. The indicator fills the need for a highly accurate unit which shows easily visible tank temperature readings. Available in four stations to 20 station units, the tank temperature indicator is rated intrinsically safe by the U.S. Coast Guard. The data sheet includes a schematic diagram.

For more information, write Marine Moisture Control Co., Inc., 39 Redfern Avenue, Inwood, L.I., N.Y. 11696.

Electric Boat Names McPherson Comptroller

Theodore L. McPherson

The appointment of **Theodore L. McPherson** of Claremont, Calif., as comptroller of the Electric Boat division of General Dynamics, Groton, Conn., was announced by **Joseph D. Pierce,** general manager.

Mr. **McPherson** has been comptroller of the Pomona division of General Dynamics since 1952.

Prior to joining General Dynamics, Mr. **McPherson** served for five years with the Air Materiel Command at Dayton, Ohio, as chief of organization and procedures and assistant chief of budgets. He was chief of budgets and accounts for the Air Materiel area at San Bernardino, Calif., in 1946-47.

During World War II he was with the Army Air Force headquarters in Washington in budget development and was chief of budgets at San Bernardino from 1942 to 1944.

Mr. **McPherson** is a native of Canadian, Texas, and is a graduate of George Washington University and Independence Junior College.

Officers And Directors Named For APL/PSI

Officers and directors of American President Lines Passenger Service Inc. were elected at the group's recent initial organization meeting, it was announced in San Francisco, Calif., by **Ralph K. Davies,** chairman of the board.

APL has chartered its three passenger vessels — the Presidents Cleveland, Wilson and Roosevelt —to the new wholly-owned subsidiary which has been formally approved by the Maritime Administration.

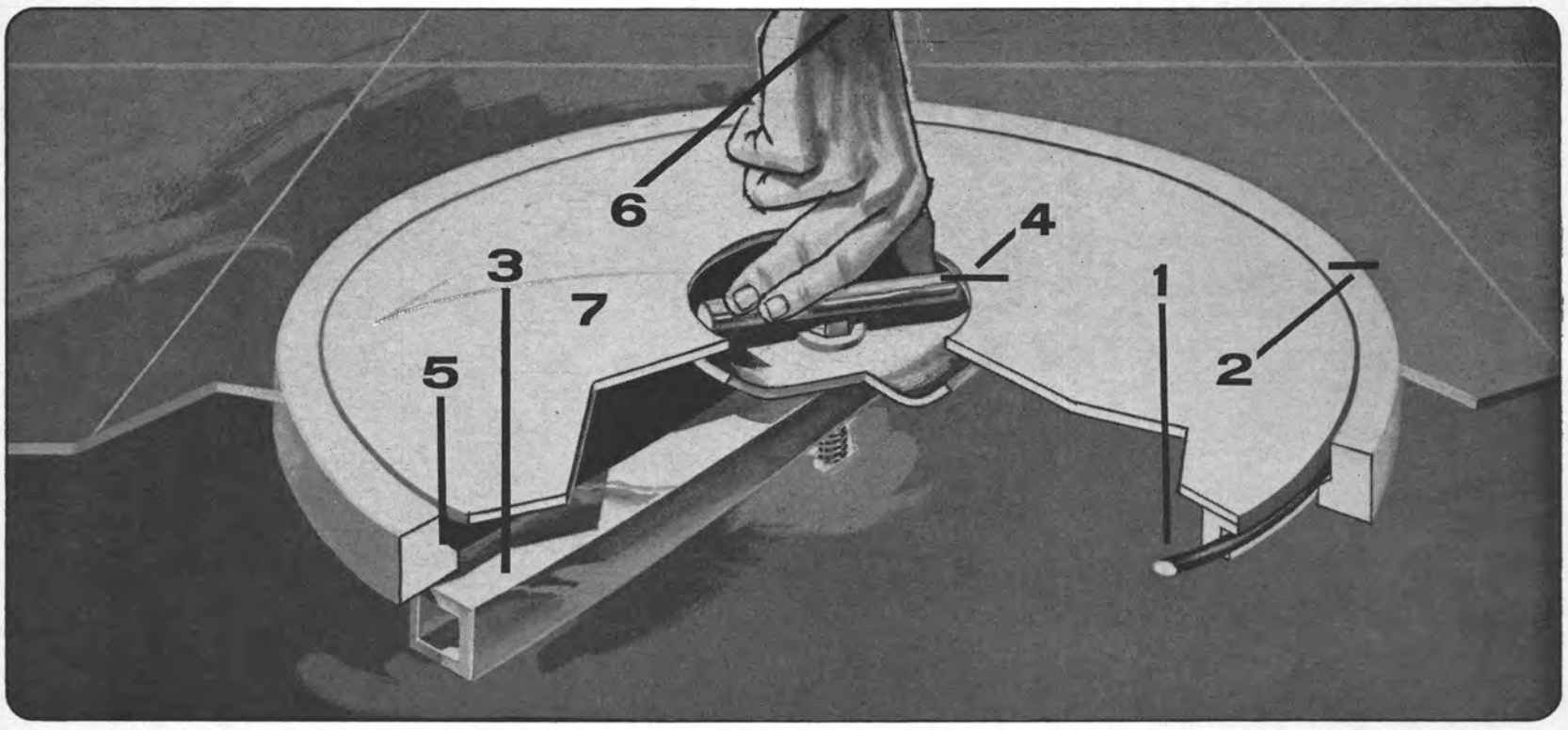
In addition to Mr. **Davies,** other officers of PSI are **Warren S. Titus,** president and treasurer; **Sam N. Mercer,** vice-president, and **George D. Wick Jr.,** secretary.

Directors of the new company are **Worth B. Fowler, William J. Biehl,** Capt. **T. C. Conwell,** Mr. **Davies,** Mr. **Titus** and Mr. **Mercer.**

"The formation of PSI marks our determination to strengthen and expand our passenger interests in accord with the new role of passenger vessels in catering to the vacation market," explained Mr. **Davies.**

In addition to operating APL's passenger vessels, PSI also will act as general passenger agent for the company's fleet of 24 twelve-passenger freighters.

Last year we thought our flush-mounted hatch was the best...



and then WE IMPROVED IT!

Nabrico Watertight, Flush-Mounted Hatch All Moving Parts Now Non-Corrosive Metal

It's difficult to be modest about this DF-430 Hatch . . . especially when Nabrico has come up with improvements to top even its former great performance! Now, this patented DF-430 Hatch has a threaded T-bar of stainless steel with a brass nut and washer. Result: no corrosion — never any seizing of parts. That's important anywhere — but it's especially vital to salt-water operation. Lighter than cast steel (63 lbs.) and with only two main components, the DF-430 Hatch has achieved ABS approval. The features listed right are ample proof that the DF-430 provides more and greater advantages than any other hatch. In fact, the only thing that's modest about the DF-430 Hatch is its price. It's actually lower than conventional hatches. Try the DF-430 as original equipment or replacement.

1. Hatch cover seats on neoprene O-ring gasket for watertight seal.
2. Mounting ring welded flush with deck to accept cover.
3. Strongback draws against mounting ring with just hand tightening.
4. Threaded "tee" handle, recessed in cover.
5. Mounting ring is machined steel with specially designed self-cleaning seal seat.
6. No tools needed to put on or remove DF-430 Hatch. Just a twist of the wrist!
7. One-piece construction of cover and fastening assures secured hatches every time. No projections to tear clothing, foul lines or trip deckhands.

$48.50 F.O.B. Nashville

Nabrico DF-430 Hatch 18" Size

Can be furnished galvanized—also in 24" size.

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The Conversion To SSB Communications Requires A Major Equipment Change

A. E. Anderson*

The International Telecommunications Union, which seeks uniformity and agreement among nations on communication needs, has recommended discontinuance of AM in favor of single sideband (SSB) for maritime operations. Several nations have already converted to SSB exclusively. The United States has established deadlines for conversion of voice communication to SSB in the 4- to 22.5 MHz (high-seas) band. After 1969, no new AM transmitters will be licensed. After 1974, no AM transmitters may be used at all.

This impending change in maritime radio communication to SSB is going to result in a major overhaul of the equipment used. One area to be affected more than most is that of frequency accuracy. The reason for this, of course, is that in SSB the carrier is not transmitted; so the receiver must reinsert a carrier within a few cycles of the frequency of the carrier that was eliminated at the transmitter. To do this, both receiver and transmitter must have accurate frequency generating equipment.

Most maritime communication in the HF range has been by AM. Frequency stability requirements for AM are relatively loose—15 to 50 parts per million (ppm) for coast stations and up to 200 ppm for shipboard equipment. This has permitted the use of a separate crystal for each channel, and changing channels meant simply switching crystals (and perhaps oscillators, for widely separated frequencies). With the change to SSB, however, frequency control becomes more critical. Attempts to simply update the old approach, a crystal for every channel, run into a new set of problems, and it behooves one to take a close look at the various alternatives. There are three approaches that may be considered:

1. Crystal control, with a separate crystal for each channel or set of harmonically related channels.
2. Frequency synthesis, deriving all desired frequencies from a single reference oscillator.
3. Crystal control by crystal mixing methods.

Approach 3 is impractical because of the 0.1-kHz channel spacing, the wide range of frequencies covered, and the fact that only a small percentage of the available frequencies are used.

The FCC requirements for frequency accuracy in the SSB mode are ±20 Hz for coast stations and ±50 Hz for shipboard operation. It would be logical to design all equipment to meet the coast station requirements, thus providing additional margin in shipboard operation for the more stringent environments and for fewer frequency calibrations. This ±20-Hz requirement thus converts to ±10 ppm at 2 MHz and ±0.73 ppm at 27.5 MHz. The problems at the low end of the range, therefore, would be not much worse than for the AM equipment. It's at the high end of the frequency range that stability becomes a problem, at least in approach 1.

To meet the accuracy requirement of ±0.73 ppm will require stability versus temperature on the order of ±0.2 ppm. This assumes that temperature variations will have a greater effect on frequency than other conditions, such as shock, vibration, humidity, line voltage variations, etc. This has been found to be generally true. Restricting variations due to temperature to 0.2 ppm leaves 0.5 ppm for aging. With a good crystal, aging rates of approximately ½ ppm per year can be achieved. This trade-off between temperature and aging is subject to debate, of course, but any relief for the designer by loosening the temperature specification puts that much more burden on the user by requiring frequency calibration more often.

Achieving an accuracy of 0.2 ppm over an appreciable temperature range is not too difficult in any given oscillator, using either temperature compensation or temperature control. It requires a reasonably good oven, on the order of a few tenths of a degree over the temperature range, or a reasonable amount of care in compensating the crystal; but it has been and is being done and is quite feasible. It might even be practical to use this approach of separate temperature-controlled or temperature-compensated oscillators for operations requiring only a few channels, up to six or eight. When channel requirements are greater than this, separate temperature-compensated oscillators are no longer practical. Separate temperature-controlled crystals also begin to become impractical, because one large oven would be required for the crystals and oscillator or oscillators. Maintaining the required temperature stability becomes more difficult and more expensive, because of the inevitable temperature gradients across the oven. If a separate oscillator is not used for each crystal, then care must be taken to ensure that the crystal switch does not affect the frequency.

Compounding the problem is the fact that at the higher frequencies where the accuracy requirements get more stringent, the crystal and oscillator stability become poorer, both with temperature and with time. Add to these difficulties the problem of periodically calibrating the frequency of each crystal at random frequencies spread over a wide range and it becomes evident that, as the number of channels increases, the advantages of the multiple-crystal approach decrease.

The automatic tuning device from Collins' MR-102 HF/SSB Maritime System. All stages, including the antenna, are automatically tuned for maximum efficiency by setting up the proper frequency and pressing the tune button.

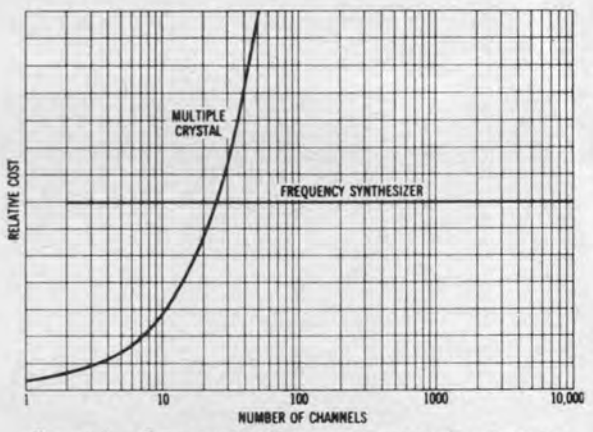

Figure 1—Comparative frequency generator costs vs. number of channels.

With the frequency synthesizer approach, the opposite is true. The advantages of this approach increase as the number of channels increases.

Here are the advantages:

a. Only one reference oscillator is needed for any number of channels. It would be practical, therefore, to build better stability into that single oscillator, along with a better crystal, than could be done with a multitude of crystals and oscillators.

b. The same percent of stability is available on all channels. The lower frequency channels thereby benefit by the high frequency stability requirements.

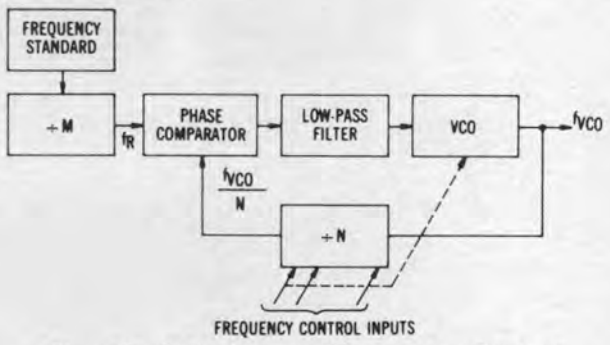

Figure 2—Basic elements of frequency synthesizers.

c. All channels are available at any time. No changing of crystals or waiting for new crystals if a frequency assignment is changed or added. Also, no requirement for recalibration on a new frequency assignment.

d. Only one oscillator need be calibrated and that could be checked quickly, at any time, by tuning to any of the standard frequency transmissions in the HF band. These standard frequencies are broadcast by most of the major countries and are available practically anywhere in the world.

e. No switching of the crystal or reference oscillator is required. They remain undisturbed during channel switching.

f. Performance capability on all channels can be upgraded by changing only the reference output.

These advantages exist for any number of channels greater than one. At some relatively small number of channels, probably in the neighborhood of 20 to 30, cost also becomes

(Continued on page 22)

*Mr. **Anderson,** assistant director, Frequency Control Development, Collins Radio Company, prepared the paper condensed here for presentation to various segments of the marine industry involved in the pending change in radio communications.

NOW at the Port of Los Angeles' East-West Container Terminal, PACECO's Twin Lift Portainer serves four shipping companies operating between Japan and California. Four other PACECO Twin Lift Portainers are currently going into operation in Australia.

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The Twin Lift's ability to service two containers *as individual units* permits a single box to be offloaded separately from its companion container. A unique feature provides spacing of twin boxes at distances from 3″ to 52″, expediting loading, stacking, transfer, as well as compensating for various ship cell widths. Containers of varying weights are automatically raised or lowered in unison.

The Twin Lift also accommodates single 20′, 30′ or 40′ containers, or interlocked 20′ units and can be equipped with a clamshell bucket for bulk handling.

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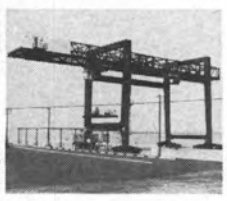
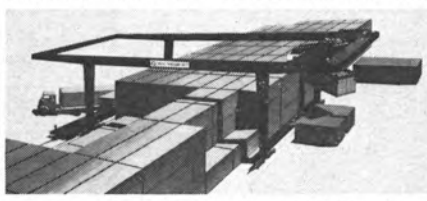
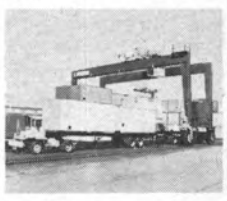
Portainers





Rail-mounted and Rubber-tired Transtainers



Shipstainers

SSB Communications—

(Continued from page 20)

a factor favoring the frequency synthesizer, as indicated in Figure 1. Where this crossover occurs will depend on the quality of the separate crystal oscillators. If each of these oscillators is designed to compete in stability and aging with the reference oscillator in the synthesizer, the crossover will occur sooner than if the design of the separate crystal oscillators is economized. Regardless of where the crossover occurs, beyond that point there are no longer any advantages favoring the separate-crystal approach.

The simplified block diagram in Figure 2 shows the basic elements of frequency synthesizers. A tunable voltage controlled oscillator (VCO) can cover the desired range or can switch in steps to cover various bands in the range. Selection of the desired frequency is accomplished by a coarse adjustment of the VCO to approximately the desired frequency and by selecting the necessary division ratio in the variable frequency divider. This is all done automatically by the channel selection switches.

As the output signal, obtained from the VCO, is phase-locked to a reference frequency derived from the reference crystal oscillator, the frequency stability on any channel will be equal to that of the reference crystal oscillator. In present Collins equipment, two choices of reference oscillators are provided: a temperature-compensated oscillator with frequency stability of 1 to 5 parts in 10^7, depending on the temperature range; and a temperature-controlled-oven standard with stability of 1 part in 10^8.

The operation of a temperature-controlled frequency standard is probably well understood. To stabilize the frequency by temperature control, the crystal is placed in a temperature-controlled oven and the temperature is adjusted to the turning-point temperature of the crystal where there is a minimum frequency change with temperature. The degree of frequency stability achieved is then a function of the temperature control of the oven and how close to the turning point the temperature is adjusted. Thermostatic temperature control can be used where stability requirements are not too high. The on-off cycling of the thermostat, the temperature differential between on and off, aging of the spring tension and contacts, and (usually) lack of provision for temperature adjustment limit the frequency stability obtainable with a thermostatically controlled oven.

Higher precision crystal frequency standards almost invariably use a proportionally controlled oven.

In either temperature-controlled or temperature-compensated reference oscillators, the nominal frequency is usually chosen in the 2.5- to 5.0-MHz region. Lower frequencies require larger crystal holders and crystal blank sizes more susceptible to shock and vibration. Above 5 MHz the aging rate begins to increase, unless an overtone crystal is used. Higher frequencies also mean dividing further to get down to the reference frequency.

To summarize, the frequency stability requirements for single sideband have been met with increasing ease over the past few years. Usually, it has been found advantageous to generate the required frequencies by means of a reference oscillator and frequency synthesizer because of the relative ease of attaining the desired stability on all channels, immediate availability of every channel, lower cost in multi-channel applications, and ease and simplicity of providing for frequency calibration of all channels.

Trinidad Shipyard Builds Crane Barge For Local Work

Designed for servicing deep-water moorings, this 25-ton crane barge was built at the ship repair yard of Furness-Smiths Dock, Port Chaguaramas, Trinidad.

The largest marine craft yet to be built in Trinidad has recently gone into service for Trinmar Ltd.

Called Soldado Crane, this 25-ton crane barge has been designed for servicing deep-water moorings in the offshore oilfield located near the large Texaco refinery of Pointe-a-Pierre.

With an overall length of 110 feet, 44-foot breadth and a depth of 9 feet, this barge was built at the new and modern ship repair yard of Furness-Smiths Dock sited at Port Chaguaramas, Trinidad. This vessel is the third new-building contract to be completed at this yard and two further new buildings are under construction.

The crane barge was designed by British naval architects, Burness Corlett & Partners, and is the first vessel to be constructed in Trinidad to the requirements of Lloyd's Register of Shipping.

A Demag tracked crane was adapted for deck mounting and as now constructed the vessel can lift and slew 25-ton loads through 360 degrees. Provision has also been made for the subsequent installation of an 'A' frame which will permit heavy loads of up to 60 tons to be lifted over the bows. At a small additional cost, the barge can be adapted for pipe laying work. Radius swim ends give additional stability to this versatile and well-equipped craft.

Power is supplied from two British Thompson Houston generators, type ATK-104 440 volt, 355 kva driven by Paxman type 12 RPH, 426-bhp diesel engines mounted in the center compartment. Day accommodations are provided for 12 men below deck. Four Clarke Chapman 25-ton winches are positioned on the forward deck.

The general standard of workmanship has proved extremely high and the completion of this craft is considered an important milestone in the development of Trinidad as a natural ship repair center for the South American coast and Caribbean.

Furness-Smiths Dock is a joint venture between the Swan Hunter Group Ltd., Wallsend-on-Tyne, and Furness-Withy Ltd., London.

Furness Withy Moves New York City Office

Furness, Withy & Co., Ltd. has announced the relocation of its New York offices to new and modern quarters on the 17th floor at 30 Church Street, New York, N.Y. 10007.

The new telephone number is (212) 964-6868.

Furness will continue to serve as New York agents for Blue Sea Line, Cairn Line, Crusader Line, Furness Lines (Gulf Service), Furness Warren Line, Manchester Liners, Ltd., Shell Tankers, Scandinavian-American Line and the North Pacific Coast Line.

Astilleros Receives Contract For Third 151,000-Dwt Tanker

The contract for the building of a 151,000-dwt oil tanker has been signed in New York by Polar Star Navigation Corporation, which belongs to the group of companies controlled by **Teodoro Teryazos,** and Astilleros de Cadiz, S.A.

This tanker will be built at the Cadiz (Spain) shipyard and delivery is scheduled for the middle of 1970.

The ship will be driven by a 'Manises-Sulzer' type 12RD-90 diesel engine, which develops 27,600 bhp continuous maximum power, built by the Manises factory of Astilleros de Cadiz, S.A.

The auxiliary deck machinery will also be built at the above-mentioned Manises factory, under Pusnes license, and the donkey boilers will be built by the Cadiz factory under license of Aalborg Vaerft.

This ship will be the third in the series of 151,000-dwt oil tankers contracted by Astilleros de Cadiz, S.A. whose orders at present total about one-million deadweight tons.

Dillingham To Build Replica Of USS Arizona For Movie

The Maritime Services and Transportation Division of Dillingham Corporation will take an active part in assisting to recreate Pearl Harbor's 'Day of Infamy' for the film production of "Tora! Tora! Tora!" being readied for filming by 20th Century-Fox.

20th Century-Fox ordered a full-sized replica of the stern half of the USS Arizona, including its 97-foot mainmast, to be built at Dillingham Shipyard in Honolulu. A separate mast superstructure representing the USS Tennessee will also be built as part of this project. The Honolulu engineering firm of Alfred Yee and Associates executed the design from data collected by the film makers with the cooperation of the U.S. Navy.

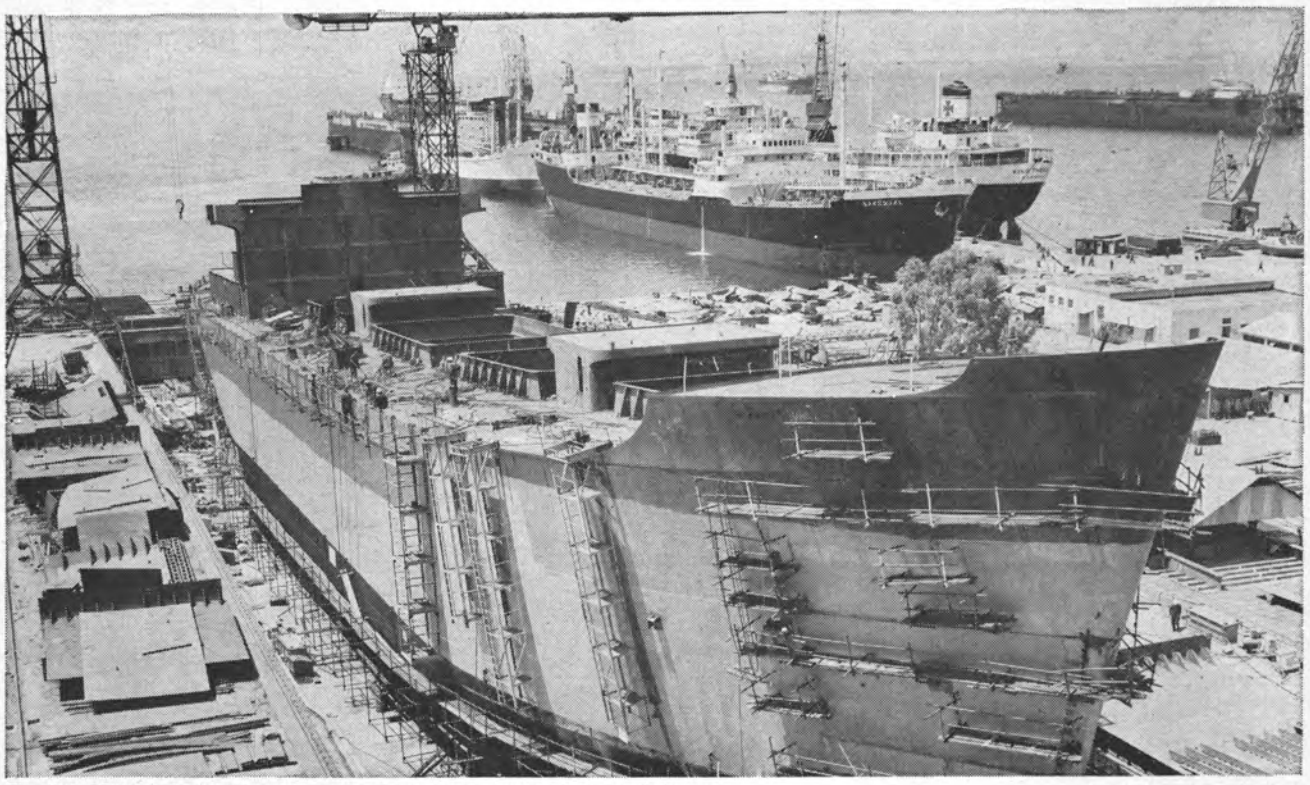
The superstructure of the Arizona will be mounted on three barges and towed to Pearl Harbor, where the scenes depicting the December 7, 1941, holocaust will be filmed. The towing and maneuvering of the replica will also be done by the tugs and barges belonging to Dillingham.

The mockup will be 93 feet wide and some 340 feet long, and the mast will be provided with a device enabling it to simulate the half-collapsed state of the actual mast as caught in photographs.

The recreation of the attack on Pearl Harbor culminating in the destruction of the Arizona will be the highlight of "Tora! Tora! Tora!" a joint American-Japanese effort.

NEW RESEARCH SHIP APPROVED for construction. Artist's conception shows the new 387-foot U.S. Coast Guard High Endurance Cutter (WHEO-701). Displacing 3,945 long tons, she will have a 51-foot beam, a depth of 29 feet 9 inches, and will draw 17 feet 6 inches of water. Driven by a single steam turbine engine delivering 10,000 shp, the cutter will have a maximum speed of 20 knots. Equipped with fully automated steam propulsion, radio and ocean data systems, the WHEO-701 will be the first multi-disciplined American research ship specially designed for operating from the fringes of the polar ice packs to the tropics. The new cutter will have accommodations for about 133 officers and men, including 14 to 16 scientists. Completion of the vessel is expected in 1972.

Auxiliaries for the **SD.14s** (built in Greece) final decision was Stork



The first SD.14 under construction at the Scaramanga yard of Hellenic Shipyards.

yet another proof of confidence in our engines

Hellenic Shipyards finally have chosen Stork auxiliary engines for their series of nine SD.14 ships now under order. These vessels are the successors to the famous Liberty ships, and in each one three Stork four-stroke diesel engines, type Ro 158, with a capacity of 335 hp at 1200 rpm will be installed. This order demonstrates the confidence in our products. Also in Greece. We will gladly use our experience to advise you in all your propulsion and auxiliary problems. Without any obligation on your part.

Outputs 36 - 36,000 hp and rpm's up to 1,800

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Stork Werkspoor Canada Ltd., 1600 Norman Street, Lachine, Montreal 630 Que., Cables: Marshmont Montreal, Tel.: 637-4681, Telex: 5267510

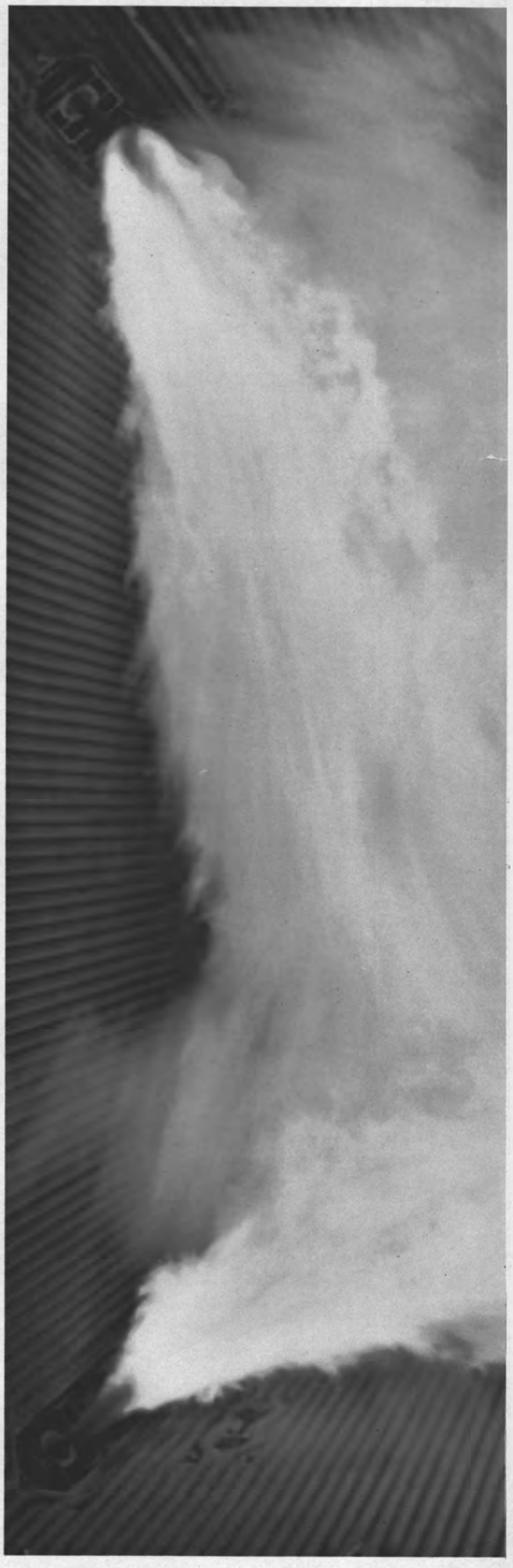
For the U.S.A.: Hamilton Engine Sales Inc., 2580 N.W. Upshur Street, Portland, Oregon 97210, Tel.: 226-3069

Herman Oosterhuis Inc., 1926 Rousseau Street, P.O. Box 30587, New Orleans, La 70130, Cables: Marinengin New Orleans, Tel.: 529-2723

For MEXICO: Division de Motores Stork-Werkspoor de Mexico S.A., Calle Queretaro 225-B, Mexico 7, D.F., Cables: Femenias, Tel.: 253423

Z8

For larger ships and higher powered ships ...C-E's V2M-9 boiler with tangential firing.



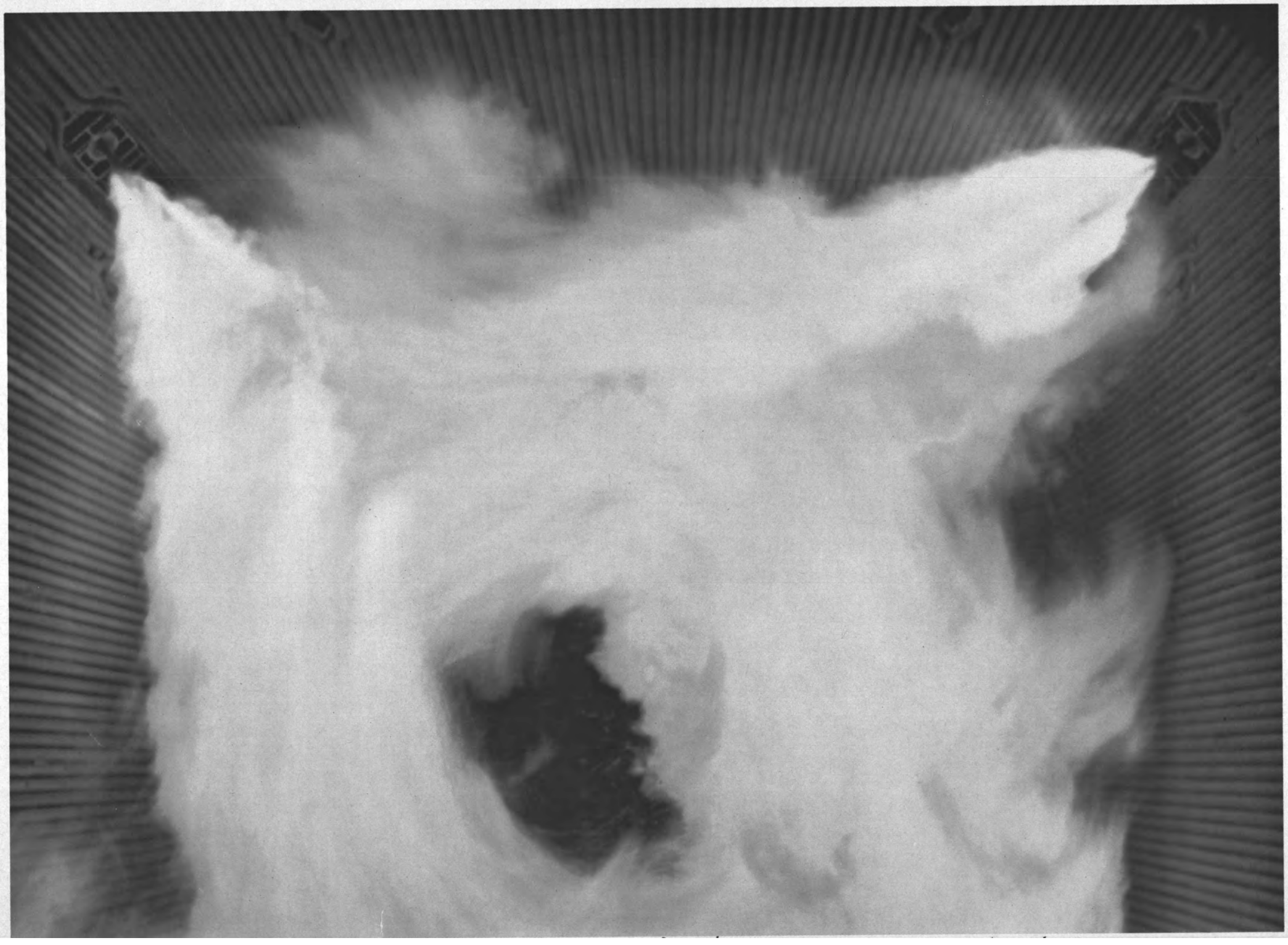
The trend to larger tankers and other higher powered ships created a demand for marine boilers in the capacity range of 200,000 to 500,000 pounds of steam per hour. With such large boilers, high efficiency, maximum reliability and low maintenance become even more vital. C-E's V2M-9 boiler with tangential firing meets these requirements.

The combustion efficiency of tangential firing has been proven during thirty years of experience in land boilers. Burners are installed in the corners of the V2M-9 furnace to produce a vortex pattern of flame, effectively utilizing the total furnace configuration. Tangential firing provides the optimum burner arrangement for low excess air operation in high capacity boilers.

The V2M-9 is more than just a large marine boiler. It is specially designed for high capacity service, to C-E's standards for maximum reliability and low maintenance. And it incorporates service proven features which benefit both the shipbuilder and the ship operator.

For details and information concerning specific applications of the V2M-9 boiler with tangential firing, write to C-E's Marine Department, Windsor, Connecticut 06095.

C-E COMBUSTION ENGINEERING
PROGRESS FOR INDUSTRY WORLDWIDE



January 15, 1969

Port Engineers And SNAME Section Review Status Of Contra-Rotating Propulsion

Taking part in the joint New York Metropolitan Section, SNAME, and Port Engineers symposium were, **Seated** (left to right): **Per-Erik Larsson,** Stal-Laval Turbine AB; **T. W. Steele,** General Electric Company; Prof.-Dr. **Ingvar Jung,** Royal Technical University of Stockholm and Stal-Laval Turbine AB; **Jacques B. Hadler,** Naval Ship Research and Development Center; **S. A. Fielding,** Maritime Administration, and **W. I. H. Budd,** De Laval Turbine Inc. **Standing:** Capt. **L. S. McCready,** USMS, U.S. Merchant Marine Academy; **J. M. Gruber,** Waukesha Industries; **P. A. Donahue,** Maritime Overseas Corporation and second vice-president of the Marine Port Engineers New York; **M. D. Macpherson,** Esso International and vice-chairman of the New York Metropolitan Section, and **Warren I. Signell,** Foster Wheeler Corporation and secretary-treasurer of the New York Section.

The hydrodynamic and mechanical aspects of contra-rotating propulsion systems were extensively discussed at the joint meeting of the New York Metropolitan Section of The Society of Naval Architects and Marine Engineers and the Society of Marine Port Engineers New York, N.Y., Inc., held in December.

The meeting was in the form of a symposium with Capt. **L. S. McCready,** USMS, head, Department of Engineering, U.S. Merchant Marine Academy, serving as moderator. Six papers on the subject were prepared for the symposium, with the authors presenting abstracts and joining in on the discussion.

