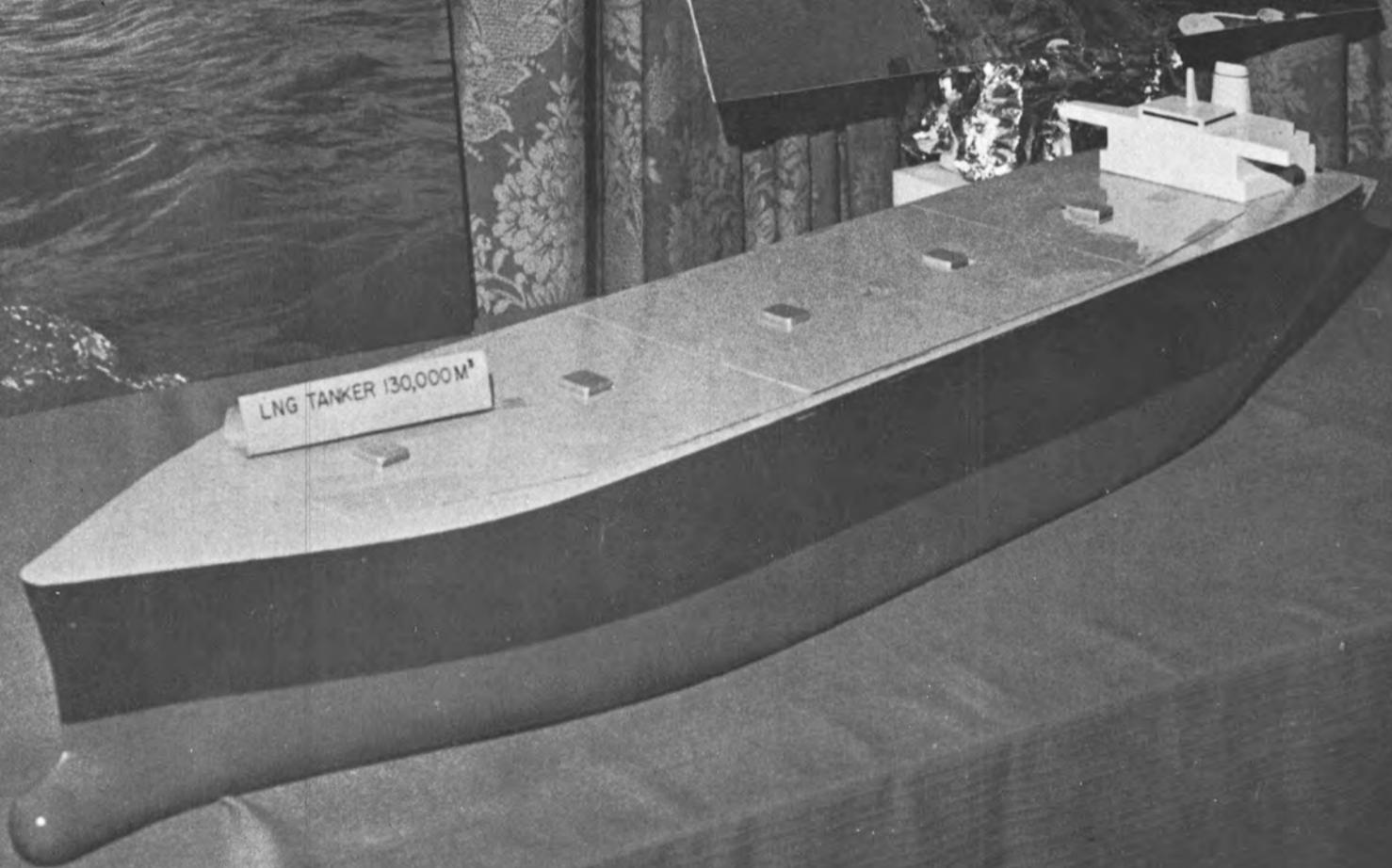


MARITIME REPORTER AND ENGINEERING NEWS



**Ogden Corporation's Avondale Shipyards
To Construct Three LNG Tankers
Under Contracts Totaling \$310 Million**

(SEE PAGE 8)

Model Of Avondale's LNG Carrier

JUNE 15, 1973

*Designed, engineered and manufactured
especially for MARINE USE*



REFRIGERATORS

BAILEY offers a complete line in standard, portable and under-counter models ranging from 4 to 102 cubic feet, AC or DC. All are equipped with heavy duty components and condensing units for efficient operation at high ambient temperatures. Cabinets are constructed of stainless steel with easy-to-clean interiors. AC units with blower-type evaporators are self-defrosting. All units are U.S. Public Health approved.



WATER COOLERS

MODEL MB-12 has a heavy gauge, stainless steel top, self-cleansing cooling unit and a sanitary, squirt-proof bubbler. It is rat-proofed in accordance with U.S. Health Service requirements.

Other models, attractively styled and compactly sized, include those that are wall mounted or fully recessed to conserve floor space.

ICE CUBERS

MODEL 613-N is a sea water cooled unit, assuring highest efficiency under almost any conditions. It will function equally as well in a hot galley or in a locked room with a limited circulation of air. Approximately 2,500 sparkling cylindrical-type cubes are produced every 24 hours.

MODEL 150 is an air cooled unit designed to fill the need of tankers and freighters whose ice cube requirements are usually less than 150 lbs. per day. Produces about 2,000 cubes in 24 hours, using less than 5 quarts of fresh water per freezing.

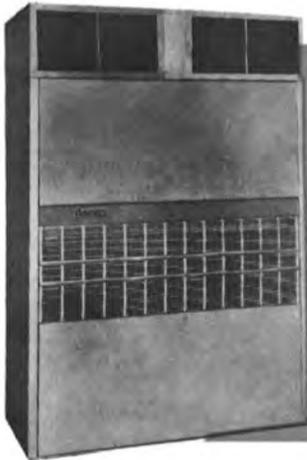
Other models, producing up to 800 lbs. of ice cubes daily are also available.



AIR CONDITIONERS

THESE WATER COOLED, self-contained units have cabinets of heavy gauge steel, protected with rust inhibiting primer possessing excellent water immersion, salt spray and humidity resistance. Finish is neutral beige, baked enamel.

In 3, 5, 7½ and 10 ton models, all of which are available in AC or DC. Four smaller models (AC only), measuring only 24" x 24" x 36" high, that have cooling capacities ranging from 9,400 to 27,100 Btu/hr can be installed quickly and inexpensively anywhere in a ship. These are water cooled with 90/10 Cupro-Nickel sea water condensers.



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When you purchase any kind of automatic equipment, be certain that your supplier can furnish proper service when needed. **BAILEY** maintains qualified mechanics to install units and service them properly, as well as a team of engineers to cope with any problems that may arise.



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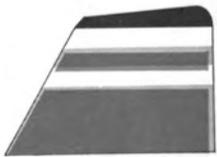
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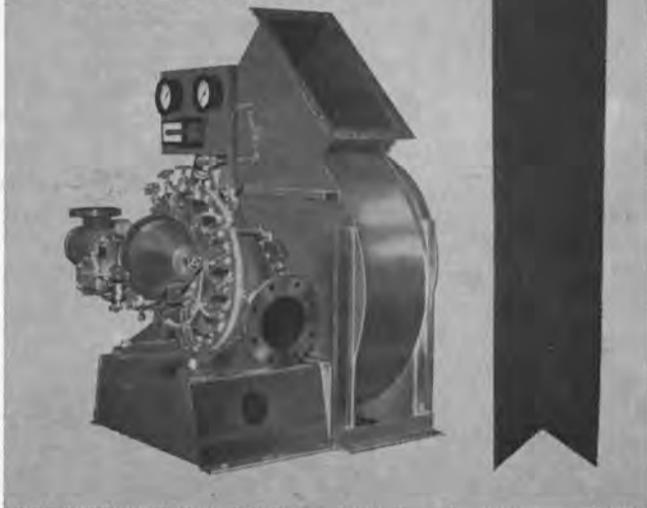
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Coppus Turbine-Fan packages custom-engineered for shipboard ventilation



The Coppus turbine-fan package has been specifically created for shipboard applications. It is used extensively in inert gas and Golar-Vent systems, as well as forced draft and other ventilation applications requiring the many advantages offered by steam turbine drive.

Designed with the fan wheel mounted directly on the turbine shaft, the need for only two main bearings instead of four or more eliminates misalignment problems, and ensures minimum maintenance and high reliability.

The unit is not limited to standard motor speeds; it can be operated at the most efficient speed. Variable speed control either manually or pneumatically is simple and effective. Since you can't overload the turbine, there is no concern about burned-out motors.

Highly efficient and compact, this package offers maximum safety in hazardous environments. It can be installed directly in the pump room or on deck and is suitable for steam pressures up to 600 psig.

The unit can deliver 50,000 cfm and static pressures up to 120 inches wg. Available in systems designed by Coppus to inert gas or Golar-Vent or the two can be combined into one space and money-saving system.

Coppus has a complete marine line that includes turbines, pump room ventilators, portable gas-freeing ventilators, shipyard exhausters and stevedoring ventilators. For details, write Coppus Engineering Corp., Dept. MREN, P.O. Box 457, Worcester, Massachusetts 01613. Phone: (617) 756-8393.

Another Blue Ribbon Product
COPPUS
 Specialists in marine ventilation

CCN Of Brazil Wins First Major Contract For Six Cargo Vessels

Brazil has won its first major shipbuilding contract for six cargo vessels totaling 90,000 deadweight tons, Paulo Ferraz, president of the CCN (Companhia Comercio e Navegacao) shipbuilding firm, has announced.

The ships will be built for the associate companies of the Oetker Group of West Germany. The order is worth \$32.24 million, Mr. Ferraz said.

Mr. Ferraz also announced further orders for three 15,000-dwt cargo vessels of a new design for the Brazilian shipping firm of Netumar (Cia. de Navegacao Maritima) which will operate between Brazil and the Great Lakes of the United States.

The total orders for all nine ships are worth more than \$57.04 million, Mr. Ferraz said.



YOU WIN WITH A FULL HOUSE AT LOCKHEED

Fast repairs are in the cards, because we work 24 hours a day, using three shifts if necessary, to get your vessel repaired fast, but good! We also have three floating drydocks to 18,000 tons, plus plenty of pier space which gives us room to maneuver! And we have special equipment and special skills to make our workers more efficient.

So you could say the docks are stacked in your favor at Lockheed, couldn't you? Or would you? Anyhow, we're busy because we deliver—on time, on target, on the money. We're never too busy to handle your ship when it comes in. So toss us a hawser—we will tie you up for the least possible time.

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3 floating drydocks to 18,000 tons
 Shipways to 100 x 700 feet • Piers to 1,100 feet

Marine Moisture Names U.K. Rep To Market MMC Draft Indicator

Henry Browne & Son Ltd. has been designated by Marine Moisture Control Co., Inc. of Inwood, N.Y., as exclusive sales and service representative in Great Britain and Ireland for the MMC Remote Reading Digital Draft Indicator, it was announced by Charles S. Schmukler, president of the Inwood corporation.

The MMC Draft Indicator is a continuous reading pneumatic-electric device incorporating advance solid state techniques, a digital readout, accuracy to 0.2% full scale, internal specific gravity compensation, automatic wave height integration, and draft conversion capabilities from feet to meters by means of electronic circuitry. A centrally located digital display box provides instantaneous remote reading of the forward and aft draft of the ship. Additional draft stations can be located midship to directly read HOG or SAG, and intrinsic safety can be furnished for any such station located in a hazardous area.

Henry Browne & Son Ltd. is located at the P.&O. Building, Leadenhall Street, London, England. Their highly qualified engineering staff has been fully oriented in the installation and servicing procedures for this unique piece of equipment, which is covered by the MMC five-year prorated guarantee.

MARITIME REPORTER AND ENGINEERING NEWS

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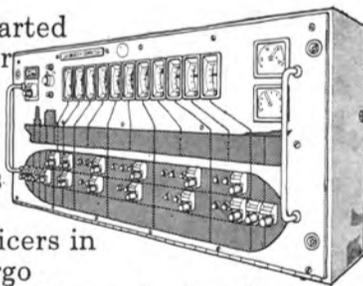
The Kockum Loadmaster List of Honour.

Afran	2	London & Overseas	1
Antares	2	Luna	1
BP Tanker	34	Malmros	3
Ben Line	4	Marcona	9
Odd Berg	1	Marflet	1
S Bergesen dy	10	Maritime Overseas	11
Bibby Line	1	Mobil Oil	16
Hj Björge	1	A P Möller	17
B Björnstad	1	Naess	2
Broström	7	Nedlloyd	2
Brasch	2	Niarchos	16
CNN	1	Noralliance	2
CNP	4	Ocean Fleets	7
Cameli	3	Ogden Corp	1
Campbell	8	P & O Line	2
Canadian Pacific	6	Panocean	8
Chevron	31	Papadakis	2
Coates Shipping	1	Petrobras	6
Thor Dahl	3	E Rasmussen	3
Docenave	1	H Reksten	19
Esso Int	47	Remsen	1
Fearnley & Eger	1	Rosshavet	1
Fritzen	2	Ernst Russ	8
N Galantes	1	SFTP	4
Gelsenberg	2	SNAM	4
Gerrards	2	Saga	2
O Godager	1	Salénrederierna	16
Gulf	4	Sanko	1
Hamburg Süd	2	Schulte & Bruns	2
Hansen-Tangen	1	Seguoia	1
Hapag-Lloyd	8	Shell	17
HAL	2	Siciloil	1
Houlder Br	2	Skjelbred	1
L Höegh	3	H Staubo	2
A Jahre	3	Texaco	3
J P Jensen	1	UBEM	2
K Jensen	3	United Int Shipping	8
K Knutsen	1	Unterweser	1
Kulu Tanker	1	Varnima	3
F Laeisz	2	Venore Transp	2
Lara Shipping	1	H Waage	4
C M Lemos	12	R Wigand	2
Livanos	4	W Wilhelmsen	2
P Lodding	1	Zim	3

In 1969 we started marketing our Kockums Loadmaster Computer.

The idea was to make life easier for officers in charge of cargo distribution, and to make it safer for everyone aboard. So far, we've sold more than 500 instruments, and that adds up to an impressive list of references (as you can see above).

We call it our List of Honour, because we're truly proud of the fact that we have the confidence of almost every important oil



company in the world.

If your name isn't already on the list, we'd consider it a great honour to be able to put it there.

In case you haven't already been fully informed about all the valuable features of the Loadmaster, we'll be happy to fill you in. Please get in touch with our representative in your country, or send us the coupon.



There are many cargo distribution instruments on the market. But only one Loadmaster Computer.

To Kockums Mekaniska Verkstads AB, Dept 291, Fack, S-201 10 MALMÖ 1, Sweden.