The papers were: "Propulsion Machinery Considerations for Contra-Rotating Propeller Systems" by **T. W. Steele,** manager-gear engineering, Marine Turbine & Gear Department, General Electric Company; "Design Concepts for a Contra-Rotating Propulsion System" by **Sterling A. Fielding,** marine engineer, Maritime Administration; "Swedish Development of Contra-Rotating Propeller Systems for Turbine and Diesel Engine Drives" by Dr. **Ingvar Jung,** Royal Technical University of Stockholm and director of Stal-Laval Turbine AB, and **Per-Erik Larsson,** chief gear designer, Stal-Laval Turbine AB; "Contra-Rotating Propeller Propulsion—A State-of-the-Art Report" by **J. B. Hadler,** head, Ship Powering Division, Naval Ship Research and Development Center; "Main Reduction Gears for Contra-Rotation" by **W. I. H. Budd,** manager of marine engineering, De Laval Turbine Inc., and "Stern Gear and Line Shaft Systems for Driving Contra-Rotating Propellers" by Dr. **Norman V. Laskey,** president, Camat Transportation Consultants, and **J. M. Gruber,** vice-president, Waukesha Industries.

Luckenbach Urges Shipbuilding Program Of 100 Ships Per Year

Edgar F. Luckenbach Jr.

Mass production of standardized cargo vessels, devoid of costly frills, may be a major objective of a national maritime policy, according to **Edgar F. Luckenbach Jr.,** president and chairman of Luckenbach Steamship Co., Inc.

Speaking at a meeting of the Propeller Club's Jacksonville, Fla., chapter, Mr. **Luckenbach** said that any meaningful maritime policy is contingent on the reaching of an understanding between various industry elements as to the needs of the nation's cargo fleet.

"The new administration will, and should, make clear to those who wish to sail onward that to do so they must proceed with a unity of purpose, realizing that some sacrifice must be expected on the part of everyone if a new maritime program is to be conceived and implemented," he said.

The mass production of standardized ships can be attained with very little modification of the nation's shipyards, Mr. **Luckenbach** said.

These yards can be expected to turn out an average of ten vessels per year. This would be accomplished by assigning to each shipyard, a class of tonnage for which it alone would be responsible, he added.

"The yards involved in such an effort must, however, be assured that they can feasibly finance initial capital investments to improve their facilities," he said.

Mr. **Luckenbach** said that President-elect **Richard M. Nixon** has pledged that United States-flag vessels will carry an increased share of the nation's foreign commerce, now estimated at about 5.6 percent of the total. The new administration seeks to hike this total to over 30 percent, he noted.

Mr. **Luckenbach** also said that the upcoming administration has pledged its support to a shipbuilding program, involving some 100 vessels per year, through improved utilization of credit facilities and amortization procedures.

"Mr. **Nixon** has suggested long-range government cargo commitments should be explored as an additional means to stimulate unsubsidized financing of ship construction," he noted.

The nation's present commercial fleet of 900 vessels includes 750 which have little life expectancy remaining, Mr. **Luckenbach** said.

He added that maritime labor should find it reasonable to back a program which would assure job opportunities through 1995.

As for management, Mr. **Luckenbach** said that up to now "we have witnessed one segment of the merchant marine bitterly opposed to the slightest concession to the other" in the matter of government assistance and other factors which could lead to an improved competitive position.

Under the new program, all elements in the industry will be encouraged to participate and expand, thereby providing the investor with an incentive in what has been a speculative venture, Mr. **Luckenbach** said.

Atlantic Lines Starts Miami-Virgin Islands Roll-On Cargo Service

A new direct roll-on cargo service from Miami to St. Thomas, Virgin Islands, has been inaugurated by Atlantic Lines, according to Chester, Blackburn & Roder, general agents for the operation in New York. The service has been started with the Norwegian-built motorship Pan America, first of ten similar ships the line is building for its services to the Atlantic islands.

The vessel will also call at St. Croix in the operation and at Tortola in the British Virgin Islands upon inducement.

The Pan America can carry 30 forty-foot trailers containing dry, refrigerated or liquid cargo. Automobiles, tractors, other type of rolling stock or palletized freight can also be handled.

The new vessel is highly automated, permitting its operation with a crew of 11 men. A feature of its design is a stern anchor, enabling it to retract from beaches and a special ballasting system which aids in loading and discharging on beaches.

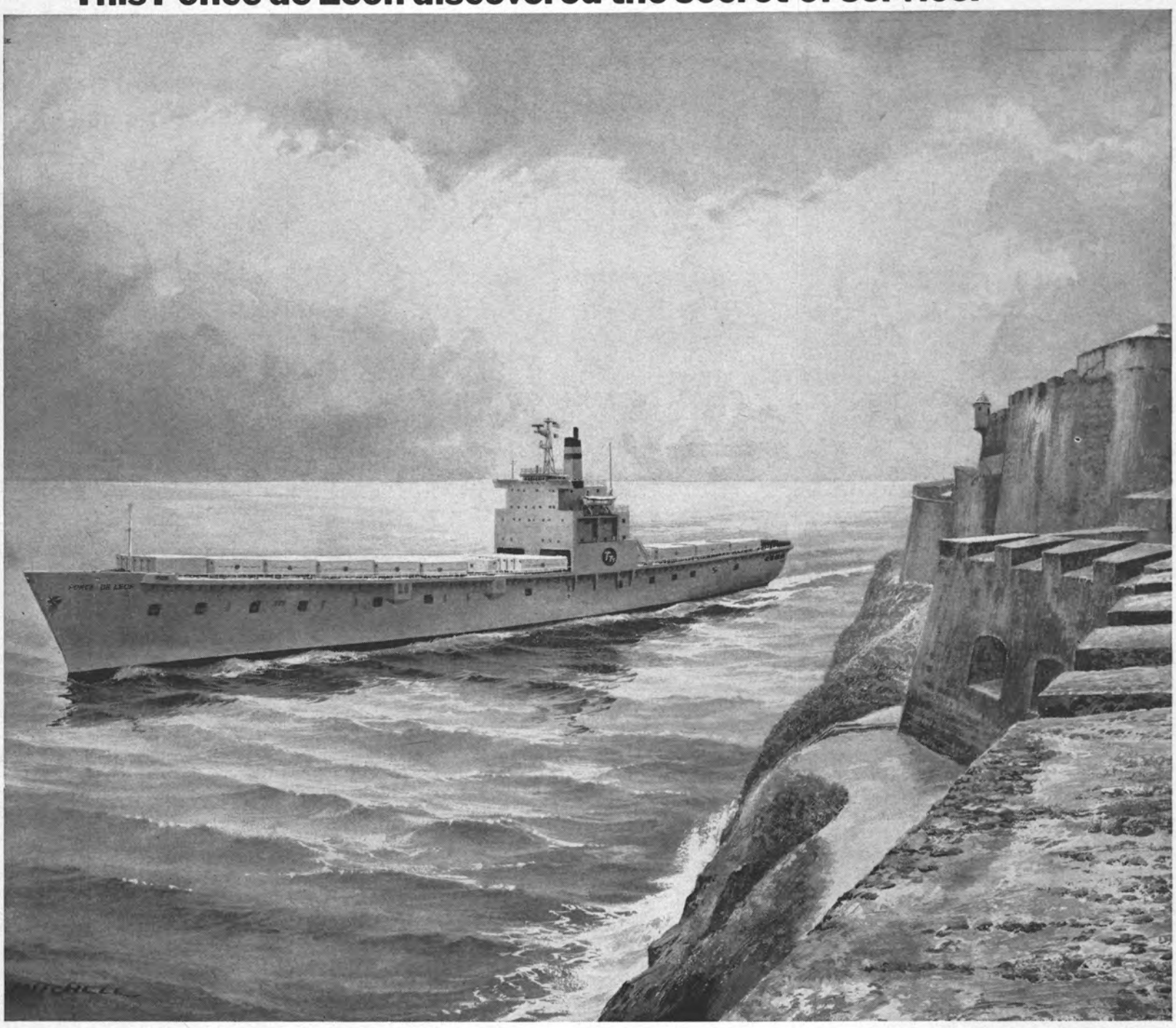
Miami terminal for the operation is at Shed No. 2, Dodge Island, and at St. Thomas, a new terminal operated by Chester, Blackburn & Roder.

Zapata Appoints B. D. McCampbell General Manager

B. D. McCampbell has been named general manager of Zapata Off-Shore Drilling Co. and its worldwide drilling operations, it was announced in Houston, Texas, by **E. F. Shiels,** senior vice-president of Zapata Norness, Inc., the parent company. He will have his office in Suite 1701, Houston Club Building.

Mr. **McCampbell,** who was made a vice-president of Zapata Norness in April 1968, is a petroleum engineering graduate of Oklahoma University, class of 1941, and has been associated with the oil drilling industry since 1946.

This Ponce de Leon discovered the secret of service.



She makes the San Juan-to-New York trip in a record-setting 57 hours.

Her roll-on, roll-off efficiency assures fast freight service once a week.

As such, the Ponce de Leon demands fast bunkering.

And gets it.

From us.

Because we at Texaco are built for speed, too.

Dependably, at 0800 every Friday in New York, there's a barge with Texaco bunkers alongside to assure prompt fueling.

We built our International Marine Sales Department with one thought in mind: service.

You'll find Texaco bunker service in approximately 200 ports of the world.

This means you're guaranteed fast bunkering, quality marine products, and the finest Marine Engineering experience throughout the world.

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Our customers made us experts.

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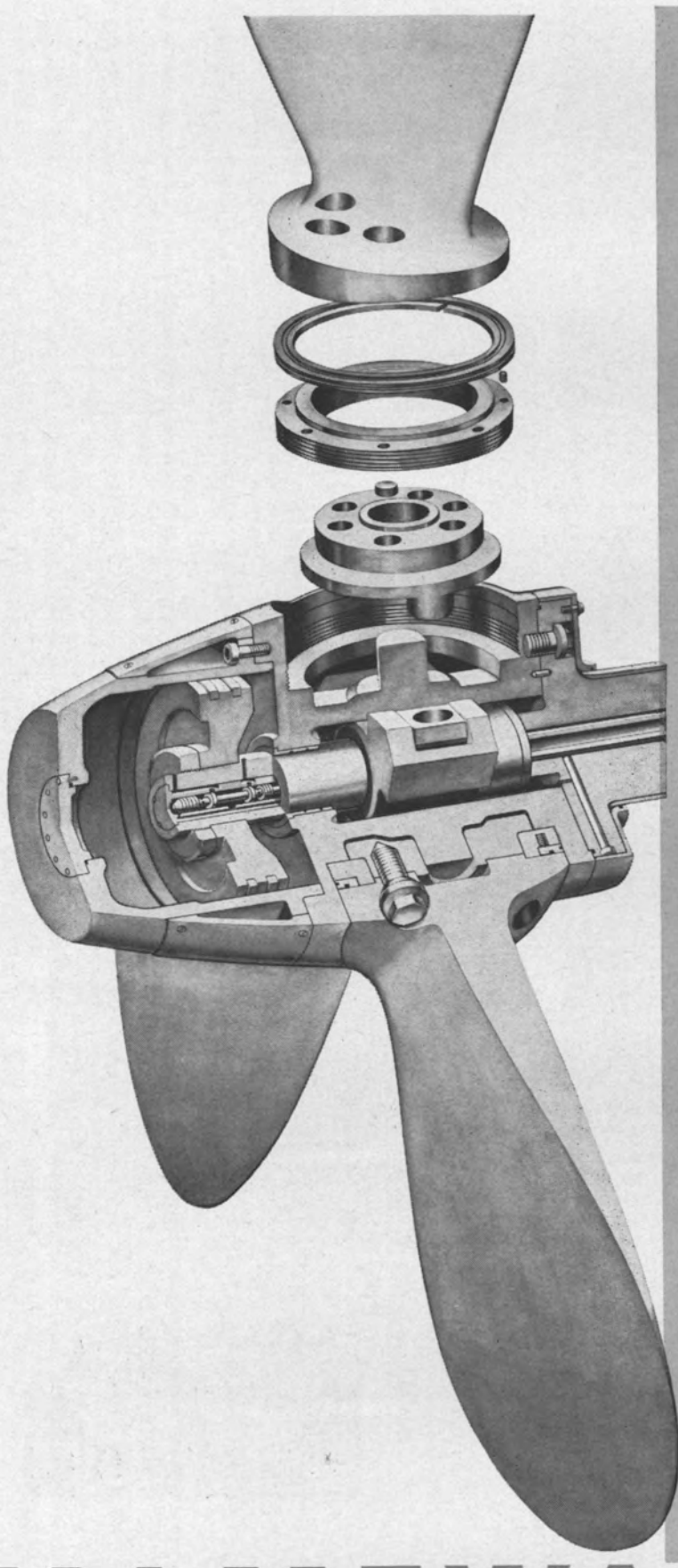
WORLD WIDE

MARINE FUELS AND LUBRICANTS



WHAT FACTORS DO YOU CONSIDER WHEN BUYING A C. P. PROPELLER? . .

★ Highest Design Reliability

★ Widest Range in Horsepower

★ Most Props in Service

★ Largest Manufacturer

★ Long-Range Economy

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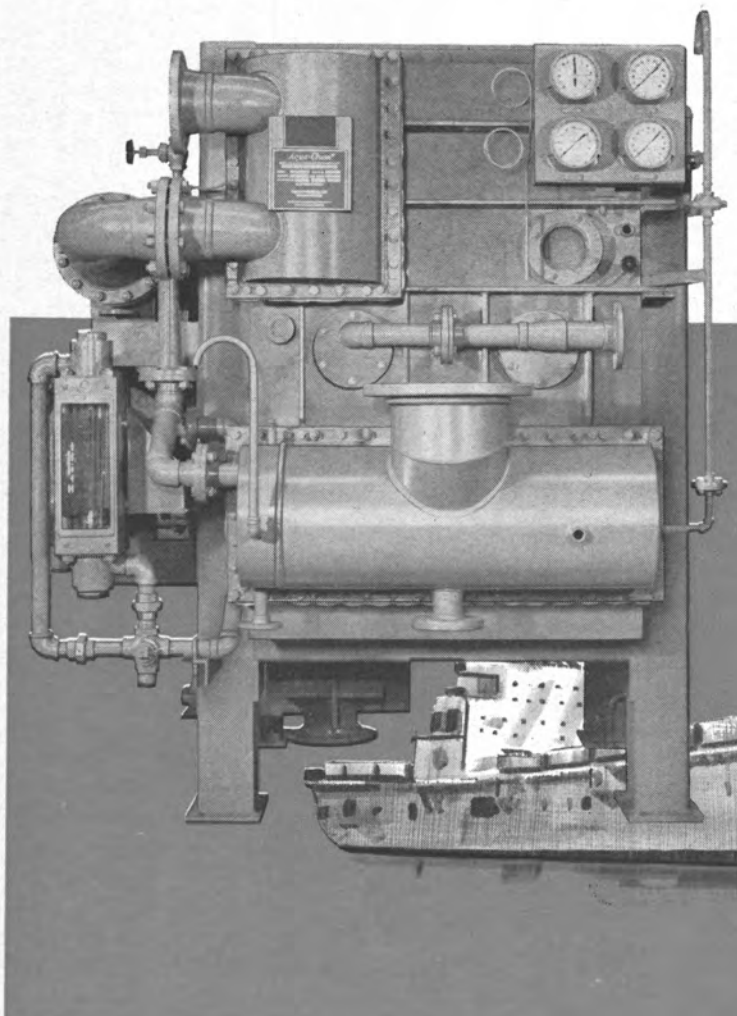
because this unique Aqua-Chem spray film evaporator...



doubles as a boiler feedwater heater...

the Ponce de Leon charts a new fuel-saving course!

This new idea from Aqua-Chem utilizes boiler feedwater as the cooling medium in the distiller condenser . . . substantially reducing fuel consumption aboard the Ponce de Leon. Yet the spray-film evaporator produces 8.28 pounds of distillate per pound of steam, compared to the normal 1.45 with a comparable flash plant. Incorporation of the unique Aqua-Chem combined first stage/second stage feedwater heater gland exhaust condenser on the same base as the distilling plant further reduces piping costs, space requirements and weight.

Combining evaporators with feed-cycle heaters is a natural for Aqua-Chem because we're specialists in both fields. Take advantage of our combination of talents. For complete information on this packaged feedwater heating system, contact Aqua-Chem, Inc., Box 421, Milwaukee, Wis. 53201.

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WORLD LEADER IN SEAWATER DESALTING

Tanker Manhattan To Test Use Of Northwest Passage For Delivery Of Alaskan Oil

Can the polar Northwest Passage be used as an oil supply route between the north slope of Alaska and East Coast ports? Three of the world's major oil companies feel that there are good possibilities that it can be used. Next June a test run will be made by the largest U.S.-flag tanker, the 106,500-dwt Manhattan, over the route.

The announcement of the plan was made jointly by the Humble Oil and Refining Company, Atlantic Richfield and BP Exploration, U.S.A. The companies are involved in developing the largest oil field discovered in the Western Hemisphere, an Alaskan deposit that has been estimated to have reserves between five- and ten-billion barrels.

Joseph Kahn, chairman of Seatrain Lines, owner of the Manhattan, said that "a successful conclusion to the tests could very significantly affect the future of the United States tanker fleet."

Other tanker operators, who pointed out that the Alaska-continental United States route was a trade reserved to American-flag vessels, said it could mean a doubling or even a tripling of the nation's tanker fleet.

M. A. Wright, chairman of the Humble board, said the ship venture was part of a broad program of studies designed to get Alaskan oil to markets. The companies are also studying the economics of overland pipeline routes, one of which is currently nearing completion to southern Alaska.

The Manhattan, built six years ago for the Greek shipping magnate **Stavros Niarchos,** is 940 feet long and capable of carrying 910,000 barrels of cargo. Since Seatrain acquired it, the vessel has been employed largely in the grain trades.

The oil companies' program calls for extensive modifications to be made on the vessel. In addition to strengthening the hull and installing an icebreaker bow, the ship will be equipped with devices to protect her propeller and rudder from ice floes.

The vessel will be converted by the Sun Shipbuilding and Drydock Company, Chester, Pa., with work starting this month. The conversion work is scheduled to be completed in June.

SNAME Calls For Applicants To Receive Scholarships

Scholarships in both the graduate and undergraduate levels are again being provided by The Society of Naval Architects and Marine Engineers to encourage young men to pursue studies in the naval architectural and marine engineering or closely related fields. For the graduate study program, application forms have been forwarded to ship operating and shipbuilding companies, affiliated trades and to universities located in all sections of the country. Applications for graduate scholarships for the fall of 1969 should be filed with the secretary of the Society at 74 Trinity Place, New York, N.Y. 10006, before the closing date of February 1, 1969.

The maximum value of each scholarship is equal to the cost of tuition at the college selected plus living expenses in the amount of $2,100. The Scholarships Committee will determine in each case the exact value of the graduate scholarship award. Successful candidates may select the institution for his advanced studies subject to the approval of the Scholarships Committee.

Factors considered in making the selection include scholastic ability, the candidate's capacity to pursue advanced study, his ambition, personality and other factors indicative of prospective leadership status in the marine industry.

In addition to the graduate program, 12 undergraduate scholarships of $1,000 each are made available by the Society at the Massachusetts Institute of Technology, the University of Michigan and the University of California at Berkeley. Those interested should contact the above institutions directly and not the Society since the award decisions on the undergraduate program have been assigned to them.

TAMPA PILOT BOARDING BOAT built by Gladding-Hearn Shipbuilding Corporation, Somerset, Mass., recently entered service with the Tampa (Florida) Pilot Association. A rubber fender, made by Johnson Rubber Company, encircles the boat at the deck edge and eliminates need for other protection. The 45-foot Egmont is powered by a Caterpillar 280-hp D-336 diesel engine which drives a three-bladed Federal Equiquad propeller through an Armco 17-4ph stainless steel shaft fitted with Johnson rubber bearings. Gladding-Hearn is presently building a 65-foot pilot boat for the Portland (Maine) Pilots Assn.

Japan took another step into the nuclear age

It was the past November 27 that construction began on Japan's first nuclear-powered vessel.
Projected launching date: this June.
Who's building it?
IHI, of course—the world's leading shipbuilder and Japan's leading manufacturer of integrated heavy industrial machinery.
The ship is an 8,350-gross ton freighter, being built for Japan Nuclear Ship Development Agency.
IHI's engineers have designed the ship with an emphasis on safety relative to radioactivity. It will be powered by one reactor with a thermal capacity of 36 megawatts amidships.
Cruising speed will be 16.5 knots.
Big job? Sure. But IHI is up to the task.
After all, we built the world's largest tanker—the 312,000 DWT "Universe Ireland" for National Bulk Carriers of the U.S.A.
Not to mention countless other record holders and the famous "Freedom Vessels" multi-purpose cargo carriers.
So you see, IHI's contribution to Japan's emergence into the nuclear age is not surprising in view of our long history of engineering success.
Success that could work for you.

(SPECIFICATIONS)

Ship type	Nuclear-powered experimental ship for transporting cargo and training personnel
Cruising areas	Ocean
Length overall	130 meters
Width	19 meters
Depth	13.2 meters
Gross tons	8,350 tons
Dead Weight	2,400 tons
Main Engine	One steam turbine of 10,000 HP
Reactor	One indirect cycle light water type of 36 megawatt thermal output
Crew and others	79 members
Cruising speed	16.5 knots

Ishikawajima-Harima Heavy Industries Co., Ltd., Tokyo, Japan IHI
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New from Sperry!

A Complete Marine Radar Family

with options to give you exactly the radar system you need.

A Sperry Marine Radar System can cost as little as, or less than, competitive units. No stripped price. That's total cost—for a complete system.

Solid-state units for long life and high dependability. Clear-image, easy-to-read presentation. Exceptional close-range accuracy.

Those are a few of the features that Sperry combines into a marine radar system for you that is economical to own and maintain. Options are available that enable you to design a system to meet your specific requirements.

Sperry's "building block" approach makes it easy for you to match the major components to your radar needs.

UNIQUE COMPONENT ACCESSIBILITY MAKES MAINTENANCE FAST AND EASY

All components are easily accessible from the front of the display unit. Principal circuits are designed as plug-in printed circuit boards for quick, no-fuss replacement.

Spare parts are available in various combinations for all systems.

Installation parts kits are available to fulfill installation requirements.

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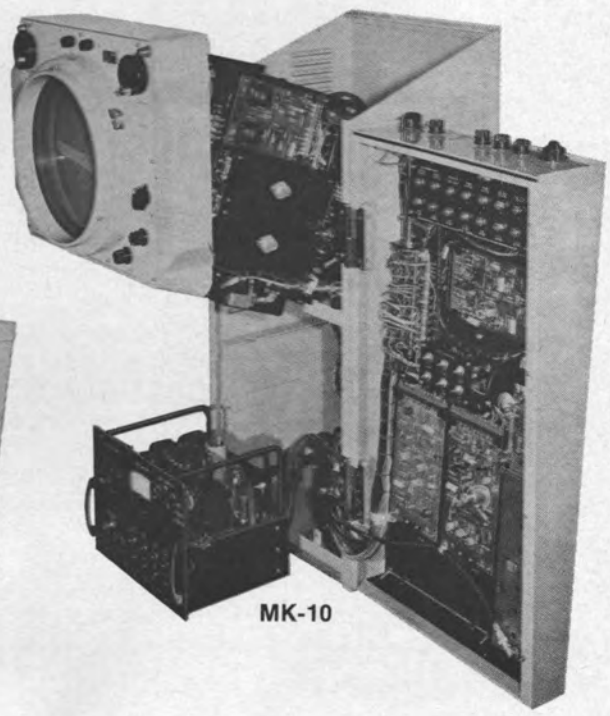
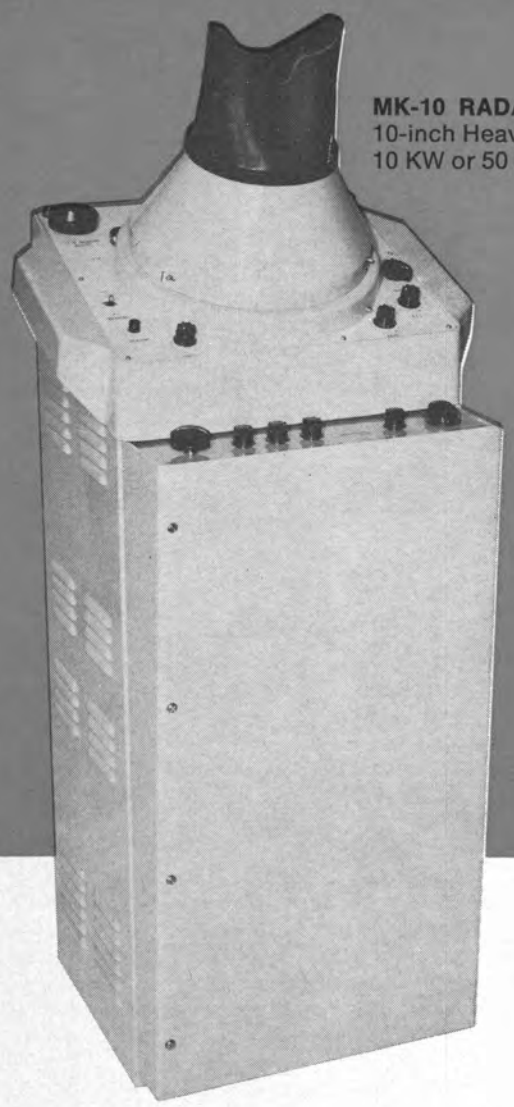
MK-12


MK-10



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Two Papers Presented At Fall Meeting Of SNAME Gulf Section Held In Biloxi

Pictured above at the speakers' table, Gulf Section meeting, left to right: **Henry J. Fray Jr.,** vice-president and general manager, Bailey Corporation, New Orleans, and Section secretary-treasurer; **Vernon A. Olson,** technical administrator, SNAME; **William H. Holland,** speaker; **Walter H. Michel,** Friede & Goldman, Inc., and Section chairman, and **George B. Clarke Jr.,** director of engineering, Alabama Dry Dock and Shipbuilding Company, and Section vice-chairman.

The recent fall meeting of the Gulf Section of The Society of Naval Architects and Marine Engineers was held at the Broadwater Beach Hotel in Biloxi, Miss.

During the technical session, two papers were presented, which were of interest to the large group of members and guests who were in attendance.

Miss B. L. Mitchell, from the Ingalls Shipbuilding Division of Litton Systems, Inc., presented "Economics of Quality/Reliability Assurance in Shipyard Application." This was of particular interest due to the sharp increase, in recent years, in this area of management control in all phases of shipbuilding. **Miss Mitchell** is the first woman to present a paper to the Gulf Section, and did an excellent job with her discussion and supporting chart presentation.

"A Pathway to Marine Corrosion Protection-Cadmium Electro-Plating from Molten Salts," was presented by **Wilbur C. Eakin Jr.,** who is also with the Ingalls Shipbuilding Division.

Vernon A. Olson, technical administrator of the Society in New York, presented an interesting account of the technical and research activities that the Society is presently engaged in.

The Gulf Section was privileged to have **William H. Holland,** vice-president of Mobile Gas Service Corporation, as principal speaker for the evening, following a well attended social hour and dinner. Mr. **Holland,** vice-chairman of Mobile's Task Force "200", made a very impressive presentation on the industrial development program presently underway in the City and Port of Mobile.

AML, PFEL And APL Name Bieri Chairman Of Coordinating Board

American Mail Line, Pacific Far East Line and American President Lines, three West Coast shipping concerns owned partially or indirectly by Natomas Co., said they are creating the post of chairman of the coordinating board of the three lines and expanding the board's activities.

Named to the post was **Floyd Bieri,** president of Consolidated Marine Inc., a concern owned by the three lines, which provides them with operating services. Mr. **Bieri** will be succeeded as Consolidated president by **Hugh W. Howard,** presently vice-president of Maher Terminals in New York City.

Natomas owns about 42 percent of Pacific Far East Line and about 54 percent of American President Lines, which in turn owns about 93 percent of American Mail. Natomas has received Maritime Administration approval of plans to consolidate the three lines but has not announced intentions to carry through the proposal. A spokesman said Mr. **Bieri's** appointment should not necessarily be viewed as a step in that direction.

However, the announcement by the three lines said Consolidated Marine will begin operating a cargo container pool for the lines as soon as the project is approved by government agencies. Consolidated Marine is moving its offices to San Francisco from Los Angeles, the announcement added.

NSSC Awards Carrier Nuclear Submarines Air Conditioning Units

A contract to supply absorption water chilling machines for nine new U.S. nuclear-powered attack submarines has been awarded to Carrier Air Conditioning Company, according to **William C. Egan,** vice-president for special products.

The contract supplements a recently received order for hermetic centrifugal water chillers for the same vessels, Mr. **Egan** said.

The orders placed by the Naval Ship Systems Command total $2.8-million. They call for one 165-ton heat-actuated absorption unit and two 150-ton electrically driven centrifugal units for each submarine's air conditioning plant.

Almost all nuclear-powered submarines in the U.S. fleet are using Carrier cooling equipment, including the first to be launched, the USS Nautilus, Mr. **Egan** said.

Marine Insurers Merge To Expand Capacity For U.S. Underwriting

The Marine Office of America and Appleton & Cox, two large marine insurance organizations, merged as of January 1 to form what is described as the nation's largest underwriting organization with annual premiums in excess of $100-million.

John B. Ricker Jr., president of the Marine Office of America said that formation of the new company was designed to expand United States underwriting capacity for international marine insurance risks.

Mr. **Ricker** will serve as chairman and chief executive officer of the new company, Marine Office—Appleton & Co., Inc., and **Fred Thieringer Jr.,** president of Appleton & Cox will become president.

In announcing the merger Mr. **Ricker** noted that a capacity problem existed in the marine insurance business, with underwriters lacking the reserves necessary to accommodate risks that are constantly growing. One of the objectives of the new company, to be known as M.O.A.C., will be to invite other companies into the field.

"There are many companies in the interior which have reserves but have not participated in such business because of a lack of expertise," he explained. "Small companies with limited capacity and personnel will now be able to share in this growing market. M.O.A.C. is prepared to represent these companies, making available its underwriting experience and offering participation in a balanced book of business.

The underwriting coverage will include cargo, commercial hull, pleasure craft, protection and indemnity—ocean and inland, marine casualty and commercial inland marine.

The new corporation will initially represent the Continental Insurance Companies, the Glen Falls Group, the Hanover Insurance Group, Phoenix of London Group and the Tokyo Marine & Fire Insurance Co., Ltd.

The new company will maintain 30 offices in the United States and Canada staffed by marine specialists, and a network of underwriting and settling agents abroad to serve United States producers and insurers, he said. Mr. **Ricker** indicated the company planned to make a major thrust in increasing the amount of business written abroad.

Houma Fabricators To Build Twin-Screw Tug

Houma Fabricators of Houma, La., is to construct a twin-screw tugboat for Nolty J. Theirot, Inc., Golden Meadow, La. The vessel, which has been designated Hull No. 25, will have the following dimensions: a length of 100 feet, a beam of 37 feet and a depth of 12 feet. It is to be powered with 3,000-total-bhp diesels.

Newport News Appoints Robert C. Strasser Director Of Research

Robert C. Strasser

Robert C. Strasser has been appointed director of research of the Newport News Shipbuilding and Dry Dock Co., a subsidiary of Tenneco Inc. The announcement was made by **J. R. Kane,** director of engineering at the Virginia shipyard.

A native of New York, Mr. **Strasser** joined Newport News in 1959. He was appointed assistant director of research in May 1967, to manage research and development in the company's materials, hydraulic, and engineering laboratories. Prior to that appointment, he was chief of the engineering laboratory.

His previous experience includes four years as an engineer with the marine division of Sperry Gyroscope Co. From 1953 to 1955 he served as hull design officer with the Supervisor of Shipbuilding, USN, New York.

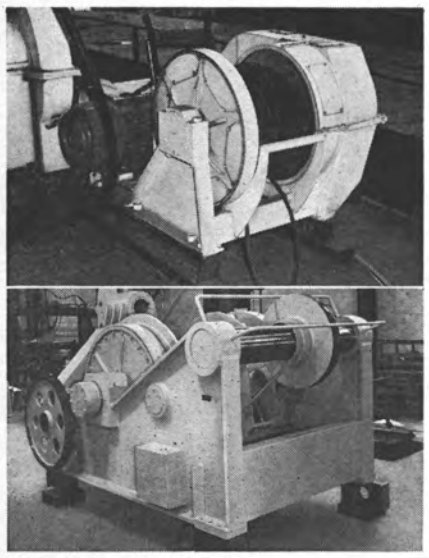
He is a graduate of New York State Maritime College, from which he received a bachelor's degree in marine engineering in 1951. Upon graduation from college, Mr. **Strasser** was employed as a naval architect at the David Taylor Model Basin. In 1955 he was granted a master of science degree in mechanical engineering from Columbia University.

Mr. **Strasser** holds a U.S. Coast Guard third assistant engineer's license for steam and diesel vessels.

A member of The Society of Naval Architects and Marine Engineers, Mr. **Strasser** has authored several technical papers, including "The Acoustic Habitability of Ships," which was published in the Transactions of the Society in 1964. He is also a member of the Society of Naval Engineers and the Propeller Club.

Mangone Ship To Build Offshore Supply Boat

Mangone Shipbuilding Co. of Houston, Texas, has received a contract from Astro-Marine, Inc., for the construction of an offshore, oil-well supply boat. Designated Hull No. 90, the vessel is to have the following dimensions: an overall length of 156 feet 6 inches, a beam of 36 feet and a depth of 15 feet. It will be powered with 2,400-total-bhp diesel machinery.



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Two Men Insulate Mokuhana In Conversion To Reefer Ship

Conversion of the sugar-freighter MV Mokuhana to a refrigerator ship was accomplished by a two-man team with the use of CPR rigid urethane-foam insulation.

The ship, 177 feet long, with a 35-foot beam, is now hauling 1½-million pounds of palletized frozen fish per trip from Alaskan ports to Seattle, Wash., under the ownership of the Kayler-Dahl Company of Seattle. A Frick refrigeration system, installed by Puget Sound Engineering, Inc., 4333 Leary Way N.W., Seattle, Wash., maintains the holds at a temperature of 0°F.

The refrigeration features hydraulically driven compressors, using the ship's existing hydraulic system as a power source, and an automatic hot gas defrost system for the cargo holds.

To convert the MV Mokuhana, approximately 14,000 pounds of CPR 385 rigid urethane foam was sprayed in a four-inch layer on the bulkheads and overheads, and 6,000 pounds of CPR 323 were poured-in-place between the double decking (existing steel deck and new wood deck wearing surface).

The urethane systems, supplied by the CPR Division of The Upjohn Company, 555 Alaska Avenue, Torrance, Calif., and applied by Vertecs Corporation, 12601-132nd Avenue, Kirkland, Wash., were chosen because urethane foam's 95 percent closed-cell structure restricts water vaporation penetration. It will not impart or absorb odors, mildew, or attract rodents.

NABRICO Dredge Division Adds Gnuske And Graves To Staff

Carl R. Gnuske

Kenneth F. Graves

Don C. Killom, manager of the newly formed Dredge Division of the Nashville Bridge Company, has announced the appointment of **Carl R. Gnuske,** dredge consultant, and **Kenneth F. Graves,** dredge service consultant.

Mr. **Gnuske** is a well-known expert in hydraulic dredging, especially as related to recovery of sand and gravel. Prior to joining the Nashville Bridge Company, Mr. **Gnuske** was consultant for the American Marine and Machinery Company. Previously, he was district sales manager for Diamond Iron Works, Chicago, Ill., and sales manager for Meckum Engineering Sales Company of Ottawa, Ill. His wide experience has included consultation in sales of a variety of equipment, including portable hydraulic dredges, pumps, chain ladders, sand plant components and other related equipment. A resident of Streator, Ill., Mr. **Gnuske** is a member of the World Dredging Association and the American Legion, as well as several fraternal organizations.

Mr. **Graves** is well-known in the dredging industry, having been associated with Dixie Dredge Corporation for the past year as plant manager. He was formerly with American Marine and Machinery Company where he served in various capacities over a period of seven years. These included shop superintendent, purchasing agent, customer service manager and field service manager.

With the addition of these two highly qualified gentlemen, several decades of experience are added to the NABRICO Dredge Division.

Marine Underwriters Elect New Officers

Doane McCarthy Jr., vice-president of the Fireman's Fund American Insurance Companies, was re-elected president of the American Institute of Marine Underwriters at the annual meeting held in New York City. The Institute, founded in 1898, is the national trade association of ocean marine insurers, representing more than 100 insurance companies.

Other officers re-elected at the meeting were first vice-president, **Dale E. Taylor,** executive vice-president of the Atlantic Companies; second vice-president, **John B. Ricker Jr.,** president, Marine Office of America; executive vice-president, **Carl E. McDowell,** and treasurer, **Robert W. Hahn,** vice-president, Great American Insurance Company.

Directors elected for a three-year term included: **David A. Arnott,** ocean marine manager, Aetna Insurance Company; **G. Gordon Brown,** vice-president, Crum & Forster Insurance Companies; **Thomas F. Hamill,** secretary, personal accounts division, Aetna Casualty & Surety Company; **Robert A. Murphy,** director and vice-president, Chubb & Son Inc. and senior vice-president, Federal Insurance Company, and **Thomas M. Torrey,** resident vice-president, Insurance Company of North America.