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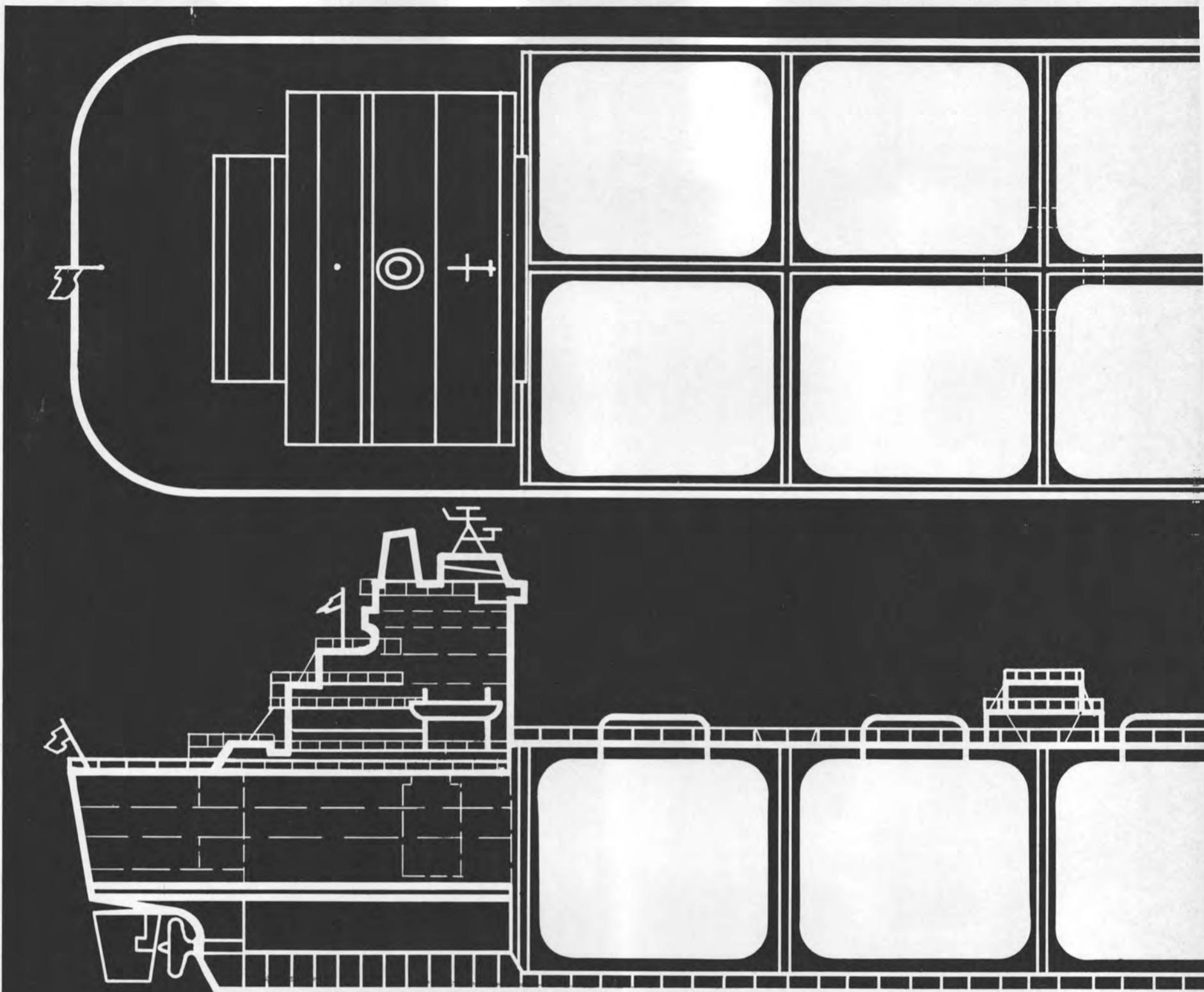
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MR-2



Why build LNG containment tanks

Economy

First, material cost. Armco CRYONIC 5 Steel costs less than other cryogenic materials—20% less than 9% nickel steel. Second, operational savings. Armco CRYONIC 5 expands and contracts less than other plate materials—one-half as much as 5083-0 Aluminum. Less expansion/contraction means sounder insulation integrity. And a thinner wall, due to CRYONIC 5's higher strength, can result in increased capacity. Calculations, based on one containment system showed an additional annual \$1 million of deliverable liquefied gas in a 125,000 m³ tanker.

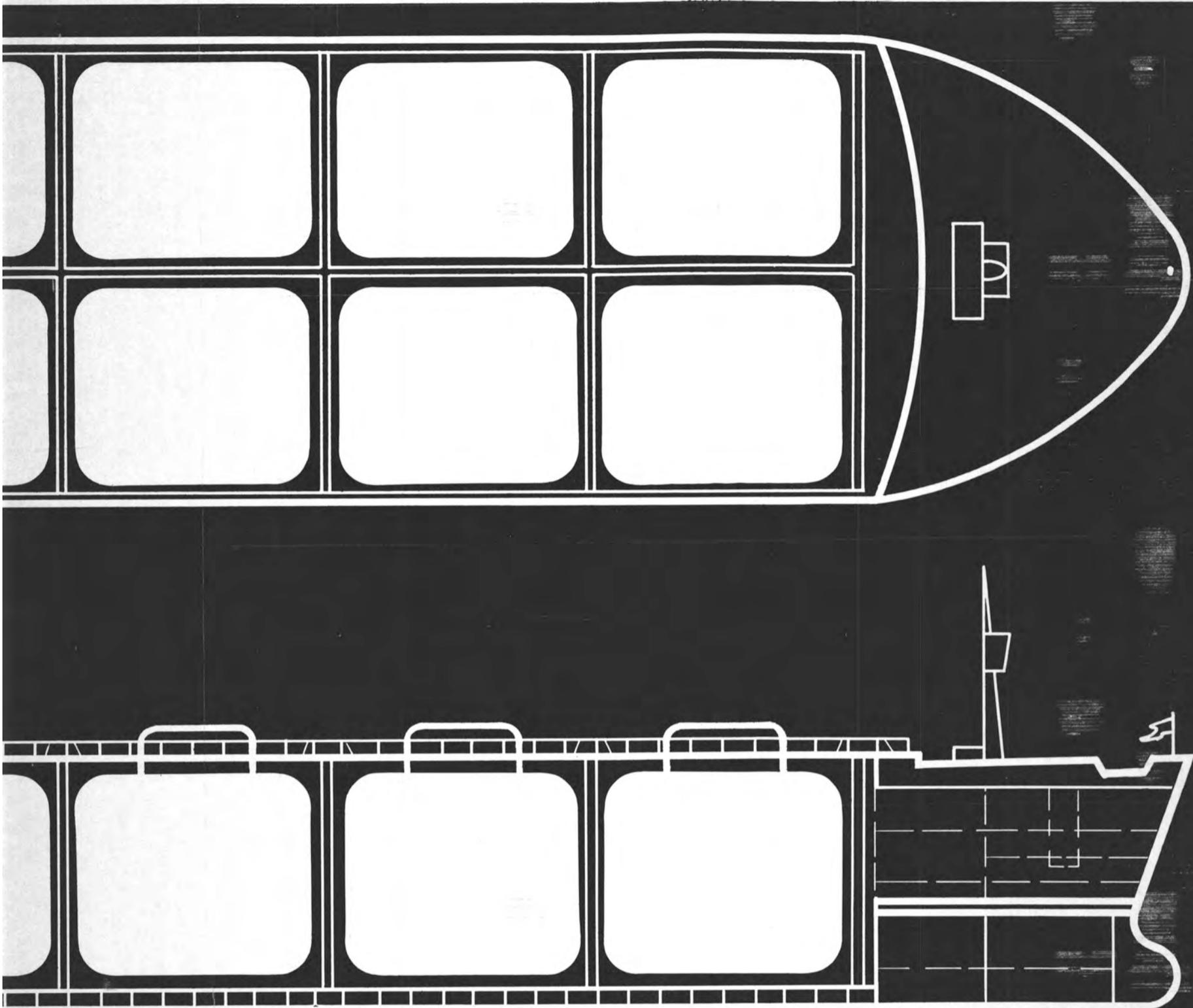
Toughness

Armco CRYONIC 5 Steel meets these *minimum* Charpy V-Notch values at -275 F, 25 ft-lbs (longitudinal), 20 ft-lbs (transverse), and 15 mills lateral expansion (transverse). They are a clear indication of CRYONIC 5's ability to provide a reliable containment system. After welding, Armco CRYONIC 5 provides sufficient toughness in the heat-affected zones to meet applicable regulatory requirements. Extensively tested, Armco CRYONIC 5 Steel provides the designer and owner a fail-safe material measured by fracture mechanics, crack propagation and conventional fatigue studies.

Weldability

Armco CRYONIC 5 Steel can be joined to other nickel-alloy steels, carbon steels and the austenitic stainless steels by all commonly used welding processes—manual, submerged-arc and gas metal-arc welding. Familiar, firmly established welding procedures, performed with existing equipment, can help achieve high quality welding, save fabrication time and eliminate the need for new equipment.

In addition, we provide CRYONIC 5 with an extremely low sulfur and phosphorus level. This combines with the low carbon level to give CRYONIC 5 excellent resistance to underbead cracking.



with Armco CRYONIC 5 Steel?

Acceptance

Armco CRYONIC 5 Steel is included in the ASME Boiler and Pressure Vessel Code as SA-645 with a maximum allowable design stress of 23,700 psi at room temperature. Ship containment tanks can be designed to acceptable design allowables. It also means that CRYONIC 5 meets the basic criteria for acceptance by the regulatory bodies governing this type of construction.

This combination of strength, toughness, weldability and economy makes Armco CRYONIC 5 Steel the logical material for LNG containment tanks.

If you would like more information on Armco CRYONIC 5 Steel, just mail this coupon to Armco Steel Corporation, Dept. H-243, Box 723, Houston, Texas 77001.

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COMPANY _____	ADDRESS _____
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CRYONIC 5 trademark of Armco Steel Corporation, Middletown, Ohio

ARMCO STEEL 

Avondale To Build Three LNGs For El Paso Natural Gas



The LNGs to be built by Avondale will have a single flush deck on which the cargo-handling system is arranged, providing optimum visibility from the bridge.

Three liquid natural gas (LNG) ships will be built by Ogden Corporation's Avondale Shipyards, Inc. in New Orleans, La., under contracts with subsidiaries of El Paso Natural Gas Co., Houston, Texas, it was announced by **Ralph E. Ablon**, Ogden Corporation chairman. These contracts, totaling \$310 million, are subject to finalization of U.S. Maritime Administration requirements involving the grant of construction differential subsidies to Avondale.

Each of the new ships will be 125,000-cubic-meter LNG vessels and will be over 900 feet long. They will carry natural gas which has been cooled to form a liquid by reducing its temperature to -260° F. When returned to its gaseous state, each cargo will occupy space equal to 600 times the liquid form in shipment.

Mr. Ablon also announced that the Ogden's Avondale Shipyards facilities will be expanded to improve productivity, and will be provided with a large sectional floating drydock to be used to construct the LNGs. The drydock, designed by Avondale, will also be built at Avondale and has been sized to provide for the construction of up to 200,000-cubic-meter LNG vessels, or 400,000-ton ultra large crude carriers.

Mr. Ablon stressed that Ogden recognizes the importance of participating with El Paso in meeting the nation's growing needs for energy, particularly through the importation of clean-burning natural gas in sophisticated vessels such as these which are designed by Avondale to meet high-quality ship standards. These three vessels are the last three ships required by El Paso in its approved and implemented program to move LNG at the rate of one billion cubic feet of gas per day from Algeria to the East Coast under 20-year contracts.

The three LNG ships to be built for El Paso are scheduled for delivery in 1976 and 1977, and will insure steady shipyard activity throughout this period. The vessels will utilize the Conch LNG containment system licensed from Conch L.N.G., a New Jersey partnership, which owns the rights to the Conch Self-Supporting tank design in the U.S. Subsidiaries of Continental Oil Company, the Royal Dutch Shell group of companies, and USY&T Industries, Inc. of Chicago are the partners in Conch L.N.G.

The Conch Self-Supporting tank design has been developed from that used in the first oceangoing LNG ships—the prototype Methane Pioneer, designed and built in the U.S.A., and Methane Progress and Methane Princess, built in the United Kingdom. The Methane Progress and Methane Princess have been successfully carrying LNG from Algeria to the United Kingdom since 1964, and between them have made over 500 deliveries.

Mr. Ablon stressed that this represents the equivalent background of 17 ship years of day-

by-day operation. This experience in the unpredictable weather conditions of the North Sea, English Channel, Bay of Biscay and the Mediterranean, he said, is unequalled by any other LNG ship design, and gives the shipowner confidence that he will be able to operate on a regular basis with a minimum of unscheduled interruptions.

Each ship has a single flush deck on which the cargo-handling system is arranged. This provides optimum visibility from the bridge for safe navigation and continuous surveillance of the system at sea. It also provides easy access to inspection of the cargo-handling system by operating personnel during loading and discharging operations, and a view of these operations from the control room.

Mr. Ablon also stated that these LNG ship contracts indicate that the market is strong for U.S.-built vessels of this class with U.S. crews, and that with the aid of Federal subsidies, U.S. shipbuilders have the ability to compete successfully in the world market for this type of sophisticated ship.

In addition to its natural gas operation, El Paso is engaged in such diverse activities as petrochemicals, plastics, synthetic fibers, textiles, insurance, wire fabrication, oil production, land development and copper mining.

Ogden Corporation, which operates in the major market areas of metals, transportation, food products, leisure, real estate development, and investments, reported sales of \$1.073 billion in 1972.

Stanley Turner Elected President Of ICHCA

Stanley Turner, group managing director, Felixstowe Dock and Railway Co., Ltd., has been elected by the general assembly of the International Cargo Handling Coordination Association as president of the worldwide transportation unit.

Mr. Turner, who has led the East Coast of England Port of Felixstowe during its dramatic growth as a containership harbor in the past few years, succeeds **J. Ph. Dack** in the presidency post.

The assembly also elected **Rouald Holubowicz**, chairman, Central MacGregor Ltd., and a director of the board of the group's United States committee, as chairman of the council of ICHCA.

Ogden To Purchase 400,000-Ton Tanker

The Ogden Corporation board of directors recently approved the purchase of a ULCC (Ultra Large Crude Carrier) of about 400,000 tons for delivery to its Ogden Marine subsidiary in 1977. With this acquisition, the Ogden Marine fleet will, in 1977, be in excess of 2,000,000 tons, consisting of 33 major vessels.

Maritime Fruit Enters Pact With Bethlehem For Additional VLCCs

Maritime Fruit Carriers Company Limited announced on May 22 that it has entered into an agreement with Bethlehem Steel Corporation providing for the purchase, subject to certain conditions including the granting of a 41 percent construction differential subsidy by the U.S. Maritime Administration, by qualified U.S. purchasers of two 265,000-dwt VLCCs to be constructed at Bethlehem's Sparrows Point, Md., Shipyard for delivery in 1977 and 1978.

Under the terms of the agreement, construction contracts for the vessels are to be executed by June 30, 1973. These contracts will be cancellable in the event that United States environmental considerations require changes in the vessels which would increase their cost. It is contemplated that the vessels will be time chartered by a U.S. subsidiary of Maritime Fruit Carriers for 25 years, which has time chartered three similar vessels being built by Bethlehem for delivery in 1975-1976. The price for these vessels is based upon the previous prices for the three similar vessels already on order, plus escalation to take into account anticipated increased labor and material costs.

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

Ship Operator To Realize 'Acceptable' Profit On Sale Of Shipbuilding Contracts

United International Shipping Corporation has announced that through a subsidiary it has agreed to sell, subject to certain conditions, all of the capital stock of two subsidiary corporations whose principal assets are shipbuilding contracts for a 166,000-dwt ore/oil carrier and a 67,000-dwt bulk carrier.

These vessels, now being built in Japan, are scheduled for delivery in July and August of 1973, when the sales are expected to be completed.

A substantial part of the total sales price of approximately \$47 million will be used to satisfy debt on the vessels. These transactions will reduce the amount of capital investment which otherwise might have been required over the next few years from Kaiser Aluminum & Chemical Corporation and Kaiser Steel Corporation, the equal owners of United International Shipping Corporation, and will provide an acceptable profit.



DIXIE POWER: A new 5,600-horsepower towboat built for Dixie Carriers, Inc., Houston, Texas, plunges into the Ohio River from the marine ways of Dravo Corporation near Pittsburgh, Pa. Named Dixie Power, the vessel is the second in Dravo's new Viking towboat line. The first Viking is a 4,200-horsepower vessel (background), built for The Alter Company of Davenport, Iowa. Both towboats measure 140 feet long, 40 feet wide, and 11 feet deep. Dixie Carriers will use its new Viking and a unit tow of four tank barges, which Dravo is also building, to transport a variety of petroleum products on the Mississippi River. The unit tow will be 1,040 feet long and will have a capacity of 97,000 barrels. Its four double-skin tank barges—two semi-integrated units and two box-type vessels—will have coils to permit cargo heating with steam.



More power for you!

The CAPE CHARLES. First of the Blue Diamond Fleet's three new 3,300 horsepower twin screw tugs. Now operating in Hampton Roads. With two sister tugs, the CAPE HENLOPEN in Baltimore and the CAPE MAY, entering the fleet soon. These three powerful tugs are the latest of eight additions to the Curtis Bay fleet in the past five years. Solid evidence of Curtis Bay's commitment to offer you the finest equipment and the most reliable service. There is a difference in tugboat companies!



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Towing Company**

Philadelphia □ Baltimore □ Hampton Roads

Three questions marine people ask about nuclear power.

And answers that show why it must be considered for every large, high-speed ship.

1. Is there an economic justification for nuclear power?

Absolutely. Nuclear power is economically superior to all other forms of propulsion for large ships operating at sustained high speeds.

A bold statement. But one that seems to be verified by recent MARAD studies and our own projections.

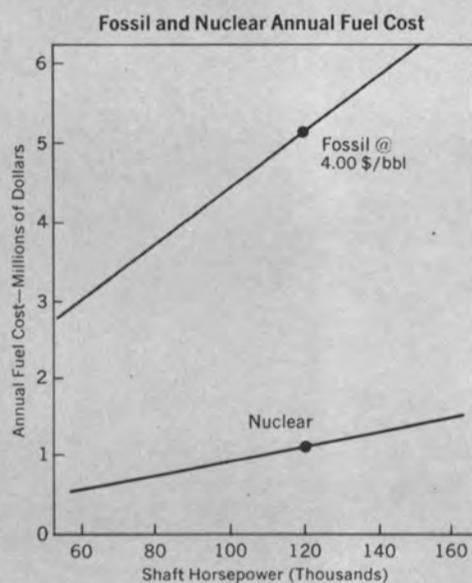
Larger, faster ships are becoming an economic necessity as world trade continues to grow rapidly.