National Steel And Shipbuilding Company's Modernization

The System At NASSCO Works

Nassco Automated Its Steel Handling Procedure Around Existing Equipment. Production Was More Than Doubled With Fewer Men Required.

National Steel and Shipbuilding Company, San Diego, Calif., completed its current major program of expansion and modernization in 1968. With the completion of this program, Nassco has more than doubled its shipbuilding capacity and is now ranked as one of the largest U.S. shipbuilders.

The objectives of this program were to achieve the maximum building capacity within geographical boundary limitations and to minimize costs of production.

These objectives have been met. The construction of shipways 3 and 4, somewhat larger than ways 1 and 2, more than doubles the yard's building capacity. The installation of an integrated, centrally controlled system for the handling of shipbuilding steel from receipt of material through subassembly has increased the capacity for these operations to a possible peak equivalent to 2,000 tons per week and reduced the 20-man force previously used in direct material handling for a lower production rate to a maximum of seven men for the much higher capacity.

Together with this increase in building capacity, it was necessary to provide new outfitting berths, warehouses, cranes and increased capabilities in supporting shops.

Material contained in this article was obtained from the paper "Shipyard Material Handling — New Concepts" presented by **Wm. R. Nichols Jr.,** National Steel and Shipbuilding Company's project engineer for modernization, before a joint meeting of the California Sections of The Society of Naval Architects and Marine Engineers.

The concept of the steel storage and fabrication area modernization was developed on the basis that no new land areas would be available. In essentially the same steel yard, plate shop and subassembly area, it was required to double the throughput capacity—tons per unit of time. The concept of the mechanical handling system was to achieve this capacity by moving materials rapidly, continuously and along preselected lines.

Each of these attributes were studied by Nassco engineers in order to put them in their proper perspective and to determine equipment requirements.

Rapidly — By moving material rapidly, less time is spent in transit between operations. More of the unit time is left for production operations.

Continuously — Time spent in storage between operations is time spent in neither transit, nor production, nor anything else. Time is wasted. Time is spent in unnecessary rehandling.

Preselected Lines—An item of material withdrawn from storage and issued to the work must be started on a specific predetermined path. A centrally directed system approaches the attributes of continuous process manufacturing.

The material handling system is designed to best serve an existing plate shop and subassembly area. This is an important distinction as opposed to building a complete new facility incorporating a material handling system. The shop buildings, platens, and craneways are there. The principal tools are there.

To the existing facility and existing tools were added two new prefabrication capabilities:

1. **Flame Planer**—For edge preparation of plate and cutting plate into strips.

2. **Beam Welder**—Fabrication of welded shapes from stripped plate.

With these new tools and existing tools established, it was then necessary to develop material flow patterns and the equipment to move the material. The system was developed by Nassco's staff and H. Nielson and Son who supplied Via Nova conveyor units and control system.

The total conveyor system is divided into seven functional sections. These sections are:

Section 1—Storage yards and surface preparation. Cranes load plates and shapes on the conveyor which has a speed of 100 fpm throughout the system. The conveyor takes the material to the wheelabrator and paint booth. During this operation, the conveyor speed is controlled by the operator for the most effective surface preparation and painting.

In normal operation, all material handling, shot-blasting and painting in Section 1 is fully automatic.

Section 2 — Distribution point, Figure 1. Material leaving the painting operation is loaded automatically on a transfer car that distributes it automatically to the next operation.

Section 3—Collocator, Figure 2. The Collocator is a mobile unit running on 1,000 feet of track. The unit can deliver and deposit material on the ground at any of 18 preselected stations.

The control of this unit is complex, involving power supply and 50 or more signal circuits. All previous units were captive units, tethered by messenger cables. This arrangement presented problems: How to fold and unfold 1,000-feet of multi-conductor cables? How to do it at 600 fpm to maintain cycle time?

The solution involved some pioneering with and by the vendor. The car was freed from cable tethers by using crane-type conductors and collectors. Two additional conductors were provided. Control signals are handled by multi-frequency transmission—all signals using only the two conductors.

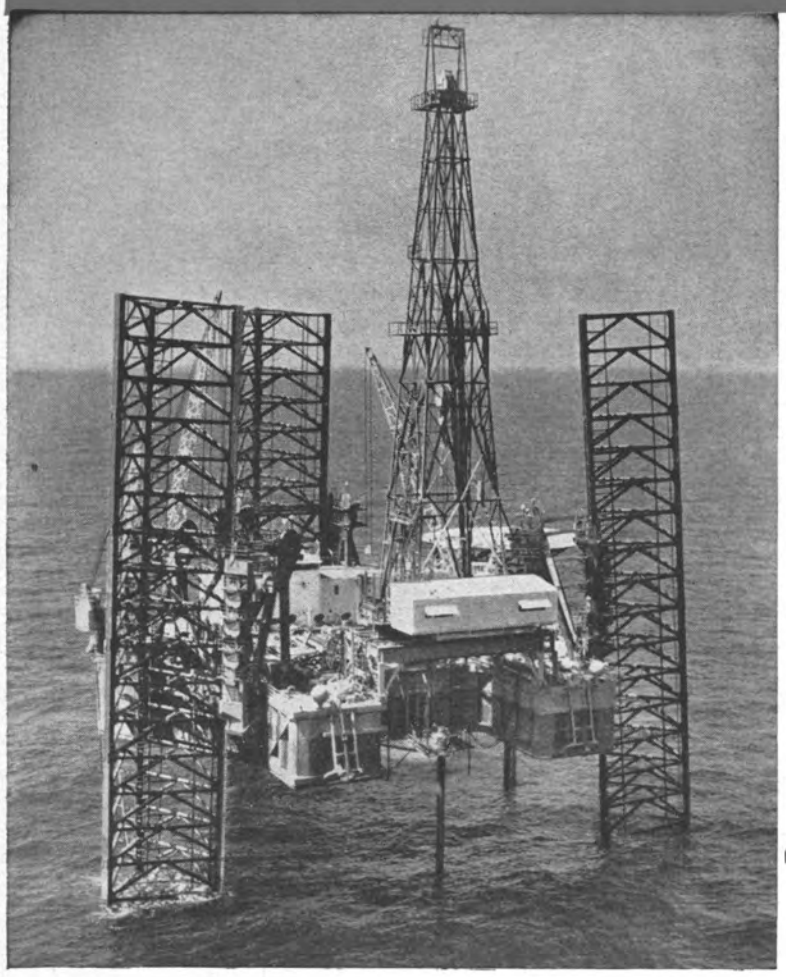
Section 4—Flame planer, Figures 3 and 6. The flame planer performs edge preparation of plates or stripping of plates into flanges and webs for the beam-welder. All burning tables are arranged with at least one roller conveyor on feed and discharge sides. On the feed side, this enables the transfer car to deliver a plate, whether the burning table is working or not; and, it also provides for a 'ready' plate to run in on the burning table without waiting for transfer car delivery. On the discharge side there is a place to run the plate off without waiting for the transfer car.

Section 5—Beam (T) welder, Figures 4 and 6. Plate cut into strips is delivered to a holding conveyor. This unit is essentially a vertical switch to receive material for the welder.

(Continued on page 40)

Figure 1—Cleaned and painted steel is transferred to next operation by transfer car shown above. The material goes either to burning operations or to Collocator.

Figure 2—The Collocator receives material from either of two transfer cars and distributes it at assigned locations along 1,000-foot track for subassembly and forming.



When corrosion control requirements are this rigorous, companies like Zapata Off-Shore Company specify "INTERNATIONAL" paints.

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Figure 3—Flame planer performs edge preparation or cuts plates into flanges and webs for beam welder.

Figure 4—The Tee welder receives cut plates by transfer car from flame planer and welds them into beams.

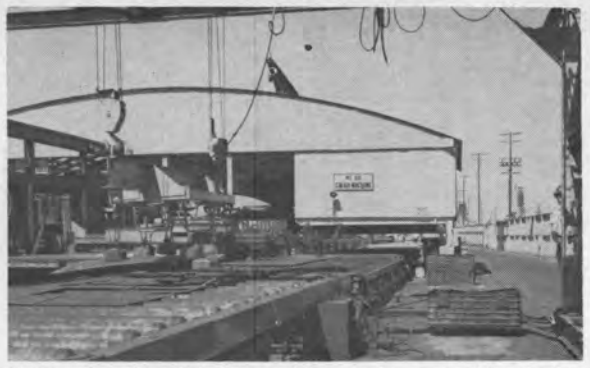


Figure 5—The CM 60 machine performs profile cutting operations. Magnet lift removes scrap material.

Nassco Modernization—

(Continued from page 38)

The completed installation is one integrated mechanical operation that cross-feeds stock, forms the beam, centers and flushes the ends to finished dimensions, continuously welds the beams head to toe, runs it out on a cooling table and cross-feeds the finished beam into racks. This installation is 104-feet long and 25-feet wide.

In this operation the plates to form the flange and web are delivered on two levels. The unit moves the flange plate into a horizontal position and then slides the web plate in position, vertically, on the flange. Power rolls flush the ends, centers the web, applies pressure to the two pieces to form a tight joint, and advances the material to the Ogden Engineering Company's special welding machines. The flange and web move through the stationary welding machines as the weld is made.

Section 6—Collection and distribution. A transfer car receives material from the flame planer and profile cutting machines and delivers it to Section 3 for distribution to subassembly stages or delivers stripped plate to the beam welder. It can also deliver material to the hand layout and burn area.

This transfer car is equipped with divided rollers to enable port and starboard pieces cut from the same plate to be delivered to two subassembly locations.

Section 7—Profile cutting, Figures 5 and 6. This section serves the CM-60 and CM-56 burning machines. Profile cutting is relatively time consuming, so holding stations are provided for material. A small magnet crane serves this section.

System Controls

The mechanical material handling plant is an arrangement of fixed and mobile specialized equipment. The components are integrated into a whole by coordinated control. The conveyors and cars provide mechanical capability. The controls make it a system. There are three modes of control. In descending order they are: central automatic control, local automatic control, and local manual control.

Central control, Figure 7, is located in an elevated tower which permits visual observation of the full travel of the transfer cars and the Collocator.

The central control console contains a back-lighted graphic display giving continuous indication of position and status of all system units.

Each section has a local control console for that section. All consoles, local and central control, are connected by a closed intercom system. A section may request local control from the central control station.

In operation the control system memory has two important characteristics:

1. Once the operator establishes the ordered sequence, he does not need to be further concerned about it. The control system will carry out the sequence as soon as it is mechanically possible to do so.

2. In a complicated sequence, each step will be taken as soon as the way is clear. The movement will always be as far along the sequence as possible.

Cranes

The plate yard is a rearrangement and extension of an existing facility. The existing crane, Figure 8, was equipped with a ViaNova magnet beam and associated controls.

At the other end of the system, the subassembly platen is served by two H. Nielson and Son ViaNova cranes, Figure 9. These cranes are also magnet beam equipped. The magnet beams are equipped with a row of magnets for shapes, with rotation of the shape about its long axis, controlled from the cab. The cranes also include an auxiliary hoist to provide conventional hook service for subassembly.

The integrated, centrally controlled material handing system installed by National Steel and Shipbuilding meets its requirements. The system at Nassco works.

Figure 6—Overall view of Sections 4-7 (taken prior to completion) shows arrangement of flame planer (1), beam welder (2), transfer car (3), and profile cutting (4).

Figure 7—Central control console can handle all material transfers in programmed sequence or transfer control to local stations. Located in an elevated tower, it permits the operator to have full visual view of operations.

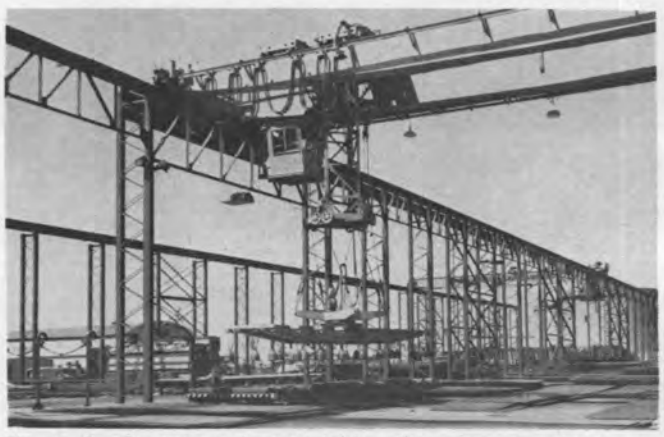
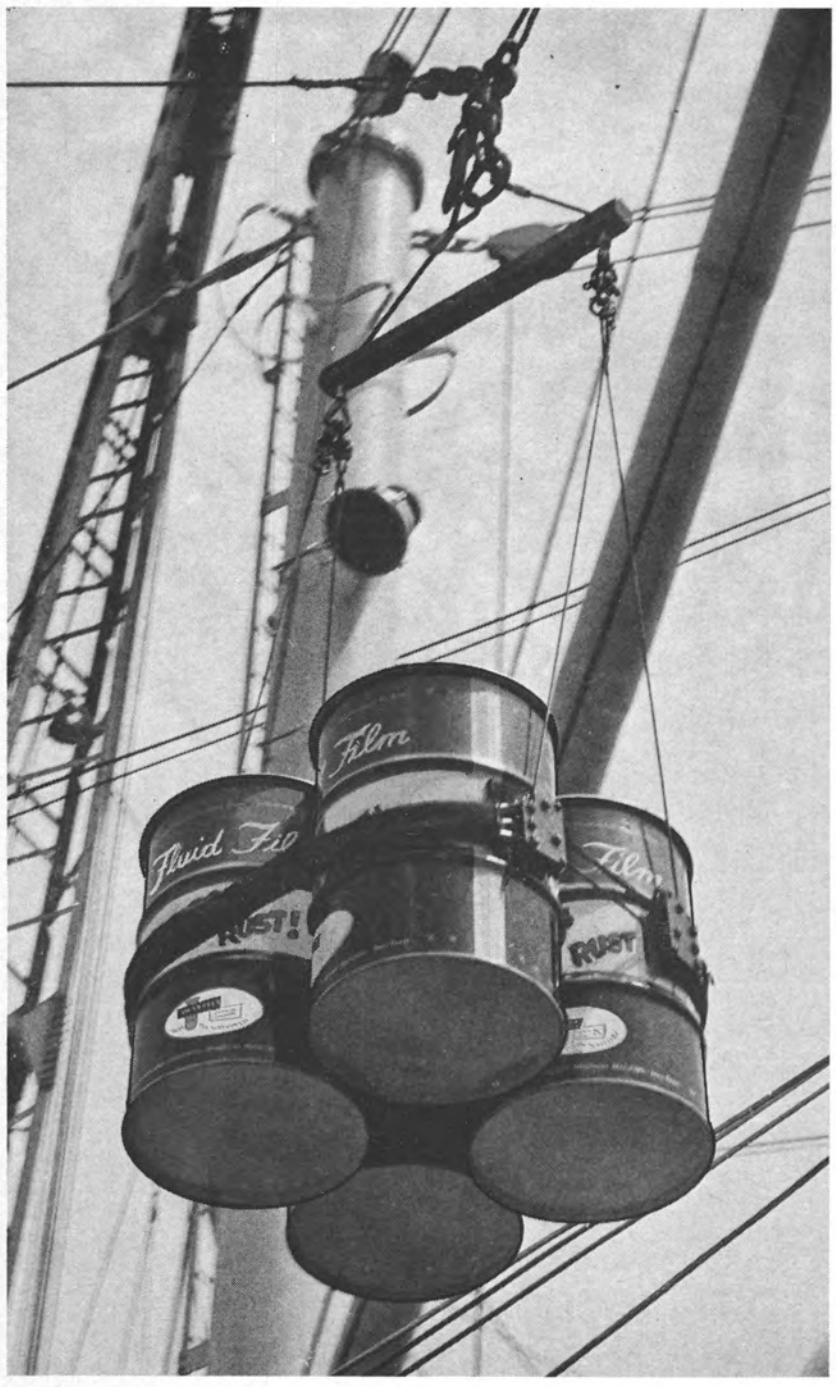


Figure 8—Programmed material-handling sequence begins in storage yard where plates are loaded on transfer car that moves to the conveyor for cleaning and painting operations.

Figure 9—Crane lifts plate from between Collocator track and moves it to proper subassembly platen. Whirley crane transfers completed assembly to transporter for building ways.



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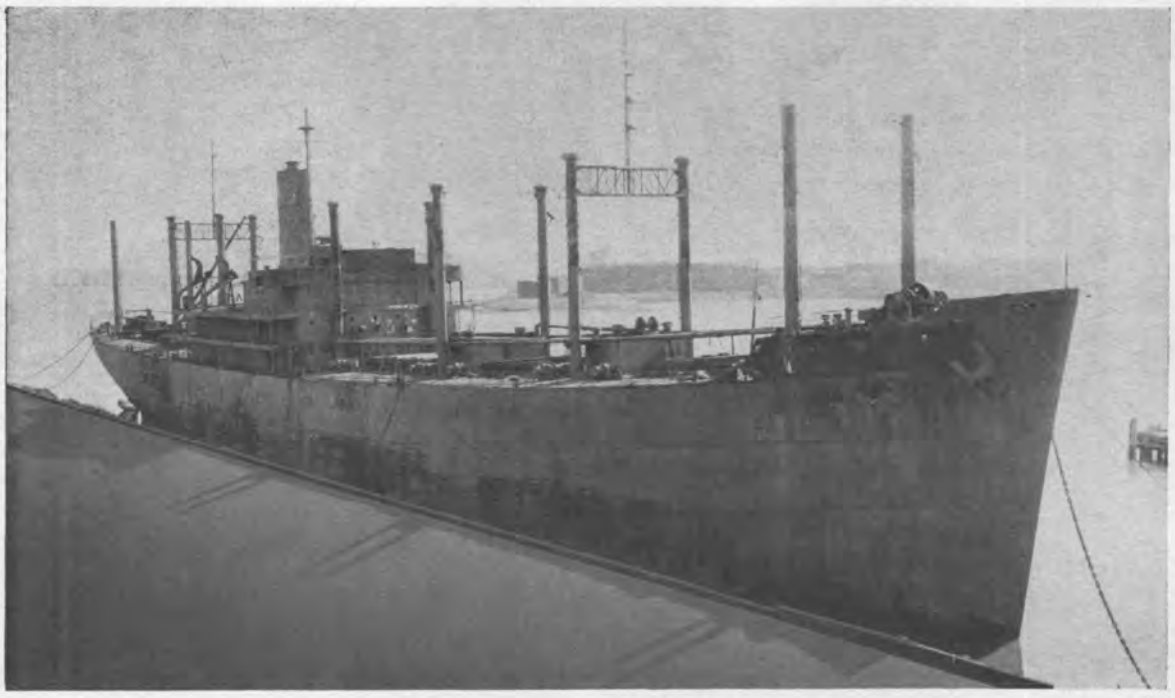


EQUIPMENT FROM MOORE DRYDOCK C-3 EX-MORMACSEA — HULL 197

350 KW TURBO GENERATORS: **Turbine**—De Laval 503 HP—10,000 RPM—6-stage—440#—282° superheat—28½" exhaust. **Gear**—De Laval—10,000/1200 RPM. **Generator**—Crocker-Wheeler 350 KW—120/240 DC—1458 amps—1200 RPM—compound wound—#230194 & 230195. Also fits Federal Hull 198. BOILERS: Foster-Wheeler type D—2-pass design—525# pressure. FORCED DRAFT FAN MOTORS: Westinghouse SK—46.5/13.81—2400/1660/960 RPM—230 VDC. PROPELLERS: 21'8" diameter—21.669 pitch. REDUCTION GEAR: De Laval 5015/3461/729/85—serial 228972. SHAFTING: 24"x19" diam. STEADY BEARINGS: 19¼" o.d. EVAPORATOR: Paracoil 36-17/48-23/28-11. MAIN FEED TRIPLEX: Worthington—4½"x8"—160 GPM @ 510#—72 HP—230 VDC—975/1750. MAIN CIRCULATOR: Worthington 20" LAS—12,000 GPM—19' head—100 HP Westinghouse motor—frame 184.5—230 VDC—485/645—365 RPM.

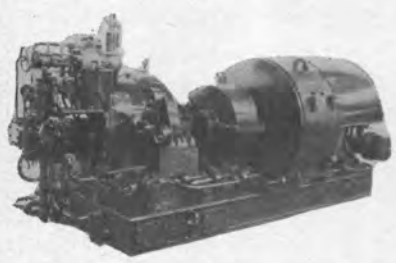
ALSO TAILSHAFT & RUDDER, KINGPOSTS, 16" PORTLIGHTS, BOOMS, DOORS, WINCHES, WINDLASSES, STEERING GEAR.

THIS IS JUST A PARTIAL LIST OF AVAILABLE MATERIAL!
INQUIRE ABOUT OTHER ITEMS YOU NEED

MATERIAL FROM MOORE-BUILT C-2 MORMACWREN — HULL 271

Specification class C2-S-B1—Maritime Commission Hull #1184. **Main Turbine Rotors:** HP & LP—HP serial 75382—LP serial 75363. ALSO, ALL MOTORS FOR FEED PUMPS, BILGE, CIRCULATORS, ETC.

TURBO-GENERATORS



300 KW — From AP2 Ex-Medina Victory

TURBINE: Worthington-Moore—serial 7547 & 7548—440 lbs.—740°TT—28½" vacuum—type S4—5-stage—6097 RPM. GEAR: Type 14x7—6097/1200 RPM. GENERATOR: Crocker-Wheeler 102-HD—120/240 VDC—125 amps—40° rise—serial No. 973643 & 999795—compound wound. Armature flange 8¼"—B.C. 7"—12 holes. NEW ARMATURE AVAILABLE FOR THIS GENERATOR. SEE 3RD PAGE FOLLOWING.

300 KW — From AP3 Ex-Ridgefield Victory

TURBINE: Worthington-Moore type S4—5-stage—6097 RPM—740°TT—440#—serial No. 7108 & 7106. GEAR: 6097/1200—type 14x7—serial No. 7108—5.081:1 ratio. GENERATOR: Crocker-Wheeler 102-HD—300 KW—120/240 DC—6-pole—3-wire—stab. shunt—1200 RPM—type CCB—serial 973583. Suitable for units 7541 & 7543 and 7089 & 7188. WILL SELL ARMATURE SEPARATELY: 12-Hole flange—⅝" bolt holes—8.247" diam.—7" B.C.—flange & shaft 5".

300 KW Murray

TURBINE: G.E.—DORV—325M—440#—740°TT—5645 RPM. GEAR: S-192—5645/1200. GENERATOR: Ideal—120/240 VDC—1250 amps—stab. shunt.

300 KW GENERAL ELECTRIC

TURBINE: G.E.—DORV—325M—440#—740°TT—reduction gear S-192. GENERATOR: G.E. 120/240 VDC—1250 amps—stab. shunt.

TURN TO 3RD PAGE FOLLOWING FOR 300 KW SPARE ARMATURES

BOILER SOOT BLOWER ELEMENTS

12 Units—Diamond Power Specialty Corp.—type FM-1220—for blower units S-3, S-4—84¼" overall—2" tubes—22 jets—calorized metal.

11 Units—Diamond Power Specialty Corp.—used with type FM-1220 coupling—2" tubes—Dialoy element—S1&S2—26 jets—12'6" OA—2x2 steel coupling.

3 Units—2" ID tubes—15 jet—8'10½" OA—with 2" steel coupling—with FM-1220 unit blower.

ENTIRE LOT $450.00

SHIPS SERVICE AIR COMPRESSOR

VEE-type—Sullivan—7x4½x4½—60 CFM—15 HP—230 volts—1850 RPM—light compound—with starter. **INGERSOLL-RAND ALSO IN STOCK**—model 15—type 40—5x4x4.

AP2 Victory Main Condenser Water Boxes

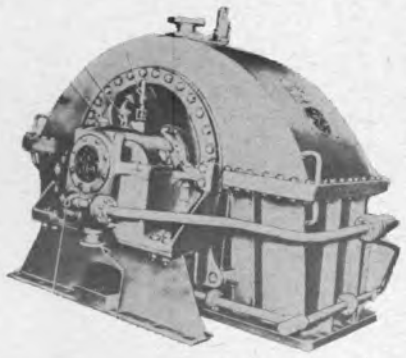
Mfg. by Graham—unused ABS and reconditioned ABS. Main condenser water boxes—AP3—Allis-Chalmers.

Aux. Condenser Water Box & Return Cover

Reconditioned ABS—Graham design—mfg. by Ross.

NEW AP2 VICTORY ENGI

6600 HP Main Propulsi



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COMPLETE TURBI

GENERAL ELECTRIC

Low Pressure Turbine $18,500
High Pressure Turbine $19,500

NEW THROTTLE VA

Schutte and

NEW H. P. AND L. P.

For General Electric and Allis-Chalmers

ABS RECONDITIONED 660

L. P. & H. P. MAIN PRO

FROM EX-MEDINA VICTORY—MARA
H.P. Turbine—complete—Serial 4A-1618—

FROM EX-SHEEPSHEAD BAY VI
H.P. Turbine—complete—Serial 4A-2264—

AP2 VI
WESTING
MA
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Immediat
6000 SHP—R
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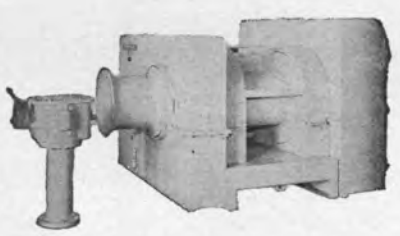
—AB No. PA
Ex-Medina Vic
1620.

VICTORY SHIP UNIT WINCHES



50 HP—230 V
house, G.E. or Cr
U-1, U-3 single
lbs. @ 223 FP
double speed—1
96 FPM. We ha
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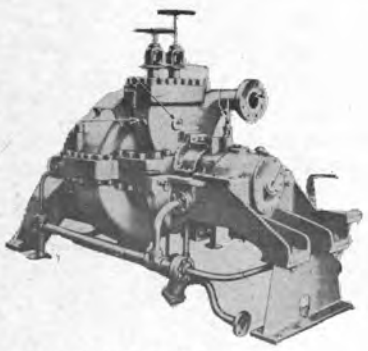
ED AND TIONED MACHINERY & EQUIPMENT

NE ROOM EQUIPMENT

on HP & LP Turbines



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NE ASSEMBLIES

ALLIS-CHALMERS
Low Pressure Turbine $17,500
High Pressure Turbine $18,500

LVES – $6750.00
Koerting

TURBINE BEARINGS
—labyrinth packing—diaphragms.

0 H.P. WESTINGHOUSE
PULSION TURBINES
HULL 586—BUILDERS HULL 586
.P. Turbine—complete—serial 4A-1619.
CTORY—OFFICIAL NO. 81752
.P. Turbine—complete—serial 4A-2265.

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NEW H. P. & L. P. FLEXIBLE COUPLING

NEW SPARE BLADING FOR WESTINGHOUSE L. P. TURBINE

DC—Westing-
cker-Wheeler.
speed—7450
M; U-2, U-5
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ve both right
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FORCED DRAFT BLOWERS–22-TD-18

Westinghouse—230 PSI—430° TT—back pressure 15 lbs.—normal capacity 8900 CFM—4.8" of water pressure. RPM 2875—9.6 HP—total steam 697—overload capacity—13,-700 CFM at 10.7.

WILL SELL FAN OR TURBINE SEPARATELY

ON METALS CO.

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dway, New York, N.Y. 10004—(212) 943-2640

MISCELLANEOUS PUMPS & PUMP MOTORS

DE LAVAL VERTICAL ROTARY MAIN LUBE OIL PUMP

10/15 HP—230 VDC—250 GPM @ 43 lbs.—980/1750 RPM. MOTORS: G.E. or Reliance.

MAIN CIRCULATOR & MOTOR FOR AP2 VICTORY

Ingersoll-Rand 18VCM bronze pump—20" suction—18" discharge—vertical. Flanges opposite each other. Distance flange-to-flange 4'5". Suction bolt circle 25"—discharge bolt circle 22¾". Suction (20) ¼" holes—discharge (16) ¼" holes. PUMP WEIGHT: 5100 lbs. MOTOR: 5700 lbs.—Allis-Chalmers 75 HP—230 VDC—500/670 RPM—frame E-Bu-162—drawing No. 31099.

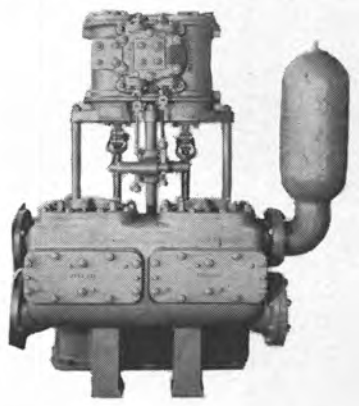
SPARE ARMATURE AVAILABLE FOR ALLIS-CHALMER MOTOR — WILL SELL PUMP MOTOR SEPARATELY.

INGERSOLL-RAND 2VHM MAIN CONDENSATE PUMP

120 GPM—85 PSI—Pump only

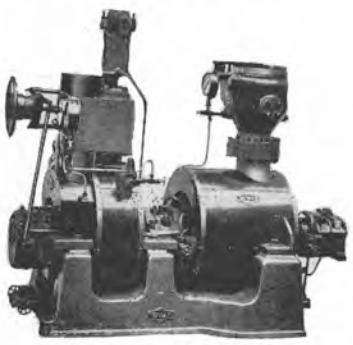
Motors for Above

15 HP Motors and Terry or Coppus turbine drive.



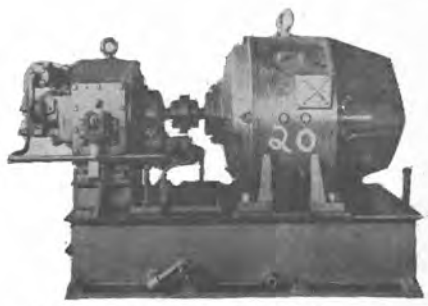
VERTICAL DUPLEX PUMP

10x11x12 Fire, Bilge, Fuel Oil and General Service pumps.



WEIR TURBINE-DRIVEN FEED PUMPS TMFP7

PUMP: 7000 GPH—585 PSI—1380 ft. head—5600 RPM. TURBINE: 480 PSIG—750°TT—exhaust 5 PSIG.



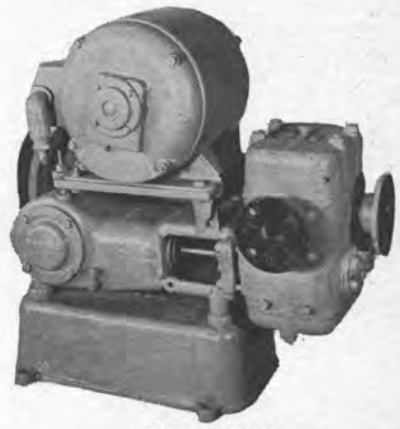
AP3 Steering Gear Pumps

Northern Hydraulic (variable stroke) and Hele-Shaw Hydraulic. **$1750**

Motors For Above Pumps

Reliance: 40 HP—230 VDC—147 amps—type T—900 RPM. **$1750**

BUY COMPLETE UNITS OR PUMPS & MOTORS SEPARATELY



DEMING FRESH WATER PUMP

AUX. COND. PUMPS

Ingersoll-Rand 1-VHM—with 5 HP 230 VDC motor.
Will Sell Pump separately.

LUBE OIL STANDBY

Vertical Duplex—Worthington—7½x9x12.

FEED PUMPS

Worthington—vertical simplex—11x7x24.

HORIZONTAL DUPLEX PUMPS

Size 6x6x6 pumps.

AUX. CIRCULATOR MOTORS: 25 HP—230 VDC—96 amps—658/875 RPM—G.E. and Reliance

AP3 LARGE VICTORY MATERIAL

PROPELLER: DORAN—Seattle—4-blade—20'6" diam.—6' pitch—heal #4931—ABS (59) 645R.
ALSO TAILSHAFT—RUDDER—RUDDER CARRIER—UPPER STOCK

FORCED DRAFT FANS & TURBINES: Westinghouse type 25-TD-18—231.6 lbs. steam—exhaust 15.6 lbs.—superheat 31°F—max. capacity 19,000 CFM—static pressure 10.7—3950 RPM—45.8—serial nos. 5A2167-11 & 5A2167-12.

SPECIAL FROM RIDGEFIELD VICTORY

G.E. HP & LP TURBINES & REDUCTION GEAR—8500 HP—9350 HP Oregon Shipbuilding Hull #1224—Instruction Book 16263

TURBINES: G.E.: L.P.—8-stage—3509 RPM—#62043 H.P.—8-stage—6159 RPM—#62042 REDUCTION GEAR: #75143—type MD-48-A—8500 HP—9350 max.—6159/3509/763/85 RPM. Maneuvering valve, operating cylinder, etc.

TURBINE FEED PUMPS

Pacific Pump Works. PUMP: Size 1½NTM—185 GPM—1415 ft. head—4825 RPM—serial 8984—8993
TURBINE: Westinghouse—112 HP—440#—740°TT—4825 HP—5A2743-6 and 5A-2744-6.

A 300 KW VICTORY SHIP & C-2 GENERATOR ARMATURES

CROCKER-WHEELER

New—as pictured above—with ABS certificate. From VC2-S-AP2 Ex-Medina Victory. For Crocker-Wheeler generator 102-HD-DP—type CCD—compound—serial 973-643; 999-795 and others in this group. Bearing shaft size commutator end—3½"; Flange size 8¼" OD; Bolt Circle 7", with 12 holes ½" diameter.

ALLIS-CHALMERS

120/240 volts DC—type MCW 21-11—1200 RPM—stab. shunt—148171 & 148173—from ex Stamford Victory—completely re-wound anuary 10, 1968—ABS—(1).

WESTINGHOUSE

120/240 volts DC—1250 amps—1200 RPM—stab. shunt—frame CB 208.4—Instruction Book 8301—51-S-20P-923 and 18-83H-313.

GENERAL ELECTRIC

120/240 volts DC—1250 amps—1200 RPM—stab. shunt—serial No. 2222725-2222807—In G.E. Instruction Book G.E.I. 16584.

C-2 ARMATURES

North Carolina C2-S-AJ-I—General Electric—120/240 volts DC—type MPC—stab. shunt.

T2-SEA-1 TANKER MAIN STEAM & AUXILIARY EQUIPMENT

B MAIN TURBINE ROTORS
Large Turbine Rotors—Lynn
Large Turbine Rotors—Schenectady
Elliott Turbine Rotors—Fit G.E. small Schenectady turbine

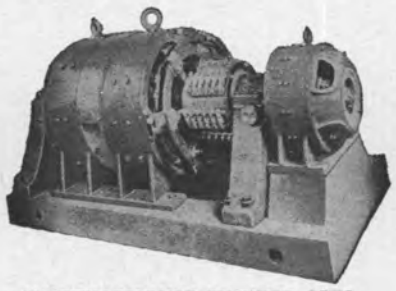
C G.E. MAIN PROPULSION GENERATOR REVOLVING FIELD
G.E. reconditioned—June 1967

D G.E. MAIN GENERATOR STATORS

E WESTINGHOUSE MAIN PROPULSION GENERATOR REVOLVING FIELD
Westinghouse reconditioned—May 1967

F WESTINGHOUSE MAIN GENERATOR STATOR WITH OR WITHOUT COOLER

G T-2 TANKER WATER BOXES
Graham or Westinghouse, with ABS certif. In stock, for immediate delivery.

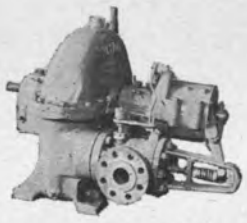


H WESTINGHOUSE EXCITER SETS
110 KW—28 KW—5 KW available
110 KW—32.5 KW—5 KW available

I 75 KW—55 KW ARMATURE ASSEMBLIES FOR G.E. 525 KW GENERATORS

J PROPELLOR
Reconditioned by Baldwin in 1957 and since that time has been carried by Esso on deck, on pedestal, as emergency spare.

K WINDLASSES UPPER RUDDER STOCK RUDDERS



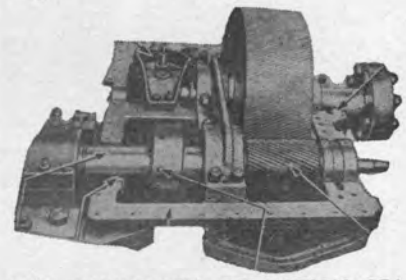
L TERRY TYPE Z FEED PUMP TURBINE
Will interchange with G.E. feed pump turbine. It is 1" higher at center of shaft. Steam exhaust same side—steam inlet opposite side.

M MAIN CIRCULATING PUMP MOTOR
125 HP—Westinghouse—Frame 876C—type CS—squirrel cage — 440/3/60 — 585 RPM. Reconditioned to ABS. Ready to go immediately.