Just ten years ago, a 30,000 SHP merchant marine ship was considered high-powered. Today, over 40 ships are being built in excess of 80,000 SHP. Eight of these are rated at 120,000.

By 1990 there will be a need for about 500 ships over 100,000 SHP and about 2,500 commercial vessels over 40,000. With all this horsepower, fuel costs and fuel availability become vitally important to ship builders and operators hard-pressed by diminishing profit margins.

So, let's take a look at fuels. Nuclear fuel prices have declined over the past five years. Those of fossil fuels continue to rise. Bunker C

fuel oil has doubled in price in recent years. By 1975, cost per barrel is expected to be at least \$5.00 to \$6.00.



Even at 1972 prices, a 120,000 SHP oil-fired ship would consume at least \$100 million worth of fuel over its 20-year life span. A nuclear ship of the same size would consume only about \$20 million worth. Despite the additional \$19 million in capital costs that a nuclear ship presently requires over an oil-fired one, and additional operating costs of about \$17 million, there are still lifetime savings of over \$44 million.

In addition, five nuclear ships, with their higher speeds, can do the work of eight conventional ships. So

a nuclear fleet would also cost less to build and less to operate.

There are other reasons to consider nuclear power for your next big commercial vessel.

Since nuclear fuel is produced domestically, its supply can be assured. Over half of all the fuel oil used by ships serving the United States in international trade originates overseas, where conditions may disrupt supplies and prices.

2. Can you expect to get government support? Subsidies?

Although there is no specific program at present to support a nuclear program, existing legislation does provide for a Construction Differential Subsidy (CDS) of U. S. built ships. From all indications, a particular nuclear ship project would be acceptable under these provisions on a case by case basis.

In addition, "first-of-a-kind" research and development expenses are covered in MARAD's advanced propulsion R&D program.

Of course, future executive and legislative action will

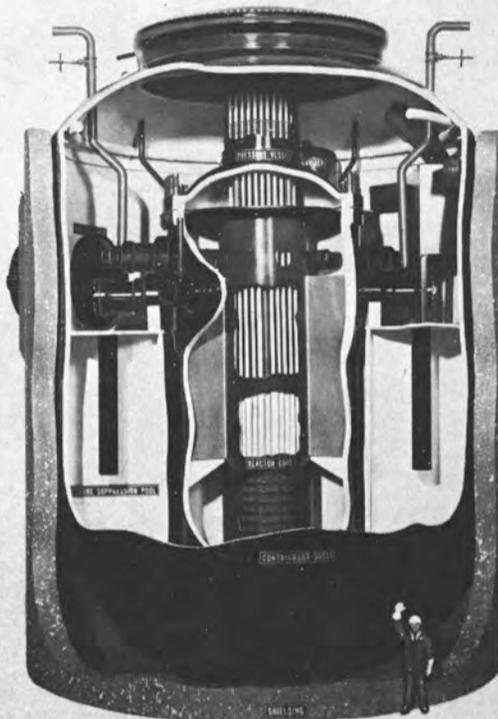
affect any current program. However, with the economic advantages of nuclear power, and the beneficial effect that domestically produced nuclear fuel has on the balance of payments, government support could be expected.

3. Is nuclear power technically feasible?

Definitely. Nuclear power proved itself with the N. S. Savannah. Using a Babcock & Wilcox Pressurized Water Reactor (PWR) of the spread-out design, the Savannah achieved an availability of 99.88% over almost half a million miles. An unparalleled performance in the history of mechanical marine propulsion.

Now, a second generation of nuclear reactors, designed by Babcock & Wilcox, is having similar success in the German ore carrier Otto Hahn.

This Consolidated Nuclear Steam Generator (CNSG-Mk I) is a much more compact system with flow passages within the reactor vessel itself. This eliminates the need for the external piping of the earlier models and offers significant savings



in both space and weight. Actually, in a 120,000 SHP ship, fossil-fired boilers with their fuel take up approximately 400% more space than a nuclear plant. This more productive utilization of space is further assurance of the economic feasibility of nuclear power.

The next logical question is: "Who has the most managerial, technological and operating background to work with you in developing your

own nuclear marine program?" The answer: Babcock & Wilcox.

B&W pioneered in marine nuclear propulsion with the Savannah and Otto Hahn. B&W worked with the Maritime Administration in the application of the Consolidated Nuclear Steam Generator to marine propulsion. We have a familiarity with the AEC and government. There's our experience in designing and building land based nuclear power generation systems for public utilities. Plus nearly 100 years of building steam boilers for both land and sea use.

It all adds up to a capability that should be consulted when you are thinking of designing a new, large merchant ship. We welcome the opportunity to answer any questions you may have on marine nuclear design, engineering, economics, applications and regulations.

Babcock & Wilcox, Government Marketing, Nuclear Power Generation Division, Lynchburg, Virginia 24505.

Babcock & Wilcox





Numero Uno in San Juan

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Advancements In Shipping And Shipbuilding Noted—

Maritime Day, 1973



IN NEW YORK: Principals participating in the Maritime Day program in ceremonies held in Battery Park and also aboard the schoolship John W. Brown II: (left to right) Rear Adm. **A.B. Engel**, USCG (ret.), Superintendent, USMMA, Kings Point; Congressman **John M. Murphy**, 17th Congressional District; **Karen Hochreiter**, Miss New York Press Photographer—1973; **James P. McAllister**, honorary chairman, World Trade Week for Maritime Industry; **Francis J. Barry**, recipient of Maritime Day Award as Marine Man of The Year, and Capt. **Robert E. Hart**, USN (ret.), chairman, Maritime Day 1973.

National Maritime Day—the one day set apart each year to honor the U.S. Merchant Marine—was observed on May 22 in most parts of the nation. The celebration of World Trade Week always includes this special day and thus many cities combine the two into one observance.

For many years the speakers at such observances have expressed optimism as to the future of the U.S. Merchant Marine. This year the speakers throughout the nation were able to back their optimistic viewpoints with solid facts. U.S. shipping and shipbuilding are showing vigorous growth. Using this as a base, some national speakers were able to develop new areas for development which would provide stronger incentive for future growth and to protect the national interests in world commerce.

The following excerpts from the many speeches given throughout the country forcefully indicate this new posture that has come to the U.S. commercial shipping field.

New York City—Rep. **John M. Murphy**, a member of the House Merchant Marine and Fisheries Committee, spoke at ceremonies held in Battery Park. "From our war-end monopoly of commercial seapower," noted Congressman **Murphy**, "we created our competition and that competition has been so effective that by 1970 our merchant marine was faced with extinction." However, the speaker noted, the 1970 Merchant Marine Act, by updating and broadening

the subsidy powers to include tankers and bulk carriers of the 1936 Act, has been a major step forward in recouping the position of U.S.-flag shipping. He concluded by stating that what is needed now is the concerted efforts of the industry to channel U.S. imports and exports into American-flag bottoms.

A second part of the New York program was held aboard the schoolship John W. Brown II. This Victory ship, formerly the Twin Falls, was formally handed over to New York City's Board of Education by Capt. **Thomas A. King**, regional director, U.S. Maritime Administration, for use as a schoolship in the City's maritime training program.

James P. McAllister, president of McAllister Bros., Inc., who was an honorary chairman of the World Trade Week Committee, representing the maritime industry, was master of ceremonies at these functions.

Chicago, Ill.—Rep. **John A. Blatnik**, chairman of the House Committee on Public Works, reiterated his stand to oppose the imposition of user charges on traffic on inland waterways. He described the Great Lakes-St. Lawrence Seaway as "a success from the very beginning" and pointed out that tonnage so far this year is nearly 46 percent ahead of 1972. Rep. **Blatnik** as a proponent of lengthening the shipping season on the Lakes stated that he has requested the allocation of \$3.36 million for the third and final year of the demonstra-

tion program on extending the navigation season. "We have proved conclusively," he said, "that winter shipping is possible and economically justified."

Galveston, Tex.—Sen. **John Tower** addressed the annual Maritime Day Dinner in this Gulf port. During the program, winners in the annual Propeller Club Essay Contest for high school senior students were honored. The Galveston Consular Corps were honored guests at the affair.

Philadelphia, Pa.—**Robert Binder**, deputy Assistant Secretary of Transportation for Policy Planning and International Affairs, was the principal speaker at the luncheon highlighting World Trade Week. Week-long activities were conducted under the auspices of the Mayor's Committee for World Trade Week.

Houston, Tex.—**E. Scott Dillon**, Assistant Administrator of Operations, Maritime Administration, spoke here at the Propeller Club luncheon. He chose as his theme "the mounting pressures emanating from both the federal and public sectors for more stringent controls and safeguards to prevent degradation of the nation's waters and shorelines by vessel generated pollutants." He pointed out that the American shipbuilding industry and the American tanker companies have a large stake in the pollution abatement measures that are currently under consideration.

He said: "One unavoidable and unfortunate consequence of en-

vironmental protection is the increased capital costs to the shipping industry when acquiring new tonnage. To a lesser extent increased operating costs go hand-in-hand with this effort. The added capital costs stem from two sources, namely, increased shipyard production costs, and more expensive ship construction with new environmental protection features. You are well aware that MarAd's tanker construction program continues but only with contracts for new ships placed prior to January 8, 1973, in accordance with a court-approved stipulation resulting from an action brought by three environmentalist groups against the Secretary of Commerce and Maritime Subsidy Board members.

"At this point, I believe it appropriate to repeat remarks made by **Robert J. Blackwell**, Assistant Secretary of Commerce for Maritime Affairs, when he spoke before the Seatrade Conference on Energy Imports and Vessel Financing. He said: 'The environmental concerns are real; they are not going away. Rather than diminish, they will intensify with each passing year. Accordingly, I believe tanker operators would be wise to consider the incorporation of pollution-control features in their new buildings.'"

Los Angeles, Calif.—The chief spokesman for American-flag shipowners said in Los Angeles that the U.S. merchant marine—with its new breed of ships—will assuredly play a starring role in the drama of coming events but, at the same time, he cautioned that the U.S. cargo-liner operator faces "enormous difficulties and great uncertainties" in the months ahead.

President **James J. Reynolds** of the American Institute of Merchant Shipping in this Maritime Day ad-

(Continued on page 15)



IN NEW ORLEANS: New Orleans celebrated National Maritime Day with a full-day program of events climaxed by a dinner attended by approximately 600 at the Roosevelt Hotel. Principals participating in the program are shown here, from left: **George Beach**, chairman of the Past President's Council which annually selects Louisiana's Maritime Man of the Year; **Stuart W. Thayer**, vice president-engineering of Lykes Bros. Steamship Co., Inc., who was named Maritime Man of the Year; Louisiana's Senior U.S. Senator **Russell B. Long**, principal speaker at the dinner; **W.J. Amoss Jr.**, president of Lykes Bros. Steamship Co., Inc., who served as master of ceremonies; **Carlos Lozano**, president of Neptune Supply Company and president of The Propeller Club of New Orleans, and **Frank McNerney**, Gulf Regional Director of the U.S. Maritime Administration, who was general arrangements chairman for Maritime Day in New Orleans.

That's Gerber's 1275 automatic drafting system. A ship shaper that slashes ship building time and costs.

The Gerber 1275 system duplicates hull lines, surface shapes and lofting contours, enabling the architect to "see and change" as he designs.

Once the design has been fixed, the 1275 develops hull plate layouts, generates and verifies NC tapes for cutting before a single sheet of steel is ordered or cut. The 1275 even duplicates burner operations, including torch characteristics and locating of on/off stations.

The Gerber ship shaper can drastically reduce lead time, produce substantial savings by increasing accuracy, speeding the cutting of plates and parts, and reducing scrap losses to a minimum.

In addition, the Gerber 1275 system can operate as remote job entry terminals, enabling ship builders to keep the entire job in house.

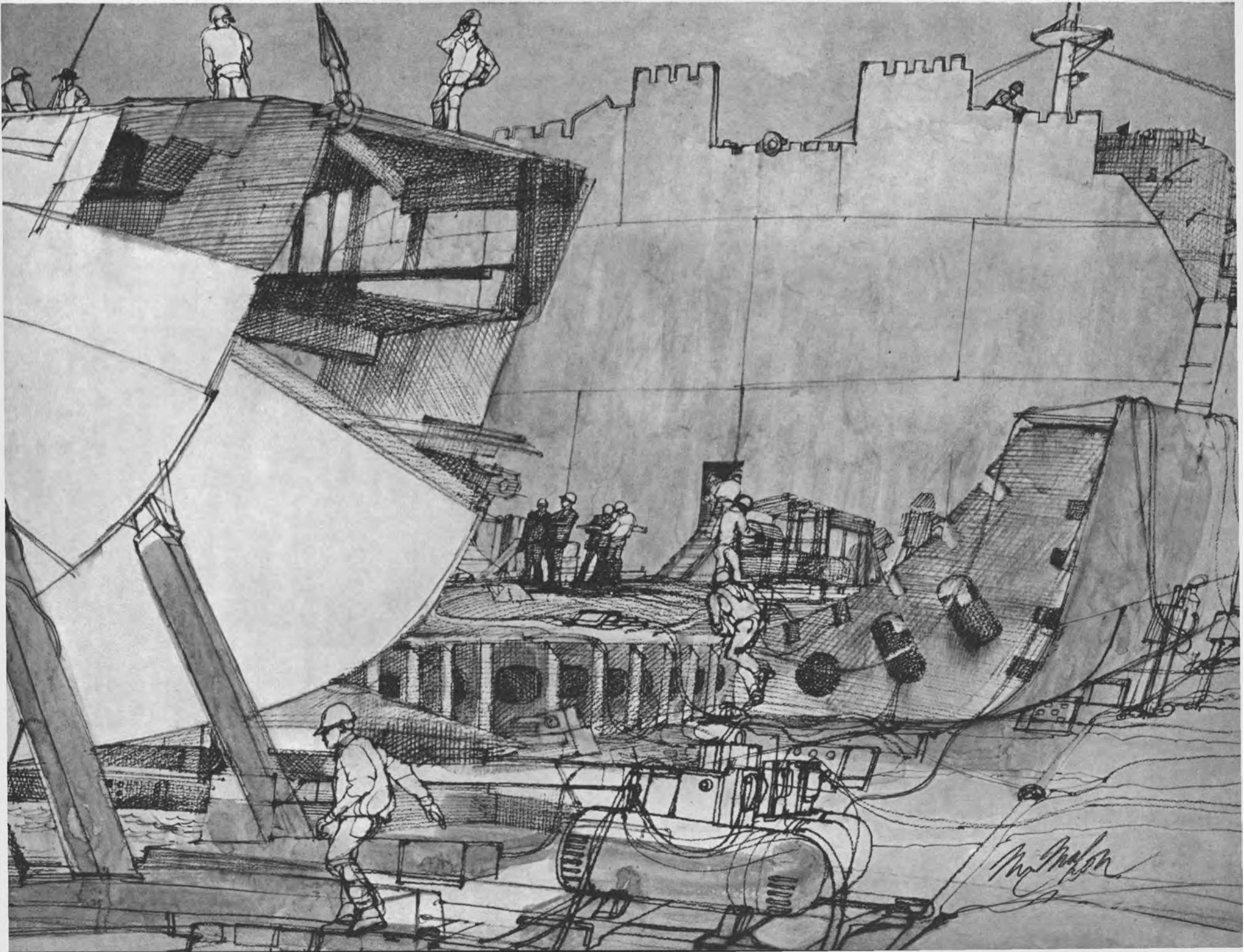
The Gerber 1275 system includes a series 1200 computer control and a Model 75 automatic drafting table, available in sizes from 5 x 8 feet to 8 x 24 feet. It accommodates all ESSI, EIA, ASCII and EIARS 244 formats. And the entire integrated system is designed, manufactured and serviced by Gerber Scientific . . . the proven name in automatic drafting systems.

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Ship Shaper.



Maritime Day—

(Continued from page 13)

dress said the drift and decline of the U.S.-flag shipping fleet has been dramatically reversed due to the courage and determination of U.S. operators and investors with the help of the 1970 Merchant Marine Act's shipbuilding program. As a result, he added, U.S. commercial shipbuilding is now at its highest level in peacetime history.

Referring to the Department of Defense's shipping policies, Mr. Reynolds stated: "There must be a firm policy applicable to all government departments and agencies that our U.S.-flag liner operators will be given first priority in transporting government shipments. The time is long overdue for the DOD and others to stop amassing their own empire of ships, to charter vessels only when berth service is not available, and to stop relying on operators who do not have modern fleets, who have no building or modernizing plans and who in brief are merely trying to squeeze the last dime out of their totally obsolete ships."

Referring to the inequities of foreign competition where foreign-flag operators and/or their governments restrict trade or undercut rates, he said, "I believe that the time has come to insure that our operators are able to compete on an equal basis with foreign liners. This is required in the national interest, not only to support our merchant marine but also to protect our trade and alleviate our payments deficits." He suggested that the solution might take the form of new legislation giving some senior government official the responsibility for annually reviewing all our liner trades and determining in each specific trade corrective steps to be taken to protect U.S. interests.

Seattle, Wash.—Howard F. Casey, deputy Assistant Secretary for Maritime Affairs, spoke at the Propeller Club luncheon in Seattle. He basically reviewed the results of the 1970 Merchant Marine Act. These results he listed as:

"Shipyard orders aggregating over \$1.7 billion in new construction and conversions have been placed. These orders—covering 37 new ships and 16 conversions of conventional freighters into containerships—have resulted in American shipyards aggregating the largest backlog of merchant-ship orders in their peacetime history.

"These ships will considerably upgrade the ability of the U.S.-flag fleet to carry American foreign trade, since they represent a 'quantum jump' in productivity over the older vessels in the fleet.

"The tank vessels ordered to date present an even more dramatic situation with respect to productivity. Sixteen ships, ranging in size from 35,000 to 265,000 tons, have been ordered. These vessels represent the equivalent of more than 25 percent of the current deadweight capacity in the U.S. tanker fleet.

"And the liquefied natural-gas tankers and combination ore/bulk/oil carriers in the shipbuilding program are the first vessels of these classes to be built in this country.

"All of these ships will be less dependent on government operating subsidy than their predecessors. As you know, the differential between foreign and U.S. wage scales comprise the bulk of each operating subsidy dollar. But these new ships will have considerably smaller crews than older ships. In fact, while crew complements on

older ships range from 40 to 50 men, manning scales on the new ships being built range from 26 to 32."

San Diego, Calif.—Following his talk in Seattle, Mr. Casey spoke the following day at the Propeller Club luncheon in San Diego. In this talk he stressed what shipyards were doing to improve their posture. He said: "The American shipyards have responded affirmatively to the productivity challenges inherent in the President's program. During the past few years they have ex-

pendent more than \$100 million on plant improvements which increase efficiency and reduce construction costs. The construction of three entirely new shipyards costing over \$100 million each is expected to get underway within the next year or two.

"In summary, on this Maritime Day, 1973, our maritime industry can be proud of the enormous progress it has made in restructuring its operations to establish a strong foundation for future growth."

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CLEARING HOUSE FOR MARINE DIFFICULTIES SINCE 1894

Computers In The Design Department To Control Shipboard Interferences

J.K. McNeal, R.P. Kakad and J.S. Magrie*

A ship as constructed does not permit one component to physically occupy the same space as another. Given the consideration of human fallibility, there is no procedure that can absolutely guarantee this achievement at the time that the completed design work flows out from the engineering department to the production department. Therefore, it is not prudent to proceed with construction work of major significance until a reasonable assurance can be given that any arrangement of components is free of physical interferences that would be costly to redesign and to refabricate.

There are several existing methods for achieving this objective. The components may be "modeled" in scaled-down physical size and arranged as designed. The components may be shown on a drawing for each local area in detail and in three views, in a "composite" of all systems. Information of space requirements may be exchanged and rigorously compared to detect problems between designers or to a central agent to accomplish this method. Designers may also input their decisions and plans, each one acting independently, to a computer to obtain the "aid" of the computer to control interferences.

The Interference Control System (ICS) is a computer-aided design procedure for determining the existence of a physically interfering design layout between two or more parts or "catalog items" of a ship's component systems. These component systems make up the ship's hull structure and machinery, and they include piping, duct work, and cableways.

The System is arranged for the use by designers of the ship's component systems through interaction with a computer. The computer receives descriptions of items which comprise the various component systems; it stores them in the data files. It computes for the existence or occurrence of physical interference and it reports such occurrences. It produces computer-generated drawings on request.

The drawings are of two different types: one type, called an in-

terference drawing, shows the nature of a reported interference by displaying the interfering parts in three orthogonal views; the other type, called a detail drawing, shows a group of catalog items from the same component system arranged for fabrication.

Experience With ICS

ICS has been applied to the design of a 126,000-dwt tanker. It was applied by simulating in the computer the component systems occupying the engine room in order to determine the benefits and problems that could result through the use of the System.

Table No. 1—Work Performed Under ICS

Pipe items and detail drawings simulated	55%
Ventilation ducts simulated	20%
Cableways simulated	70%
Structural items simulated	30%
Total items simulated, approx.	7,000
Interference reported (from drawings)	137
Interference checks reported	42

By the time a decision was made to apply ICS to the design work, a considerable number of the systems were designed and fabricated, and construction of the ship was under way. Fabrication of pipe was about 60 percent completed, and the ventilation duct work was 90 percent templated. The amount of work involved in the application of ICS that was actually accomplished during the design stage is shown in Table No. 1.

The cost savings which were realized from this partial use of ICS were little more than a break-even situation. However, the data and experience that were realized have been prorated to a normal situation in which the use of ICS was commenced at the beginning of the mechanical design work. The results are given in Table No. 2. These results do not include any costs for developing the program, for training personnel, or any testing and debugging problems that occurred in the use of the new program. These costs are based on current 1973 rates. The net savings, which are in excess of \$30,000, may be regarded as the low range because the system was applied to a tanker where interference problems are less than with most other types of vessels.

ICS and the procedures for the design of the ship's component systems were found to be compatible. The resistance of the designers to ICS was negligible and a procedure

Table No. 2—Prorated Cost Analysis For The Use Of ICS On A Tanker

Savings	Labor	Material	Total
Production Departments			
Due to: Interference reports	\$32,952	\$4,279	\$37,231
Interference checks	2,354	305	2,659
Reduced drafting errors	13,497	1,274	14,771
Design Departments			
Due to: Interference checks			1,050
Subtotal			\$55,711
Expenditures			
Design Departments			
Due to: Computer costs			\$7,035
Manpower, inputting to computer			15,026
Subtotal			\$22,061
Net Savings			Total
			\$33,650

was developed by which they had at their disposal, through the "interference checks," the information stored in the computer data banks.

The cost savings were obtained in three principal areas of the design work. First, savings came from the detection of interferences which were discovered in completed arrangement drawings. As the ship's component systems were simulated in the computer and interferences were reported, "interference change notices" were distributed to the involved design personnel. Second, proposed system arrangements were simulated in the computer from free-hand sketches. This mitigated the need to complete and then revise the completed arrangement drawing when an interference would have been reported. Those sketches were termed "interference checks." Third, savings came from the discovery of drafting and dimensioning errors on the completed arrangement drawings. These were discovered by the ICS operator and by the computer. These savings were a pure by-product of the ICS.

Interference checks were free-hand sketches of portions of the component systems to be used as computer input for interference control. They were prepared by the designers of the component systems prior to the development of the arrangement drawings and material lists.

Interference checks also reduced the manhours expended by designers for studying component system arrangement drawings for the purpose of avoiding interferences. Having the foreknowledge that their free-hand proposals would be checked for interferences by the computer, the designers could largely avoid this task.

As the development of the engine room progressed and became more completely packed with component systems, the probability of interference increased. In the later stages of the project, more than one-third of the detail drawings entered to the computer resulted in interference reports. It was an obvious shortcoming of ICS that the bare notification that an interference existed did not enable the designer to rectify it without the fear that a new one would emerge in its place. An extension of the interference-check concept provided the answer.

Interference Control Methods

In order to control interferences, the situation from which it results must be considered, and the entire design process must be evaluated. The background is the preliminary design activity, which includes the definition of hull form, the arrangement of major machinery components, the development of structural scantlings, and the basic engineering for the piping, ventilation, and electrical systems. Then the scene changes to the production design activity, in which a host of designers are released to produce concurrently the hundreds of drawings needed for the various component systems. They work under severe constraints of time and lack of information in order to effect the ordering of material and fabrication parts. It is the concurrent development of many component systems by independent designers, each operating in his own vacuum, that results in an interference problem.

The solution lies in establishing an effective communication system, either on a designer-to-designer basis, or on a designer-to-central

*Messrs. McNeal, Kakad and Magrie, Research and Development Department, Sun Shipbuilding and Dry Dock Company, presented the paper condensed here before a recent meeting of the Delaware Valley Section of the American Society of Naval Engineers.

agency basis. Intra-drawing room communication is an integral part of the production design activity, and it can greatly reduce the number of interferences. However, the number still resulting makes a supplementary program of centralized interference control very attractive.

At least three methods of centralized interference control have been tried: 1. physical models; 2. composite drawings, and 3. computer simulation.

Some of the characteristics associated with these methods are summarized in Table No. 3. "Timeliness" refers to the time delay between the completion of drawing of a component system and the report of its interference status. For significant savings to be realized, potential interferences must be detected and rectified before work is initiated by the production departments. It was primarily a deficiency in this characteristic for both composite drawings and physical models that fostered interest in computer simulation. The timeliness for ICS given in Table No. 3 assumes that one person prepares the computer input for 10 designers.

Accuracy and readability characteristics refer to the susceptibility for error that derives from the use of the method. After composite drawings have been modified many times, they become complex, congested, and smeared; therefore, they are susceptible to misinterpretation. Physical models have problems with accuracy from working with plastic and glue. Deviations from true dimensions are multiplied aboard the ship by the scale factor (usually 10 to 1). The computer simulation data are stored in the computer to an arbitrary precision. For ICS, the accuracy is plus or minus one-eighth of an inch.

"By-products" are the benefits derived from an interference con-

control methods varies as follows for a comparable 126,000-dwt tanker:

- Composite drawings ... \$ 25,000
- Physical models \$125,000
- Computer simulation .. \$ 25,000

For this outlay, the return in the form of cost savings has been estimated. Consideration has been given for any savings due to by-products. The result is given in Table No. 3 as "ratio of return to outlay."

Further Possibilities And Benefits

The Interference Control System can be extended and modified easily to obtain other functions, such as isometric and orthogonal view arrangement drawings, material lists, weight and moment calculations, composite drawings, and cut and bend lists for piping. The Ship and Catalog Files may be accessed by separate, additional programs as a basis for further developments.

Locations of the various component systems in a ship (piping, ventilation ducts, structure, machinery, etc.) have been determined and stored in the ship file. Both isometric and orthogonal views of arrangement drawings could be generated by modifying the ICS.

The Ship File contains all the data needed to produce bills of materials. The ICS can be extended to produce bills of materials for any particular component system in the ship. For example, the main steam supply system can be analyzed by the computer to give total lineal feet of pipe. It can give the number and specification of valves and all other pipe fittings. By adding the corresponding weights of items, the ICS might be extended to give weight and moment calculations directly, which would be related to the geometric description of the items in terms of the basic shapes comprising them.

Table No. 3—Characteristics Of Interference Control Methods

	Composite Drawings	Physical Models	Computer Simulation (ICS)
Timeliness	4 to 6 weeks	2 to 8 weeks	0.5 weeks
Accuracy & Legibility	poor	fair	very good
Designer Efficiency	fair	fair	good
By-Products	none	designer's aid rigging training	detail plans interference plots
Ratio of Return to Outlay	100%	75%	250%
Basis for Further Development	poor	poor	very good

trol method, beyond interference control itself. These benefits generally do not require appreciable additional investment of time or capital. The three-dimensional physical model enables designers to grasp otherwise obscure characteristics of the engine-room arrangement and, consequently, to develop optimum component systems. The most efficient sequence of crane lifts for the assemblies that comprise the engine room may be more easily determined by the riggers via inspection of models. Personnel training is also more readily accomplished through the use of models.

The approximate cost outlay required to implement interference

The ICS can be extended to generate cut and bend lists to provide dimensions and optimized sequences for fabricating piping assemblies. The program can ultimately be used to output tapes to run numerically controlled machines for cutting and bending pipes in fabricating piping assemblies.

The principal benefits of the ICS may be summarized as savings in cost, both in design and in fabrication. While it is alleged that significant cost savings might be obtained (having been estimated as a return of \$2.50 for every \$1.00 expended on ICS), there is a further extension that might ultimately produce an optimization result-

ing in an increase in payload or the revenue-earning capacity for the ship. This benefit stems from a two-part extension: first, into "routing" of the distributive systems, and secondly, into "arranging" the engine-room space. The first step is a necessary capability before the second can be realized.

The result would simulate an optimum arrangement and location of important equipment in the ship and then route the various component distributive systems to connect this equipment. This would result in interference-free routing and optimal arrangement of all component systems in the ship. This could be converted into reduced machinery space and increased availability of cargo space for a given design.

Basic Program Structure

The ICS programs control the computation (of interference) within the computer. They consist of two main programs. The first program (called 635 EXEC) controls processing on a GE 635 or Univac 1108 Computing System for making calculations as well as producing data for further processing by the second program. The 635 EXEC program with 125 subprograms performs the data file and interference computing activities.

These subprograms are written in full Fortran, except for the six subprograms concerned with data files and written in assembly language. The 635 EXEC program performs its work using eight basic functions that comprise eight of the subprograms and which make use of the remaining 117 subroutines and subordinate functions.

The second program (called 1130 EXEC) controls processing on an IBM 1130 Computing System with an attached Gerber 522 Drafting System for making drawings. The program can also drive an attached Calcomp 663 Plotter. The input data comes from the first program and determines whether the program will produce an interference drawing or a detail drawing. The program is written in basic Fortran and performs the single function of making drawings.

The procedure diagram for ICS, Figure 1, shows the different steps required to enter "catalog items" or "detail drawings" into the files, and to check for interferences. It should be noted that a single item piece of equipment or machinery is a catalog item; a group of catalog items, such as piping items fabricated together, is known as a detail drawing. A single item piece of machinery may also be known as a detail drawing.

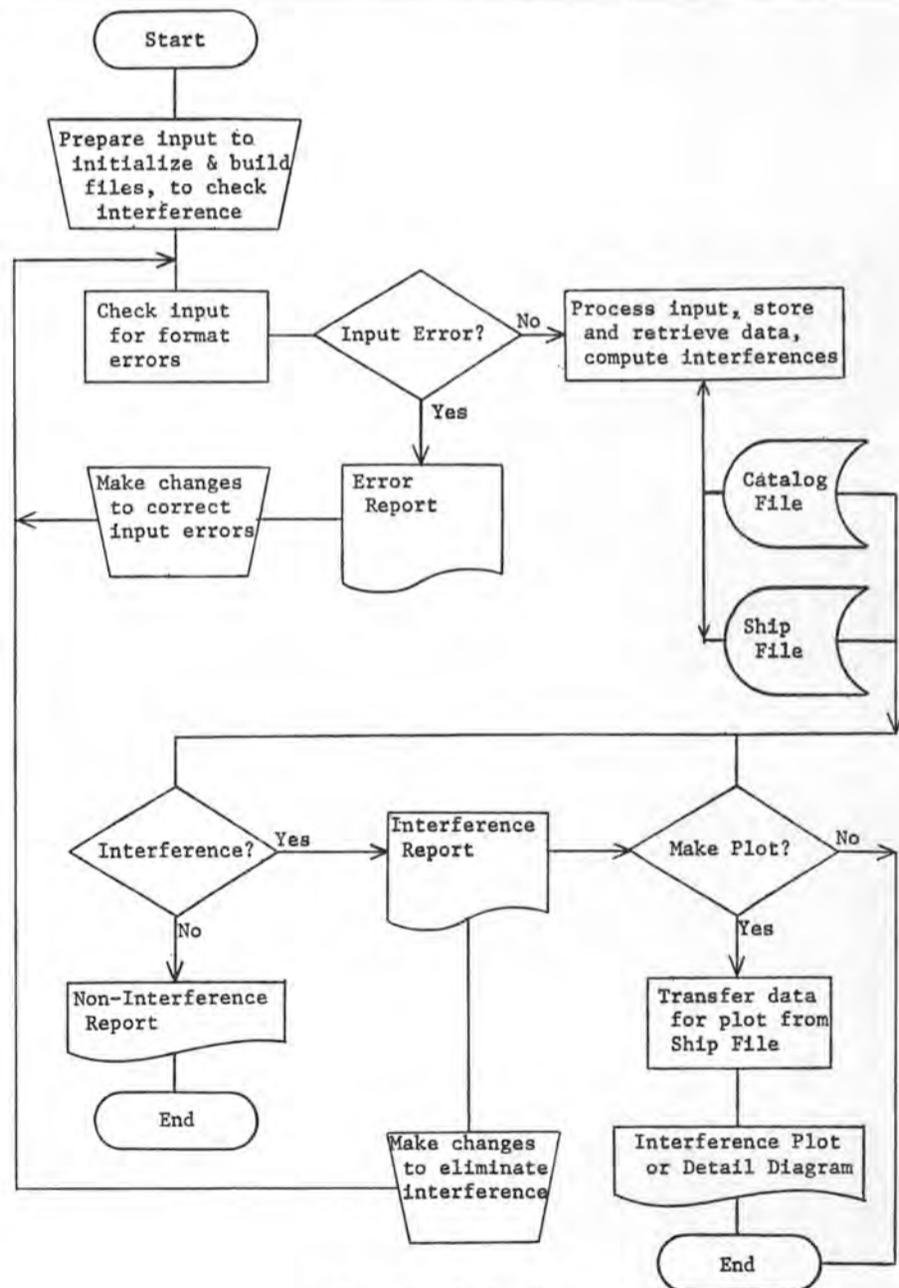


Figure 1—ICS flowchart.