N LORIMER EMERGENCY GENERATOR ENGINE AND GENERATOR PARTS

O G.E. GEAR TYPE PUMP
Used with reduction gears on 525 KW generator

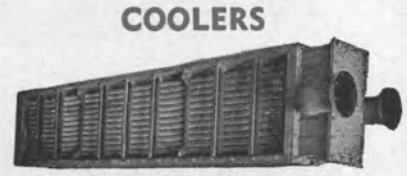
P AUX. TURBO-GENERATOR THROTTLE VALVE
G.E. for 525 KW generators



Q G.E. AUX. TURBO-GEN. REDUCTION GEARS
Bull gear & pinion. With ABS.

R WESTINGHOUSE AUXILIARY GENERATOR REDUCTION GEARS AND BEARINGS

COOLERS



S MAIN MOTOR AIR COOLER
Westinghouse—ABS—ready to ship

T MAIN GENERATOR AIR COOLER
Westinghouse — reconditioned with ABS—ready to ship

U ANADALE OIL COOLERS FOR AUXILIARY GENERATORS

V G.E. MAIN GENERATOR COOLER
type G4—bronze heads—AL brass tubes

ALL MACHINERY FROM U.S.M.C. NORTH CAROLINA C2-S-AJ1

INCLUDING MASTS, BOOMS, KINGPOSTS, AND RIGGING

Send us your inquiries

CENTRIFUGAL PUMPS

— ALLIS-CHALMERS —

MAIN CIRC. PUMP

9500 GPM @ 27'—800/600 RPM—type S.B. 20x20 — horizontal. MOTOR: Allis-Chalmers 100 HP—230 volts—600 RPM—Frame EB-162.

TURBINE DRIVEN MAIN FEED PUMP

Allis-Chalmers type BK-4—150 GPM @ 1465' head—180 GPM @ 1342' head. TURBINE DRIVE: Type ZS-1—94 HP normal—440 PSI—740°TT—4400 RPM.

AUXILIARY CIRCULATOR

Allis-Chalmers 8x6 — SE — 1500 GPM — 27' head—1200/1600—15 HP motor—horizontal.

MAIN CONDENSATE

6x3 CF2V — Allis-Chalmers — vertical — 120 GPM—185' head—1310/1750 RPM—15 HP.

AUXILIARY CONDENSATE

3x1½ SSL — 20 GPM — 185' head—1310/1750 RPM—7½ HP—vertical.

FIRE PUMP

4x3 B-2 — Allis-Chalmers — 400 GPM—280' head—1425/1900 RPM—50 H.P.

CIRCULATING PUMPS

Hot water & auxiliary sea water circulating pumps—1½x1½ SSH—20 GPM—10' head—1750 RPM—½ HP—and 80 GPM—70' head—2620/3500 RPM—3 HP.

— WORTHINGTON —

MAIN FEED PUMP

2 UQS-2—150 GPM @ 1465 T.D.H.—4000 RPM—115 HP. Turbine. Form S2RM—Moore steam turbine—1½" steam inlet—440 lbs WP—750°F @ 10 lbs gauge. Water rate 26.8 lbs BHP/HR.

MAIN CIRCULATOR

20-LAL-18 — 20" suction — 20" discharge — horizontal—9500 GPM—27' TDH—800 RPM — 100 HP. MOTOR: 100 HP — 360 amps — 800/600 RPM—horizontal—Frame 183 SK—light compound.

6-L-1 AUXILIARY CIRCULATING

1500 GPM—27' head—1450 RPM—horizontal—8" suction—6" discharge—15 HP—230 DC—56 amps—1450/1090—frame 83SK.

2½UZS-1 MAIN CONDENSATE

Vertical—6" suction—3" discharge—120 GPM—185' T.D.H. — 1750 RPM — 15 HP — 230 VDC—56 amps—1750/1310—ambient 50°C—frame 83SK.

3-UB1—FIRE SERVICE

Horizontal — 4x3 — 400 GPM — 281' head—1750—50 HP Motor—230 VDC—178 amps—1310/1750 RPM—frame 133SK.

AUX. SALT & HOT WATER CIRCULATING

1½ D—20 GPM—10' TDH—1750 RPM—3 HP salt water circ.—1 HP hot water circ.

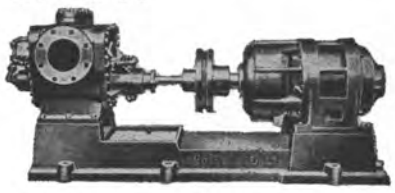
RECIPROCATING STEAM PUMPS

— WORTHINGTON —

- Port Feed — 8½x5¼x15 — 50 GPM—600 lbs.—VS
- Fire Service & Standby — 12x11x18 — 400 GPM—125 PSI—VS
- Dirty Ballast—Clean Bilge 10x11x18—400 GPM—50 PSI—VS
- Fuel Oil Standby—7x4x10—11 GPM—400 lbs—VS
- Lube Oil Standby—7½x9x12—250 GPM—47' head—VD
- Make-up Evaporator Feed—3x2 3/4x3—20 GPM—50 lbs.—HD
- Contaminated Evaporator Feed—20 GPM—75 lbs—HD
- Salt Water Evaporator Feed—3x2 3/4x3—20 GPM—35 lbs.—HD

— POWER RECIPROCATORS —

- Drinking water—2½x2—10 GPM—70 lbs—¾ HP—230 volts DC
- Sanitary—2½x2—30 GPM—80 lbs—2 HP—230 volts DC



KINNEY MOLASSES PUMP

430/215 GPM—size 8x8—pressure 60 lbs.—142/280 RPM—Motor RPM 875/1750—Reducer Falk 6.25:1. GE Motor—30/15 HP.

STEERING GEAR

McKiernan-Terry — size 10½ RAM Electro-Hydraulic. MOTOR: 40 HP. Westinghouse—frame 143S—690 RPM—230 volts.

— REFRIGERATION EQUIPMENT —

- **CARGO REFRIGERATION PLANT**

Compressor 7G8-EF—size 240—897 cu. inches—minimum displacement 39.2 tons—Carrier. Has 365 sq. ft. 3-pass Freon 12 condenser. MOTOR: 35 HP — 230 VDC — 1310/1750 Westinghouse—type 113-SK.

- **SHIP SERVICE REFRIGERATOR**

York 4x4—type Y-38—model 44-Fe—50 sq. ft. condenser. MOTOR: 10 HP—230 VDC—type SK—frame 43—1750 RPM—37.3 amps.

- **COLD DIFFUSER**

York type 4—Fan-Fin unit 1155 CFM—82 sq. ft. York type 2—543 CFM—36.8 sq. ft.

- **CARGO WINCHES**

North Carolina built type 73-S — mfg. by AH&D—50 HP—230 volts DC.

- **BAILEY BOARD COMPONENTS**

G.E. 300 KW TURBO GENERATORS

GENERATOR: Type DORV-325M — 5645 R.P.M. — 440 Lbs.—740° TT—18" exhaust. GEAR: Type S-192—right hand—5645/1200—G.E. GENERATOR: G.E. 300 KW—120/240—1200 RPM—type MPC—stab. shunt. WILL SELL ROTORS — GEARS — ARMATURES SEPARATELY.

SPRAY DEAERATING HEATER

54000 lbs. water/hour. Elliott Co.

FEED WATER HEATERS

- FIRST STAGE—Shell & tube—45000 lbs/hr—100°—172°F—305 sq. ft.—Heat Transfer Products.
- THIRD STAGE—5400 lbs/hr—240° to 318° 200 sq. ft. effective surface. Heat Transfer Products Co.

EVAPORATORS

Contaminated water — 36-14 Paracoil-Davis Eng.—Distiller 2F72D Davis.

EMERGENCY DIESEL GENERATOR SET

Heavy duty—75KW—120/240 DC—720 RPM Ideal. ENGINE: Lorimer 115 HP—7½x9½—720 RPM—4-cycle—radiator cooled. With all switchgear. OAL 12'4"—OAW 49"—OAH 79" Weight 10,500 lbs.

M.G. SET

D.C. final AC—Bus—MG set—5.5 HP—230 Volt 1800 RPM input—Diehl's—3 KW 120/1/60 output.

AIR EJECTORS

Ingersoll-Rand main air ejector and auxiliary air ejector.

AIR COMPRESSOR

Ship service — type PB-2 — 7x4x4 — Chicago Pneumatic—15 HP—230 volts—1750 RPM.

COMBUSTION CONTROL

Worthington—4¼x2½x2¾—2-stage — 17.9 CFM at 100 lbs.—5 HP—230 volts DC.

FORCED DRAFT BLOWER

Type 6-SL — 12000 CFM — 8.1 S.P. — 1830 RPM— Buffalo Forge. MOTOR: Allis-Chalmers type EB-100—20 HP—1190/1830 RPM—230 volts—75 amps.

FUEL OIL BURNER

Todd HexPress—3 per boiler.

FUEL OIL HEATERS

ALCO—4400# fuel oil—from 100° to 230°—shell & tube type—unit in four sections.

FUEL OIL METER

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EDO Western Docking System Going On 312,000-Dwt Tanker

The first ship to use EDO Western's new Model 482 NAVTRAK docking system will be one of the six 312,000-dwt tankers being built in Japan for National Bulk Carriers for long-term charter to Gulf Oil Corporation. This ship is scheduled for delivery in February. Another installation will be made on Nomikos (London) Ltd. new 250,000-dwt tanker, Alexander the Great, building in Japan and scheduled for delivery in 1970.

With the advent of the giant supertankers, berthing and mooring has become a problem. The gentlest of 'bumps' by a 300,000-ton ship, for example, can cause considerable damage.

The EDO Western Corporation, Salt Lake City, Utah, a subsidiary of the EDO Corporation of College Point, N.Y., has developed a computerized sonar docking system for use on large vessels. The digital-computation and sonar equipment serves as an instantaneous four-direction recorder of absolute over-the-bottom velocities. It measures the fore or aft speed, and also the bow and stern lateral movement of the ship either to port or starboard, displaying the results in feet per minute and at one-second intervals.

EDO Western's Model 482 NAVTRAK employs the so-called Doppler effect. The digital computation system of the NAVTRAK docking sonar translates the Doppler-effect information into bow and stern lateral velocities, either to port or starboard, and fore or aft velocity. It automatically adjusts for error that could occur because of variations in water temperature and salinity. The electronic equipment also compensates for ship motion (pitch, roll, yaw and heave), providing real over-the-bottom velocities with accuracy estimated at 99 percent.

The computer transmits the figures on fore or aft and bow and stern movement second by second to a primary display panel on the bridge and to optional remote panels in either or both wings of the ship.

Two transducers, which send and receive the sonar signals, are hull-mounted, one fore and the other aft. They can be installed in sea-chest assemblies to permit removal without the need for drydocking.

Operating conditions for the NAVTRAK docking equipment range from a minimum of one foot clearance beneath the hull of the ship to water depths in excess of 150 feet.

$2-Million NSSC Contract Awarded Fairbanks Morse

The Naval Ship Systems Command has awarded a negotiated fixed-price, multi-year contract worth $2,008,246 to Fairbanks Morse Inc. of Beloit, Wis. The contract (N00024-69-C-5259) is for diesel engines, associated special tools, and engineering services.

MULTI-PURPOSE CARRIER, the Frans Malmros, was constructed by Hitachi Zosen's Innoshima shipyard for Malmros Rederi A.B. The 870-foot, 108,000-dwt ship is designed to carry iron ore, coal, grain, etc., or liquid cargoes. The 19,000-shp steam-turbine propulsion plant gave the ship a trial speed of 16.6 knots. The ship is outfitted with a gymnasium and swimming pool for the crew. The Frans Malmros is classed by Norske Veritas.

Coughlin Named M&O Manager-Field Sales By Vickers Division

Eugene F. Coughlin

Sperry Rand Corporation's Vickers Division has announced the appointment of **Eugene F. Coughlin** to manager-field sales for its marine and ordnance division.

Mr. **Coughlin** has been with Vickers for eight years. Previous to his new position, he was market development manager for commercial marine and Navy deck machinery, marine and ordnance division, 1966-68. Earlier, he handled M&O sales application engineering assignments.

A former U.S. naval officer, Mr. **Coughlin** holds a B.S. degree in marine engineering from the Massachusetts Maritime Academy.

Equitable Delivers Tug Ranger To Temple

Equitable standard 95-foot tug goes to Great Lakes on first tow.

The new tug, Ranger, sailed from New Orleans recently, bound for Lake Erie via the East Coast and St. Lawrence Seaway. On stream behind the tug was a jack-up rig, the first towing assignment for the tug after its delivery by the builder Equitable Equipment Company, Inc., New Orleans. Owner of the Ranger is Temple Towing Company, a subsidiary of Zapata Off-Shore Company, Houston. After its maiden voyage, the Ranger entered regular towing service between Florida and various Gulf of Mexico ports.

The Ranger is an Equity standard 95-foot tug. Built for delivery from stock, the new tug was delivered to Temple Towing within 11 days after order, an end result of Equitable Equipment Company's program of building vessels for delivery from stock.

The tug was designed and built to American Bureau of Shipping class Maltese Cross Al Towing Service. It is powered by two Caterpillar D-398 Series B diesel engines that develop a continuous duty rating each of 850 hp at 1,225 rpm. The vessel is fitted with twin rudders of streamlined section with lower stocks of extra heavy pipe, and pintles of ABS certified steel with bronze sleeves and set in Goodrich Cutless rubber bearings. Caterpillar 3192 reverse-reduction gears have a 5.31:1 ratio.

Propulsion controls are Westinghouse Air Brake pneumatic, located at two stations in the pilothouse, one port and one starboard, and at an after station.

Auxiliary equipment aboard the Ranger includes two 40-kw Caterpillar D-320T diesel generator sets, two air compressors driven by 5-hp motors with manual and automatic control, two ABS certified air receivers, transfer pumps, bilge, ballast, fire and general service pumps, and a potable water pressure set.

Quarters for eight men are provided, arranged in three staterooms. The Ranger is centrally air conditioned for year-round comfort.

Deck equipment includes a Smatco towing winch powered with a General Motors 6V71 diesel engine equipped with an Allison torque converter which affords a line pull of 100,000 pounds at 20 fpm, 150,000 pounds at stall, 11,000 pounds at 105 fpm. Line speed light is 115 fpm.

Ingalls And Kockums Sign Technical Exchange Agreement

A technical exchange agreement has been signed by Ingalls Shipbuilding division of Litton Industries and Kockums Mekaniska Verstads, AB, a Swedish shipyard.

The latest experience and information on technological developments taking place at both yards will be made available to each other by the accord, advised **Lars-Erik Thunholm,** chairman of Kockums, and **Ellis B. Gardner,** senior vice-president of Litton and president of Ingalls.

Kockums, located at Malmo, Sweden, has entered into this unprecedented arrangement between shipbuilding firms of two countries in order to participate in technological advances to be incorporated into Ingall's new shipyard under construction in Pascagoula, Miss., Mr. **Thunholm** said.

The new Litton shipyard, scheduled to be in production by 1970, is the first of its kind in the United States. The $130-million plant will turn out ships on an assembly-line basis.

Kockums is one of the most modern and competitive shipyards in the world, Mr. **Gardner** said. He credited earlier exchanges with the Swedish shipyard management and personnel for many of the new ideas and concepts that are being incorporated into Litton's new shipyard.

"The agreement will make available exchanges of personnel for training and on-site inspections as well as the interchange of technical information," Mr. **Gardner** said.

"Under this program, each will be a laboratory for the other—Ingalls in the systems, techniques and equipment resulting from its intensive application of capital to shipbuilding, and Kockums in the utilization and development of the latest machinery and equipment for building ships," Mr. **Gardner** said.

All exchanges of information will be subject to security restrictions imposed by the governments of the United States and Sweden and to non-disclosure stipulations in contracts with third parties.

Kockums has completed more than 500 vessels totaling more than 5-million tons. A pioneer in welded construction techniques, the firm has evolved 20 standard designs covering various ship sizes and types, as well as highly specialized vessels. Among the highly specialized ships produced by Kockums are fast refrigerated vessels and the MS Paul Endacott, designed to carry 852,000 cubic feet of liquid petroleum gas at condensation temperature (–51°C.) and atmospheric pressure. Kockums is also a leading builder of diesel marine engines.

Kockums is currently building two vessels for carrying liquefied natural gas for Phillips-Marathon for service between Alaska and Japan. Ingalls recently has obtained the exclusive license for the United States from Worms Engineering of Paris for the same system of LNG carriage.

Ingalls, a producer of a wide variety of merchant and military ships, recently introduced utilization of lightweight, high-tensile steels throughout the hull and superstructure of merchant ships and is currently developing the design of a Litton standard line of tankers, bulk carriers and containerships. Designs of several sizes of tankers are already available and the first series is now under production. Ingalls is also the only private shipbuilder in the United States to have delivered every type of amphibious assault ship to the U.S. Navy.

Lakes And Rivers Section Schedules Winter Meeting For January 23 In Cleveland

The winter meeting of the Great Lakes and Great Rivers Section of The Society of Naval Architects and Marine Engineers will be held in Cleveland, Ohio, on Thursday, January 23, 1969. Headquarters for the meeting will be the Cleveland Sheraton Hotel. The meeting will begin with registration in the morning followed by a technical session at which the following papers will be presented:

"Lad—A New Family of Devices for the Avoidance of Collisions at Sea" by **Robert F. Riggs,** research engineer, Sperry Marine Systems Division, Sperry Rand Corporation and **John L. Horton,** assistant marine manager, Cleveland Cliffs Iron Company.

"Measures of Merit for Ship Design" by **Harry Benford,** chairman, Department of Naval Architecture and Marine Engineering, The University of Michigan.

"Three Dimensional Enlargement of Great Lakes Bulk Carriers" by **Trevor White,** director of engineering, Fraser Shipyards, Inc.

"Recreation Boating—Survey" by **David Beach,** manager of yacht engineering, Boating Industry Association.

"Trends in Yachting Brought About by New Manufacturing Materials and Techniques" by **Martin C. Kelsey Jr.,** president, Palmer Johnson Boats, Inc.

Lunch will be served after paper No. 3. At the conclusion of the technical session complimentary tickets to the Cleveland Boat Show will be available to all registrants. The meeting will close with an evening reception and dinner at the Cleveland Sheraton Hotel.

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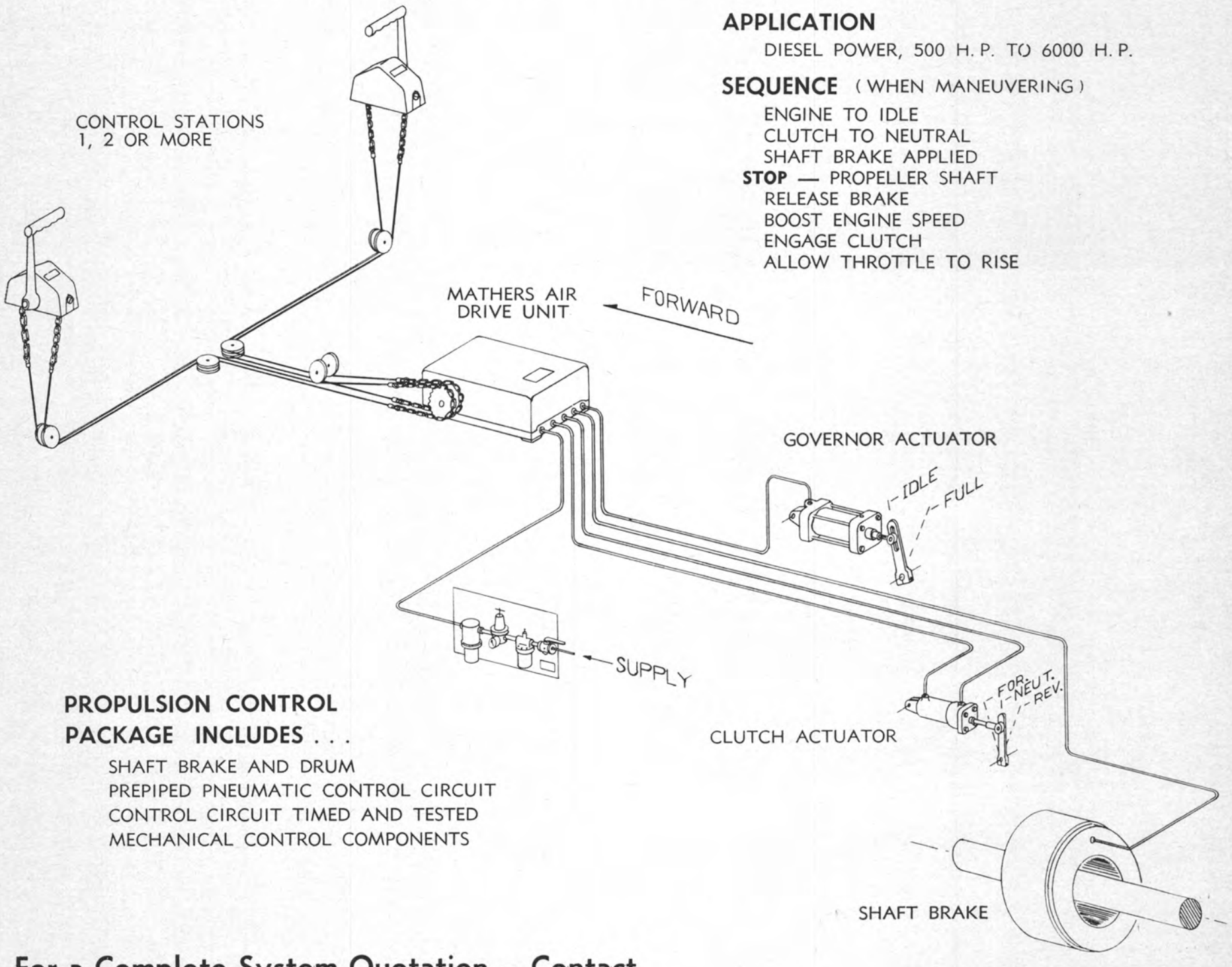

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Research Submarines—Sea Cliff and Turtle—Star In Double Launching At Electric Boat

A pair of deep-diving Navy research submarines, Sea Cliff, left, and Turtle (21 tons each), are lowered into the Thames River at Groton, Conn., following christening at the Electric Boat division of General Dynamics.

A pair of deep-diving research submarines, Sea Cliff and Turtle, were launched at Groton, Conn., on December 11, 1968, and the Navy's top scientist said they represent "a major step" in the Navy's quest for knowledge of the undersea environment which he called "largely an unexplored wilderness."

"The scientist has never been satisfied with remote operations. Just as he is compelled to visit the moon in person, he must also physically take himself to the uttermost depths of his world," Rear Adm. **Thomas B. Owen,** USN, chief of Naval Research, declared.

The two 21-ton submarines which can dive to depths of more than a mile were launched at the Electric Boat division of General Dynamics. They were launched into the Thames River by two giant gantry cranes. Both boats are 26 feet long and are equipped with emergency escape systems.

Admiral **Owen** said that the operating depth of the vessels "permits us to investigate 16 percent of the ocean floor, an area equivalent to the surface of the moon." At test depth, he declared, the personnel spheres of the identical subs must withstand 30,000 tons, the weight of five Fleet Ballistic Missile submarines.

Prior to the launchings, the research subs had carried the names Autec I and Autec II, but they were christened as Sea Cliff and Turtle to commemorate small U.S. communities which denote oceanographic life and terms.

Sea Cliff, named after a town in Nassau County on Long Island, N.Y., was sponsored by **Mrs. Owen,** wife of the principal speaker. The boat will be assigned for operations to the Woods Hole Oceanographic Institution, Woods Hole, Mass. Admiral **Owen** said that "it was very likely and entirely fitting" that Sea Cliff would aid in the recovery of Alvin, sunk last October in 4,500 feet of water south of Cape Cod.

Turtle, named after Turtle Town in Polk County, Tenn., was sponsored by **Mrs. Edward J. Fahy,** wife of Rear Adm. **Fahy,** commander of the Naval Ship Systems Command. Turtle will be assigned to the Navy's Atlantic Underwater Test and Evaluation Center (AUTEC) in the Bahamas following the completion of tests at sea next year.

Both new submarines are equipped with two elaborate manipulating arms designed to duplicate the motions of the human arm and wrist. They are capable of lifting 100 pounds at full reach.

Alice L. Moran Tows MV Valkenburg To N.Y. To Complete Voyage

The Alice L. Moran, a 9,600-hp tug of the Moran International Towing Corporation, safely delivered the MV Valkenburg to a Staten Island pier in December. The Valkenburg had been disabled 1,500 miles east of New York and was towed through gale conditions to her original destination.

For the Alice L. Moran, one of the world's most powerful tugs, this was one of many rescue assignments. She also has accomplished the towage of various marine equipment and floating oil rigs to locations throughout the world.

Boiler Operators Train On Bailey Simulators

Bailey marine boiler simulator has an instructor's console, background, and a trainee's console, which is a replica of a typical shipboard console.

Introduction of more sophisticated, wide range controls on Navy and merchant marine ships, coupled with lack of experienced personnel and high turnover, have created a great need for fast and effective training of boiler-control operators. Inadequately trained operators often misinterpret or fail to quickly recognize even simple casualties. Subsequent misdirected action can create major problems that affect overall operation of the ship, and on occasion have resulted in shutdown at sea. Not only must new personnel be trained, but operators from hand-fired ships slated to operate automatic equipment must also have their knowledge upgraded. However, training during actual operation is inadequate since simulated faults cannot be introduced into a boiler system without affecting operation.

To solve these problems of operator training, Bailey Meter Company, Wickliffe, Ohio, has developed a combustion and feedwater control simulator, consisting of computer equipment which simulates the operating characteristics of the ship's boiler during steady-state and maneuvering conditions; two-element steam pressure control, and a multi-element feedwater control. The simulator is pneumatically operated from a source of 30 psig air.

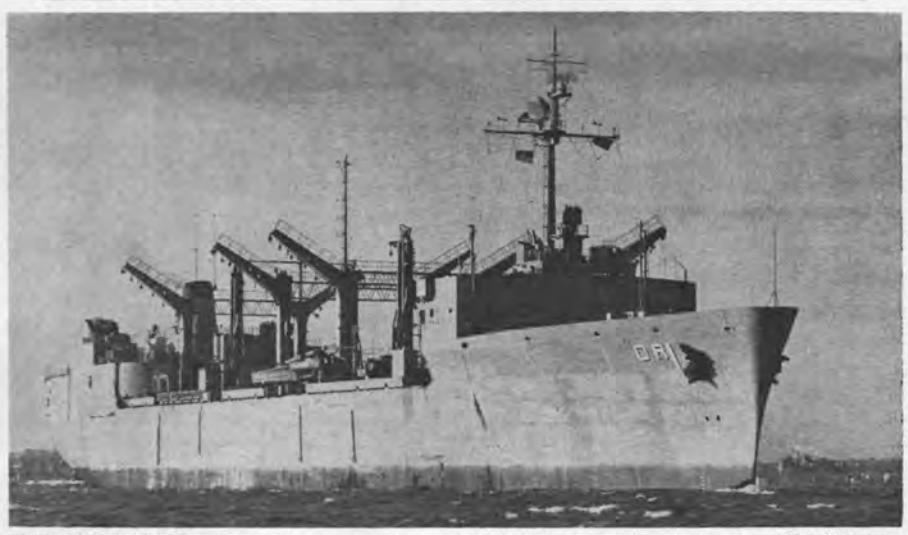
Two consoles are provided, one for the trainee and another for the instructor. The trainee's console duplicates the ship's console. It contains the combustion and feedwater control equipment, and is used for solving operating and casualty control problems. The instructor's console houses the boiler simulating equipment, and is used for varying the load and introducing various operating casualties.

Three simulators have been shipped to date; one each to Navy destroyer schools at San Diego and Newport, R.I., and the third to the Maritime Academy at Buzzards Bay, Mass. A fourth simulator is scheduled for installation aboard the carrier USS Ranger, which will enable the crew to maintain a continuous onboard training program.

A subsidiary of The Babcock & Wilcox Company since 1925, Bailey Meter Company is a leading manufacturer of instrumentation, control computers, and systems for process and powerplant automation.

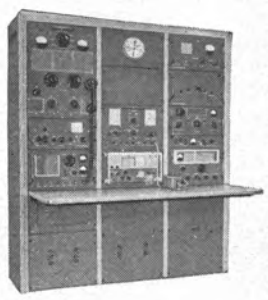
Raytheon Receives Navy Sonar Order

Raytheon Co. has announced that its submarine signal division has been awarded a $3,235,110 contract by the United States Navy's Naval Ship Systems Command for the calibration and restoration of sonar equipment on Navy ships. The work will be done at the company's Portsmouth, R.I., plant.



NAVY'S NEWEST—First of a new class of U.S. Navy supply ships, the USS Wichita (AOR-1) heads to sea from the Quincy, Mass., shipyard of General Dynamics for her maiden trials. The 659-foot-long vessel, displacing 37,360 tons when fully loaded, is designed to replenish operating forces at sea with petroleum products, refrigerated and dry provisions, consumables and ammunition, including missiles. Named after Wichita, Kansas, the ship was launched March 16, 1968. She is the first of six ships of her class to be built by the Quincy division of General Dynamics.

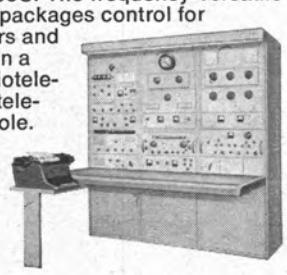
Type CRM-N2C-30. 10 cm. big-ship radar that scans a 40-mile area with extreme clarity. High definition 16-inch PPI display. Provides both true and relative display flexibility for all your plotting requirements. (Another model, type CRM-N1C-75, does the same quality job in the 3.2 cm. band.)



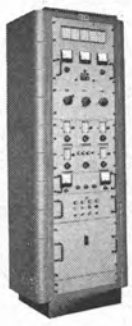
Type 7U/SSB. Single sideband radiotelegraph-radiotelephone console for "Flags of Convenience" ships. Provides 750-watt antenna power output. Contains 3 receivers and 2 transmitters.

Type CRM-N7A-40. The radar that's small enough for a tugboat, but powerful enough to reach 40 miles. Transistorized for compactness and low power consumption. 10-inch display. AFC. 40 KW minimum peak power output. Dual pulse operation and 6-foot slotted waveguide antenna sharpen the picture. 7 range scales with 13-yard range resolution.

Type CRM-C8C. The frequency-versatile system that packages control for 3 transmitters and 3 receivers in a modern radiotelegraph-radiotelephone console. Gives you 500-watt transmitting power.



Type ET-8063-A. The powerful one kilowatt single sideband transmitter that turns an ocean liner into a worldwide 50-frequency telephone and telegraph center. Its 5-band coverage ranges from 2 to 30 MHz. Versatile enough for suppressed carrier, reduced carrier, full carrier or CW carrier operations. Drawer-type construction makes all components easy to get at.



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Tatco Delivers Tuna Clipper First Of New 83-Foot Class

First tuna clipper of new class designed by **Elmer Olson** and built by Tatco Shipbuilding performed well on trials.

Tatco Shipbuilding Corporation, San Diego, Calif., has delivered the first vessel in an entirely new class of 83-foot steel tuna clippers incorporating a unique hull design and interior arrangement. The new tuna clipper was christened the Tropicana in ceremonies at Tatco's San Diego yards last October. Sea trials for the $240,000 ship were conducted early in December before the Tropicana was turned over to her new owner, **Moises Llanes,** a veteran of 20 years at sea.

The Tropicana-class vessels are of welded steel construction and feature a new bulbous-bow design constructed especially for tuna fishing off the coasts of North and South America. Naval architect **Elmer Olson** of Chula Vista, formerly the owner of Olson Marine Construction in Chicago, adapted the hull concept from the highly successful bow bulges incorporated in the hull design of large tankers for stability and added speed.

The December sea trials of the Tropicana were more than successful. The performance characteristics of the new hull design were termed outstanding by owner and builder alike. In a fully-loaded condition the Tropicana cruised at 10½ knots with her engines turning less than their design speed of 1,800 rpm. Excellent handling under all speed and turning tests further proved the soundness of the new hull design, which minimizes the pitch, roll and yaw frequently found in fishing vessels of this size.

The Tropicana is 83 feet long with a maximum beam of 24 feet and a draft of 11 feet. Displacement is 242 tons. The boat has a total capacity of 126 tons of frozen fish—106 tons in its eight fish wells and 20 tons in the bait tank aft.

Main propulsion for the Tropicana is a single Caterpillar D-343T turbocharged diesel engine rated at 300 hp at 1,800 rpm. The engine is equipped for keel-cooling and has separately cooled after-coolers capable of adding 30 hp to the rating of the engine. The main engine is direct reversing and uses a 6:1 reduction gear driving a bronze five-bladed 62-inch Coolidge propeller with a 56-inch pitch.

Auxiliary power for all the boat's internal systems is generated by two Caterpillar Model D-330 diesel engines driving 60-kw, 3-phase, 60-cycle a-c generators built by the Kato Engineering Company. The ship has both 110-volt and 220-volt a-c electrical systems.

With the exception of hand flashlights, the Tropicana uses no batteries. All engine starting is by air stored in two large air receivers. The ship's two air compressors are Quincy Model 214, 2-cycle rated at 17.6 cfm at 125 psi.

The wheelhouse on the upper deck is equipped with radar, automatic direction-finding equipment, Sperry autopilot, ship-to-shore radiotelephone with single sideband, a citizens-band radio and loran navigational equipment. Steering is hydraulic with an integrated autopilot.

Crew's quarters are located on the main deck along with the galley and crew's recreation area. Three staterooms provide accommorations for the crew of ten. All living space is air conditioned.

Richard Tatus, Tatco's vice-president and general manager stated that Tatco is negotiating with several companies for the construction of additional vessels in the Tropicana class, and there is increasing interest in the Tatco 57, a 57-foot steel vessel which, with minor modifications can be built as a trawler, bait boat, dragger or gill netter.

"The first of these smaller boats is now under construction and will be ready for delivery in June 1969," Mr. **Tatus** said.

Order For Sea Barge Clipper Turbines And Gears Given GE

An order for propulsion equipment for the world's largest cargo transports has been awarded to the General Electric Company.

H. W. Ogilvie, manager of marketing for GE's Marine Turbine and Gear Department, West Lynn, Mass., said the company has received an order of nearly $5-million from the Quincy Division of General Dynamics. The propulsion equipment is for three sea barge clippers, which General Dynamics will build for Lykes Bros. Steamship Co., Inc., New Orleans. These ships represent a new concept of ocean cargo transport.

The geared steam turbine powerplant of 36,000 hp, which GE will build for each ship, will also be the largest installed in any cargo vessel. The ships will be capable of speeds of 20 knots or better.

To start service in 1971, the sea barge clippers are 875 feet long and 106 feet wide. They are to be built in the Quincy, Mass., yards of the General Dynamics Corp. at a cost of $32,629,333 each.

The sea barge clippers provide a new concept of cargo handling using a 2,000-ton capacity submersible elevator at the stern, capable of lifting two barges, each measuring 97½ feet long and 35 feet wide. The ships can also handle roll-on/roll-off vehicles as well as containers of standard size.

General Electric's MST-14 non-reheat type propulsion equipment will power the ships. Some 40 of these units are already being supplied by the company.

MarAd Offers Savannah For Long-Term Charter

Proposals for long-term operation of the nuclear ship Savannah have been requested from U.S.-flag operators by the Maritime Administration, U.S. Department of Commerce. The proposals may be for a bareboat charter agreement starting about July 1, 1969, and extending for a period between 5 and 10 years with or without renewal options, or for outright transfer of title to the ship, or for some other satisfactory arrangement.

"The Maritime Administration believes that the potential of nuclear propulsion for merchant vessels may be growing," Acting Maritime Administrator **J. W. Gulick** said. "The higher power requirements and higher vessel utilization of larger and faster surface vessels will give nuclear power an advantage in fuel economy. The Martime Administration has been promoting the development of nuclear-powered merchant ships since 1956 and has supported research along this line as well as building and operating the Savannah."

Estimated cost to the government of operating the Savannah in its present commercial service under First Atomic Ship Transport Inc., a subsidiary of American Export Isbrandtsen Lines, is about $1,800,000 a year, plus $1,200,000 for operating support, and $300,000 for crew training. The present agreement with FAST extends to June 30, 1969. The government desires to reduce or eliminate the need for this support by long-term charter or transfer of the ship to an operator who could make the Savannah a successful business venture.

It is expected that revenues could be increased and operating costs reduced, through modifications such as installation of container capability; insertion of a midbody to increase available cubic; expansion of mechanization, automation, and centralization of machinery control to provide some reduction in required manning levels; modification of present hold arrangements and cargo handling equipment; or modification for non-cargo carrying operation such as a Trade Fair Ship.

Since the ship was recently refueled, it has nuclear propulsion energy for between 5 and 6 years, which could be made available to the operator.

The prospective operator would be required to obtain licensing by the U.S. Atomic Energy Commission. The proposed use of government nuclear training and servicing facilities are to be included in the proposal. Government technical assistance could be made available in these areas, and, if required, in opening new ports. The government will provide Third Party Nuclear Liability insurance, together with self-insurance of the vessel's hull and machinery if the vessel is chartered. Federal Ship Mortgage Insurance could be made available for hull and machinery modifications if the title is transferred.

The proposals are to be submitted by March 14, 1969.

Peterson Submits Low Bid For Two Steel Trawlers

Bids were opened by the Maritime Administration, Washington, D.C., for the construction of one or two 86-foot steel trawlers. The apparent low bidder is Peterson Boat Building Co. of Tacoma, Wash., with a cost of $598,392 for each.

The trawlers are to be built for Ann-B, Inc., and Ildhuso Fisheries, Inc.

Gamage Low Bidder For Wooden Scalloper

With a price of $379,381, Harvey Gamage Shipbuilder, Inc., South Bristol, Maine, was the lowest bidder for the construction of a 94-foot 4½-inch wooden scalloper for Victoria Fishing Corp., New Bedford, Mass.

Bids were received by MarAd on October 1, and Harvey Gamage was determined the low bidder on November 26. A subsidy of 36.7 percent will be paid, based on Norway.

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Tuna Seiners Cheryl Marie And Kerri M Launched A Week Apart By Tacoma Boat

Kerri M, sistership to the Cheryl Marie, rides high in the water after launching.

Two launchings, only a week apart, at Tacoma Boatbuilding Co., Inc., Tacoma, Wash., have added the 176-foot tuna seiners Cheryl Marie and Kerri M to the expanding U.S. fishing fleet.

The Cheryl Marie was the second and the Kerri M the third of a series of three seiners being constructed at Tacoma Boat. The first vessel, the Pacific Tradewinds, is already working in the southern tuna fishing grounds. All three seiners were constructed under a federal government subsidy program by which the U.S. pays 48 percent of the approximate $1.8-million cost of each vessel.

The Cheryl Marie was sponsored by **Mrs. John Silveira,** wife of the captain-managing owner of the seiner. The Kerri M was christened by **Miss Kerri Medina,** the 10-year-old daughter of its captain-managing owner.

While the Kerri M was the third to be launched, it will be delivered prior to Cheryl Marie. The latter seiner will be delivered in February.

The designer of the three sisterships was Rados & Sons Engineering Company of San Pedro, Calif.

Cheryl Marie launching party, left to right: **Miss Cheryl Silveira; Gary Silveira;** Father **Gerard Morin; Miss Denise Marie Silveira; Mrs. John Silveira,** sponsor; **John Silveira,** skipper-owner; **John Silveira Jr.; Mrs. Joe Silveira,** attendant; **Joe Silveira Jr.; Mrs. Joe Silveira Sr.,** and **Joe Silveira Sr.**

Launching party for Kerri M, left to right: **Robert Moore Jr.,** vice-president Tacoma Boat; **Edward Madruga,** partner in boat; **Mrs. Madruga** with **Miss Judy Medina** in front of her; Father **Gerard Morin; Miss Medina,** sponsor; **Harold Medina,** ship's captain-managing owner, and **Robert Rados,** designer of the vessel.

Nuclear Ship Program And Shipyard Support Announced By Germany

A major role is foreseen for the A. G. "Weser" shipyards in the construction of West Germany's first nuclear supership. The announcement came as Bonn's federal minister for scientific research, Dr. **Gerhard Stoltenberg,** revealed plans for his government's third nuclear program for the 1968-1972 period during ceremonies marking the 125th anniversary of A. G. "Weser" in the Bremer Stadthalle.

Well-known for its success in the construction of superships, A. G. "Weser" is among those leading West German yards currently considering installation of a reactor in a large vessel. The supership's construction is planned for the time when nuclear marine propulsion is considered commercially feasible for Germany's merchant fleet, and considerable experience has been gained from the operation of the atomic-powered cargo ship Otto Hahn. The immediate aim of the project will be to demonstrate the reliability and economy of nuclear propulsion.

Dr. **Stoltenberg** pointed out that the Bonn government would continue its support of German shipyards in regard to the adaptation of customary financial terms in export shipbuilding. "For a period of six years, the federal government has furnished loans with low interest rates in the amount of $217.5-million from European Recovery Program funds, as well as $55-million extra interest allowances from the federal budget. Ship exports encouraged with these resources will reach a total of $1,575-million, including deliveries to 1972."

The Scientific Research Minister added that $17.5-million in Adaptability Aid from the federal government for progressive technical development of German shipyards would contribute to further cooperation within the German shipbuilding industry.

Technical Product Data With New Color Guide In Woolsey Brochure

A new color guide containing technical product data on the full line of Woolsey heavy-duty marine coatings has been published by Woolsey Marine Industries, Inc.

The product information section condenses the pertinent facts required by users of marine coatings into one easy-to-read chart that covers such characteristics as drying time, film thickness per coat, thinners, etc. Some 43 actual color chips are provided showing the available selection for topsides, superstructures, engine rooms, boottops and bottoms.

The new guide also points out Woolsey's association with the Pan American World Paints, a group of manufacturers whose purpose is to assure the availability of uniform equal quality paints throughout the world. Concurrent with the issuance of this new literature is a complete revised series of technical product bulletins which are available on request.

The new color guide can be obtained by writing to: Woolsey Marine Industries, Inc., 201 East 42nd Street, New York, N.Y. 10017.

Zapata Buys Drill Rig From Loffland Bros.

Zapata Norness, Inc., Houston, Texas, announced that it has executed a purchase agreement with Loffland Brothers Co., Tulsa, Okla., to acquire the Loffland deep water LeTourneau jackup unit, Ocean Master I, for a price between $6- and $7-million.

This unit, presently working in the Gulf of Mexico, is capable of drilling in water depths to 300 feet.

The purchase becomes effective at the conclusion of the unit's current contract, anticipated to be about February 1, 1969.

Ocean Master I is almost identical to the Zapata mobile jackup units Chaparral, Heron and Endeavour, and is about three years old.

Crumrine To Head Container Leasing Div. Formed By Pullman

Carl T. Crumrine

Pullman Incorporated, Chicago, Ill., has announced that its Trailmobile Division, a leading builder of truck trailers and containers, has entered the leasing field. To be known as T/M Leasing, the organization will be headquartered in Chicago.

W. Irving Osborne Jr., chairman and president of Pullman Incorporated, announced that T/M Leasing will be headed by **Carl T. Crumrine** as vice-president and general manager. Mr. **Crumrine** came to Trailmobile in August, 1967, as vice-president, marketing, after resigning as president of Berman Leasing.

"The creation of T/M Leasing is a logical forward step for the world's largest producer of commercial transportation equipment," Mr. **Osborne** said. "Henceforth our transportation equipment divisions will be offering an across-the-board service that encompasses selling, leasing and rental of rolling stock that moves not only on the rails, but on highway, sea and air."

Initial plans call for the establishment early in 1969 of T/M leasing and rental facilities in the Midwest, East and South. The company will offer customers long-term finance leases, maintenance leases and short-term rentals.

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to the National Boat Show's
great Side Show....

The Elac Exhibit

Just a stone's throw away from the Coliseum, at the Holiday Inn, you can see the world-renowned Elac equipment. On display will be the recorders, scopes and various other Elac instruments which have meant so much to so many ships.

In addition, we'll have advance information for you about the very latest Elac developments, such as: the Dual Frequency Sounder for deep and extremely shallow water; the Shallow Water Sounder; Scope Readout Sounders and the Pier Ranging System for docking huge ships easier and safer. So come see us and leave informed and refreshed.

Place: Holiday Inn, 440 West 57 Street, New York Marco Polo Room
Dates: Wednesday, January 22 through Saturday, January 25 inclusive.

Brown & Ross ELAC

U.S. Representatives of Elac
770 Shore Walk, Lindenhurst, New York 11757

A New King On The Pacific Coast

Island King, latest addition to Island Tug & Barge fleet, averaged over 14 knots on trials.

On the Pacific Coast, Island Tug & Barge Ltd., Vancouver, B.C., continues to make headway in a $4,000,000 program of new construction initiated two years ago. The company's most recent addition to the fleet, Island King, incorporates the latest in technical advances—a statement which seems to hold true whenever a new tug is launched these days. The fact is that the Island King represents a further advance in tug construction.

As with all of Island's recent tugs, the 3,600-hp King is the result of several years' of planning and testing. A model of her hull underwent tank testing in the Netherlands Ship Model Basin at Wageningen, a procedure which is becoming standard and essential in the tugboat business as in other naval construction.

The combination of a 20-cylinder, GM Model 20-645 E-5 engine with a Kort Nozzle system utilizing a fixed propeller 10 feet 6 inches in diameter puts the King in the top class of powerful tugboats operating on the West Coast. The tug has a maximum bollard pull of 100,000 pounds.

The Island King has an overall length of 131 feet 9 inches, a molded breadth of 32 feet, a molded depth of 17 feet 7 inches, and displaces 850 tons.

The tug was designed by Robert Allan Ltd., Vancouver naval architects. Builders were Star Shipyard (Mercers) Ltd. She will be used primarily for towing the largest of the offshore barges operating along the Pacific Coast, but has the power and the equipment to handle units in the 20,000-ton class. Deepsea salvage will undoubtedly be included among her duties.

An inspection of the Island King carries the mind beyond impersonal statistics. Her overall appearance is sleek, solid and compact, with the low silhouette typical of the latest additions to Island's fleet. A survey of interior fittings and accommodation reveals an unusual degree of comfort and good planning. There are individual cabins for crew members, all located above the main deck, all panelled in wood grain plastic laminate and fitted with deep, floor-to-ceiling lockers. Master and mate occupy their own separate quarters above the fo'c'sle deck, and the chief engineer's cabin is at the engine room entrance on the main deck, starboard side.

The spacious, all-electric galley ushers in a new era for tugboat cooks long resigned to preparing full course meals in cramped quarters. Adjoining the galley is a combination mess and recreation lounge trimmed in oak wood grain and brightened with chairs and seats upholstered in blue leatherette. A concealed stereo unit pipes taped music into this area on off-duty hours. This area as well as crew's quarters, bridge, and engine room control booth are air conditioned.

The engine room houses one of the first marine applications of the 20-cylinder version of the popular GM 645 series. This is a turbocharged version rated at 3,600 bhp at 900 rpm. Speed and bollard pull trials performed last November produced a running speed of 14.5 knots and a bollard pull of 100,000 pounds—remarkably close to the performance predicted by the designer.

The King's deck machinery centers on a single drum, hydraulically powered winch carrying 3,000 feet of 2⅛-inch diameter steel-cored cable. All deck machinery including the anchor windlass and the spare towline reel located in the aft hold is driven by high pressure hydraulics powered by a Detroit Model 6/71 diesel engine.

Duplicate steering and engine controls are located in a plexiglass sheltered console at the aft end of the fo'c'sle deck. In this same console are controls governing the brake, clutch and speed levers for the towing winch. From this position as well as from the wheelhouse the steering Kort Nozzle can be swung from hardover to hardover in 15 seconds.

Steering controls include wheel steering by telemotor from the wheelhouse center, and non-follow up electric steering levers at other stations. A Sperry gyro-controlled autopilot system takes over from the helmsman whenever required.


Spacious galley, unique among tugs, provides ample area for the cook to prepare meals without being disturbed.

In the engine room, main and auxiliary machinery installation and alarm panels and the main switchboard are enclosed in a sound-insulated control booth at the forward, starboard end of the machinery space.

The tug has a seawater evaporator producing 20 gallons of fresh water an hour, utilizing the heat from the water jacket of the main engine's fresh-water cooling system.

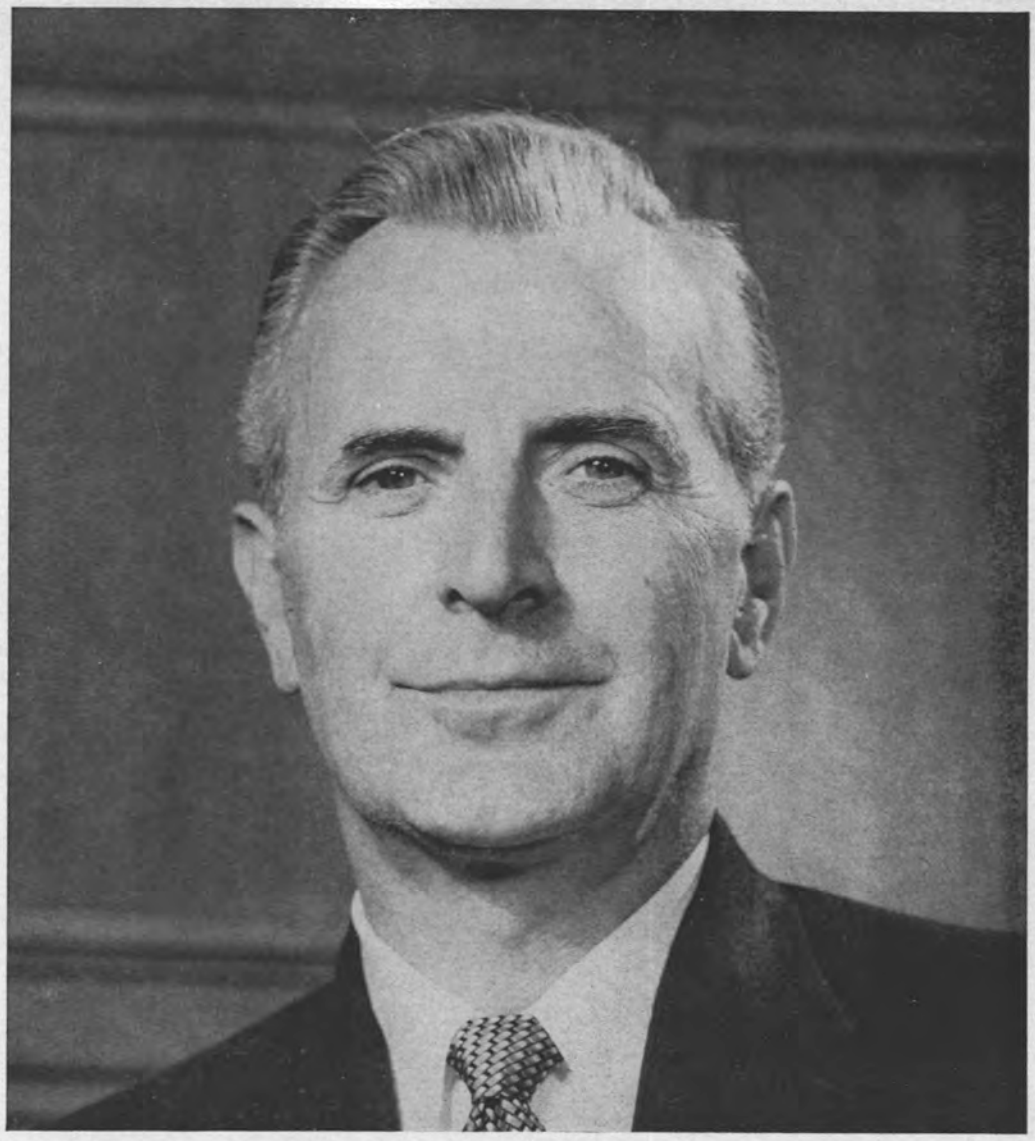
The Island King has been designed to go 50 days without refueling. Her size, power and complete range of navigation and control equipment enable her to go anywhere on the high seas, although her main duties will employ her along the Pacific Coast. At present she is dividing her time between the Island Yarder, the company's 11,000-ton self-loading, self-dumping log barge, and the equally large lime-rock barges, Island Importer and Island Exporter.

Island Tug's construction program does not stop with Island King. On the ways at the moment is another tug as yet unnamed. Her design will incorporate technical changes unique for her class. Island King, however, will be a true monarch in Island Tug's fleet for years to come.


Island King's wheelhouse, fitted with latest in navigational and control instrumentation, including automatic pilot.


Engine controls and gauges are centralized in a soundproofed room at the forward end of the machinery space.


Island King's messroom and lounge facilities. Concealed stereo unit pipes taped music into this area.



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Raytheon Appoints Hartnett Manager Marketing Services

John J. Hartnett

John J. Hartnett has been named manager of marketing services for Raytheon Company's Marine Products Operation, South San Francisco, Calif.

Mr. **Hartnett** will direct advertising and sales promotion activities for the operation whose products include a wide range of marine electronic equipment for navigation, communication and safety.

He has served for the past three years as sales engineer for the operation's Northern California region. He joined Raytheon in 1963 and served initially in customer service. Prior to that he had been with Norwich Union Insurance Company. Mr. **Hartnett** attended Golden Gate College.

He is a member of the Society of Port Engineers and the Propeller Club.

Drew Appoints Mauter Regional Manager For Marine Division

David J. Mauter has been named as regional manager for the Marine Division of the Drew Chemical Corporation. Based in New York, Mr. **Mauter,** as part of Drew's reorganization of the Marine Division, will have the responsibility of subdividing the United States into territories and designating area managers for these subdivisions. He will also supervise the various sales activities at the national account level in the New York area.

Mr. **Mauter** joined Drew as a sales engineer and was assigned to Norfolk, Va. He was later transferred to Drew's New York office where he served as staff engineer and area manager. He is a graduate of the U.S. Merchant Marine Academy at Kings Point, N.Y.

Wesmar Appoints Marketing Director For Marine Systems

Dick A. Molenaar has joined Western Marine Electronics, Inc. (Wesmar) of Seattle, Wash., as marketing director, marine systems. In this capacity he will direct the sale of the company's Sonovision line in 22 countries.

Mr. **Molenaar** comes to Wesmar with a diversified background in the marine industry. He was previously sales manager for Progress Electronics Co. of Oregon, a firm engaged in electronics sales and service for defense, industrial, and marine applications. Prior to that he was in the Dutch and Swedish Merchant Marine—sailing as chief purser for six years.

Mr. **Molenaar** has a degree in business administration from The Hague, Holland, and speaks six languages.

EG&G Side Scan Sonar To Be Used On PX-15 To Map Ocean Bottom

The Geodyne Division of EG&G International, Waltham, Mass., has announced that its new Mark I (S) side scan sonar will be installed by the U.S. Naval Oceanographic Office on the PX-15 deep-sea submersible before it begins a 30-day undersea cruise in the Gulf Stream next June.

Grumman Aircraft Engineering Corporation's 48-foot PX-15, recently named the Ben Franklin, will follow the path of the Gulf Stream from West Palm Beach, Fla., to a point off northern New England, drifting with the current at a depth of 300 to 1,000 feet. The Mark I (S) side scan sonar will be used during the Ben Franklin's deep dives to the 1,000-2,000-foot levels. The side scan will produce a permanent, continuous map of the deep ocean floor and will locate and outline sunken objects and terrain at 1,000-foot ranges on both sides of the sub.

The Mark I (S) acoustic transducer will be mounted externally on a boom attached to the bow. The transducer emits high frequency sound pulses in a fan-shaped beam and returns its findings to a graphic recorder located inside the sub. The graphic recorder provides a continuous 'map' of the ocean bottom on strip chart paper, resulting in a broad detailed picture, somewhat resembling a large-scale aerial photograph.

Mark I was similarly mounted on the 51-foot submersible Aluminaut during ten dives off Vieques Island near Puerto Rico in August of this year.

The first submersible to test the Mark I (S), in July 1968, was Lockheed Missile and Space Company's 40-foot Deep Quest. Deep Quest cruised for 3½ hours at depths up to 520 feet, seven miles off the coast of San Diego.

The Mark I (S) is one of a family of EG&G side scan sonars. Other designs include the Mark I and Mark I (DT), systems which are towed from surface vessels to produce sea floor maps in harbors, as well as continental shelf and slope regions.

For further information, contact EG&G International, Geodyne Division, 151 Bear Hill Road, Waltham, Mass. 02154.

Fifth Containerliner In U.S. Lines' Program Launched By Sun Ship

The American Lark, the fifth new full containerliner in the United States Lines' current, $105,000,000 new ship construction program, was launched on December 20, 1968 in the yard of the Sun Shipbuilding and Dry Dock Company, Chester, Pa.

The 32,000-ton container carrier was christened with the traditional bottle of champagne and sent down the ways into the Delaware River by Mrs. **William S. Vaughan,** wife of the chairman of the board of the Eastman Kodak Company. Seventy-five percent completed at time of launching, the American Lark will be ready for her maiden voyage in mid-February.

The new vessel is one of six, which are the largest and fastest full containerliners ever built or ordered in this country or abroad. She is 700 feet 6 inches in length and 90 feet in breadth and has a cargo capacity of 1,335,000 cubic feet. Her streamlined hull, divided into eleven holds has an underdeck capacity of 658 twenty-foot containers which are carried in cellular stalls and tiered six high.

Strongly reinforced hatch covers permit the stacking of another 552 containers three high and ten rows across on deck for a full-ship total of 1,210 twenty-foot containers. A mix of 40-foot and 20-foot containers can also be carried. Recognizing that the movement of perishable cargoes is growing and will continue to expand with fast cargo handling and high-speed ocean crossings, the new ship will have plug-in deck facilities for 90 refrigerated containers.

The American Lark will be followed down the ways at Sun by the American Leader in February, completing a six-ship, full containerliner program.

Reflecting the company's complete commitment to the container concept of shipping, the United States Lines has applied to the Maritime Administration for construction differential subsidy for the building of six more full containerliners, similar to the American Lark. In addition, the company has applied for aid in the reconstruction of its eight Mariner-class cargoliners as full containerliners.

Grace Line Promotes Smith And Lesica

Grace Line has announced two promotions in its labor relations staff: **Ernest E. Smith** has been named assistant to the vice-president, industrial relations, and **Charles J. Lesica** will succeed him as manager, marine labor relations.

Mr. **Smith,** a Rutgers University graduate, joined Grace Line in 1943 and began his career sailing as a wartime purser. In 1965 after assignments in the purchasing department where he was in charge of commissary maintenance and repair, he was transferred to the marine labor relations department to which he was appointed manager in 1967.

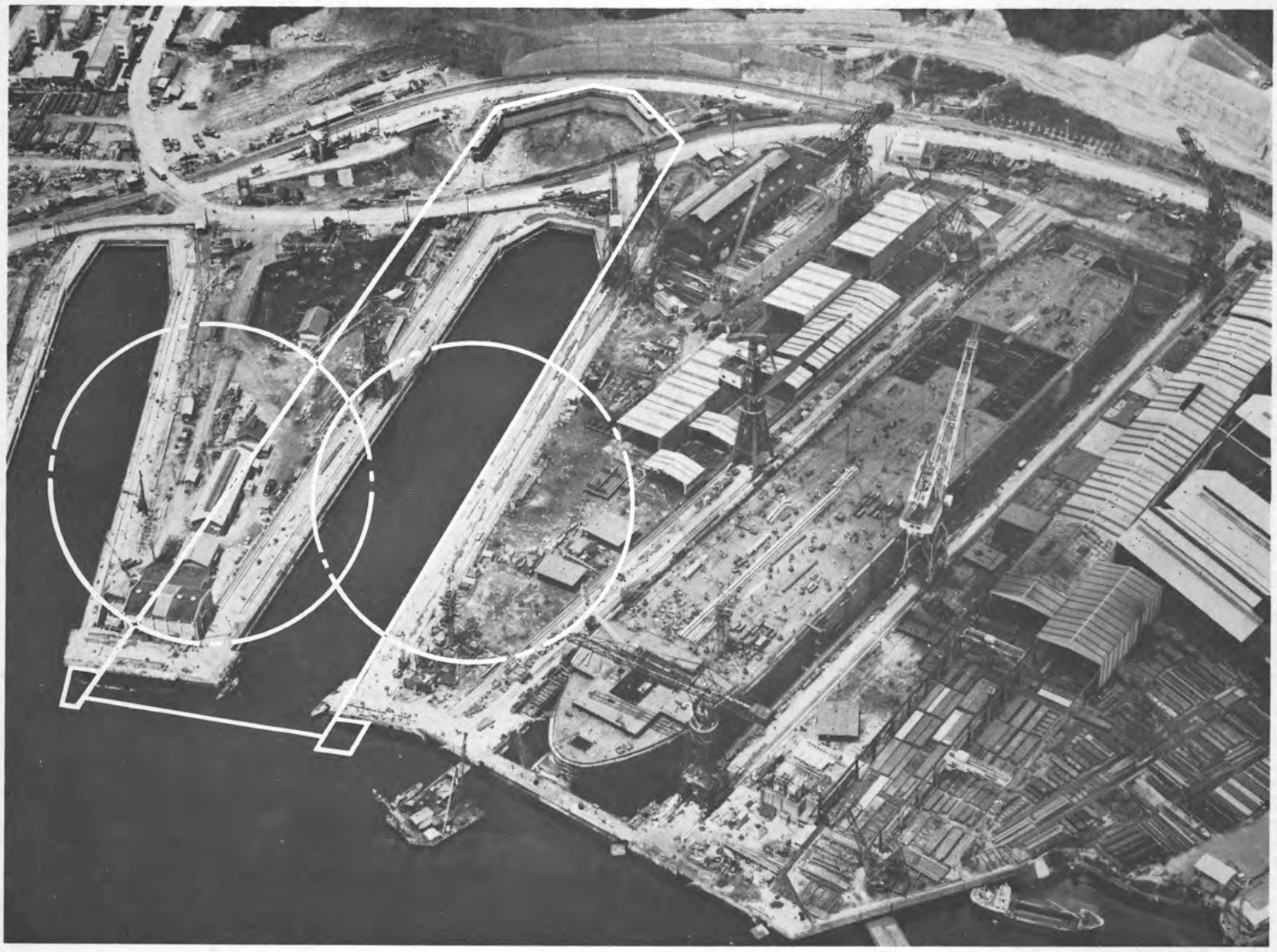
Mr. **Lesica** came to Grace Line in 1950 following service in the U.S. Army and three years in a partnership enterprise. He was assigned to the marine labor relations department in 1966 after holding positions in the port purser's department, and as stevedoring cost analyst, warehouse manager, and finally, stevedore for the Santa Rosa-Santa Paula operation. He was named assistant manager of the marine labor relations department in March 1968.

Wallace Unit Speeds Cutting Stainless Bars

Cutting 3¾-inch-diameter 17-4-ph forging grade stainless bars into short pieces can be time consuming. However, the approximately 11-square-inch cut was made time after time in an average of 52 seconds.

This operation was performed by a Wallace 'Oscila-Modular' cutting unit series No. 1520. This unit can use either abrasive blades or metal wheels ranging in size from 18 inches to 34 inches in diameter. The oscillator has a basic 4-inch traverse, with the power feed being varied to suit the job. Cuts with a surface finish of 25 micro-inches or less can be readily obtained.

For information on this unit, contact Wallace Supplies Mfg. Co., 1304 W. Diversey Parkway, Chicago, Ill. 60614.



Vessels and docks at SASEBO keep abreast of the times

The mammoth tanker era is here! No questions about it. Constantly setting and keeping pace is Sasebo Heavy Industries Co., Ltd. We have fourteen 210,000 DWT mammoth tankers on order. And construction is underway at our modern Sasebo Shipyard in the No. 4 building dock. Of this series the first mammoth tanker has already entered service.

Some time back we launched the world's first 130,000 DWT mammoth tanker and the whole world looked with awe. Today this feat is but another page of our progressive history. But since those days we've made unmistakable headway. In ship construction as well as dock facilities. Expansion work is progressing right on schedule at our No. 3 repair dock. When completed it will surpass a capacity of 300,000 DWT.

No questions about it. With facilities as unique as any in the world it's no wonder that Sasebo builds mammoth tankers bigger and better than ever.

Right: No. 4 building dock.
Building 14 consecutive 210,000 DWT mammoth tankers.
Left: No. 3 repair dock.
Capacity will be expanded to the size outlined.
Completed dimensions 370m x 70m.

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IBES 'Seeing Eye'— A New Tool To Reduce Engineering Costs

A unique, new tool that solves many of the complexities of modern engineering is now being used to advantage by industry. It is the IBES 'Seeing Eye,' product of IBES, Inc. (International Basic Engineering Systems), Seattle, Wash.

"There's nothing like it anywhere in the world," states **James E. Joyce,** vice-president and general manager of IBES. "The IBES 'Seeing Eye' is not a memory device but an output function. It cuts through manufacturing costs.

"It draws. It tapes. It scales. It records. It inspects. It compares. It's an entirely new concept in data accumulation and conversion."

The unique IBES 'Seeing Eye' is a systems tool comprised of interconnected units that provide advanced state electro-mechanical data. It substantially reduces the lead time from design to production.

As a professor from a leading western university says: "It literally extends the hands of a highly skilled artisan so that duplicates of his original ideas can be mass produced."

The IBES 'Seeing Eye' can: produce 3-dimensional illustrations in any rotated or tilted position; compare mating surfaces of two parts for accurate fit; provide data plane and point information in three axes through punched tape and print-out; convert models into accurate working lines; create plan, top and end views of section drawings, lofting drawings and finished engineering drawings . . . in scale; provide production drawings from free-formed models; template lines for tracer operations, and many other operations.

Mr. **Joyce** said, "A man can become an expert operator of the IBES 'Seeing Eye' in two weeks."

Markets for the use of the remarkable new tool include automotive, aviation, shipbuilding, general data processing, electronics, quality control. Management, engineers, draftsmen, toolmakers, architects, mathematicians, programmers, all gain a competitive edge from savings in time, money and labor.

Some of the current users of this system are: Boeing Corporation, Bremerton Naval Shipyard, Marine Iron Works and Western Gear Corporation.

Complete information on the system can be obtained from: **J. E. Joyce,** vice-president and general manager, International Basic Engineering Systems, Inc., 1915 21st Avenue South, Seattle, Wash. 98144.

Epoxy-Based Cement Offered By Engelhard Resists High Currents

Recently concluded tests conducted by Engelhard Minerals & Chemicals Corporation reveal that a newly developed epoxy-based cement has superior qualities over any other formulation when used as a dielectric shield for marine impressed current cathodic protection anodes. The name Capastic (Registered), will be retained from the previous formulation.

Test results show the new Capastic to be extremely tough and not subject to damage even by excessively high current in the vicinity of an anode. Easy application in hot or cold weather, and unlimited shelf life, are two other positive results determined from the evaluation tests.

It has further proved to be an excellent repair material as a patching cement for ship hulls, rudders, propellers, and other metallic surfaces and equally applicable to wood or plastic repairs.

W. L. Ean Appointed Director Of Marketing For Hydro Drive Corp.

William L. Ean

William L. Ean has assumed the position of director of marketing for Hydro Drive Corporation according to an announcement by **Langdon Simons,** president of the Seattle marine propulsion equipment firm.

Mr. **Ean** joins Hydro Drive from the Boeing Company where he has been B-52 interface manager representing Boeing in technical interfaces with associate contractors and Air Force agencies. Prior experience with Boeing includes systems engineering on SRAM, C5A proposal, and Minute Man projects.

Before joining Boeing in 1962, Mr. **Ean** was assistant to the president of Coolidge Propeller Company where he had both design and sales functions. Previously, he was a field engineer for Fairbanks Morse.

Mr. **Ean** holds a B.S. degree in electrical engineering from Oregon State University.

Stewart To Manage Marine Division Of Alden Electronic

Michael J. Stewart

Robert E. Stubbs, director of marketing for Alden Electronic & Impulse Recording Equipment Company, Inc., Westboro, Mass., has announced the appointment of **Michael J. Stewart** to the position of manager of the Alden Marine Division.

Mr. **Stewart,** former third and second mate for American Export-Isbrandtsen Lines, Inc., will be responsible for the marketing and sales coordination of the Alden Marine/Oceanographic product line which includes radiofacsimile scanners/recorders and oceanographic survey recorders.

In making the appointment, Mr. **Stubbs** pointed out that the Alden facsimile communications equipment and instant graphic recording instruments perform a vital function for the marine/oceanographic communities.

Mr. **Stewart** is a 1965 graduate of the U.S. Merchant Marine Academy at Kings Point, N.Y.

Nixon Named APL/PSI Public Relations Dir.

Stuart Nixon, publicist, author and former editor, has been named public relations director for American President Lines Passenger Services Inc.

The announcement was made by **Warren Titus,** president of APL/PSI, which operates luxury President passenger liners in APL's worldwide services from the Port of San Francisco.

Since 1961, Mr. **Nixon** has been publicity director of the Redwood Empire Association and is widely known in the travel-promotion field. He is the author of a popular pictorial history "Redwood Empire," published in 1966.

Prior to 1960, he was editor and publisher of the Fremont (Calif.) News-Register, and has a background in feature and newspaper work. In 1967 he served as chairman of the San Francisco Public Relations Round Table, oldest organization of its type in the U.S.

He is president of the Travelers Aid Society of San Francisco, a United Crusade agency.

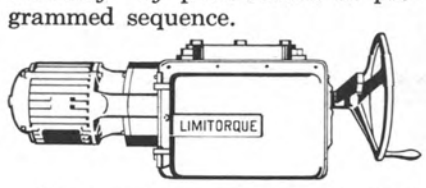
Limitorque

The valve operators specified for more than 80% of the nation's automated cargo fleet.

The first U.S. automated cargo ship was equipped with Limitorque valve controls . . . and it started a trend. Today they're being used on—or are specified for—more than 80% of automated cargo vessels laid down since 1963, such as the typical classes shown below.

And on tankers as well . . . some have more than 100 Limitorque operators on their deck valves alone!

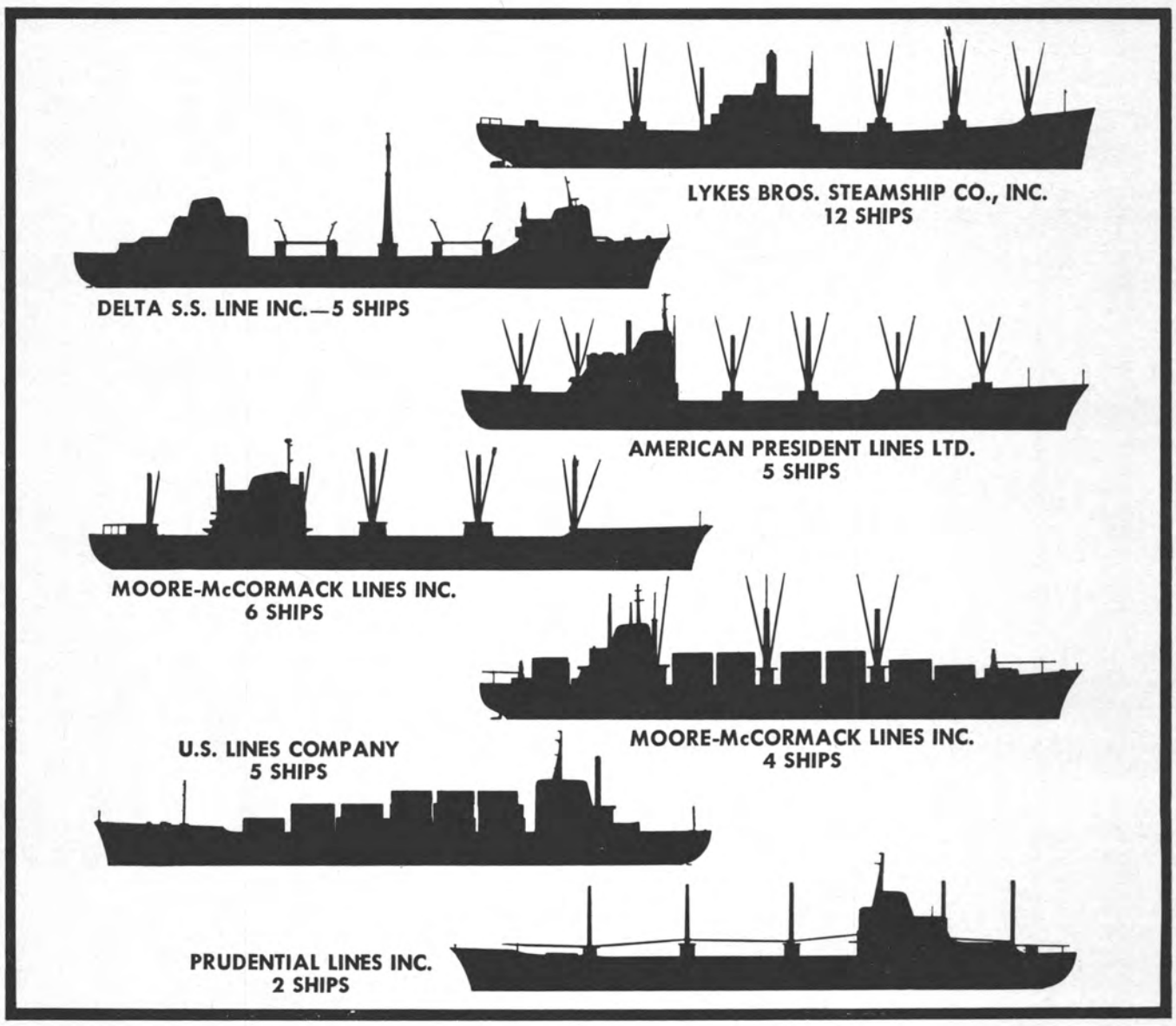
What makes Limitorque first choice? Proven performance . . . and reliability unequalled for critical marine valves. Limitorque operators are designed for the most advanced automated remote-control systems. They open and close valves anywhere on the ship—smoothly, instantly—by push-button or programmed sequence.



Valve maintenance is minimized because the precision action of a Limitorque control protects valve components from undue wear and damage . . . even under overload conditions. Limitorque controls protect the ship and personnel . . . close valves automatically in emergencies. Units may be readily operated by hand, if required . . . whether power is available or not.