Congress Urged To Consider Needs Of Water Carriers In Growing Shortage Of Fuel Oil

James R. Smith, president of The American Waterways Operators, Inc., Washington, D.C., recently appeared before Congress to express "deep concern" over present and growing shortages of diesel fuel needed to propel the barge and towing industry, movers of 16 percent of the nation's total domestic freight.

Mr. Smith expressed his views in testimony before the Senate Committee on Banking, Housing and Urban Affairs, which is conducting hearings on the fuel shortage problem. Bernard Goldstein, president of the Alter Company, Davenport, Iowa, accompanied Mr. Smith as a backup witness to outline some of the problems created for the industry by the shortage.

The AWO president told the committee that a survey of AWO members throughout the nation "indicates an ever increasing difficulty in securing sufficient quantities of fuel; present and impending rationing by fuel suppliers; increased prices in most areas; extensive searching and costly retransportation of essential fuel from distant points, as well as occasional tie-ups of equipment from lack of fuel."

Thus far in 1973, he said, the impact of diesel fuel shortages has been spotty on a geographical basis except in mid-continent America, primarily of the Mississippi River System from about Memphis upstream.

"The situation is most serious in the Midwest from St. Louis north, an area heavily dependent on barge traffic for importation of fuel oil and bulk commodities for manufacturing and for the export of grain," Mr. Smith said. "Some tows traveling north from the Gulf

Coast have been stranded in the St. Louis area because they were unable to purchase fuel there either to continue upstream or make a return trip. In that area, fuel suppliers servicing the towing industry are finding it increasingly difficult to secure sufficient fuel for their customers."

The AWO president said that the fact that the industry in that area has not substantially curtailed operations because of fuel is that the industry is now operating at less than 50 percent capacity because of the prolonged floods on the Mississippi and its tributary streams.

"If there is a diesel fuel crisis now," he warned, "wait until June."

Mr. Smith said that because of the floods and slowly receding ground water, mid-continent farmers are not yet in the fields, and the outdoor construction industry is nearly motionless.

"When the floods recede; when the farmers' tractors are running 24 hours daily; when the construction industry, including the highway construction industry begins to repair and reconstruct after the most devastating flood in the nation's history; and when the barge industry will be expected to catch up on the movement of delayed shipments, fuel problems of today will be magnified many times over," he said.

"The serious consequences to the nation's economy if waterborne commerce is curtailed by lack of fuel cannot be overemphasized," the AWO president said. "Fifty-eight percent of the total tonnage our industry moves is energy for others. Of this total tonnage, approximately 20 percent is coal to be used as boiler fuel for the electric utility industry. Curtailments of coal movements will cause serious repercussions in the electric industry and will increase demands for distilled petroleum products by those utilities equipped to burn oil and able to find it."

He said that since petroleum and coal are major inland waterborne commodities, if they cannot move, the "ripple effect will curtail highway and rail traffic, electric power and a host of consumer production industries."

Further, he added, the effects of curtailment of the movement of waterborne agricultural products and chemicals could have a serious effect on the nation's balance of payments problems, create unemployment, and cut down drastically on industrial productivity and economic stability in both basic and finished product manufacturing.

"It is an understatement for me to say that the barge and towing industry expects a very difficult situation in the months ahead," Mr. Smith said. "My purpose has been to dramatize the need for this nation to recognize the unique role which water transportation plays in the transporting of energy to be used by others, agricultural products and the heavy raw materials of industry so that in the solution of an admittedly very difficult problem, the fuel to propel the waterborne transportation industry is treated fairly and equitably."

Bilbao Yard Building Sener Technique LNG

Presently under construction at the Bilbao yard of Tomas Ruiz de Valasco S.A. for Naviera de Productos Licuandos is a 5,000-cubic-meter LNG/ethylene vessel. This ship will be the first to utilize the Sener spherical cargo tank developed by Sener S.A. and approved by Bureau Veritas.

The tanks of the vessel will be fabricated from 9 percent nickel steel but are also suitable for fabrication from other material.

The approximate principal dimensions of the new ship are length bp, 335 feet; beam, 61 feet, and depth, 32 feet. Powered by a 5,400-bhp B&W engine, the speed of the ship on a draft of some 21 feet will be about 16 knots.

IF YOU RATE EXPERIENCE HIGHLY, CONSIDER CHAN YORK HIN... HE'S BEEN ON THE JOB AT KEPPEL FOR 35 YEARS! It's not surprising Chan York Hin knows his job inside out. After all, 35 years of working in boiler repairs has taught him a thing or two about his work. It's made him quite an expert. But Chan York Hin always has been just that. Because even when he joined us 'way back in 1938, he already was a skilled Boilermaker. He just had to prove it to us. And to our customers. And that's exactly what he did. So over the years Chan York Hin patiently and methodically worked his way up. Up the long ladder of experience until he earned the title of Chargehand, the position he holds today. It's a position that places him in a supervisory capacity over a team of 30 boilermakers. And because they've got Chan York Hin to guide them, they're a very skilled team indeed. They're skilled and professional like all Keppel men. And there are plenty of them—3,000 men in all. It's these Keppel men who make our shipyard one of the finest in Asia. We have the capacity to undertake any type of work on any type of vessel. And that includes ship repair and maintenance, conversions, annuals and specials. If you're in shipping and you rate experience highly, think of Keppel Shipyard. Think of the Keppel men.

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**Seaspan International Appoints
R.H. Cooper And F.S. Collins**



Capt. R. Harold Cooper



Capt. Fred S. Collins

J. Rod A. Lindsay, president of Seaspan International Ltd., North Vancouver, British Columbia, has announced the appointments of R. Harold Cooper as general traffic manager, and Fred S. Collins as general operations manager.

Captain Cooper has served the company in a number of senior operating positions since coming ashore in 1955, including a period as manager, Eastern operations, with headquarters in Montreal. In his new capacity, he will be responsible for General Towing, Forest Products and Oil and Chemical Divisions.

Captain Collins transferred to shore staff in 1956 and has served in various capacities since that time. Prior to this appointment, he was manager of traffic services. He will now be directly responsible for coordination of dispatch, fleet services and marine personnel departments.

Seaspan is a diversified coastal and deepsea transportation and salvage company specializing in tug and barge operations in the Pacific region, and is one of the Genstar group of companies.

**GE/AG 'Weser' Turbines
To Power LNG Carriers**

AG "Weser" will supply the main turbine units for both the LNG carriers of 125,000 cubic meters each that have been ordered from Howaldtswerke-Deutsche Werft AG.

Each gas tanker will be fitted with a General Electric/AG "Weser" steam-driven geared turbine designed to provide a performance of 40,000 shp and a propeller speed of 105 rpm.

A unit will include a high-pressure and a low-pressure turbine unit with integral astern turbine, a reduction gearing and a separate thrust bearing. Delivery is scheduled in 1975 and 1976.



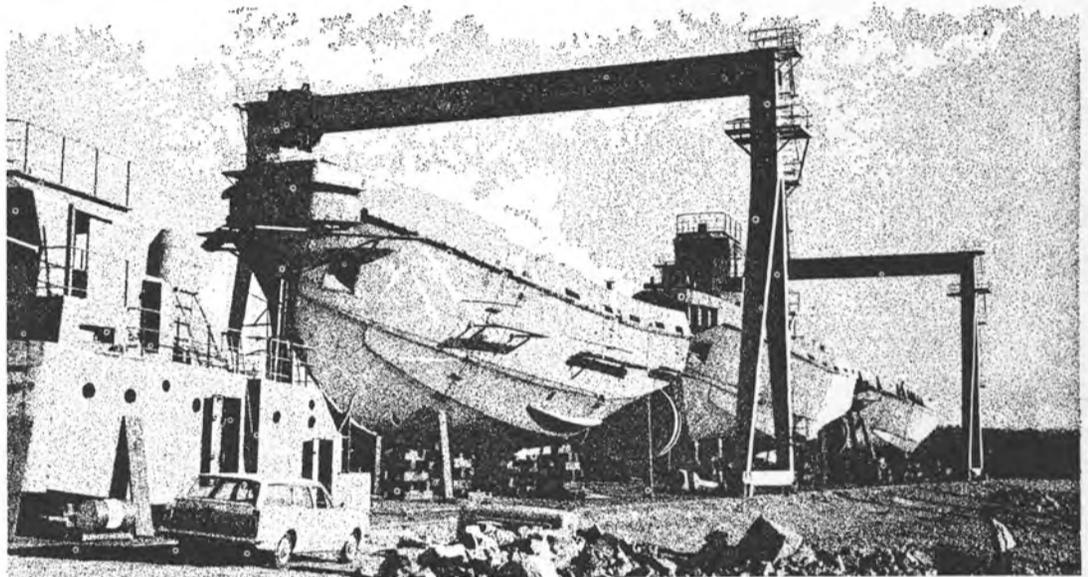
FIRST HUNDRED YEARS: If the first 100 years are supposed to be the hardest, the newly elected officers of the Maritime Association of the Port of New York give no indication that the second 100 years will be anything less than enjoyable. Commemorating 100 years of continuous service to the shipping and navigation industry are (left to right): vice president **Charles di Maria** (general manager, French Lines); president **John D. Kerr** (vice president, Calmar Steamship Corporation); secretary **Albert E. Bowen Jr.**, (president, A.E. Bowen, Inc.); treasurer **Thomas M. Torrey** (American Institute of Marine Underwriters), and past president **Edward J. Barber** (president, Barber Steamship Lines, Inc.).

June 15, 1973

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Todd To Build Twelve Tug/Supply Vessels For Allseas Of Panama

Todd Shipyards Corporation and Allseas of Panama, Inc. have announced the award of a construction contract for six tug/supply vessels for service in support of international oil exploration. Under the contract, Todd will commence construction of three vessels immediately at its Seattle Division,

and it is expected that three additional vessels will be commenced at the option of Allseas within three months. The contract also provides that Allseas will have an option to order six additional vessels. If all options are exercised, the complete contract has a total potential value of more than \$33 million.

The vessels are highly sophisticated for support of worldwide offshore drilling and exploration. They

measure 220 feet by 44 feet by 19 feet, and are powered by two diesel engines having in excess of 8,000 horsepower per vessel. The vessels will have controllable pitch propellers for maximum fuel economy and maximum bollard pull. They will be ABS classed for ice, and capable of operating worldwide for extended periods of time. These vessels will provide a new field of shipbuilding for Todd's Seattle Division, and will assist it in main-

taining its shipbuilding manpower.

The principal stockholder and chief executive officer of Allseas of Panama, Inc. is **William H. Henderson**, pioneer in the supply vessel industry. Mr. Henderson and his management team have experience dating to the initial offshore drilling in the Gulf of Mexico and operating supply vessels in the offshore waters of five continents.

Jay McEwen Named Jacuzzi Bros. Marine Industrial Accounts Rep



Jay McEwen

Jacuzzi Bros., Incorporated, Little Rock, Ark., recently announced the appointment of **Jay McEwen** to industrial accounts representative for its marine products department.

In his new position, Mr. McEwen will provide sales consultation service in specialized commercial and industrial applications for marine jet drive systems, as well as directly assist JacuzziJet industrial customers.

Mr. McEwen recently joined Jacuzzi after working for Teledyne Seacraft as a contracts administrator, and before that serving with the U.S. Navy as a craft development officer. He is a graduate of Syracuse University with a degree in marketing.

Jacuzzi manufactures jet drives in 12 to 36-inch stock sizes, and larger systems to customers' specifications.

Subsidy Asked For Six Tug-Barge Systems To Cost \$162 Million

Ingram Technologists, Inc., Nashville, Tenn., a wholly owned subsidiary of Ingram Corporation, has filed an application with the Maritime Subsidy Board for ship construction subsidy covering six huge tug-barge systems. The units would cost a total of \$162 million and require more than \$63 million of Government construction subsidy.

The tugs will measure 106 feet in length and will be capable of 12.5 knots with a 35-foot draft. The barges would be 907 feet long, with a beam of 136 feet, and a draft of 38 feet. They will be able to haul 957,421 barrels of oil each. No builder has been indicated.

Ingram intends to charter the six 80,000-dwt units to Burmah Oil Tankers (a Bermuda shipping firm) for 25 years of service to transport crude oil between the Bermuda facility and U.S. East and Gulf Coast ports.

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Gotaas-Larsen Orders LNG Carrier From West German Yard

Gotaas-Larsen Shipping Corp., a subsidiary of IU International, has ordered a 125,000-cubic meter liquefied natural gas (LNG) carrier from Howaldtwerke Deutsche Werft (HDW), Kiel, West Germany.

The order was announced by **H. Irgens Larsen**, chairman of Gotaas-Larsen and vice chairman of IU International.

The new vessel is scheduled for delivery in 1977. It will be similar in dimensions to three LNG carriers Gotaas-Larsen has on order from Moss Rosenberg Verft, Stavanger, Norway. The ship will utilize the Moss Rosenberg tank design under license to HDW. The price of the vessel has not been disclosed.

The LNG carrier will be 943 feet in length, with a beam of 142 feet and a draft of 36 feet. A 40,000-shaft-horsepower turbine will produce a speed of 20 knots. The ship will have a crew of 35.

Gotaas-Larsen operates one of the world's leading independent fleets—54 bulk cargoships totaling 4.3 million deadweight tons. Including the LNG carrier announced above, the company has on order eight ships totaling one million dwt, plus two semisubmersible drilling rigs for offshore oil and gas exploration.

E.F. Curley Joins Furness Withy As Manager U.K. Services



Edward F. Curley

T.J. Cassidy, president of Furness Withy Agencies (USA), has announced the appointment of **Edward F. Curley** as manager for the United Kingdom Services. Mr. Curley has over 20 years of executive experience in the shipping industry, most recently as manager of the New York office of the State of Illinois Department of Business and Economic Development.

Prior to joining the State of Illinois, Mr. Curley was for many years an executive at Kerr Steamship Co.

In his new position, he will be responsible for the services of Manchester Liners Limited, Gulf Container Line, Furness Warren Line, and The Pacific Steam Navigation Company. Mr. Curley will be located at the company's head U.S. office at Five World Trade Center, Suite 7411, New York, N.Y. 10048.

June 15, 1973

Delta Steamship Planning To Build 'Mini-LASH' Vessel

Delta Steamship Lines, Inc., New Orleans, La., is planning to build the first of what may be a new type feeder vessel.

The new 11,000-dwt "mini-LASH" type vessel, about one-third the size of Delta's full-sized \$80-million lighter-aboard-ship (LASH), will be only

about 530 feet in length with a capacity for 24 LASH barges.

The regular 800-foot LASH vessels, of which Delta has three under way, can haul 74 lighters, plus 288 containers. The "mini-LASH" ships have no specific container capacity, but some lighters can be replaced by containers.

The "mini-LASH" will operate in the Central American-Caribbean area picking up and discharging lighters

and funneling cargo into and out of New Orleans.

A company spokesman said Delta believes the small feeder-type LASH has a big future, and that ultimately there will be a "worldwide network" of such craft servicing the smaller outlying ports.

Delta has applied for both operating and construction subsidy for the vessels. No decision has been reached on a builder. Avondale is building its regular LASH ships.

Here's what happens with the new Raytheon Watchstander System for remote monitoring of engineering, cargo and bridge parameters — as well as spares inventory, fuel consumption, cargo control, dockside maneuvering, satellite navigation, or just about anything else you might need a computer to do:

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For a complete system description, send for our free new brochure. Raytheon Company, Ocean Systems Center, Portsmouth, Rhode Island 02871.