For reliable control of valves, hatches, ramps — wherever controlled linear or radial movement is needed—investigate *automated* control by Limitorque. Talk to your valve supplier *or request Catalog SMB-168. Limitorque Corp., Dept. MREN 22, c/o Philadelphia Gear Corp., King of Prussia, Pa. 19406.*

LIMITORQUE
VALVE CONTROLS



Independent Petroleum Opens London Office

Independent Petroleum Supply Company (IPS), a subsidiary of Natomas Company, San Francisco, Calif., announced the establishment of a branch office in London, England, under the direction of **John T. Dutfield,** IPS' European representative. The office is located at Swan House, 34/35 Queen Street, London, E. C. 4, telephone 01-236-4326.

IPS is engaged primarily in the purchase and sale of crude oil and refined product cargoes for its own account and for the account of others, worldwide marine bunker sales and tanker brokerage. It is also the exclusive sales representative for the West Indies Oil Company's active bunker operation at Antigua, W.I.

IPS and its parent, Natomas, currently have a refinery project under development to be located on the Isle of Man.

Normandy And Harbor Expand Services To Industrial Fields

Anixter Bros., Inc., Evanston, Ill., has announced the entry of two of its wire and cable service centers into the industrial field.

Until this time the two Anixter subsidiaries, Normandy Electric Wire Corporation, Brooklyn, N.Y., and Harbor Marine Electrical Supplies, Inc., Oakland, Calif., have specialized in the distribution of insulated wire and cable for marine use.

In expanding their services, both companies have established inventories for immediate shipment and have added experienced personnel to their sales staffs. Each now stocks portable cords and cables, welding cable, high-voltage cable, mining cable, control cables and other mill stock for industrial requirements.

In addition to servicing naval and other vessels, including nuclear submarines, Normandy supplies wire and cable for missiles, offshore oil rigs, radar and sonar installations, nuclear plants and digital data transmission.

Harbor sells a complete line of navy and maritime electric wire and cable to shipyards, the Navy and other government units for shipbuilding and ship repairs.

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All-Day Meeting Scheduled By SNAME And ASNE Sections For February 7 In Charleston

What promises to be an important session and one which could well set a pattern for the future will be the joint meeting of The Society of Naval Architects and Marine Engineers, Southeast Section and The American Society of Naval Engineers, Charleston Section, scheduled for February 7 at the Sheraton-Fort Sumter Hotel in historic Charleston, S.C.

Two technical papers will be presented during the morning, with **Frank De Grim,** Jacksonville Shipyards, and chairman of the papers committee, acting as moderator. Paper No. 1, "Submarine Pressure Hull Circularity," will be presented by **John Brett Kruse,** supervisory naval architect, SSBN & Hull Integrity Branch of Hull Sub-Division, Charleston Naval Shipyard. This paper investigates basic design structural considerations and methods of checking circularity; also procedures for maintaining circularity.

Paper No. 2, "Economic Consideration of Controllable-Pitch Propeller with Diesel Main Propulsion," will be presented by **D. E. Ridley,** vice-president and **O. H. Midttun,** sales and application engineer, Bird-Johnson Co. Environmental influence, hull deterioration and certain other factors are considered, relating to an economic comparison between a controllable-pitch propeller and a fixed-pitch propeller driven by a diesel primemover.

The moderator for the afternoon session will be Capt. **E. T. Westfall,** USN, production officer, Charleston Naval Shipyard. Paper No. 3, "Adhesive Attached Test Blanks for Installed Submarine Sea Valves," will be presented by **H. H. Nathan,** assistant chief design engineer, marine/mechanical, Charleston Naval Shipyard. After dicussing the theory of adhesive joints, a typical full-scale joint will be pressurized for a demonstration. Information for the design of these joints and field problems encountered will be given.

At the conclusion of the technical presentations, members and guests of the two organizations will be taken by bus on a tour of the Charleston Naval Shipyard. Selected production shops and other work areas will be visited and, particularly, one of the drydocks in which a fleet ballistic missile submarine is being overhauled. The tour will be followed by a reception at the commissioned officers' mess.

At 7:30 p.m. there will be a banquet at the Sheraton-Fort Sumter for members and guests, including ladies, for whom an attractive program is planned during the day. The dinner speaker will be Capt. **W. N. Nicholson,** USN. Captain **Nicholson** is presently director of the deep submersible special project (DSSP) for the Navy. This project includes oceanographic research by the Navy with which Comdr. **Scott Carpenter** has been involved. Visual presentation of various naval undersea activities will be included.

New Gulf Coast Chapter Of World Dredging Association Schedules New Orleans Meeting

The Gulf Coast Chapter of the World Dredging Association has scheduled its first organizational meeting to be held at the Roosevelt Hotel in New Orleans, La., on Friday, February 7, 1969.

A general business meeting will be held on Friday afternoon at 2:00 p.m. at the Roosevelt with cocktails and dinner Friday night.

Banquet speaker will be **Mal Fisher** of Vero Beach, Fla., president of Treasure Salvors, Inc. Treasure Salvors is the world renowned organization of treasure explorers which has made the largest finds of Spanish gold during this century, off the Florida coast and in the Caribbean.

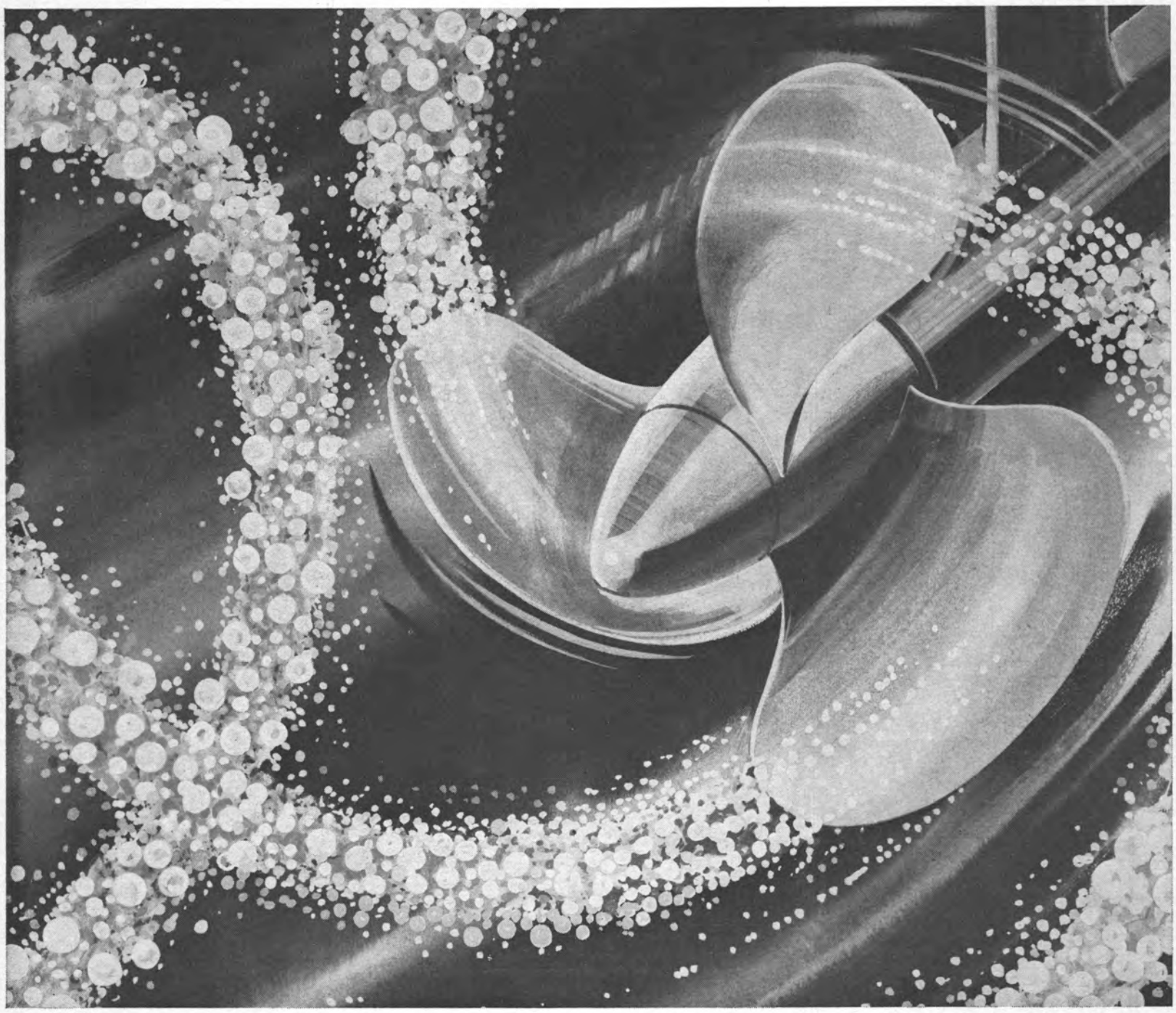
Stories of their explorations have appeared in National Geographic, Life, Time and many other national and international publications.

The World Dredging Association is dedicated to the advancement of dredging technology and membership is open to all dredging professionals and representatives of allied industries. Members of WODA and all others interested in its aims are invited and urged to attend this meeting so that an interesting and active chapter can be formed. The Gulf Coast Chapter is intended to cover the states of Texas, Oklahoma, Louisiana, Arkansas, Tennessee, Mississippi, Alabama, Georgia and Florida.

However, persons outside this geographical area are invited to participate in the Gulf Coast Chapter.

Registration will be held beginning Friday at 10:00 a.m. at the Roosevelt.

Additional information about this meeting can be obtained from **Jack Dunn,** Nashville Bridge Company, Nashville, Tenn.; **C. B. Hakenjos,** Williams-McWilliams Company, New Orleans, La.; or **Bob Sorensen,** Civil Engineering Department, Texas A&M University, College Station, Texas.



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Uraga Lays Keel For First LASH Ship

Uraga Heavy Industries, Ltd. has laid the keel for the first of two 43,000-dwt LASH ships (Lighter Aboard Ship) on order with the shipyard at Uraga's yard in Yokosuka. The vessel was ordered by A/S Moslash Shipping Co. of Norway in January 1968, and will be delivered in September 1969.

The vessel will be operated by Central Gulf Steamship Corporation on a long-term charter basis when completed. It will shuttle between ports on the Gulf of Mexico and in Europe on a 30-day run, mainly in the transportation of the products of International Paper Company.

Uraga Heavy Industries, Ltd. will successively lay down the keel of the second LASH ship of the same type for A/S Mosvold Shipping Co. of Norway in December 1969, and complete it in mid-1970.

This LASH system, developed by Lash System Inc., shipbuilding consultants, consists of a LASH ship, a giant gantry crane and a series of lighters, and will provide 'door to door' service by means of the lighters utilizing the highly developed inland waterways. The ship can carry 73 lighters.

The 768-foot vessel will be powered by a Uraga-Sulzer diesel engine, Type 9RND90, developing 26,000 bhp at 122 rpm. This power will give a speed of about 20 knots.

Mitsui-Built Paceco Crane Installed On Tokyo Wharf

Mitsui Shipbuilding & Engineering Co., Ltd. recently delivered a 30.5-ton capacity container handling crane to the City of Tokyo, for installation at the Shinagawa wharf in the port of Tokyo. The crane is the Mitsui-Paceco type portainer manufactured by Mitsui under licensing agreement with Paceco.

With a similar container-handling crane manufactured earlier by Mitsui and installed at the Maya wharf in the Port of Kobe, Japan's two major container-handling ports of Tokyo and Kobe are now equipped with Mitsui-Paceco type container-handling cranes. The Japanese containership operators now have similar cranes at both ends of their trade route, as Paceco-type container-handling cranes manufactured by Paceco are being used at the U.S. ports of call—Los Angeles and Oakland.

Besides portainers, Mitsui's agreement with Paceco covers the manufacture of many other types of cranes for various purposes.

Woolsey Marine Industries Acquires Drake Products

The acquisition of the assets of Drake Products, Greenville, Mich., maker of marine accessories by Woolsey Marine Industries, Inc., New York, N.Y., diversified marine paint and accessories manufacturer, has been announced by **H. W. Evans Jr.**, Woolsey president.

Drake, a leading manufacturer of marine boarding ladders, boat hooks and paddles, will operate within the Seaquipment Division of Woolsey, with its management intact. The terms of the transaction were not disclosed.

The acquisition by Woolsey is part of the company's expansion and diversification which in the past year has included the acquisition of Telo Industries, Inc., Newport Beach, Calif., maker of sailboat accessories as an operating division, and the formation of their new Seaquipment Division, which markets Plowright anchors, and Aerosol Froghorns in addition to Drake products.

Woolsey, a leader in the marine paint field for more than 115 years, continues to expand its full line of marine coatings for the pleasure boat and commercial markets.

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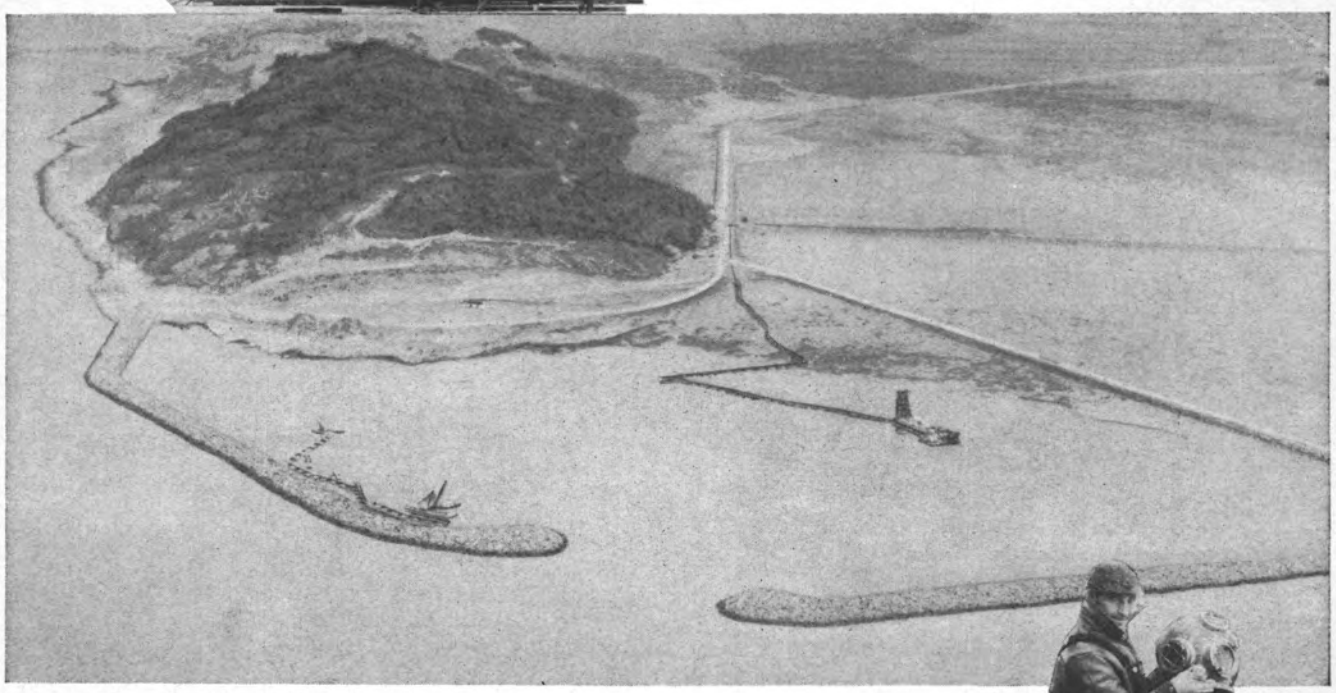

The gigantic task of dredging the St. Lawrence River and providing part of the fill for Expo 67 was entrusted to Marine Industries. In the above photograph the company's dredges are digging an all-season deep-water harbor at Cacouna, near Rivière-du-Loup, about 130 miles downstream from Quebec City.

M.I.L.'s dredging crews include *full-time* deepsea divers of long experience. Marine Industries delivers on time.

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It is designed as a multi-purpose carrier which is able to carry grain, ore, or a combination of cargoes without any temporary fittings.

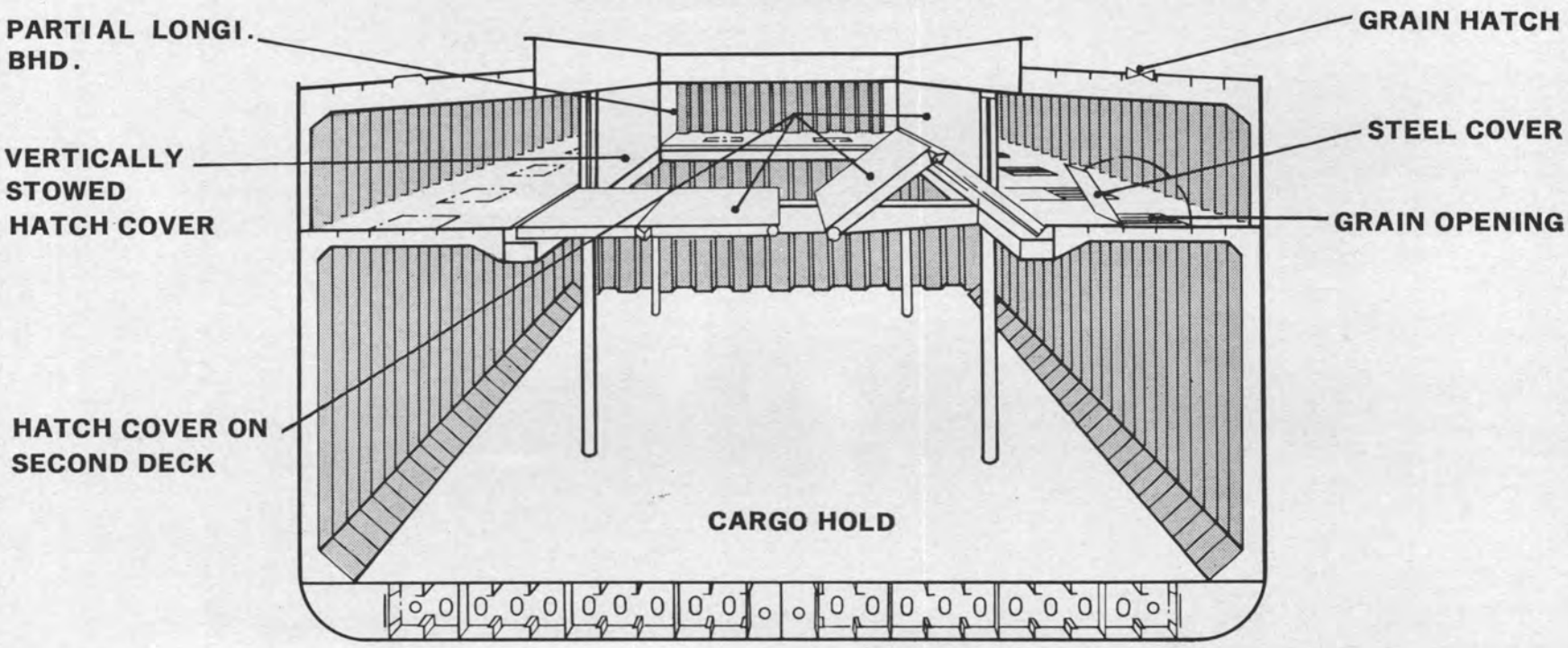
The new Universal Transport has one row hatches on the upper deck, not two. The accompanying single row hatch on the second deck is equipped with dual folding hatch covers that transversely fold up and under the hatch side girders. In this position they form two longitudinal bulkheads. These longitudinal bulkheads are used as a grain feeder and to prevent grain shift. Hatch cover handling is quick and easy, using wires from cargo winches.

The wing parts created by these folding hatch covers can be filled through smaller holds on the upper deck.
Around the central hatch on the second deck are small grated hatches. They come with covers that can be removed to facilitate loading grains into the lower deck.

These are just some of the many new design features in our UT-15. The Universal Transport — Hitachi Zosen's latest word in versatility.

For more information, don't hesitate to write us.

HOLD SECTION



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First Of Four LNG Tankers For Esso Launched In Spain

The LNG tanker Laieta was christened by **Mrs. G. Lopez Bravo,** wife of Spain's minister of industry, and launched in El Ferrol del Caudillo, Spain, on December 21, 1968.

Built by Astilleros y Talleres del Noroeste, S.A. (Astano) for Naviera de Productos Licuados, S.A., (Naproli), the Laieta will transport liquefied natural gas from Esso's gas liquefaction plant, the world's largest, at Marsa el Brega in Libya to customers in Barcelona, Spain, and in La Spezia, Italy.

The Laieta is one of four LNG tankers being built to an original Esso design, which are among the largest such tankers in the world (the other three tankers are being built in Italy).

She will carry 250,000 barrels of LNG in four insulated aluminum tanks at a temperature of minus 259°F., an amount equal to 750-million cubic feet of gas.

She is 675 feet long, with a draft of 28 feet, and is equivalent in size to a 37,000-dwt petroleum tanker. Her speed of 17 knots will permit the Laieta to make the 1,000-mile voyage from Libya to Spain or Italy in two or three days.

Laieta and her sisterships will be the vital link in one of the largest international sales of LNG ever made—345-million cubic feet a day. Of this amount, 110-million cubic feet daily will be delivered to Gas Natural, S.A. in Barcelona, whose gas plant and distribution network are nearing completion, thus marking the introduction of natural gas into Spain.

An affiliate of Italy's Ente Nazionale Idrocarbure (ENI), will purchase 235-million cubic feet a day. Total investment in the international project by Standard Oil Company (New Jersey) approaches $350-million.

Storm Drilling To Convert Karin Into Drilling Platform

The Nicolai Jaffe Corp. has received permission from the Maritime Administration to sell the former government-owned motorship Karin (AF-33) to the Storm Drilling Co. of Houston, Texas, for the purpose of converting it into a floating oil/gas drilling platform. Permission for the sale had been denied by MarAd at an earlier date.

The 4,663-dwt vessel was originally purchased by the Nicolai Jaffe Corp. from the government in October 1967, for scrapping or some other non-transportation purpose.

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HENDY (Terry design)	300 KW
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WESTINGHOUSE	300 KW
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WESTINGHOUSE CA 20	100 HP
WESTINGHOUSE HP & LP TURBINES	4,400 HP
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FAIRBANKS-MORSE, radiator cooled, 25 KW Continental Generator, 120/208/3/60.
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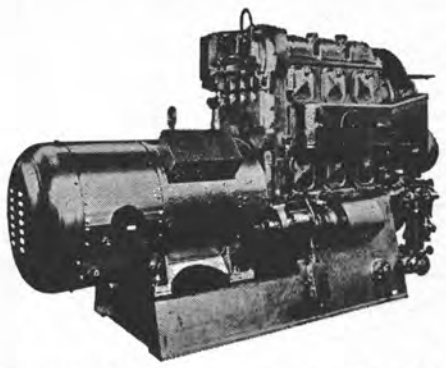
LORIMER, F5SS, 75 KW, 120/240 DC, radiator cooled.
COOPER-BESSEMER, JS-5, 250 KW, 240 DC.



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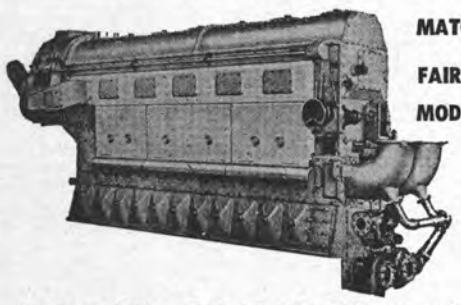

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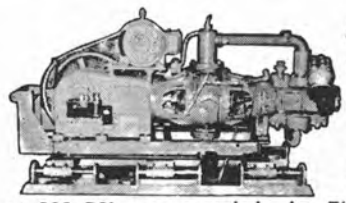

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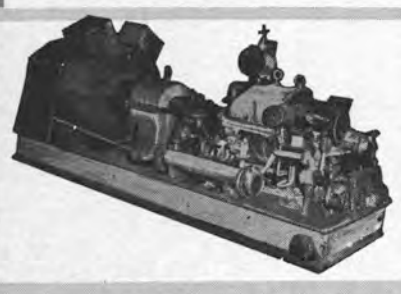

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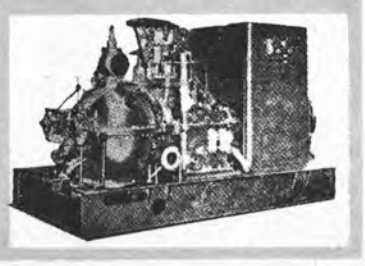
TERRY TURBINES, type TM5, 440 PSI, 750° F, with Crocker-Wheeler Generators, 300 KW, 120/240 DC.



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Portland, Oregon 97201

Phone: (503) 228-8691
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BEST BUYS!

AC & DC *Marine* PUMPS

ZIDELL

EXPLORATIONS, INC.

3121 S.W. Moody
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Contact

Ralph E. Ingram

(503) 228-8691

Hundreds of other pumps in our stock
Phone or mail required specifications.

AC PUMPS—Horizontal Centrifugal

2—Goulds, 2000 GPM, 470' head, Size 8x10, with Westinghouse Motors, 350 HP, 2300/3/60.

1—Ingersoll-Rand, 3000 GPM, 250' head, Size 8ALV, with Westinghouse Motor, 250 HP, 2200/3/60, 1775 RPM.

1—Worthington, 400 GPM, 150 PSI, 5½" suction, 3½" discharge, with G.E. Motor, 75 HP, 440/3/60, 3550 RPM.

2—Goulds, 300 GPM, 336' head, 3" suction, 2" discharge, with G.E. Motors, 50 HP, 440/3/60, 3550 RPM.

7—J.C. Carter, 365 GPM, 250' head, stainless steel, 3" suction, 3" discharge, with 220/440/3/60 Motors.

6—326 GPM, 138' head, C.I. pump housing, 3" suction, 3" discharge, with Westinghouse Motors, 20 HP, 220/440/3/60, 1755 RPM.

6—682 GPM, 60' TDH, C.I. pump housing, 5" suction, 5" discharge, with Westinghouse Motors, 15 HP, 220/440/3/60, 1700 RPM.

2—Worthington, 80 GPM, 60 PSI, 2½" suction, 2" discharge, with G.E. Motors, 8 HP, 440/3/60, 3450 RPM.

3—Worthington, 650 GPM, 9 PSI, 6" suction, 6" discharge, with Star Motors, 6 HP, 440/3/60.

1—Worthington, 175 GPM, 20 PSI, 3½" suction, 3" discharge, with G.E. Motor, 3.74 HP, 440/3/60, 3450 RPM.

4—Worthington, 60 GPM, 22 PSI, 3½" suction, 2" discharge, with G.E. Motors, 3 HP, 440/3/60, 3450 RPM.

3—Allis-Chalmers, 35 GPM, 100' head, 2" suction, 1½" discharge, with Allis-Chalmers Motors, 3 HP, 440/3/60, 3500 RPM.

1—Allis-Chalmers, 65 GPM, 80' head, 1½" suction, 1½" discharge, with Allis-Chalmers Motor, 3 HP, 220/440/3/60, 3500 RPM.

2—Worthington, 13 GPM, 51 PSI, 1½" suction, 1½" discharge, with G.E. Motors, 2.64 HP, 440/3/60, 3490 RPM.

1—Worthington, 75 GPM, 22', 3" suction, 2½" discharge, with G.E. motor, 1.9 HP, 440/3/60, 3450 RPM.

5—Worthington, 30 GPM, 30 PSI, 1½" suction, 1½" discharge, with G.E. Motors, 1.75 HP, 440/3/60.

14—Warren, 6 GPM, 36 PSI, 1¼" suction, 1" discharge, with G.E. Motors, 1.25 HP, 440/3/60, 3450 RPM.

AC PUMPS—Vertical Centrifugal

6—Worthington, 275 GPM, 56.6 PSI, 8½" suction, 3½" discharge, with G.E. Motors, 22.9 HP, 440/3/60, 1180 RPM.

4—Worthington, 490 GPM, 35 PSI, 7" suction, 4½" discharge, with G.E. Motors, 19.6 HP, 440/3/60, 1175 RPM.

6—Chicago Pump Co., submersible, 400 GPM, 6 # suction, 30 # discharge pressure, with Wagner Motors, 15 HP, 440/3/60, 1740 RPM.

6—Dayton-Dowd, 1160 RPM, 15 PSI, 10" suction, 8" discharge, with Wagner Motors, 10 HP, 440/3/60.

4—Worthington, 100 GPM, 40 PSI, 5" suction, 3" discharge, with G.E. Motors, 7.37 HP, 440/3/60, 1750 RPM.

4—Warren, 135 GPM, 35 PSI, 6" suction, 3" discharge, with G.E. Motors, 6 HP, 440/3/60.

1—Worthington, 35 GPM, 62.4 PSI, 3" suction, 2" discharge, with G.E. Motors, 5.83 HP, 440/3/60, 1150 RPM.

7—Allis-Chalmers, 68 GPM, 114' head, Type SSV-C, 3" suction, 1½" discharge, with Wagner Motors, 7½ HP, 440/3/60, 1750 RPM.

3—Worthington, 350 GPM, 11.1 PSI, 10" suction, 3½" discharge, with G.E. Motors, 5 HP, 440/3/60, 1150 RPM.

12—Allis-Chalmers, 10 GPM, Size 2"x2½", with Wagner Motors, 3 HP, 440/3/60, 3600 RPM.

AC PUMPS—Horizontal Rotary

4—Warren, 197 GPM, 175 PSI, with Electro Dynamics Motors, 30 HP, 440/3/60, 1750 RPM.

2—Northern, 10 GPM, 350 PSI, 3" suction, 2" discharge, 200 RPM, with G.E. geared Motors, 5 HP, 440/3/60.

3—DeLaval, 25 GPM, 50 PSI, with G.E. Motors, 1.8 HP, 440/3/60.

AC PUMPS—Vertical Rotary

2—DeLaval, 550 GPM, 50 PSI, with G.E. Motors, 27.4 HP, 440/3/60, 1180 RPM.

7—Quimby, Size 2½, 10/6 GPM, 350 PSI, 2½" suction, 1½" discharge, with Wagner Motors, 6/3 HP, 440/3/60, 1160/865 RPM.

8—Blackmer, 50 GPM, 35 PSI, 420 RPM, with G.E. geared Motors, 2 HP, 440/3/60, 1750 RPM.

DC PUMPS—Horizontal Centrifugal

6—Worthington, Size 8L1, 2100 GPM, 138.5 TDM, with Westinghouse Motors, 100 HP, 230 DC, 1310/1750 RPM.

6—Worthington, Size 12 LA1, 4000 GPM, 67.3 TDM, with Westinghouse Motors, 100 HP, 230 DC, 1310/1750 RPM.

6—Worthington, Size 3UB1, 400 GPM, 280' head, with Westinghouse Motor, 50 HP, 230 DC, 1310/1750 RPM.

2—Weil, 400 GPM, 100 PSI, with 40 HP Motors, 230 DC.

1—Goulds, Figure 3380, 4" suction, 3" discharge, 250 GPM, 100 PSI, with 30 HP Motor, 230 DC, 2200 RPM.

6—Worthington, Size 4L1, 400 GPM, 83' head, with Westinghouse Motors, 15 HP, 230 DC, 1225/1750 RPM.

1—Aldrich, 8" suction, 6" discharge, with G.E. Motor, 12/25 HP, 115 DC.

3—Warren, 1175 GPM, 11.2 PSI, with Reliance Motors, 10 HP, 230 DC.

4—Gardner-Denver, 900 GPM, 30' head, with Crocker-Wheeler Motors, 10 HP, 230 DC.

1—Westco, 100 GPM, 100 PSI, 2" suction, 2" discharge, with 10 HP Imperial Motor, 115 DC.

DC PUMPS—Horizontal Centrifugal

2—Yeomans, 135 GPM, 3" suction, 115' head, 3" discharge, with Kimble Motor, 10 HP, 230 Volts DC.

2—Warren, size 5, 600 GPM, with Electro-Dynamics Motors, 8/4.5 HP, 230 Volts DC.

1—Warren, 5" suction, 4" discharge, with Reliance Motor, 7½ HP, 115 Volts DC.

1—Dayton-Dowd, 3" suction, 2½" discharge, with Crocker-Wheeler Motor, 5 HP, 120 DC.

1—Ingersoll-Rand, Model A, 45 GPM, 125' head, with G.E. Motor, 5 HP, 115 Volts DC.

3—Ingersoll-Rand, Size 1MVR, 50 GPM, with Electro-Dynamics Motors, 3.9 HP, 230 DC.

1—Fairbanks-Morse, 250 GPM, 13' head, with Fairbanks-Morse Motor, 3.72 HP, 230 Volts DC.

2—Worthington, 150 GPM, 22 PSI, 3½" suction, 3" discharge, with Diehl Motors, 3.47 HP, 230 Volts DC.

DC PUMPS—Horizontal Centrifugal

1—Yeomans, 40 GPM, 75' head, 1½" suction, 1" discharge, with Master Motor, 2 HP, 230 Volts DC.

2—Westco, 20 GPM, 50 PSI, with Century Motors, 1½ HP, 120 Volts DC.

2—Worthington, 60 GPM, 23.7 PSI, 2½" suction, 2" discharge, with Diehl Motors, 1.43 HP, 230 Volts DC.

7—Warren, 4 GPM, 38 PSI, 1½" suction, 1" discharge, with Century Motor (4-230 DC, 3-115 DC), 1.25 HP.

DC PUMPS—Vertical Centrifugal

2—Buffalo, Size 3 SAV, 400 GPM, 125 TDH, with Electro-Dynamic Motors, 50 HP, 230 Volts DC, 1350/1800 RPM.

1—Gardner-Denver, 1500 GPM, 56' head, 8" suction, 6" discharge, with Century Motor, 30 HP, 230 Volts DC, 1750 RPM.

1—Ingersoll-Rand, Size 18VCM, 8500 GPM, with Electro-Dynamic Motor, 20/40 HP, 230 Volts DC, 410/545 RPM.

2—Worthington, 16" LAS-2, 5600 GPM, 10 PSI, with G.E. Motor, 20/40 HP, 230 Volts DC, 540/720 RPM.

1—Ingersoll-Rand, 10" suction, 10" discharge, 1050/2000 GPM, with G.E. Motor, 20 HP, 230 Volts DC, 805/1150 RPM.

1—Worthington, 340 GPM, 33.6' 6" suction, 3" discharge, with G.E. Motor, 15 HP, 230 Volts DC.

1—Ingersoll-Rand, 1050 GPM, ... 5" suction, 5" discharge, with Crocker-Wheeler Motor, 15 HP, 230 Volts DC. 1150 RPM.

2—Ingersoll-Rand, 450 GPM, 15' head, 4" suction, 3" discharge, with G.E. Motors, 10/15 HP, 230 Volts DC, 1300/1750 RPM.

1—Allis-Chalmers, 750 GPM, 30.3' head, 5" suction, 5" discharge, with Star Motor, 10 HP, 230 Volts DC, 1750 RPM.

2—Buffalo, Size 3SLV, 425 GPM, 35 TDH, with Electro Dynamic Motors, 7½/15 HP, 230 Volts DC, 1310/1750 RPM.

3—Ingersoll-Rand, Size 1VHM, 18 GPM, 75 PSI, 3¼" suction, 1½" discharge, with G.E. Motors, 7½ HP, 230 Volts DC.

1—Worthington, 175 GPM, 50 PSI, 4" suction, with G.E. Motor, 7½ HP, 230 Volts DC.

2—Ingersoll-Rand, Size ..... 8 VCM, 1400 GPM, with Electro Dynamic Motors, 5/10 HP, 230 Volts DC, 950 RPM.

2—Ingersoll-Rand, Size 1½ VBM, 70 GPM, with Electro Dynamic Motors, 5/10 HP, 230 Volts DC, 1500/2000 RPM.

2—Ingersoll-Rand, Size 1MVR, 20 GPM, with Electro Dynamic Motors, 3/1.5 HP, 230 Volts DC, 1950/2600 RPM.

2—Worthington, 8" LS-1, 1400 GPM, 10 PSI, with G.E. Motors, 5/10 HP, 230 Volts DC, 875/1200 RPM.

2—Worthington, Type 1½ UZS-3, 20 GPM, 75 PSI, with G.E. Motors, 5 HP, 230 Volts DC, 1800 RPM.

2—Weil, 20 GPM, 40 PSI, 1½" suction, 1¼" discharge, with G.E. Motors, 3 HP, 230 Volts DC.

DC PUMPS—Horizontal Rotary

3—Worthington, Size 5GES, 400 GPM, 50 PSI, with Westinghouse Motors, 20 HP, 230 Volts DC, 1750 RPM.

1—DeLaval, 15 GPM, 350 PSI, 2½" suction, 2½" discharge, with Diehl Motor, 10 HP, 230 Volts DC.

2—Viking, Type EKK, 60 GPM, 70 PSI, 2" suction, 2" discharge, with Diehl Motors, 5 HP, 230 Volts DC.

3—National Transit, 50 GPM, 50 PSI, 3" suction, 2½" discharge, 3 HP, 230 Volts

DC PUMPS—Vertical Rotary

6—Quimby, Size 5, 400 GPM, 60 PSI, 6" suction, 5" discharge, with Westinghouse Motors, 30 HP, 230 Volts DC.