Kansas Firm Orders VLCC From Holland

Koch Industries Inc., Wichita, Kan., has awarded a contract to the Rhine-Schelde-Verolme Group for the building of a 228,600-dwt crude oil tanker. The vessel, which has to be delivered by March 1976, will be built by the Nederlandsche Dokken Scheepsbouw Maatschappij v.o.f., member of the R.S.V.-Group in Amsterdam.

Powered by a 32,000-shp Verolme/General Electric steam turbine, the tanker's approximate measurement will be length, 1,031 feet; breadth, 160 feet; depth, 84 feet, and draft, 65 feet.

The vessel will be the first one that Koch Industries, who have about 20 vessels on term charter, will own and manage themselves.

Campbell-Built Purse Seiner Will Carry 1,200-Ton Payload

The Conquest, newest in a series of large purse seiners built for the American high-seas tuna fleet, was launched in San Diego, Calif., on May 19.

The new ship, valued at approximately \$2.8 million, will be owned by **Joseph and Richard Madruga**, independent fishing operators. She will be skippered by Capt. **Maurice Correia**, currently in command of the smaller and older original Conquest, which the new "superseiner" will replace.

Designed by Campbell Industries, the vessel will now undergo outfitting at the company's facilities on San Diego Bay.

Principal speaker for the event was **Glen Copeland**, formerly president of Van Camp Seafood, and now consultant to that firm and its parent company, Ralston Purina. **Jack G. Allen**, Campbell Industries vice president, officiated as master of ceremonies for the launching.

Sponsor for the christening was **Mrs. Maurice Correia**, attended by **Mrs. Manuel Vargas** and **Mrs. Joseph DeSilva**. Fr. **James Rafferty** of St. Agnes Catholic Church, San Diego, performed the blessing.

According to **George Soares**, president of Campbell Industries, the Conquest will be equipped with the company's full standard fishing equipment package, including a Marco seine winch and Campbell's own design anchor winch. Other major equipment includes Vilter refrigeration, a Brunvoll 200-horsepower hydraulic bow thruster, and an anti-roll stabilizer.

The new seiner is 218 feet in length, has a 40-foot beam, and will carry a fish payload of approximately 1,200 tons. Her speed will be approximately 17 knots.

The main propulsion engine for the Conquest will be a 3,600-hp General Motors marine diesel, driving a 5-blade stainless steel propeller. Auxiliary power will be supplied by three Caterpillar 300-kw generator sets with Kado generators.

Navigational aids and other electronic gear will include two Kelvin-Hughes long-range radars, Sperry magnetic and gyrocompasses, Benmar ADF, an Omega navigation system, an azimuth bearing repeater, Fathometer, two single sideband transceivers, two emergency radios, a tone generator, and a PA/intercom system.

In other construction, Campbell's San Diego Marine Construction Corp. yard is currently building four bulbous-bowed seiners of its own design under contracts with purchasers. Three more "superseiners" are also under construction at the Campbell Marine yard, along with the outfitting currently under way on the Lucky Strike, launched in late March from the San Diego Marine facility. Campbell is also building three all-aluminum high-speed ferryboats under contract with the Golden Gate Bridge, Highway, and Transportation District, San Francisco.

World's Largest Ore/Oil Carrier Launched By Nippon Kokan

The Docecanyon, 269,500-deadweight-ton ore/oil carrier, to be the largest vessel of her type in service, has been launched by the Tsu Yard of Nippon Kokan (NKK), Japan's only integrated shipbuilder-steelmaker-fabricator.

NKK's New York shipbuilding department said the vessel is being built for Seamar Shipping Corporation of Liberia, a subsidiary of Vale Do Rio Doce Navegacao S.A. of Brazil. Docecanyon was christened by **Mrs. Raimundo Mascarenhas**, wife of the president of Cia Vale Do Rio Doce.

The vessel is being built to a standard design for 270,000-dwt class ore/oil carriers developed by NKK's shipbuilding division. She will carry iron ore from Brazil to Japan and oil from the Persian Gulf to Brazil, following delivery scheduled in July 1973.

Docecanyon features a new cargo tank arrangement which meets recommendations of the Inter-Governmental Maritime Consultative Organization, and provides for five center cargo tanks and 20 wing tanks. The 25 tank total increases by eight tanks the cargo space conventional on vessels of this type and class, and is designed to reduce oil spillage caused by accidents.

Main particulars are 1,115.5 feet length overall; 1,056.4 feet length between perpendiculars; breadth molded, 180.4 feet; depth molded, 92.8 feet, and a draft of 70.2 feet. The Mitsubishi turbine main engine developing 34,000 shp at 83.5 rpm gives the 169,500-gross-ton ship a service speed of 15.5 knots.



The huge ore/oil carrier Docecanyon, shown above, features eight more cargo tanks than conventional vessels of her type and class. She will carry iron ore from Brazil to Japan, and oil from the Persian Gulf to Brazil.

Combustion Engineering Elects Richard J. Hallinan Secretary

The board of directors of Combustion Engineering, Inc., Windsor, Conn., has elected **Richard J. Hallinan** as secretary of the corporation. Mr. Hallinan was also appointed general counsel and will continue to direct C-E's legal and patent departments.

He was previously vice president-legal, and prior to that vice president and member of the board of directors of C-E Lummus, a Combustion Engineering subsidiary.

Before joining C-E, Mr. Hallinan was associated with the New York City law firm of Shearman & Sterling, and was also special assistant to Commissioner **Thomas E. Murray** of the U.S. Atomic Energy Commission.

Mr. Hallinan graduated from Georgetown University, and received his LL.B degree from Harvard Law School in 1948.

Combustion Engineering's 1972 sales were \$1,179,883,000. The company provides a broad range of energy equipment, including fossil fueled and nuclear steam generating systems, petroleum and gas production processing equipment, refractories, minerals, pollution control systems, screening equipment, building products, tempered safety glass, nuclear components, and designs petroleum, chemical and petrochemical process facilities.

Hydro Products Offers New Product Catalog

A new 24-page Product Catalog is now available from Hydro Products, a Dillingham company.

This new catalog describes Hydro Products' complete line of underwater television, photographic, lighting and communications systems; oceanographic instrumentation and sampling equipment; detecting and locating devices; precision depth recorders; winches and other support equipment.

For a free copy, contact **Jim Hitchin**, Assistant General Manager, Hydro Products, P.O. Box 2528, San Diego, Calif. 92112.

Brochure Available On Offshore Oil Pipe Tensioners

An illustrated brochure describing the LPT series of Pipemaster Tensioners is available without charge from the Heavy Machinery Division of Western Gear Corporation at Everett, Wash.

The brochure outlines uses of the specialized machinery in controlling the tension of a pipeline on a lay barge in offshore oil operations. The Pipe Tensioner, a patented and proprietary product, features the ability to adapt to the curvature of a pipeline in many diameter sizes from six inches to more than 56 inches.

For a copy of the brochure on Pipe Tensioners write to the Marketing Manager, Western Gear Corporation, Everett, Wash. 98201.



CAPTAIN KESLER HONORED: Coast Guard Capt. **William Kesler Jr.**, New York Captain of the Port until early May, was praised by the N.Y. Towboat and Harbor Carriers Association for his "... pragmatic sensitivity to the problems of the towing and transportation industry in New York Harbor..." The presentation of the Laudatory Resolution was made by the association's president **William E. Cleary** at a luncheon on Governors Island. Captain Kesler has since left Governors Island for a new assignment in Miami, Fla., as Legal Officer on the staff of the Commander, 7th Coast Guard District. Mr. Cleary is shown above presenting Captain Kesler with a plaque recalling his contributions to the marine transportation industry in New York Harbor.



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June 15, 1973

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Univ. Of Mich. Awards Honorary Degree To Jerome L. Goldman

Naval architect **Jerome L. Goldman**, inventor of the LASH (lighter aboard ship) system and designer of innovative offshore drilling platforms and floating equipment, has been awarded an honorary doctor of science degree by the University of Michigan.

Mr. Goldman was one of only five

men to receive honorary doctorates at commencement ceremonies in May at Ann Arbor, Mich. He is a 1944 graduate of the university, holding a bachelor of science degree in engineering.

The citation that accompanied Mr. Goldman's honorary degree said: "'Innovative' is the word most often used to describe the work of **Jerome Goldman**. An engineer whose designs are as sound as they are original, Mr. Goldman

has a reputation in naval architecture that is international. His imaginative approaches to cargo handling have done much to improve the efficiency of ocean transport. His inventiveness also has been turned to offshore oil-drilling technology, playing a major role in development of petroleum resources. The industry recently recognized him for his contributions. He is a distinguished member of his profession, an enthusiastic supporter

of the University's maritime research program, and an active participant in the civic affairs of his adopted community, New Orleans.



Naval architect **Jerome L. Goldman** (left) receives an honorary doctor of science degree and a warm handshake from **Robben W. Fleming**, president of the University of Michigan.

"The University thus is proud to give its further recognition to the talents and accomplishments of **Jerome Goldman** and to confer upon him the degree Doctor of Science."

Mr. Goldman is president of Friede & Goldman, Inc., naval architects and marine engineers, New Orleans, and president of LASH Systems, Inc., licensor for LASH vessels. He holds more than 10 worldwide patents in connection with his designs for ships and floating equipment.

United States Lines Names James Conway



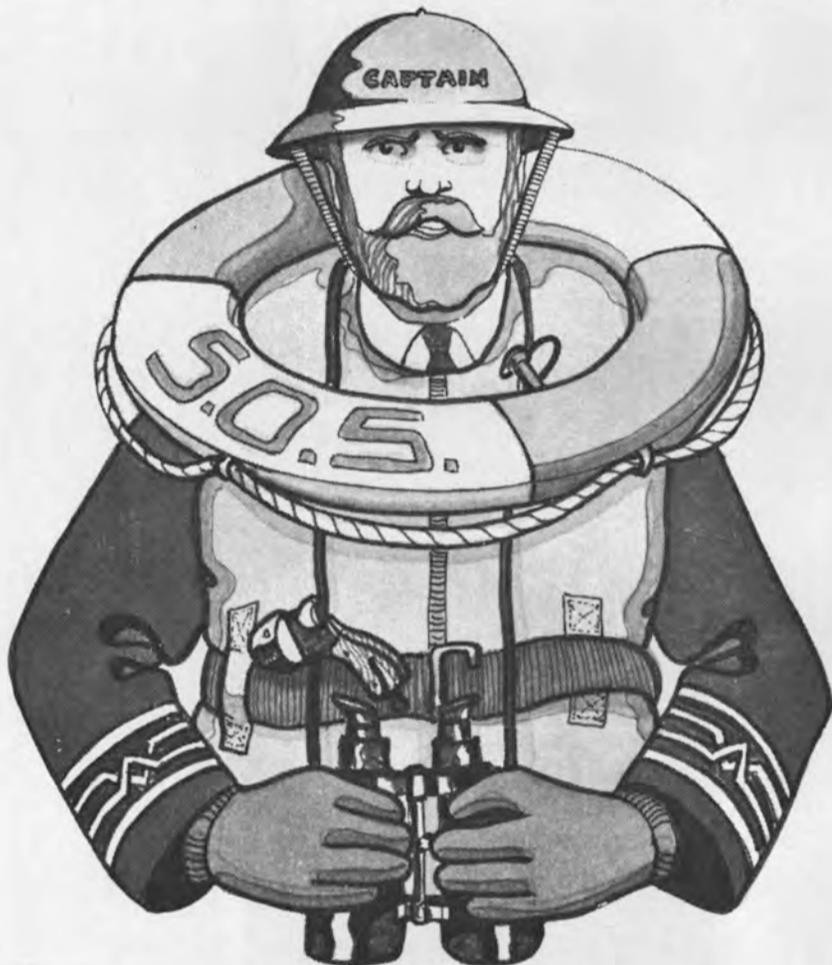
James G. Conway

James G. Conway has been named director of Government services at United States Lines, Inc., it was announced by **W.J. Keely**, vice president-marketing of the containership company.

Mr. Conway's new duties will include negotiating Government shipping through Federal departmental procurement offices.

Prior to his new assignment, Mr. Conway was North European service manager in charge of operations for United States Lines Tri-Continent services in that sector. He has also served as district manager in Hamburg for Central Europe and Benelux countries, and traffic manager, Continental service in New York, all with United States Lines. Mr. Conway has been with United States Lines since 1957.

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



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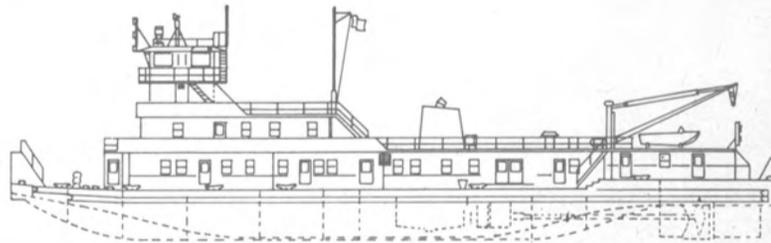
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HERMAN T. POTT
Chairman of the Board

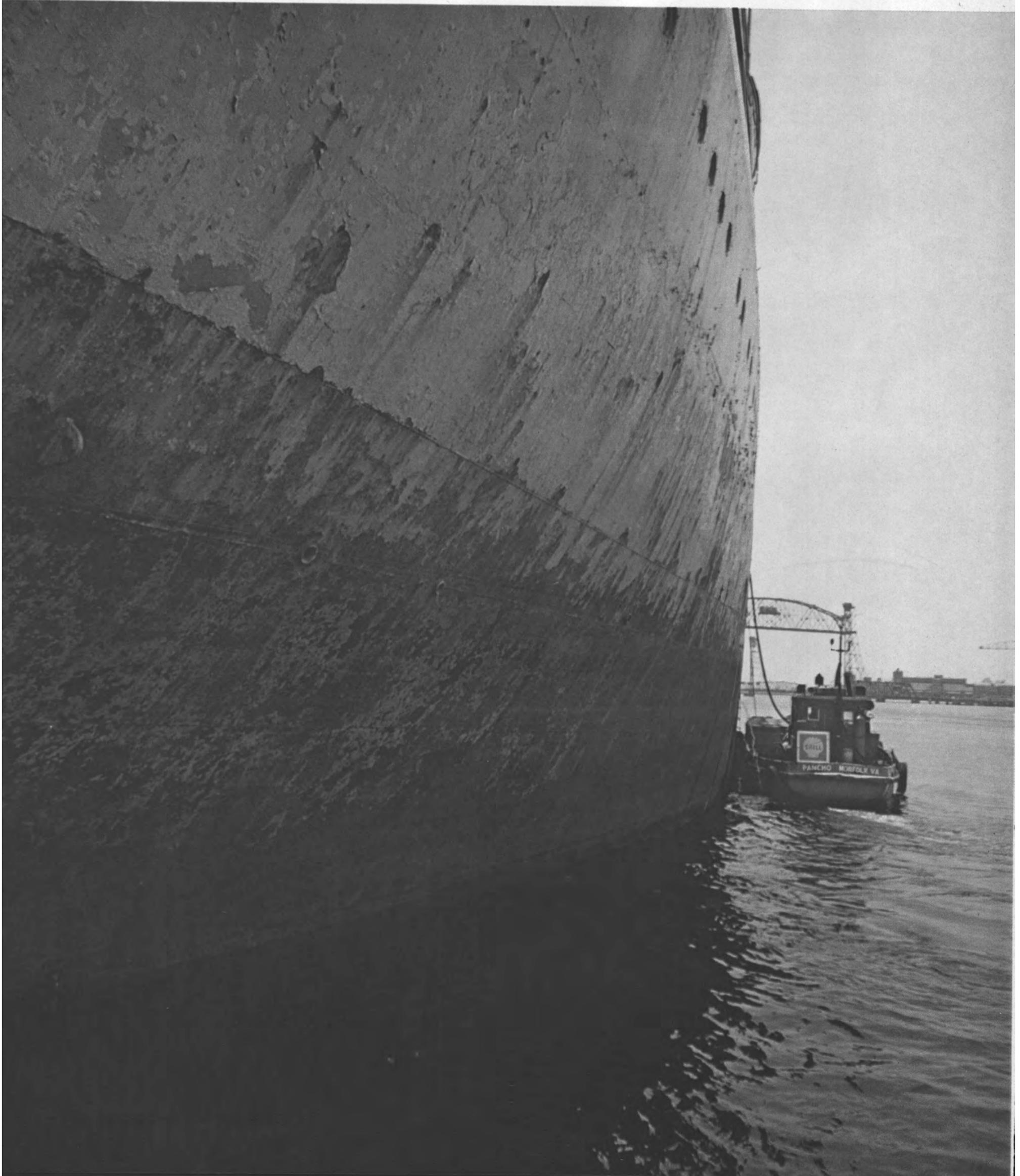


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This firm uses two tank boats—one holds 13,500 gallons, the other 19,500 gallons, to service ships in Hampton Roads. Each boat is divided into two compartments and can deliver up to 4,000 gallons of Shell Lubricants per hour to ships' tanks.

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With this speedy tank-to-tank delivery system, there is less chance of product contamination, and only minimum assistance is needed from ship crews. In addition, there is no interference with cargo operations. Delivery is faster and less hazardous than with drums. Still, both of the tank boats frequently carry drums on deck, in addition to full tanks below, to fill smaller orders.

Use of Shell MELINA® Oil increasing

Demand for multi-purpose MELINA Oil is increasing for both slow speed crosshead-type diesels—including Sulzer, MAN, B & W, Gotaverken, Fiat, Stork—and medium and high speed trunk piston engines. MELINA Oil protects engine parts against wear and corrosion, and resists oxidation over a long service life. MELINA also satisfies the requirements of other shipboard equipment such as gear transmissions, variable pitch propellers, steering gear, turbochargers and air compressors.



Shell Representative, John Barnett, discusses some of the advantages of MELINA Oil with Chief Engineer, Demetrios Kalisporis. MELINA Oil neutralizes acids that straight mineral oils cannot.

◀ Marine Oil Services' tank boat, Pancho, pumps Shell MELINA Oil into the Greek tanker, Captain Xilas. Pancho's pumps can deliver 4,000 gals./hr. from her 19,500-gallon tanks. This fast, clean delivery speeds ship turnaround time.



E. J. Wheeler, Manager of Marine Oil Services, Inc., opens an outlet valve so that ALEXIA Oil can be pumped at 55 gals./minute into a waiting tank boat. Four insulated 10,000 gallon storage tanks hold Shell lubricants at a constant 120°F., permitting fast flow in any season.

Marine Oil Services also offers TALPA® Oil, a specially refined straight mineral oil, for engines not requiring additive type lubricants. And Shell ALEXIA® Oil is in demand for engines with separate cylinder lubrication because of its anti-wear and acid-neutralizing properties.

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DIESEL GENERATOR SETS

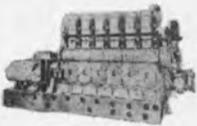
1



350 KW DIESEL GENERATOR SET

350 KW—120/240 volts DC—600 RPM—compound wound G.E. generator with switchgear. ENGINE: Ingersoll-Rand—heavy-duty type S—505 HP—10½x12—reconditioned to ABS.

2



250 KW DIESEL GENERATOR SET

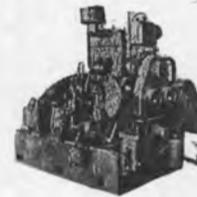
ENGINE: Enterprise 12 x 15 DSG-6—6 cyl.—450 RPM crank No. 50J. GENERATOR: Westinghouse 250 KW—120/240 DC—1040 amps—450 RPM. Typical serial No. 35-10P-913. Complete with switch gear.

3

EMERGENCY GENERATOR SUPERIOR 75KW 120/240 VOLT D.C. DIESEL GENERATOR SET

With switchgear. ENGINE: Radiator cooled Superior GBD-8—6 cylinder—1200 RPM GENERATOR: Electric Machinery Co.—120/240 volts DC—316 amps—1200 RPM—stab. shunt.

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UNUSED 10 KW SUPERIOR DIESEL GENERATOR SET

GENERATOR: Delco 10 KW—120 VDC—83.3 amps—1200 RPM. ENGINE: Superior diesel—2 cyl.—4½x5¼—15 HP—heat exchanger cooled.

5



500 KW—120/240 VOLT DC DIESEL GENERATOR SET EQUAL TO NEW

GENERATOR: Allis Chalmers—Compound wound. Has Class "A" insulation. Output 500 KW—120/240 volts DC—2080 amperes—720 RPM—drip-proof—self-cooling. Ambient 50°C—temperature rise 40°C. ENGINE: Model GM 8-278—2-cycle—Vee type—8½x10½—air starting—720 RPM. Complete with switchgear. Condition very good. Still aboard naval vessel. Has Ross shell & tube type lube oil & raw coolers—temp. control valve—shock mounts.

6

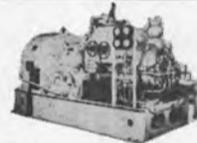


300 KW DIESEL GENERATOR SET

ENGINE: G.M. 6-278—6-cylinder—2 cycle—8¾x10½—750 RPM—with oil and water Ross Shell and Tube Heat Exchangers, instrument panel, pyrometer, etc. Vibro Isolators. GENERATOR: G.E. 300 KW—120/240 volts DC—1250 amps—shunt wound—continuous overload rating 375 KW—2 hours—55° Weight of unit approximately 26,000 pounds. Complete with shock mounts. Unit 13' 2" long, 64" wide, 8' high.

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

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8

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

GENERATOR: 300 KW—240 VDC—1250 amps—1200 RPM. GEAR: 5286/1200—frame 6x15—serial 10A-2612-4. TURBINE: Frame C-325—225 PSI—397°TF—5286 RPM—Serial 10-A-2611-4. Wt. 16,700 lbs.—complete in original factory crate.

9



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

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

10



WESTINGHOUSE 440/3/60 200 KW UNIT

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

11



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

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

12

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



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

13



AP2 VICTORY WORTHINGTON-MOORE CROCKER-WHEELER 300 KW UNIT

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

14

UNUSED C-4 CROCKER-WHEELER 500 KW GENERATOR ENDS ONLY FORMERLY USED WITH WORTHINGTON-MOORE TURBINES & GEARS

Upgraded by U.S. Navy—rewound in glass. Generator Frame and Armature—Marine 500 KW type 3-1200—dripproof enclosure—base mount. Modified from Crocker-Wheeler generator frame 152HD—240/120 volts DC—2083/521 amps—1200 RPM. Ambient temperatures 50°C. APPLICATION: For C-4-SA1; C4-SA-3; T-AP-134 vessels, using Worthington-Moore Turbine—Form S-6 and generator Form 14 x 10. No pedestal bearing.

15

WESTINGHOUSE 400 KW TURBO-GEN 835 LBS — 840°TT

Newport News Hulls 480—541 Esso ships. TURBINE: Westinghouse 835 lbs/840°TT—9018 RPM—6-stage—instruction book 1430-C1—serial 5A-7090-7 & 8. GEAR: 9018/1200 RPM. GENERATOR: Westinghouse 400 KW—440/3/60/1200 RPM—rewound field—instruction book 5442. EXCITER: 5.5 KW.

16

TWO 538 KW WESTINGHOUSE T-2 AUX. GENERATORS (COMPLETE)

TURBINE: 538 KW @ 5010 RPM—438 PSIG—750°TT—28½" vacuum. GEAR: 5010/1200 RPM. A.C. GENERATOR: 400 KW 450/3/60/1200—0.8 PF. DC EXCITER: 32.5 KW—120 volts (variable voltage)—shunt—4-pole—DC excitation 5 KW. ALWAYS WELL MAINTAINED BY MAJOR OIL CO.

TURBINES & ROTORS

MAIN PROPULSION

17

BETH. CLASS—13,600 H.P. Sparrows Point & Quincy 1600 hulls. H.P. turbine casing only. Excellent blading & labyrinth packing.

KNOW 'ROUND THE WORLD



THE BOSTON

313 E. BALTIMORE

Main Office: (301) 481-1111

18

H.P. & L.P. COUPLINGS
1 Set—for Beth Class 13,600 HP 4400 hulls and Quincy 1600 hulls.

19

G.E. 6690 HP @ 7062 RPM HIGH PRESSURE 8-STAGE TURBINE

835 lbs—840°TT—#83341—originally built for Esso Christobol—Newport News.

20

T-2 TURBINES & ROTORS

COMPLETE WESTINGHOUSE T-2 MAIN TURBINE—UNSHROUDED 6600 HP—435 PSI—750°F 28" VACUUM—3720 RPM

Instruction book IB-8345—type D—serial No. 5A-2124-6—unshrouded. Unit complete with all packing, stationary blading, linkage, governors, diaphragms, nozzles, etc. WILL SELL ROTOR SEPARATELY OR COMPLETE TURBINE CASING & ROTOR. Always well maintained by major oil company.

21

2 COMPLETE T-2 G.E. TURBINES

#61818 and #61834—large Lynn—all stages magnafluxed.
ROTOR WILL INTERCHANGE WITH ELLIOTT MAIN TURBINE
Will Sell Rotors Separately

22



T2-SE-A1 MAIN PROPULSION ROTOR — G.E.

Large Schenectady — serial 77418—reconditioned Bethlehem Steel 1970—all stages magnafluxed.

23

T-2 TANKER UNUSED—4 UNITS AVAILABLE AUX. G.E. TURBO GEN. ROTORS



DORV — 325M — 5645 RPM—for 525 KW G.E.

24

VICTORY SHIP TURBINES & ROTORS

8500 H.P. 8-STAGE TURBINES FOR LARGE VICTORY SHIPS L.P. — 3509 RPM H.P. — 6159 RPM

LP Serial #77943—HP Serial #77942—Interchanges Ingalls C-3—Class 442 & Sun C-4 vessels—U.S. Navy Victory "Liberty".

LP Serial #72272—HP Serial #72271—Interchanges Ingalls C-3—10 boxes of spares.

LP Serial #62042—HP Serial #62043—GEI 16263—Ridgeway Victory.

WRITE OR PHONE FOR DETAILED INFORMATION AND PRICES

ON METALS CO.

ST. • BALTIMORE, MD. 21202
9-1900 Marine Dept.: (301) 355-5050

25 VICTORY SHIP AP2 H.P. & L.P. TURBINES NEW — UNUSED — 6000 HP SETS

G.E.—H.P. & L.P.—with throttle valve
Westinghouse—L.P.—with throttle valve
Allis-Chalmers—H.P. & L.P.—with throttle valve

26 6000 H.P. G.E. — NORTH CAROLINA C-2

H.P.—8-stage—serial 78040
L.P.—7-stage—serial 78043
G.E.I. 16262



19 STAGE WESTINGHOUSE H.P. ROTOR FOR AP2 VICTORY

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



G.E. 8500 H.P. REDUCTION GEAR FOR LARGE AP3 VICTORY & C3

MD-48A—8500 HP—6159/
3509/763/85 RPM.

29 ALSO 6000 H.P. VICTORY AP2 REDUCTION GEAR

Westinghouse 4A-1640.

PUMPS



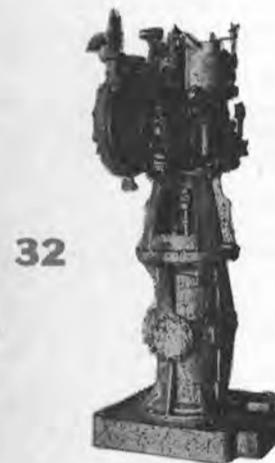
UNUSED DELAVAL IMO ROTARY PUMP

175 GPM—35 PSIG—10 HP
—120 volts DC—1750 RPM
—serial E-8619—frame 324
VY—76 amps—mfg. by Elec-
tro Dynamics. With magnetic
control. Excellent condition.

CARGO PUMP TURBINES

WESTINGHOUSE

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



UNUSED DELAVAL 24.5 H.P. LUBE OIL PUMP

Turbine-driven main lubri-
cating oil pumps — vertical
rotary with horizontal worm
geared turbine drive. 575#
Steam pressure—5000 RPM
—15# back pressure. GEAR:
5000/1035 RPM. PUMP: 550
GPM at 50 PSI—suction lift
10.0". Suitable for Fletcher
Class Destroyer. DD 445
Class.

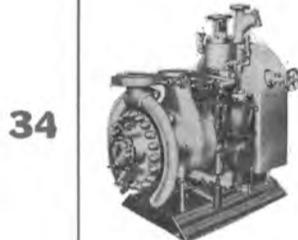
33 NEW TURBINE DRIVEN FIRE AND GENERAL SERVICE PUMP



Allis-Chalmers 6x5 pump,
type SKH—1200 GPM—125
PSI—3500 RPM. Coppo tur-
bine type TF-22-2 1/2 — 3500
RPM. 273#—50° superheat.

TURBINE DRIVEN BOILER FEED PUMPS

*Suitable for Navy and
Merchant Vessels*



COFFIN TYPE D.E.B. TURBO FEED PUMP

34

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

UNUSED DD445 CLASS WORTHINGTON TURBINE-DRIVEN FEED PUMP

35



Worthington — draw-
ing SL5043—425 GPM
—1675' total dyna-
mic head—5000 RPM
3-stage—double suc-
tion. Flanged 4 1/2"
inlet—4" outlet. Pow-
ered by Sturtevant steam turbine—282 HP—
590 PSI. For Fletcher DD-445 Class Destroyers.

36 INGERSOLL-RAND BRONZE CARGO PUMP

10GT—4500 GPM at 125 lbs.—2-stage—size
14x12.



BUFFALO SIZE 4 FEED PUMPS

37

Terry Turbine—BM—273 HP—550 RPM—ex-
haust 15 lbs—590 PSI—superheat 0°—425
GPM Buffalo Pump—discharge pressure 750
lbs—5"x4"—built for USN DD destroyers. DD
445 Class Fletcher.

WORTHINGTON 16"x14"x18" VERTICAL DUPLEX STRIPPING PUMP

38



1400 GPM @ 110 PSI—
suction lift 11.5 ft.—
steam back pressure 15
lbs. Suction 14"—dis-
charge 10"—steam 2 1/2"
—exhaust 4". Overall
width 6'8"—overall height
9'1 1/2"—depth 3'9 1/2"
—wt. approx. 10,000 lbs.



WORTHINGTON 3-STAGE UNUSED BOILER FEED PUMP

39

PUMP: 5" Worthington—460 GPM @ 750 PSI
—5000 RPM—305 HP—steam flow 8052/hr—
26.4 lbs HP hr. TURBINE: Sturtevant C-22—
type 21—575# dry saturated steam—15 lb.
back pressure—259°F water temperature—15
lbs/inch suction pressure.

MISCELLANEOUS

REDUCTION GEARS for Diesel Drive

40



3200 HP
DOUBLE INPUT
SINGLE OUTPUT
DIESEL
REDUCTION GEARS
20 DEGREE OFFSET

Farrell-Birmingham — 3200 SHP. REDUCTION
GEAR: 1.81:1—handles two 1600 HP diesels
@ 720 RPM. With hydraulic couplings & Fa-
wick clutch. Port and starboard. Gear output
400 RPM. Suitable for dredge pumps. Non-
reversing. OK for 38D8-1/8 engine.

41

IN LINE GEARS

Farrell-Birmingham 3200 HP non-reversing —
from seaplane tenders. Ratio 1.867:1. Complete
with hydraulic couplings, etc. Will handle two
38D8-1/8 FM diesels. Has Fawick clutch.

42

2100 HP DOUBLE INPUT SINGLE OUPUT GEARS

Farrell-Birmingham — heavy duty — originally
built for 2 heavy-duty direct-reversing engines
—300 RPM—1050 HP each. Ratio 3.435:1.

43

SINGLE ENGINE REDUCTION GEAR

Farrell-Birmingham — non-reversing—1600 HP
at 2.4909:1. With hydraulic couplings.

44



NEW—UNUSED 1-5/16" IDEAL ANCHOR WINDLASS

Made by Ideal Electric Co.—with spares. Double
wildcat—1 5/16"—15 HP—115 volts DC—
1750 RPM—all controls—two outboard gypsies.
Wildcat 36" between centers—6000 lb line
pull at 50 FPM. DIMENSIONS: O.A.W. over
gypsies 84"—OAL 81". Will sell windlass with-
out power if desired.

45

ANCHOR WINDLASS

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

46



SHARPLESS LUBE & DIESEL OIL PURIFIERS

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

47



UNUSED 1135 SQ. FT. C.H. WHEELER CONDENSER

20" Ex. inlet—5/8" Cu-Ni tubes—with or without air
ejector.

48

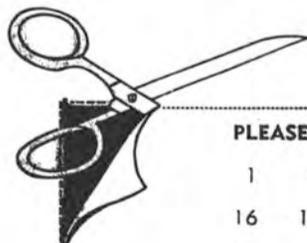


UNUSED 70 HP McKIERNAN-TERRY WINDLASSES

Chain and two 10640 lb anchor & 30 fathoms chain
@ 30 FPM. 70 HP—230 volts—shunt DC motors—233
amps—550 RPM—55°C rise. Wildcat centers 47 1/2".
Base 9'5" wide x 11' long. Weight 36,000 lbs.