1—DeLaval, IMO, 250 GPM, 40 PSI, with G.E. Motor, 15/20 HP, 230 Volts DC, 1310/1750 RPM.

3—Worthington, Model 4GRVS, 225 GPM, 35 PSI, with G.E. Motors, 15/20 HP, 230 Volts DC.

4—Worthington, Model 4GRVS, 175 GPM, 50 PSI, with G.E. Motors, 7½/10 HP, 230 Volts DC.

1—Quimby, Size 4, 175 GPM, with Electro Dynamic Motor, 7.5/10 HP, 230 Volts DC, 865/1150 RPM.

2—Worthington, Type 3GRVS, 90 GPM, 75 PSI, 2¾" suction, 2½" discharge, with Diehl Motors, 7½ HP, 230 Volts DC.

1—Quimby, Size 2, 8 GPM, with Electro Dynamic Motor, 2/5 HP, 230 Volts DC, 575/1150 RPM.

2—Worthington, Type 2GRVS, 7 GPM, 400 PSI, with G.E. Motors, 2½/5 HP, 230 Volts DC, 900/1800 RPM.

BOILER FEED PUMPS — TURBINE & ELECTRIC

4—Worthington, Vertical type, single acting, triplex, constant speed, size 2¼ x 4, 47 GPM, 525 PSI, with G.E. Motors, 20 HP, 230 Volts DC.

2—Worthington, 5" UFD, 460 GPM, 750 PSI, 5" suction, 5" discharge, driven by Sturtevant Steam Turbine, Size CC-22', Type 21, 2½" steam inlet, 5½" exhaust.

2—Aldrich Pump Co. Triplex, Vertical, Size 2½ x 4, 65 GPM, 575 PSI, with G.E. Motors, 25 HP, 230 Volts DC.

2—Ingersoll-Rand, 165 GPM, 575 PSI, with turbine drives.

TURBINE DRIVEN PUMPS — Various

2—Worthington, Size 20-LAL-18, Main Condenser, Centrifugal, 10500, 27' head, Vertical, with Whiton Turbines, 95 HP.

1—Ingersoll-Rand, Size 5UV, Centrifugal, Horizontal, 1200 GPM, 225' head, 6" suction, 5" discharge, with Elliot Turbine, 84.3 HP.

1—Worthington, Fire, Flushing & Emergency Bilge, Centrifugal, Horizontal, Rating—Fire: 500 GPM, 150 PSI, Flushing: 1000 GPM, 60 PSI, Bilge: 750 GPM, 25 PSI, 5½" suction, 4½" discharge, with Whiton Turbines, 72.9 HP.

1—DeLaval, Fuel Oil Transfer, Vertical, Rotary, 250 GPM, 150 PSI, 7" suction, 6" discharge, with DeLaval Turbine, 35 BHP.

8—Goulds Main Circulating, Vertical, Centrifugal, 3700 GPM, 13 PSI, Size 12", with Elliot Turbines, 30 HP.

2—DeLaval Fuel Oil Service, Vertical, Rotary, 50 GPM, 350 PSI, 3½" suction, 3½" discharge, with DeLaval Turbines, 14.4 HP.

4—DeLaval—IMO, L.O. Service, Vertical, Rotary, 300 GPM, 45 PSI, 6" suction, 6" discharge, with DeLaval Turbines, 14.1 HP.

8—Allis-Chalmers, Type SSC-V, 68 GPM, 114' head, 3" suction, 1½" discharge, with Carling Turbines, 7½ HP, 1750 RPM.

2—Warren, 85 GPM, 60 PSI, For Lube Oil Service, Turbine Driven.

2 — Warren, Main Circulating, 3500 GPM, 13.5 PSI, Turbine Driven.

STOCKLESS ANCHORS

USED, GOOD QUALITY . . . SAVE!

3,000 pound size
8,000 pound size
10,000 pound size

ANCHORS... Unused, surplus 3000 # size Danforth

ANCHOR CHAIN . . . Used, good, with or without test certificate . . .
1 1/2" size
1 3/8" size
2 1/16" size
2 1/4" size

ANCHOR WINDLASS

1—LIDGERWOOD horizontal Anchor Windlass, double wildcat—for 2 1/16" Chain, double gypsy, with 50 motors, 230 volts DC, complete with controls.

1—Horizontal, of German Mfg., double wildcat—for use with 3" anchor chain, double gypsy with 230 VDC motor, complete with electrical control equipment.

American Engineering, horizontal, double 2⅛" Chain, 65 HP, 230 DC, complete.

7—American Hoist and Derrick Company, horizontal, double wildcat—for 2¼" chain double gypsy, 70 HP, 230 Volts DC, with electric controls.

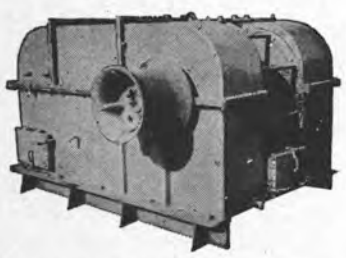
3—Hesse-Ersted, horizontal, double wildcat, 2⅛" chain, 60 HP, 230 DC.

1—Hyde Horizontal Anchor Windlass double wildcat—for use with 2⅛" Anchor Chain, and with General Motors Electric Motor, 60 HP, 230 volts DC, 560/1700 RPM, Type CDM 18831 AE. Complete with Contractor Panel, Resistors, and Master Switch.

ANCHOR WINCHES

2—Jaeger, single drum—capacity approximately 900' of 1½" wire rope, double gypsy, with 35 HP Motors, 230 Volts DC, complete with electricals.

UNIWINCHES



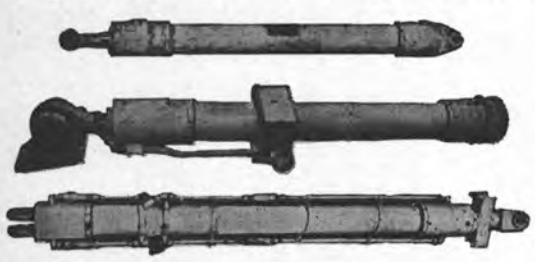
LAKESHORE UNWINCHES, with Allis-Chalmers Motors, 50 HP, 230 Volts DC, complete with Control Equipment.

Single speed, double drum, 7450 # at 220 FPM.

Single speed, single drum, 7450 # at 220 FPM.

Two speed, single drum, 7450 # at 220 FPM, 14400 # at 105 FPM.

HYDRAULIC CYLINDERS



3000 PSI

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

STEERING STANDS

Brass Steering Stands. Complete with angle indicator on top, used, 11" base diameter by 35½" high, and with 42" overall, 8-spoke brass steering wheel.

$149.50 each

CAPSTAN WINDLASSES

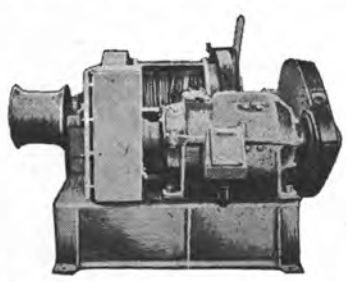
Model CWP-3, Vertical 24" Planetary Capstan Windlasses, Single Wildcat — using 1¼" Anchor Chain, Single Gypsy with 20 HP motor, 230 volts DC, complete with Contactor Panel, Master Switch, and Resistors.

3—Hesse-Ersted Vertical, Single Wildcat—for 1⅜" Anchor Chain, single gypsy, with HP General Electric Motor, 230 Volts DC, complete with Controller equipment.

Hyde, Vertical, Single Wildcat, for 1⅛" Anchor Chain, single gypsy, with 20/5 HP Motor, 440/3/60.

McKiernan — Terry, Single Wildcat — for ¾" chain, Single Gypsy, with underdeck drive with Star Motor, 7½ HP, 115 DC, with Electrical control equipment.

CARGO WINCHES

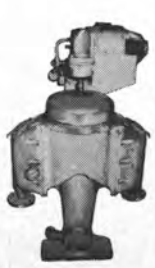


American Hoist and Derrick Company Winches with Westinghouse Motors, 50 HP, 230 Volts DC, complete with Contactor Panels, Master Switches, and Resistors.

Type 66—single speed, single drum.

Type 67—two speed, single drum.

CENTRIFUGES



Sharples Purifiers—For Diesel Service or for Lube Oil Service.

150 GPH—440 AC, 230 DC

350 GPH—230 DC

600 GPH—230 DC

FAIRLEADS

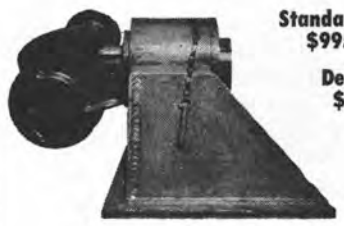
Designed and Manufactured by ZIDELL EXPLORATIONS, INC.

To Give You These Features:

One size fairlead with universal type sheave to accommodate wire rope sizes 1" up to and including 2".

Self Aligning, Swivel Type Head.

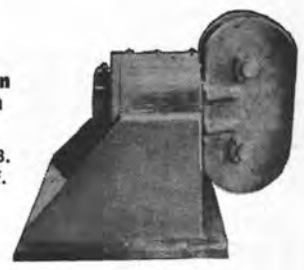
Dependable and Ruggedly built to perform consistently year after year with minimum maintenance.



Standard Design $995 each

Deluxe Design $1250 each

Model Design $1350 each



PRICES ARE F.O.B. PORTLAND, ORE.

SPECIAL MARINE ITEMS

HIGH SPEED COUPLINGS

(Flexible Couplings between Turbines and Reducing Gear)

1—Set from C3-S1-A3 Vessel

1—Set from C2 Vessel (Moore built)

1—Set from AP2 Victory Ship

PROPELLERS

From C2-SU Vessel

From C2 Vessel (Moore built)

From AP2 Victory Ship

From Liberty Ships and LST Vessels

PROPELLER SHAFTS

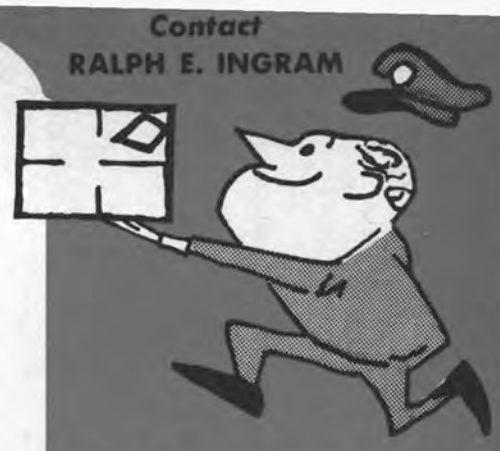
From C3-S1-A3 Vessel

From C2-S-B1 Vessel (Moore built)

From C2-SU Vessel

From Liberty Ships and LST Vessels

Contact
RALPH E. INGRAM



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on all your needs!

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AXIAL FLOW FANS

Rebuilt—Guaranteed

LaDel, STURTEVANT etc.

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

EXAMPLE LISTING:

Size A1¼	**@ $160 each**
Size A1½	**@ $185 each**
Size A1	**@ $215 each**
Size A2	**@ $290 each**
Size A3	**@ $350 each**
Size A4	**@ $410 each**
Size A5	**@ $500 each**
Size A6	**@ $550 each**
Size A8	**@ $630 each**
Size A10	**@ $695 each**
Size A12	**@ $750 each**
Size A16	**@ $900 each**

PRICES ARE F.O.B. PORTLAND, OREGON

SPERRY GYRO COMPASSES

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

Machinery and EQUIPMENT as removed from S.S. "JAMES O'HARA" (AP-179) C3-S1-A3

for Immediate Sale!

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CARGO HOISTER BLOCKS

5 ton rated, steel, as removed from surplus Liberty Ships. Manufactured by Young, Draper, etc. 12" or 14" sizes, your choice

$29.50 each

$35.00 each with pull test certificates.

HP TURBINE, Allis-Chalmers, Impulse Reaction type, 5003 RPM, 740° F, 440 PSI, Serial #1737.

LP TURBINE, Allis-Chalmers, Straight Reaction, Type, 4289 RPM, 740° F, 440 PSI, Serial #1738.

2 — TURBINE GENERATORS, Allis-Chalmers, Turbines: Impulse Condensing Type, 740° F, 440 PSI, 8000 RPM, Generators: 300 KW, 240 Volts DC, 2 wire, 1200 RPM.

CARGO WINCHES
2—Jaeger, 2 drum, 2 speed, 50 HP, 230 DC.
2—Parkersburg, 2 drum, 1 speed, 50 HP, 230 DC.
2—O.C.S., 2 drum, 1 speed 50 HP, 230 DC.
2—Vulcan, 1 drum, 2 speed, 50 HP, 230 DC.
2—American Hoist & Derrick, 1 speed, 1 drum, 50 HP, 230 DC.

SALT WATER EVAPORATOR, Davis, Size 36-17, rated 2500 lbs. per hour.

MAKE UP FEED EVAPORATOR, Davis, Size 26-8, rated 1500 lbs. per hour.

LAKESHORE TOPPING WINCHES, single speed, capacity 10,000 # at 67 FPM, 5 HP, 230 DC.

ANCHOR WINDLASS, Markey, Type CWA-4, horizontal, double wildcat—for 2 5/16" anchor chain, 70 HP, 230 DC.

MAIN CONDENSER, Allis- Chalmers, 7800 sq. ft. cooling service, 2 pass, horizontal.

LUBE OIL PURIFIER, Sharples, Type M-34-W-22U43, 350 GPH, 230 Volts DC Motors.

FUEL OIL STANDBY PUMP, Worthington, horizontal duplex, Size 5½" x 3" x 6", 13 GPM, 410 PSI.

GENERAL SERVICE PUMP, Worthington, vertical simplex, Size 12 x 14 x 18, 600 GPM, 50 PSI.

FIRE & STANDBY PUMP, Worthington, vertical duplex, Size 12 x 8½ x 12, 400 GPM, 150 PSI.

BOILER FEED PUMP, Worthington Auxiliary, vertical simplex, Size 11 x 7 x 24, 120 GPM, 550 PSI.

FRESH WATER PUMPS, 2—Worthington, Size 4x6, horizontal duplex, 100 GPM, 80 PSI, 7½ HP, 230 DC.

BALLAST PUMP, Allis-Chalmers, Type SGV, Size 5 x 5, double suction, vertical centrifugal, 600 GPM, 30 PSI, 20 HP, 230 DC.

SUBMERSIBLE BILGE PUMPS, 2—Worthington, 5", vertical centrifugal, 600 GPM, 30 PSI, 20 HP, 230 DC.

BILGE PUMP, Allis-Chalmers, Size 5 x 5, Type SGV, double suction, vertical centrifugal, 600 GPM, 30 PSI, 20 HP, 230 DC.

EVAPORATOR TUBE NEST DRAIN PUMPS, 2—Allis-Chalmers, Type SS-LH, horizontal, Size 2½ x 2, 17 GPM, 127' head, 5 HP, 230 DC.

MAIN CONDENSATE PUMPS, 2—Allis-Chalmers, Type CF-2V, vertical volute, Size 6 x 3½, 170 GPM, 208' head, 20 HP, 230 DC.

DISTILLER CONDENSATE PUMPS, 2 — Allis-Chalmers, Type SS-L, horizontal centrifugal, Size 4 x 2, 45 GPM, 2 HP, 230 DC.

AUXILIARY CONDENSATE PUMPS, 2—Allis-Chalmers, Type CF-2V, vertical volute, Size 2½ x 1½, 30 GPM, 208' head, 7½ HP, 230 DC.

DIESEL OIL PUMP, Viking, Type ZKK, gear type, Size 3 x 2½, 40 GPM, 30 PSI, 2 HP, 230 DC.

DISTILLER FRESH WATER DISTRIBUTION PUMPS, 2—Allis-Chalmers, Type SS-DH, horizontal centrifugal, Size 2½ x 2, 55 GPM, 51' head, 2 HP, 230 DC.

FIRE PUMPS, 2—Allis-Chalmers, Type B2-V, vertical centrifugal, Size 4 x 3, 400 GPM, 280' head, 50 HP, 230 DC.

MAIN FEED PUMP, Terry Turbine, Type ZS-1, 124 HP, with Ingersoll-Rand horizontal pump, Size 4 x 3½, 4 stage, 250 GPM, 1340' head.

STEERING GEAR PUMP, Waterbury, Size 5, Type K, with Westinghouse Motor, 55 HP, 230 Volts DC.

LUBE OIL SERVICE PUMPS, 2—Quimby, vertical screw, Size 5, 400 GPM, 48 PSI, 6 x 5, 25 HP, 230 DC.

FUEL OIL TRANSFER PUMP, Quimby, vertical screw, Size 4D, 225 GPM, 50 PSI, 15 HP, 230 DC.

FUEL OIL SERVICE PUMP, Quimby, vertical screw, Size 2½, 20 GPM, 400 PSI, 2½ x 1½, 10 HP, 230 DC.

ICE WATER CIRCULATING PUMP, Allis-Chalmers, Type SS-RH, 10 GPM, 81' head, 1" x ¾", vertical volute, 1 HP, 230 DC.

HOT WATER CIRCULATING PUMP, Allis-Chalmers, Type SS-HH, 35 GPM, 70' head, 1¼ x 1¼, vertical volute, 2 HP, 230 DC.

REFRIGERATION CONDENSER CIRCULATING PUMPS, 2—Allis-Chalmers, Type SJK, 180 GPM, 81' head, 2½ x 2, horizontal volute, 7½ HP, 230 DC.

MAIN CONDENSER CIRCULATING PUMP, Allis-Chalmers, Type LS-V, 12,550 GPM, 20' head, 20 x 20, vertical volute, 100 HP, 230 DC.

AUXILIARY DISTILLER CIRCULATING PUMPS, 2—Allis-Chalmers, Type SG, 650 GPM, 29' head, 5 x 5, horizontal volute, 7½ HP, 230 DC.

AUXILIARY CONDENSER CIRCULATING PUMPS, 2—Allis-Chalmers, Type SE-V, 2820 GPM, 29.2' head, 12 x 12, vertical volute, 40 HP, 230 DC.

AIR COMPRESSOR, Ingersoll-Rand, Type 40, 2 stage, air cooled, 194 CFM, 110 PSI, 40 HP, 230 DC.

FORCED DRAFT BLOWERS, 2—American Blower, Sirocco capacity 17560 CFM, 5½ SP, 75 HP, 230 DC.

COURSE RECORDER, Sperry, Mark 65091.

AUTOMATIC PILOT, Sperry, Mark 642840.

LIFEBOAT DAVITS, 2—sets, Welin, gravity trackway type, Size 135, capacity 21,500#.

AIR COMPRESSOR, Chicago Pneumatic, 161 CFM, 100 PSI, 2 stage, air cooled, Model PB2, 40 HP, 230 DC.

Attention Shipbuilders!

FORGED STEEL LINE SHAFTING

Excellent buys on used—good shafting for re-machining to your requirements:

6—Sections 19" diameter, 23'—11" long, flanged

1—Section 19" diameter, 23'—8" long, flanged

3—Sections 19" diameter, 22'—10" long, flanged

12—Sections 19" diameter, 22'—6" long, flanged

6—Sections 14⅛" diameter, 26'—6" long, flanged

2—Sections 14⅛" diameter, 18'—6" long, flanged

2—Sections 14⅛" diameter, 13'—9" long, flanged

39—Sections 13½" diameter, 22'—0" long, flanged

15—Sections 13½" diameter, 14'—0" long, flanged

1 Only, Model 17-DE-90

CLYDE WHIRLEY CRANE

LIFTING RATE: 25 tons at 50 foot radius at 50 to 60 FPM.

BOOM: 80' to headblock (with 10' whip)—WHIP: 10 tons at 125 FPM—2 part line—TRACK CENTERS: 20' — ENGINE: Cummins HBIS 601, 180 HP supercharged, elec. start —MOTORS: each leg (4 tot.) 7½ HP, 230 DC—POWER: Diesel Electric (DC).

1 Only

ORTON WHIRLEY GANTRY

With specifications similar to Clyde 17-DE-90. Complete specifications and prices on request.

SALT WATER EVAPORATORS

Overhauled—Tested

Used, Davis Engineering or equal, with ABS and/or Coast Guard certification. 5 sizes available:

SIZE 48-23
SIZE 36-17
SIZE 36-14
SIZE 26-8
SIZE 20-5

PROMPT QUOTATIONS & DELIVERY

ELECTRIC MOTORS

Many Radio, Radar & Electronic Equipment. Motor-Generator Sets. Let us have your inquiries.

MISCL. D.C. MOTORS

1—Westinghouse, 304 HP, 115 V, DC, 900 RPM, Sh. Wd., 2 pedestal bearings.

3—Allis-Chalmers, 50 HP, 230 V, DC, 600 RPM, Comp'd Wd., Mod. MDS-11975.

6—Westinghouse, 50 HP, 230 V, DC, 600 RPM, Comp'd Wd., Type CK, Fr. 9.

4—Westinghouse, 9.3 HP, 230 V, DC, 640/852 RPM, Type SK, Fr. 93.

20—Westinghouse, 7½ HP, 120 V, DC, 1750 RPM, Stab. Sh. Wd., Type SK, Fr. 43.

Others in stock: 5 HP & up . . . 115 & 230 V.

230 VOLT D.C. MOTORS

1—250 HP, G.E., Type CY, Form HJ, Model 24G, 1200 RPM Horizontal, 2 B.B., Shunt Wd.

2—220 HP, G.E., Type CDM—1348S, Form HA, Model 25G 339, 1800 RPM, Stab. Sh. Wd. Horizontal, 2 B.B.

6—100 HP, Westinghouse, Type SK, FR. 163, Style 1B4631, 1150 RPM, Shunt Wd. Horizontal, 2 B.B.

2—55 HP, Electro-Dynamic, FR 25-SL, 550 RPM, Compound Wound, Single Ball Bearing. Originally for high pressure Air Compressor.

6—50 HP, Westinghouse, 600 RPM, Compd. Wd., Type CK, FR 9, Horizontal 2 B.B.

1—40 HP, Allis-Chalmers, 1750 RPM, Compound Wound, Horizontal, 2 B.B.

1—40 HP, G.E., Type CDM, FR 95, Model 35A1663, 1800 RPM, Compound Wound, Horizontal, 2 B.B.

1—18/25 HP, Electro-Dynamic, 1225/1750 RPM, Compd. Wd., FR. 7½ S, Horizontal, 2 B.B.

6—15 HP, Allis-Chalmers, 1225/1750 RPM, Stab. Sh. Wd., Type EB90, Horizontal, 2 B.B.

2—10 HP, Allis-Chalmers, 1225/1750 RPM, Compd. Wd., Type EB80, Horizontal, 2 B.B.

4—9.3 HP, Westinghouse, 640/852 RPM, Type SK, FR. 93.

120 VOLT D.C. MOTORS

1—304 HP, Westinghouse, 900 R.P.M., Shunt Wound, Horizontal, Pedestal Bearing.

3—25 HP, G.E., Type CDM, 1200 R.P.M., Horizontal, 2 B.B., unused. Removed from M.G. Sets.

20—7½ HP, Westinghouse Type SR, FR 43, Stab. Sh. Wd., 1750 RPM,.

STEERING GEAR MOTORS

2—General Electric, 30 HP, 230 V, DC, 600 RPM, Stab. Sh. Wd., Type CDM, Fields Continuous Duty, Armature 1 Hr.

1—Westinghouse, 35 HP, 230 V, DC, 850 RPM, Stab. Sh. Wd., Type SK, Fr. 123, Fields Continuous Duty, Armature 1 Hr.

SHIP'S LIGHTING M-G SETS

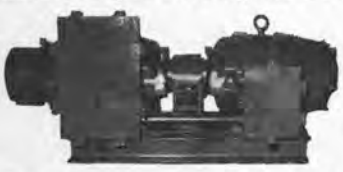
230 V, DC/115 V, DC. Ship's Lighting M.G. Sets for C3-S1-A-3 150 K.W. and Moore built C2 100 K.W.

SPECIAL D.C. GENERATORS

3—Unused, G.E., 15 KW, 100 A, 15 V, Type CDM, 1200 RPM, 2 B.B., D.P. Generators.

MOTOR-GENERATOR SETS

Unused Surplus in Original Boxes



Janette M-G Sets. Input: 1.75 HP, 230 V, DC, 7.2 Amperes, 1800 RPM. Output: 1-KVA (.85 KW), 115/1/60, 4 ball bearing, with speed regulator, and with noise filters. Navy Type CJM-21151, continuous duty. Net weight 435 #, Dimensions 44" L, 19½ W, 18⅝" H. Instruction book and parts list included.

D.C. MARINE CONTROLLERS

1—Cutler-Hammer, 250 HP, 230 V, DC, No. 232 793A14.

2—General Electric, 225 HP, 230 V, DC, CR 5430-B32D.

6—Westinghouse, 100 HP, 230 V, DC, Type 8585A SO-1B4636.

1—Cutler-Hammer, Unused, 50 HP, 230 V, DC, No. C280981A290, Contactor Panel for Stern Anchor Haulage Winch. Many others from ¼ HP & up—115 and 230 V.

ROTOTROLS

15—Westinghouse Rotorols, driven by 5 HP, 440 V, 3 phase, 60 cycle, 1700 RPM, AC Motors.

D.C. TRANSFER PANEL

Cutler-Hammer, 3-pole, 300 A, 120/240 V, DC, Bul. 6007, No. B870102A2.

SPARE ARMATURES

For C-3-S1-A3 Auxiliaries . . . Send for List A-1. Many others — Let us have your inquiries.

SWITCHBOARDS

Westinghouse Propulsion Control Switchboards as used on S-4 Vessels. AC and DC Switchboards. Let us know of your requirements.

CIRCUIT BREAKERS

2 and 3 Pole Air Breakers, 2 and 3 Pole Molded Case Navy Type Breakers. 2 and 3 Pole Trip Elements for Molded Case Breakers.

Need 3 Wire 120/240 Volts DC for Shore Power? Motor-Generator Sets and Engine Driven Units from 15 KW to 500 KW . . . Let us quote.

D.C. GENERATORS

2—500 KW, 120/240 V, Westinghouse FR. CB813.7, 750 RPM, 2 Pedestal Bearing, with Balance Coils. Removed from GM 8-278 Engines.

2—250 KW, 120/240 V, Westinghouse, 1200 RPM, Single Pedestal Bearings. Balance Coils not available, Type 12S18P107PH, removed from Turbines.

2—150 KW, 120 V, G.E., Type CDM-1348-S, Form HA, Model 25G 340, 1800 RPM, Compound Wound, Horizontal 2 B.B.

1—150, 120 V, GE, Type CDM, Form AA, Model 24G, 1200 RPM, Compound Wound, Horizontal, 2 B.B.

6—100 KW, 120/240 V, Westinghouse, Type SK, FR. 143.8, 1800 RPM, Single Ball Bearings. Balance Coils available.

3—100 KW, 120/240 V, Delco, 1200 RPM, Single Bushed Bearings, with Balance Coils. Removed from Superior GDB-8 Engines.

1—100 KW, 120/240 V, Allis-Chalmers, 1200 RPM, Single Sleeve Bearing, Shunt Wound, Type 4-14-45-13, removed from GM 3-268A Engine.

10—90/165 KW, Westinghouse, 125/400 Volt, Type SK, FR. 185, Shunt Wound, separately excited (120 V), 1200 RPM, Horizontal, 2 B.B.

4—75 KW, 120 V, G.E., Type CDM-1234, Mod. 24GA71, 1200 RPM, 2 Ball Bearing, Tapered Shaft. Removed from Motor-Generator Sets.

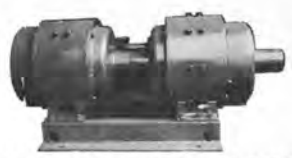
6—60 KW, 120 V, Westinghouse, Type SK, FR 143, Style 3B2855-PH, 1800 RPM, 1 B.B. Removed from Turbines.

6—60 KW, 120 V, Westinghouse, Type SK, FR. 153-L, Style 1B4632, 1200 RPM, Compound Wound, Horizontal, 2 B.B.

A.C. TO D.C. M.G. SETS

From 250 Watts to 500 KW in 115 Volt, 230 Volt and 120/240 Volt, 3 Wire DC. Any drive including Synchronous Motor. Let us have your inquiries.

Reconditioned MOTOR GENERATOR SETS



MANY SMALLER UNITS IN STOCK

230 VOLTS D.C. TO A.C.

Hertner. Input: 230 V, DC, 24A. Output: 3.5 KVA, 440 V, 60 cy., 3Ø.

Hertner. Input: 230 V, DC, 28A. Output: 5 KVA, PF .85, 115 V, 60 cy., Ø1.

Continental. Input: 230 V, DC, 28A. Output: 7.5 KVA, 3.5 KW, 120 V, 1Ø, 60 cy., 62.5A.

Century. Input: 10 HP, 230 V, DC. Output: 7.5 KVA, 3.75 KW, 120/1/60.

Bogue. Input: 230 V, DC, 57A, 15 HP. Output: 10 KVA, PF .8, 120 V, 60 cy., 1Ø.

Fidelity. Input: 15 HP, 230 V, DC. Output: 12.5 KVA, 10 KW, 120/1/60.

Bogue Electric. Input: 15 HP, 230 V, DC. Output: 12.5 KVA, 10 KW, 120/1/60.

Burke Electric. Input: 20 HP, 230 V, DC. Output: 25 KVA, 12.5 KW, 120/1/60.

General Elec. Input: 25 HP, 230 V, DC. Output: 18.75 KVA, 15 KW, 120/1/60.

Star Kimble. Input: 30 HP, 230 V, DC. Output: 25 KVA, 20 KW, 120/1/60.

Ideal. Input: 40 HP, 230 V, DC. Output: 31.3 KVA, 25 KW, 450/3/60.

Star Elec. Input: 40 HP, 230 V, DC. Output: 33.4 KVA, 25 KW, 450/3/60.

General Elec. Input: 230 V, DC, 40 HP. Output: 25 KW, 480 V, 60 cy, 3Ø, 24A, 1800 RPM.

Star Elec. Input: 125 HP, 240 V, DC. Output: 93.75 KVA, 75 KW, 450/3/60.

115 VOLTS D.C. TO A.C.

Marathon. Input: 1 HP, 115 V, DC. Output: .500 KVA, .425 KW, 115/1/60.

Bludworth. Input: .75 HP, 115 V, DC. Output: .500 KVA, .450 KW, 115/1/60.

Elec. Spec. Input: 1 HP, 90/130 V, DC. Output: .500 KVA, .500 KW, 115/1/60.

Century. Input: 1.5 HP, 115 V, DC. Output: .750 KVA, .600 KW, 102/1/60.

Janette. Input: 13 Amp, 115 V, DC. Output: 1 KVA, 110/1/60.

Elect. Prod. Input: 1.5 HP, 115 V, DC. Output: 1 KVA, 115/1/60.

Allis-Chalmers. Input: 14 Amp, 115 V, DC. Output: 1.250 KVA, 1 KW, 115/1/60.

Cont. Elect. Input: 6 HP, 115 V, DC. Output: 2.9 KW, 440/3/60.

Louis Allis. Input: 10 HP, 105/130 V, DC. Output: 7.5 KVA, 440/3/60.

Cont. Elect. Input: 12 HP, 120 V, DC. Output: 7.5 KVA, 440/3/60.

Star Elect. Input: 12½ HP, 115 V, DC, 1800 RPM. Output: 7½ KW, 120 V, 60 Cy.

Ideal. Input: 40 HP, 115 V, DC. Output: 31.3 KVA, 25 KW, 450/3/60.

Continental. Input: 50 HP, 115 V, DC. Output: 50 KVA, 25 KW, 120/3/60.

Burke. Input: 20 HP, 115 V, DC. Output: 25 KVA, 12½ KW, 120/1/60.

RCA. Input: 4 HP, 105/130 V, DC. Output: 2.22 KVA, 2 KW, 120/1/60.

INGERSOLL-RAND
PUMPS
From Ex-Naval Vessels

FIRE & FLUSHING PUMP

200 GPM—total head 224'—discharge pressure 100 PSI — 3½" suction — 3" discharge — 3500 RPM—bronze construction—flanged. MOTOR: 20 HP — 440/3/60/3600 RPM — G.E. type K.F.—frame 326 — full load amps 28 — fan cooled — ambient 50°C—class B insulation—totally enclosed — Navy Service A. DIMENSIONS: OAL 37¼"—OAW 18 31/32"—OAH 18½"—total weight 1225 lbs. Reconditioned.

$397.50

FIRE & BILGE PUMP
Self-Priming

200 GPM—bronze—224' head—90/100 lbs fire service—suction lift 23'—3500 RPM. MOTOR: 20 HP—440/3/60/3500 RPM—28 amps—G.E. type KF—frame 326—class B—totally enclosed—Navy Service A — 3½" suction — 3" discharge. PRIMER MOTOR: 1½ HP — 440/3/60/3600 RPM—fan cooled—totally enclosed—2.2 amps. Nash priming pump complete with priming valve. Reconditioned.

$497.50

THE BOSTON METALS COMPANY

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NEW — UNUSED
ROSS COOLERS
FOR LUBE OIL SERVICE

Screw connections — copper jacket — cupro-nickle tubes. 8" diameter x 6'3" length—84 sq. ft. surface. Water inlet 3"—outlet 3". Oil inlet 2½". Two Pass. Complete with zinc plugs.

$695

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Wanted - Tug Boats

Well qualified company wishes to obtain tug boats with long term contracts on charter/purchase basis.

We are well qualified to operate worldwide.

Interested parties please contact

MOSS TOWING, TRANSPORT & SALVAGE
456 Post Street Suite 708
San Francisco, California 94102
Houston, Texas 713 CL 3-5353

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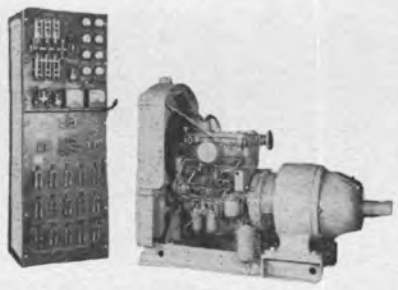
15 KW DIESEL
GENERATOR SET



Hercules DOCC 4" X 4½" diesel engine. Generator: Fidelity Electric — LCD3 — 15 KW — 120/240 Volts DC—62.5 amps. With switchboard and automatic transfer switch. From C2-S-AJ2—North Carolina built. Good operating condition.

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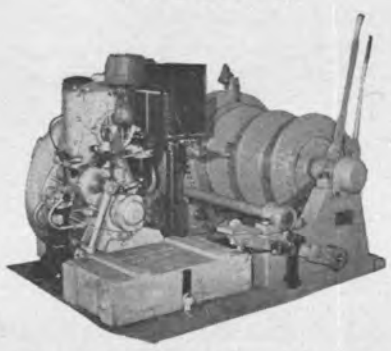
NEW
2500 LB DIESEL WINCHES



Small general purpose winches, mfg by Jaeger. Rated 2500 lbs @ 75 FPM. Driven by air-cooled Enfield single Cylinder diesel engine. Declutchable free spooling drum has center flange which can be removed if required. Excellent for small vessel use and general purpose service on all vessels. Has spare parts box. Weight about 1500 lbs.

$1095 EACH

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RENT, LEASE OR SALE!

BARGE MOUNTED REVOLVING CRANE 50-Ton capacity, Barge dimensions: 57' wide x 190' long.
CRANES-WHIRLEYS: One American 1956 model R20 HHE heavy duty 50 Ton. One practically new American model 254 capacity 90 Tons at 50', 25 Tons at 140'. One Clyde model 24E 50 Tons at 45'.
CONTINUOUS LIBERTY SHIP DISMANTLING—Marine parts always available.
STEEL BARGES AVAILABLE IMMEDIATELY—180'x42'x 12' and 150'x42'x12'—A.B.S. Newly Constructed. OTHER SIZES ALSO AVAILABLE.

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T-2 TANKER VALVES

24" OVERBOARD DISCHARGE VALVES

Reconditioned to ABS standards

LOW INJECTION VALVE

Rebuilt to ABS and Coast Guard requirements

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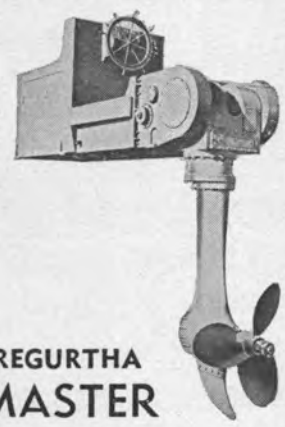
DIESEL PROPULSION UNITS



MURRAY & TREGURTHA
HARBORMASTER

3 Model 0-7 units in stock. Powered by twin GM 6-71 diesels with hydraulic clutch & electric steering. Propeller diam. 64" pitch 48". Tailfin raised & lowered mechanically. 7' from bottom of unit to propeller hub center. Weight about 20,000 lbs. Propeller speed 308 RPM. Unit can develop up to 500 HP. Formerly used on Cargill Grain Co. barge "Carpolis". Actual photo on request. Can be demonstrated running in shop.

1—0-6 Series — Single engine — GM 6-71. Hydraulic controls—electric steering. PROPELLER: Maximum RPM 308—64" diameter—48" pitch. Deck to centerline of propeller 7½'.

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NEW-UNUSED LIBERTY SHIP
Troy-Enberg 20 KW Generators

WHILE THEY LAST

$695 CLOSE OUT PRICE

Factory Packages

120 volts DC—400 RPM—drip-proof marine type. 2-Wire direct connected set. Reciprocating 6 x 7 type E vertical self-oiling steam engine—plug & piston valve—220 lbs PSI—80 lbs. BP.

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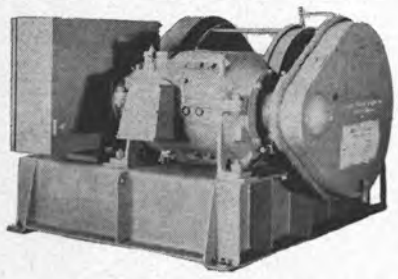
AH & D CARGO WINCH



American Hoist & Derrick—single speed—single drum—all steel cargo winches. 7250 lbs @ 220 FPM based on first layer of ¾" rope. Drum 18" diameter—20" wire. G. E. Motor—50 HP—230 volts—600 RPM. Excellent condition. Priced with controls.

ALL REBUILT BY USMC

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VERTICAL BOILER

Suitable for

Pile Drivers
Steam Cranes
Hoists
etc.

100 HP @ 100 PSI. Water heating surface 747 sq. ft.—total heating surface 1144 sq. ft. A.S.M.E. Built by International Boiler Works—East Stroudsburg, Pa.—Height to top of cylinder 12'0"— Diameter 66"—4" main steam line—two 1½" safety valves—practically new—very little if any use. Oil burning.

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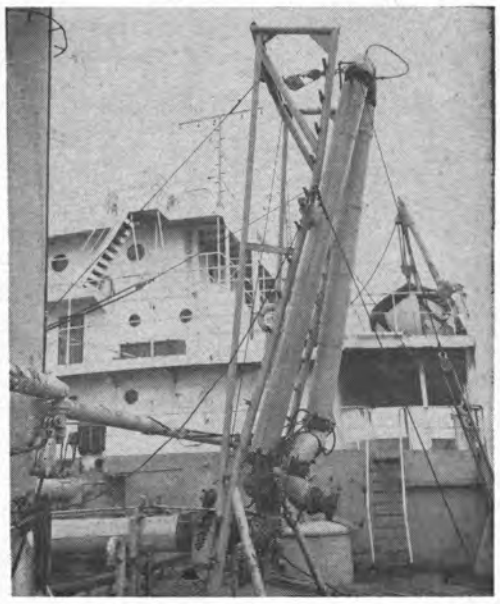
Molten Sulphur, Asphalt, Oil, Etc.



2 Sets—"Chicksan" unloading gear. Each pipe about 20'—total outreach 40'. Steam jacketed.

Complete with "A" frame.

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BERGER
Self - Aligning
MARINE FAIRLEADS

Model 626—for 2" wire. 26" Sheave—shank opening 9½"—4960 lbs.—BASE: 36" long—50" wide—throat 9½".

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WINDLASS FOR 1" CHAIN

New—unused. Single wildcat—P.C. type—gypsy head 19" diam. x 12" high—driven by 7½ HP 120 volt DC motor, with all controls and spare parts, including spare motor armature. Mfg by McKiernan-Terry.

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LESLIE PUMP GOVERNOR VALVE

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

$495

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AXIAL FLOW FANS

NEW
UNUSED
230 V. D.C.

Navy size A10D2W6—LaDel Co., 10,000 CFM @ 3" S.P. MOTOR: Reliance Motor Co.—7.5/3.1 HP, 230 VDC—1310/1750 RPM. DIMENSIONS: 32⅛" OD—31¼" BC—29¼ ID—40¾" length.

$450.00

Navy size A8D2W5—Buffalo Forge Co.—8000 CFM @ 3" S.P. MOTOR: G.E. 6/1.8 HP—230 VDC—1310/1750 RPM. DIMENSIONS: 30 9/16" OD—29¼" BC—27¼ ID—37¾" length.

$329.50

AF80—Sirocco—8000 CFM @ 2" S.P. MOTOR Welco 4/1.9 HP—230 VDC—1310/1750 RPM. DIMENSIONS: 30½" OD — 29¼ BC — 27¼ ID—37¾" length. U.S. Maritime type fan.

$329.50

AF100—Sirocco—10,000 CFM @ 2" S.P. MOTOR: Welco 5/2.2 HP—230 VDC—1310/1750 RPM. DIMENSIONS: 32½" OD—31⅛" BC—29¼ ID—40⅜" length. U.S. Maritime type fan.

$375.00

NEW — UNUSED — 115 V.D.C.

20000 C.F.M. — 115	10000 C.F.M. — 115
16000 C.F.M. — 115	5000 C.F.M. — 115 (explosion-proof)
12000 C.F.M. — 115	4000 C.F.M. — 115

RECONDITIONED — 440 V.A.C.

A1A4W5 to A16A4W5—with starter—440/3/60

1000 C.F.M.	6000 C.F.M.
2000 C.F.M.	8000 C.F.M.
3000 C.F.M.	10000 C.F.M.
4000 C.F.M.	16000 C.F.M.

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539-1900 (301) 355-5050

EVERYTHING IN C-1MAV-1 EQUIPMENT

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DUPLEX STRAINERS
in good condition

4" **$349.00**
22" x 3" between mounting holes

2" **$249.00**
15" x 3" between mounting holes

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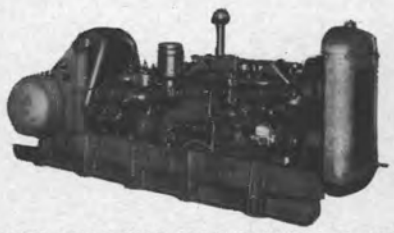
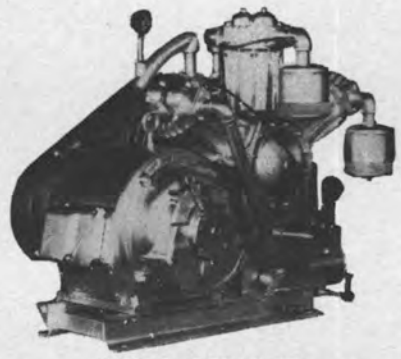
SHIPBOARD AIR COMPRESSORS



DIESEL-DRIVEN INGERSOLL RAND

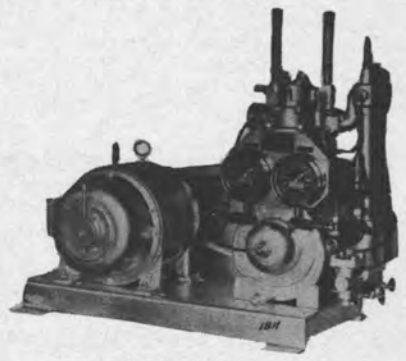
Ingersoll-Rand compressor—315 cu. ft. at 125 lbs. —driven by International Harvester UD-18 diesel. Tank mounted on skid—radiator cooled—from Corps of Engineers salvage vessel.



SHIPS SERVICE

Ingersoll-Rand—type 30—class R—5x5x4x4—50 CFM @ 150 lbs. 20 HP 440/3/60 motor & controls—1750 RPM—50°C—class A. Complete with centrifugal unloader. OAL 4' 1⅛"—OAH 3' 2½" —OAW 2' 6½"—total weight 1505 lbs.

$1250



DIESEL STARTING

Ingersoll-Rand type 30—class T—4 x1½x3½—10 CFM at 600 lbs.—7.5 HP—motor is 440/3/60—1750 RPM—class A—50°C—weight 700 lbs. Complete with inter- and after cooler. OAL 3'6"—OAH 4'1½"—OAW 2'2¾".

$1750

T2 TANKER SHIPS SERVICE

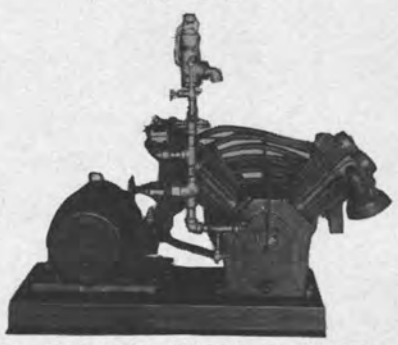
Worthington—5½x3⅛x3½—VA2—20 CFM @ 100 lbs. Motor 5 HP—440/3/60—1750 RPM—marine type ball-bearing drip-proof—fan cooled—with magnetic starter & self-unloader. OAL 4' 8½" —OAH 28"—OAW 25 5".

$695

T2 TANKER COMBUSTION CONTROL

Ingersoll-Rand type 30—5x5 & 4x4—54.4 CFM @ 100 lbs. Motor 15 HP—440/3/60—1750 RPM—with magnetic control, self-unloader, etc. Weight complete 1122 lbs. OAL 4' 11¼"—OAH '2 10"—OAW 2' 7¾".

$995



T2 TANKER SHIPS SERVICE

Ingersoll-Rand type 30—model 253x5—5x3x3½ —20 CFM @ 100 lbs—self unloader. Westinghouse 5 HP 440/3/60 motor.

$695

T2 TANKER COMBUSTION CONTROL

Worthington 6½x3½x4—VA2—52 CFM @ 100 lbs. Motor is 15 HP—440/3/60—1750 RPM. Complete with magnetic starter, self-unloader, etc.

$995

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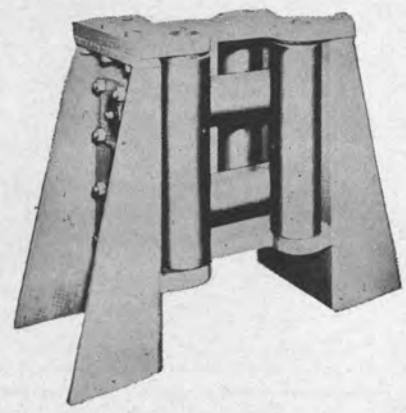
NEW 7" RADIUS PANAMA CHOCKS

(Meet Panama Regulations)

With Extended Legs For Welding To Deck

Clear opening 10" x 14" — 7" radius — with extended legs for welding to deck. Use as double or single bow chock. OAL 28" on base — OAW 14" — OAH 27¾" — Cast Steel.

IMMEDIATE DELIVERY FROM STOCK



NEW UNIVERSAL CHOCKS

6 Rollers—2 horizontal and 4 vertical. For fairleads in all directions — inboard and outboard. Strong construction—easy to maintain. Fulfills all requirements of St. Lawrence Seaway, etc. Excellent for container chips. 5½" Rollers for vessels up to 20,000 tons. For vessels from 20,000 to 150,000 tons, series L with 7⅝" rollers. OAH 30"—OAL 30"—OAW 17".

BULWARK-MOUNTED CHOCKS

for curved or flat plate

7" RADIUS—14" x 10" opening

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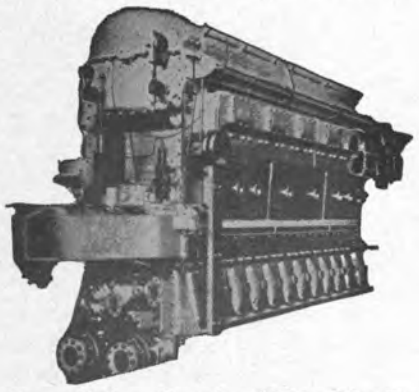
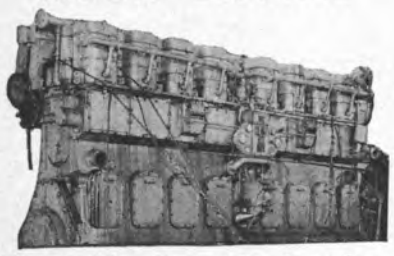
FAIRBANKS - MORSE 38D8 1/8 DIESEL



(4)—10 Cylinder—2-cycle—1800 HP @ 800 RPM. 8⅛x10—air starting—reversible. Complete with Harrison coolers, sylphon valves, strainers, filters, etc. For immediate delivery.

COOPER-BESSEMER DIRECT REVERSIBLE MAIN ENGINE

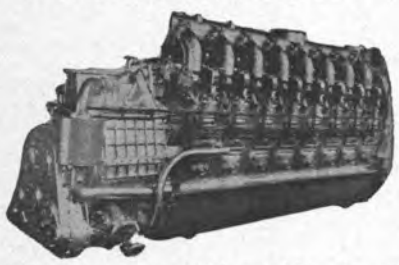


Type LS — 15½ x 22 — turbo-charged engine—BHP 1300 @ 270 RPM. Air starting @ 250 lbs. Complete with air tanks, heat exchanger and all accessories. Preserved in equal-to-new condition. Also spare pistons, cylinder liners, valves, etc. Still aboard Corps of Engineers vessel. Serial No. 2172—Buchi Turbo-charged.

NORDBERG DIESEL From C1-MAV-1

Practically new—complete—with very little use. 1700 HP @ 180 RPM—6-cylinder—21½"x29"—complete with all heat exchangers, strainers, etc.

G.M. 16-278A 1700 BHP MAIN PROPULSION DIESEL ENGINES



16-Cylinder Vee type—8¾ x 10½. Air starting—never run commercially. All taken from Navy D.E. vessels. You'll be surprised by the good condition of these engines. Buy now and save.

USE AS PROPULSION ENGINES OR BUY FOR PARTS

You'll be surprised at the condition. Only 6 engines remaining for sale.

$9750.00

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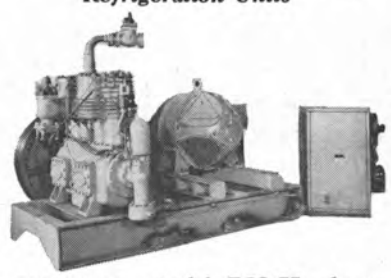
CARRIER REFRIGERATION UNITS

40-Ton Air Conditioning & Cargo Refrigeration Units



Carrier compressor—model 7G8-EF—freon compressor with manual cylinder cut-out—426 RPM—39.4 tons—suction temp. 45°F—cond. temp.—105°F—35 HP—230 volt DC motor. Complete with motor control—refrigeration condenser—receiver — fittings. 8 Complete units. Dimensions: Compressor 6'8½" long—4' 10½" OAW—approx. 6' high over suction connection. Condenser about 14' long—approx. 12" diameter. Just removed from Grace Line vessels. Excellent for fishing industry, banana boats, air-conditioning quarters, etc.

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New Watertight Doors

FOR IMMEDIATE DELIVERY

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

SIZES:
26" x 48"
26" x 57"
26" x 60"
26" x 66"
30" x 60"

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M.G. SETS

NEW JANETTE 1 KVA SETS

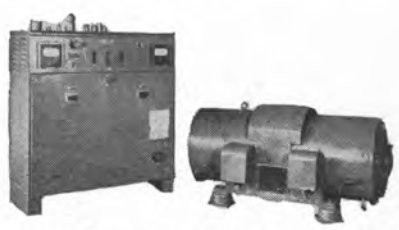
2-Bearing Sets—type D.E.—3L. MOTOR INPUT: 2 HP—115 volts DC—3.5 amps—1800 RPM. OUTPUT: type C.E.I.—120 volts 60 cycle single phase. 8.3 amps—40°C Temp rise—0.8 P.F.

$179.50

1.24 KW G.E. MG SETS

G.E. Motor—3 HP—115 volts DC—1800 RPM. OUTPUT: G.E. generator—1.24 KW—1.56 KVA—120/60/1—0.8 PF—14.2 amps—1800 RPM. With spare armature. Overspeed trip on motor side.

$339.50



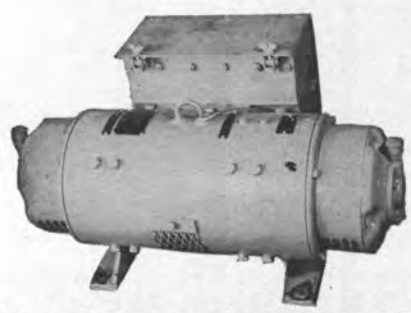
25 KW IDEAL M.G. SETS

INPUT: 40 HP—115 volts DC—290 amps—1800 RPM—frame 445. OUTPUT: Generator 31.5 KVA—25KW—440/3/60—1800 RPM. Control cabinet includes motor starter & generator control.

UNUSED SURPLUS 1 KVA SETS

INPUT: 1.75 HP—115 Volts DC—17 amps—1800 RPM. OUTPUT: 1 KVA—115 volts—8.7 amps—60 cycle single phase—0.9 PF. Unit is self-excited and will carry load immediately on starting. Regulation ±5%. Complete with magnetic starter & spare parts. Units designed and built to rigid Navy specs. SIZE: 19.5" long—26.5" wide—16" high. Weight 285 lbs. SPARES: 85 lbs. CONTROL: 20"X15"X10"—75 lbs.

$189.50



NEW 0.5 KVA HERTNER SETS

Type CHT-211761. INPUT: Motor 115 volts DC—9.0 amps—1800 RPM—1 HP. OUTPUT: 0.5 KVA—115 volts single phase 60 cycle—4.3 amps—.85 PF.

$127.50

CONTINENTAL: 3.7 KW—Input: 7½ HP 230 volts DC/28 amps/1800 RPM. Type D-324X—continuous. Output: Generator type DS-324XB 3.7 KW/7.5 KVA/120/1/60—62.5 amps—0.5 PF compound wound.

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Gunnar Nelson, 2185 Lemoine Ave., Ft. Lee, N.J. 07024
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Research & Design Corp., 17 Battery Place, Suite 1227 New York, N.Y. 10004
Philip L. Rhodes, 369 Lexington Ave. ,New York, N.Y. 10017
M. Rosenblatt & Son, Inc., 350 Broadway, New York, N.Y. 10013 and 45 Second St., San Francisco, Calif.
Sanders & Thomas, Inc., 1st-Federal Bldg., Pottstown, Pa. 19464
George G. Sharp, Inc., 100 Church St., New York, N. Y. 10007
George Slifer, 1422 Lakewood Rd., Jacksonville, Fla. 32207
Philip F. Spaulding & Associates, 65 Marion St., Seattle, Wash. 98104
R. A. Stearn, Inc., 100 Iowa St., Sturgeon Bay, Wisc. 54235
Richard R. Taubler, 44 Court St., Brooklyn, N.Y. 11201
H. M. Tiedemann & Co., Inc., 74 Trinity Pl., New York, N.Y. 10006
Transcaribbean Shipping & Trading Corp., Panam Docks, Isla Grande, P.O. Box 564, San Juan, P.R. 00902
H. Newton Whittelsey, Inc., 17 Battery Pl., New York, N.Y. 10004
OIL & POLLUTANT DISPOSAL
Spentonbush Fuel Transport Service, 500 Fifth Ave., N.Y. 10036
OIL PURIFIERS—Repair
Norse Electric Mfg. Co., Inc., 57-59 Commerce St., Bklyn, N.Y. 11230
OILS—Marine—Additives
Esso International Inc., Esso Bldg., 15 West 51 St., New York, N.Y.
Gulf Oil Trading Co., 1290 Ave. of the Americas, New York, N.Y.
Mobil Oil Co., Inc., 26 Broadway, New York, N.Y. 10004
Refineria Panama, S. A., 277 Park Ave., New York, N.Y. 10017
Shell Oil Co., 50 W. 50 St., New York 10020
Texaco, Inc., 135 E. 42nd St., New York, N.Y. 10017

PAINT—Marine—Protective Coatings
Amercoat Corp., 201 N. Berry St., Brea, Calif. 92621
Devoe & Raynolds Co., Inc., Marine Division, Newark, N.J. 07105
Enjay Chemical Co., 60 West 49th St., New York, N.Y. 10020
International Paint Co., 21 West St., New York, N.Y. 10006
Mobil Chemical Company, Metuchen, N.J. 08840

PETROLEUM SUPPLIES
Independent Petroleum Supply Co., 277 Park Ave., New York 10017
Refineria Panama, S. A. 277 Park Ave., New York, N.Y. 10017
Shell Oil Co., 50 W. 50 St., New York 10020
Texaco, Inc., 135 E. 42nd St., New York, N.Y. 10017
The West Indies Oil Co., Ltd. St. John's, Antigua, W. I.

PLASTICS—Marine Applications
Atlas Minerals & Chemical Div., ESB, Inc., Mertztown, Pa. 19539
Hubeva Marine Plastics, Inc., 390 Hamilton Ave., Bklyn, N.Y. 11231
Philadephia Resins Co., 20 Commerce Dr., Montgomeryville, Pa. 18936

POLLUTION CONTROL
Enjay Chemical Co., 60 West 49th St., New York, N.Y. 10020
Tretolite Div., Petrolite Corp., 369 Marshall Ave., St. Louis, Mo. 63119

PROPELLERS: NEW AND RECONDITIONED
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans, La. 70150
Baldwin-Lima-Hamilton Corp., Phila., Pa. 19142
Bethlehem Steel Corp., Shipbuilding, 25 Broadway, N.Y., N.Y. 10004
Bird-Johnson Co., 883 Main Street, Walpole, Mass. 02081
Escher Wyss, G.M.B.H., 798 Ravensburg, Germany
Federal Propellers, 150 Buchanan Ave., S.W., Grand Rapids, Mich. 49502

PUMPS
De Laval Turbine, Inc., 853 Nottingham Way, Trenton, N.J. 08602

RATCHETS
American Forge & Mfg. Co., McKees Rocks, Pa. 15136
W. W. Patterson Co., 830 Broket St., Pittsburgh, Pa. 15233

REFRIGERATION—Refrigerant Valves
Bailey Refrigeration Co., Inc., 74 Sullivan St., Brooklyn, N.Y. 11231
Frigitemp Corp., 329 Herzl St. Brooklyn, N.Y. 11212
Thermo King Corp., 314 W. 90 Street, Minneapolis, Minn. 55420
York Corp., Grantley Road, York, Pa. 17405

ROPE—Manila—Nylon—Hawsers—Wire
American Mfg. Co., Inc., Nobie & West Sts., Brooklyn, N.Y. 11222
Cating Rope Co., 309 Genesee St., Auburn, N.Y. 13022
Columbian Rope Co., Auburn, N.Y. 13022
Jackson Rope Corp., 9th & Oley, Reading, Pa. 19604
Plymouth Cordage Company, Plymouth, Mass. 02364
Tubbs Cordage Company, 200 Bush St., San Francisco, Calif.

RUBBER PRODUCTS—Dock Fenders, Hose, Life Preservers
Hughes Bros., Inc., 17 Battery Pl., New York, N.Y. 10004

RUDDER ANGLE INDICATORS
Hose McCann Telephone Co., Inc., 524 W. 23rd St., N.Y. 10011
Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.

SEALS
Golten Marine Co., Inc., 160 Van Brunt St., Brooklyn, N.Y. 11231
Syntron, a division of FMC Corp., 398 Lexington Ave., Homer, Pa. 15748

SEARCHLIGHTS
Portable Light Co., Inc., 67 Passaic Ave., Kearny, N.J. 07032
Snelsen Oilfield Lighting Co., 1201 E. Daggett St., Fort Worth, Texas 76104

SEWAGE DISPOSAL
Youngstown Welding & Engineering Co., 3708 Oakwood Ave., Youngstown, Ohio 44509

SHIPBREAKING—Salvage
The Boston Metals Co., 313 E. Baltimore, Md. 21202
National Metal & Steel Corp., 1251 New Dock St., Terminal Island, Cal. 90731
Northern Metal Co., Minor & Bleigh Sts., Philadelphia, Pa. 19136
Peck Equipment Co., 3500 Elm Ave., Portsmouth, Va. 23704
Zidell Explorations, Inc., 3121 S. W. Moody St., Portland, Ore. 97201

SHIP BROKERS
Gulf Coast Marine, Inc., P.O. Box 52987, Houston, Texas 77052
Hughes Bros., Inc., 17 Battery Pl., New York, N.Y. 10004
Mowbray's Tug and Barge Sales Corp., 21 West St., N.Y., N.Y. 10006

SHIPBUILDING—Repairs, Maintenance, Drydocking
Albina Engine & Machine Works, 2100 N. Albina Ave., Portland, Ore. 97227
Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042
Astilleros de Codiz, S.A., Zurhono 72, 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. 28560
Bender Ship Repair, Inc., 265 So. Water St., Mobile, Ala. 36602
Bethlehem Steel Corp., Shipbuilding, 25 Broadway, N.Y., N.Y. 10004
Blount Marine Corp., P.O. Box 360, Warren, Rhode Island 02885
Brewer Dry Dock Co., Mariners Harbor, Staten Island, N.Y.
Ira S. Bushey & Sons, Inc., 764 Court St., Brooklyn, N.Y. 11231
Conrad Industries, P.O. Box 790, Morgan City, La. 70380
Dravo Corporation, Neville Island, Pittsburgh 25, Pa.
Equitable Equipment Co., Inc., 410 Camp St., New Orleans, La. 70130
Gotaverken American Corp., 39 Broadway, New York 6, N.Y.
Halifax Shipyards, Ltd., P.O. Box 640, Halifax, Nova Scotia, Canada
Halter Marine Services, Inc., Route 6, Box 287H, New Orleans, La. 70126
Hillman Barge & Construction Co., Grant Bldg., Pittsburgh 19, Pa.
Hitachi Shipbuilding Co., 25Nakanoshima2-chomeKitaku,Osaka-Japan
Ishikawajima-Harima Heavy Industries Co., Ltd., 50 Broad Street New York, N.Y. 10004
Jacksonville Shipyards, 644 E. Bay St., Jacksonville, Fla.
Jeffboat, Inc., Jeffersonville, Ind. 47130
Kawasaki Dockyard Co., 8 Kaigan-dori, Ikuta-ku, Kobe, Japan
LISNAVE, P.O. Box 2138, Lisbon, Portugual
Litton Industries, 9920 W. Jefferson Blvd., Culver City, Calif. 90230
Lockheed Shipbuilding and Construction Co., 2929 16th Avenue, S.W., Seattle, Wash. 98134
Lone Star Marine Salvage Co., 7200 S. Harbor Drive, Houston, Texas 77001
Matton Shipyard Co., Inc., P.O. Box 428, Cohoes, New York 12047
Mitsui Shipbuilding & Eng. Co., Ltd., Nihonbashi-Muromachi, Chuo-ku, Tokyo, Japan
Nashville Bridge Co., P.O. Box 239, Nashville 1, Tenn.
National Steel & Shipbuilding Corp., San Diego 12, Cal.
Newport News Shipbuilding and Dry Dock Co., Newport News, Va.
Nippon Kokan Kabushiki Kaisha, 2, 1-chome, Otemachi, Chivoda-ku, Tokyo, Japan
O.A.R.N. (officine Allestimento e Riparazioni Navi) Genoa, Italy
Pacific Coast Engineering Co., P.O. Drawer 6, Alameda, Calif. 94506
Pearlson Engineering Co., Inc., 2825 Oak Ave., Miami, Fla. 33133
Perth Amboy Dry Dock Co., Perth Amboy, N.J.
Puerto Rico Drydock and Marine Terminals, Inc., P.O. Box 2209, San Juan, Puerto Rico 00903
Rodermond Industries, Foot of Henderson St., Jersey City, N.J. 07302
St. Louis Shipbuilding—Federal Barge, Inc. 611 East Marceau, St. Louis 11, Mo.
Sasebo Heavy Industries Co., Ltd., New Ohtemachi Bldg., Chiyoda-ku, Tokyo, Japan
Sociedad Espanola De Construccion Naval Sagasto, 27, Madrid 4, Spain
Tampa Ship Repair & Dry Dock Co., Inc., P.O. Box 1277, Tampa, Florida 33601
Terrin Agency, Inc., 17 Battery Place, New York, N.Y. 10004
Todd Shipyards Corp., 1 Broadway, New York City
Vare Corp., Equipment Systems Div., 516 Sylvan Ave., Englewood Cliffs, N.J. 07632
Vickers Ltd., 222 London Rd., St. Albans, Herts England
Wiley Mfg. Co., Port Deposit, Md.
Wyatt Industries Inc., Port Houston Shipyard Div., P.O. Box 3052, Houston, Texas 77001

SHIP MODELS
Boucher-Lewis Precision Models, Inc., 36 E. 12 St., N.Y., N.Y. 10003

SHIP STABILIZERS
Lidgerwood Mfg. Co., (Superior Lidgerwood Mundy Corp.), 7 Dey Street, New York, N.Y. 10007
John J. McMullen Associates, Inc., 17 Battery Pl., N.Y., N.Y. 10004
Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.

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

SYNTHETICS
E. I. Dupont De Nemours & Co., Inc., Textile Fibers Dept., Wilmington, Delaware

TANK CONTAINERS
Fruehauf Trailer Div., Fruehauf Corp., 10940 Harper Ave., Detroit, Mich. 48232

TOWING—Lighterage, Transportations, Barge Chartering
Bay-Houston Towing Co., 805 World Trade Bldg., Houston, Texas 77002
Curtis Bay Towing Co., Mercantile Bldg., Baltimore 2, Md.
G & H Towing Company, 509 Texas Building, Galveston, Texas 77550
Henry Gillen's Sons Lighterage, 99 Wall St., N.Y., N.Y. 10005
James Hughes, Inc., 17 Battery Pl., New York, N.Y.
Jackson Marine Corp., P.O. Box 1087, Aransas Pass, Texas 78336
McAllister Bros., Inc., 17 Battery Pl., New York, N.Y.
McDonough Marine Service, P.O. Box 26206, New Orleans, La.
P. F. Martin, Inc., Mall Bldg., 325 Chestnut St., Philadelphia, Pa.
Moran Towing & Transportation Co., Inc., 17 Battery Place, N.Y.
Nickerson Marine Towing Co., 1670 Southeast 17th Street, Ft. Lauderdale, Fla. 33316
Pace Marine Service, Route 6, Box 1321, New Orleans, La. 70129
Red Star Towing & Transportation Co., 500 Fifth Ave., N.Y. 10036
L. Smit & Co., 11 Broadway, New York 4, N.Y.
Suderman & Young Towing Co., 329 World Trade Center, Houston, Texas 77002
M. & J. Tracy, Inc., 1 Broadway, New York, N.Y.
Turecamo Coastal and Harbor Towing Corp., 1752 Shore Parkway, Brooklyn, N.Y.
Vancouver Tug Boat Co., Ltd., 10 Pemberton Ave., No. Vancouver, B.C., Canada

VALVES AND FITTINGS—Hydraulic—Safety Flanges
Hooper Valve & Engineering Corp., 24th St. & Virginia Ave., Newport News, Va.
Hubeva Marine Plastics-Lining, 435 Hamilton Ave., Brooklyn 31, N.Y.
Hydrasearch Co., Inc., Riva Rd., Annapolis, Md. 21401
Kerotest Mfg., Corp., 2516 Liberty Ave., Pittsburgh, Pa. 15222
Marine Moisture Control Co., 39 Redfern Ave., Inwood 96, L.I., N.Y.
Mechanical Marine Company, 45-15 37th St., Long Island City, N.Y.
Todd Products, Div. of Todd Shipyards Corp., Halleck St., Brooklyn, N.Y. 11231

VAN CONTAINERS—Insulated, Refrigerated, General Commodity
Fruehauf Trailer Div., Fruehauf Corp., 10940 Harper Ave., Dertoit 32, Mich.

WEATHER ROUTING
Weather Routing, Inc., 90 Broad St., New York 4, N.Y.

WIRE ROPE
Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042
Bethlehem Steel Corp., Bethlehem, Pa. 18018
DiMattina Supply Co., 59-61 Seabring St., Brooklyn, N.Y. 11231

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

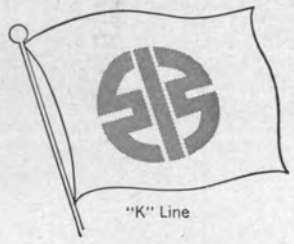
STEAM GENERATING EQUIPMENT
Combustion Engineering, Inc., Windsor, Connecticut 06095

STEVEDORING
M. P. Howlett, Inc., 415 32nd St, Union City, N J
Luckenbach Steamship Co., 120 Wall St., New York 5, N.Y.

Hamburg American Line

N.Y.K. Line

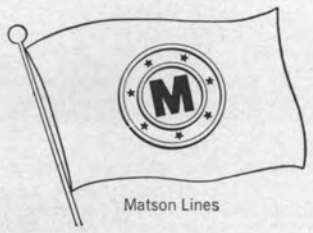

Atlantic Container Line


"K" Line


Maersk Line


States Steamship Co.

Finnlines



Matson Lines


American President Lines

American Export
Isbrandtsen Lines


Belgian Line

Grace Line

Agence Maritime, Inc.


Clarke Traffic Service

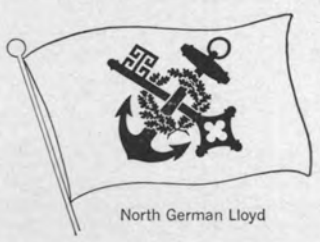

Hansa Line

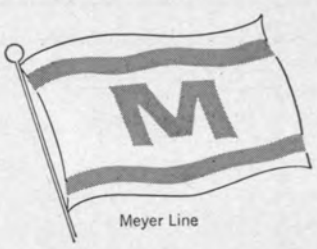

United States Lines

Moore McCormack Lines

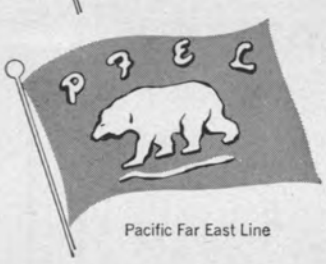
Sea-Land Service, Inc.


White Pass & Yukon Route


North German Lloyd



Meyer Line



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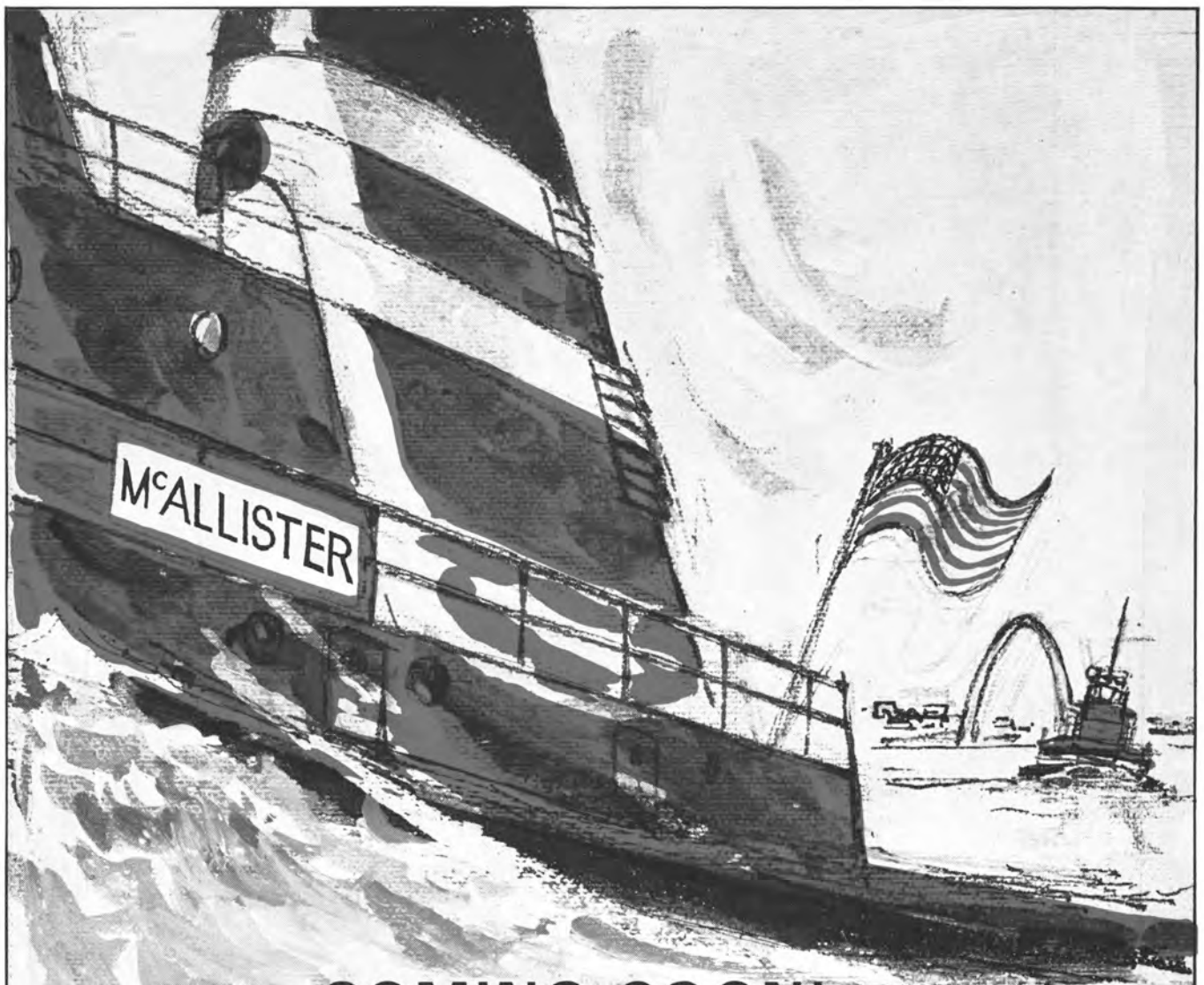

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