INQUIRE FOR ALL OTHER ITEMS

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



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46	47	48												

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Port Of Philadelphia Honors Adrian Hooper



Adrian S. Hooper

Adrian S. Hooper, board chairman of Interstate Oil Transport Company, Philadelphia, Pa., was recently chosen as the recipient of the Annual Award of the Port of Philadelphia Maritime Society. Mr. Hooper was recognized for his outstanding service and effort on behalf of the Philadelphia Port area.

He received the award from Francis A. Scanlon, the organization's president, before approximately 700 members and guests at the society's 38th Annual Dinner

at the Bellevue Stratford Hotel in Philadelphia.

Mr. Hooper, whose Philadelphia-based firm is among the largest independent energy transporters in the United States, indicated: "We are facing unprecedented change in waterfront facilities. It behooves us to recognize the change and take advantage of it; to recognize obsolescence in its early stages and profit from it."

The Interstate Group of Companies serves ports from Maine to Florida, the Gulf Coast, the Caribbean, and Puerto Rico.

D.J. Cahalane Joins Waterman Steamship

Waterman Steamship Corporation has announced that Daniel J. Cahalane has joined their New York office as vice president of Far East traffic.

Before joining Waterman, Mr. Cahalane was vice president and general manager of Moran Borinquen Lines. He had previously been with States Marine Lines for many years.

Clifford Hoitt Group Buys Walz & Krenzer



Clifford E. Hoitt

Clifford E. Hoitt, president of Marine Products & Engineering Co., New York, N.Y., together with three of his associates, has announced the acquisition of the assets and corporate name of Walz & Krenzer, Inc., Rochester, N.Y., due

to the retirement of its president C.T. (Cy) Krenzer.

Under the new corporate structure, Mr. Hoitt, who was also a vice president of the former Walz & Krenzer, has assumed the presidency. Anthony Karpich, chief engineer of Marine Products & Engineering, now occupies that position in Walz & Krenzer as well.

Victor W. (Pete) Bethge will be in charge of naval architecture and sales at the New York office, while Wilbur C. Weiland will supervise manufacturing and sales in Rochester.

All Walz & Krenzer sliding doors, sluice gates and allied products, as well as Pilgrim Nuts and Morgrip Bolts that are marketed by Marine Products & Engineering Co., will continue to be manufactured in Rochester.

Mitsui Delivers Self-Propelled Drilling Ship Petrobras II And Four Supply Vessels



The Petrobras II leaves the Tamano yard of Mitsui upon acceptance of her owners. The self-propelled drilling rig is designed to rotate its amidships drilling rig.

Mitsui Shipbuilding & Engineering Co., Ltd. recently delivered at its Tamano Works the self-propelled drilling vessel Petrobras II to Petroles Brasileiro S.A. of Brazil. The vessel has the same hull form as an ordinary ship. Unlike rigs of such types as jack-up, fixed and submersible, the Petrobras II is a floating type rig with electric-propulsion plant. To date Mitsui has built and delivered three drilling vessels of the same type.

Four supply and anchor handling vessels also were ordered by the same firm to work with the Petrobras II. All of these vessels have been delivered.

The Petrobras II has an overall length of 379 feet 4 inches, a length between perpendiculars of 351 feet 3 inches, a molded breadth of 70 feet, a molded depth of 26 feet and a draft of 18 feet 10 inches. The total deadweight of the ship is 6,314 tons. The main powerplant consists of three sets of 2,200-hp diesel generator sets. These units drive the drilling machinery when operating in this mode and the 2,000-hp propulsion motors when underway.

These motors give the ship a speed of 10.97 knots. The Petrobras II is classed by the American Bureau of Shipping.

The design of the hull incorporates an upper deck, a second deck and two longitudinal bulkheads and is longitudinally framed. A mooring plug (special mooring device) is provided amidships and above the plug a substructure is installed.

The superstructure at the stern consists of the after deck, a 70-foot by 70-foot heliport deck which overhangs the stern and a pilot house. Accommodations are provided for 75 people—the normal underway crew consists of 37, while 75 people are needed during drilling operations.

During drilling operations the mooring plug, installed amidships, is made stationary in the bottom of the sea by an anchor so that the hull can rotate 360 degrees around it. The bow can be directed to head against the wind or the tide by means of the bow and stern thrusters. The ship can drill in water 1,000 feet deep and drill to a depth of 25,000 feet.

At sea, you can depend on Norriseal performance



You'll find Norriseal butterfly valves in use on offshore drilling and mining rigs, in ventilating systems, as flooding valves on dry docks, in ballast-deballast systems and on offshore oil terminals. They control the flow of everything from water to drilling mud and they stand up as much as 30% longer in service than comparable competitive valves.

Norriseal valves give you positive shut-off with 360° uninterrupted disc sealing. And, you get pressure handling capability up to 200 psi.

Better Norriseal design prevents leakage and saves money on maintenance. Leakage from the valve bore is prevented, contaminants are locked out and shaft lubricants are locked in. This design makes on-site replacement of either the seat or the seals easier, faster and lower in cost.

Norriseal valves come in sizes up to 28 inches. They're available in span or lug body styles, in a variety of metals—including bronze—and with a wide range of elastomers.

For more information on butterfly valves, call or write Pat Dillard.

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49-29-47

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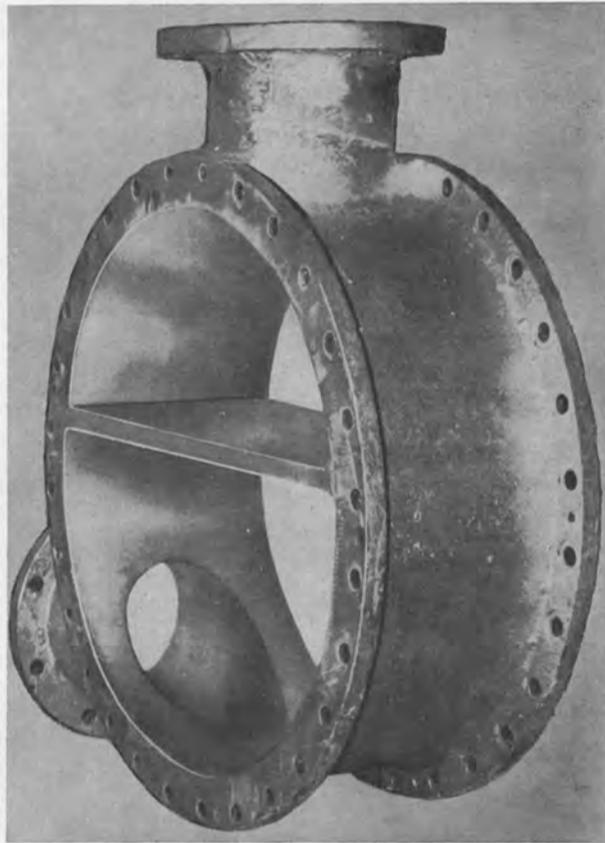


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quickly and economically with



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AFTER ↑

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

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| Water Boxes | Ventilators |
| Machinery Castings | Stacks |
| Ducts | Pumps |
| Pipes | Sea Valves and Chests |
| Condenser Covers | Tanks, Bulkheads and Decks |
| Cooler Heads | Shell Plating Etc. |
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The Cordobond Strong-Back Components, when used according to directions, will repair anything from a pin hole to a complete break with a patch of great strength that clings tenaciously and lastingly.

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CORDOBOND REPAIR KITS CONTAIN ALL THE COMPONENTS AND ACCESSORIES FOR MAKING EMERGENCY REPAIRS AT SEA

Packed in sturdy Navy type refillable metal containers.

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Over 6000 ocean going vessels carry our standard repair kits. Cordobond is not affected by water, oil, gasoline, etc. It does not corrode. It eliminates costly gas freeing. Cordobond is self curing, no applied heat necessary.

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Van Lessen & Punt N.V.
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Marine Supply Company
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Indame S.A.
—Cadiz
Consulmar S.L.
- TRINIDAD W.I.**—Port of Spain
R. Landry & Company, Ltd.
- WEST GERMANY**—Hamburg
Van Lessen & Punt GMBH

General Dynamics Awards Contract To Build Two Building Basins At Quincy

General Dynamics has announced the award of a multimillion dollar contract to Perini Construction Company of Framingham for the construction of two shipbuilding basins at its Quincy Shipbuilding Division, Quincy, Mass.

P. Takis Veliotis, president and general manager of Quincy Shipbuilding Division, in making the announcement said: "Construction of these basins will be similar to our three existing building basins and will allow us to compete effectively in today's market as well as future markets, not only for liquefied natural gas tankers, but for other ships of comparable size."

General Dynamics has contracts for \$270 million to construct three LNG ships, and is currently negotiating with several companies for additional contracts.

Conversion of the shipways will mark the end of sliding-type launchings at the Quincy shipyard. Construction of the basins is expected to be completed by the summer of 1974.

The last ship to be launched from the sliding ways was the Navy replenishment oiler Kalamazoo, on November 11, 1972. She is in the final stages of fitting out preparatory to commissioning.

Trans-Sonics Offers Bulletin On Tank And Draft Gaging For Offshore Applications

An Offshore Systems Description Bulletin on Tank and Draft Gaging Systems for Offshore Applications has been published by Trans-Sonics, Inc., Burlington, Mass.

The bulletin describes innovations and proved performance of electrical tank indication and control systems; basic system description; applications; analog and digital display systems. It also includes an illustration of a typical system installation and photographs of system components. A copy of the bulletin can be obtained by writing to Peter H. Emerson, Marine Products Marketing Manager, Trans-Sonics, Inc., P.O. Box 326, Lexington, Mass. 02173.

B&W Shipboard Disposal Systems To Be Installed On States Steamship Vessels

Three systems for the disposal of shipboard wastes have been sold by the Babcock & Wilcox Company to the Bath Iron Works Corporation, Bath, Maine for the States Steamship Company, San Francisco, Calif.

B&W's "zero discharge" Sanitary Waste Disposal system (SWD), the first of its kind to be sold, will be installed with B&W marine boilers on three new 18,000-ton roll-on/roll-off type ships scheduled for commercial operation during 1974. The total contract amounts to \$2.1 million.

According to R.E. Whitam, B&W manager of marine marketing: "This type of system is an advancement over the present practice of chemically treating waste and discharging it overboard. Because of its unique nature in incinerating the effluent in the ship's propulsion systems," he added, "no liquids are discharged overboard."

The SWD system has been undergoing testing for two years at B&W's Alliance, Ohio Research Center. Based on test results, it will meet Environmental Protection Agency standards regulating marine sources of pollution.

The B&W Sanitary Waste Disposal system utilizes the main propulsion boilers to incinerate sewage from the vessel's sanitary system, laundry washwater and galley garbage disposal.

The SWD system consists of a holding tank where waste is chlorinated and aerated, a pump

grinder, and a mechanism for firing the waste into the boiler. Once in the boiler furnace, the liquid is evaporated and the waste is burned, converting it into steam and a biologically inert gas.

Because of its simplicity and few number of moving parts, it can be installed on new ships or retrofitted to existing boilers. The system requires little maintenance and is designed for completely automated operation.

The size of each system varies according to the specific needs of the ship so that the holding tank can handle approximately one and a half days of accumulation. The systems designed for the new States Steamship Company vessels will handle 70 gallons of sewage per man/per day, and is based on a capacity of 55 people.

Mr. Whitam stated that the system has been designed to operate on ships using freshwater sanitary systems, as in the case of most modern vessels. "The conversion," he said, "of existing saltwater systems to fresh water is relatively a simple task, and would involve an amount equal to approximately 30 gallons of fresh water per day/per man."

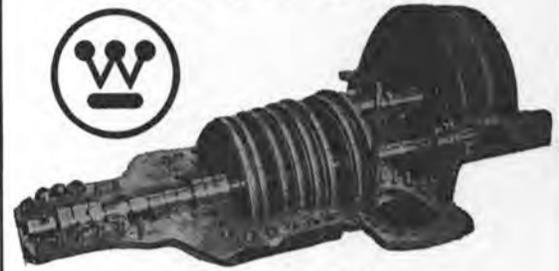
Commenting on the SWD system's marketing potential, Mr. Whitam concluded that: "As the stringent environmental laws governing shipboard dumping come into effect, our system looks like the answer for the future in shipboard waste disposal for steam-propelled ships."

Inge International Inc. Moves To Huntington

Inge International Inc. has announced the relocation of its offices to 50 Gerard Street, Huntington, Long Island, N.Y.

The company, which was previously located at 42 Broadway, New York City, specializes as ship chartering agents and shipbrokers. The firm's New York telephone number is unchanged.

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Berwind Promotes Three In Caribbean —Announces Major Expansion Program



Bruce J. Robeson



Rene F. Rodriguez



Carlos A. Morales Silva

H.G. McComas, group vice president, Berwind Corporation, Caribbean, has announced the promotions of two executives to president and one to vice president of Caribbean subsidiaries, and outlined plans on capital expansion.

Bruce J. Robeson has been promoted to president of Berwind Lines, Inc., Licenciado Rene F. Rodriguez has been promoted to president, and Carlos A. Morales Silva to vice president of Industrial Molasses Puerto Rico, Inc.

Mr. Robeson, who joined Berwind Lines as executive vice president in 1971, is a graduate of the U.S. Merchant Marine Academy at Kings Point and had worked in various executive capacities with Matson Lines in San Francisco, Calif.

Mr. Rodriguez, a graduate of the University of Puerto Rico with a degree in business administration and law, is a member of the American Bar Association and is a Certified Public Accountant. Before joining Industrial Molasses in 1969, he was president and general man-

ager of the Agricultural Credit Corporation and had held executive positions with the Land Authority of Puerto Rico and the Shell Company (Puerto Rico) Ltd.

Mr. Silva studied business administration, majoring in management at the University of Puerto Rico, and San Diego City College in California. He is a member of the Junior Chamber of Commerce and is past commander of Post 22 of the American Legion. He worked in various executive positions in Puerto Rico and in Caracas, Venezuela, before joining Industrial Molasses in 1963.

Mr. McComas also described a major expansion program proposed by Berwind Lines to provide equipment needed to meet demands of its daily St. Thomas and St. Croix shipping service. A new ship has been added to its fleet and almost three-quarters of a million dollars has been allocated for backup equipment, including all types of trailers and cargo handling equipment, and a new terminal in the Isla Grande area of San Juan.

SNAME Los Angeles Honors Past Chairmen



Past chairmen of the Los Angeles Metropolitan Section of SNAME, left to right: Thomas Wilson (71-72), Robert Rourke (70-71), Nat Friedland (67-68), Paul Bukunt (64-65), Richard Fay (72-73), Vernon Shelton (57-58), Philip Finkelstein (54-55), and John Marriner (52-53).

The May meeting of the Los Angeles Metropolitan Section of The Society of Naval Architects and Marine Engineers aboard the S/S Princess Louise in Los Angeles Harbor honored their past chairmen and introduced the incoming officers.

Past chairmen Richard Fay (1972-73), Commander U.S. Naval Shipyard, Long Beach, Calif.; Thomas B. Wilson (1971-72), independent naval architect; Robert A. Rourke (1970-71), J.J. Henry Co., Inc.; Nat Friedland (1967-68), Tetra-Tech, Inc.; Paul Bukunt (1964-65), General Electric; Vernon Shelton (1957-58), Deep Ocean Systems; Philip Finkelstein (1954-55), U. S. Naval Shipyard, Long Beach, and John Marriner (1952-53), independent naval architect, represented the past chairmen and were well received with a hearty round of applause.

The newly elected Section officers, chairman Frank Nickels, in-



Los Angeles Metropolitan Section SNAME officers for 1973-74, shown left to right: Harry Levy, secretary-treasurer; Frank Nickels, chairman; and Charles K. Pollock, vice chairman. Carl M. Lippincott, executive committee, is not pictured.

dependent naval architect; vice chairman Charles K. Pollock, Todd Shipyards Corporation, Los Angeles Division; secretary-treasurer Harry Levy, Long Beach Naval Shipyard, and executive committee Carl Lippincott, Todd Shipyards Corporation, Los Angeles Division, were introduced to the members prior to the presentation of the meeting program.

Comdr. Richard Rounseville, USCG, presented a paper, "Recreational Boating Safety Standards," detailing the Coast Guard requirements for small boats. Still pictures of recreational boating traffic and accidents emphasized the need for small boats to be properly built, equipped and operated. The recreational vessel accident rate, according to the author, could be greatly reduced if all rules and regulations were properly observed.

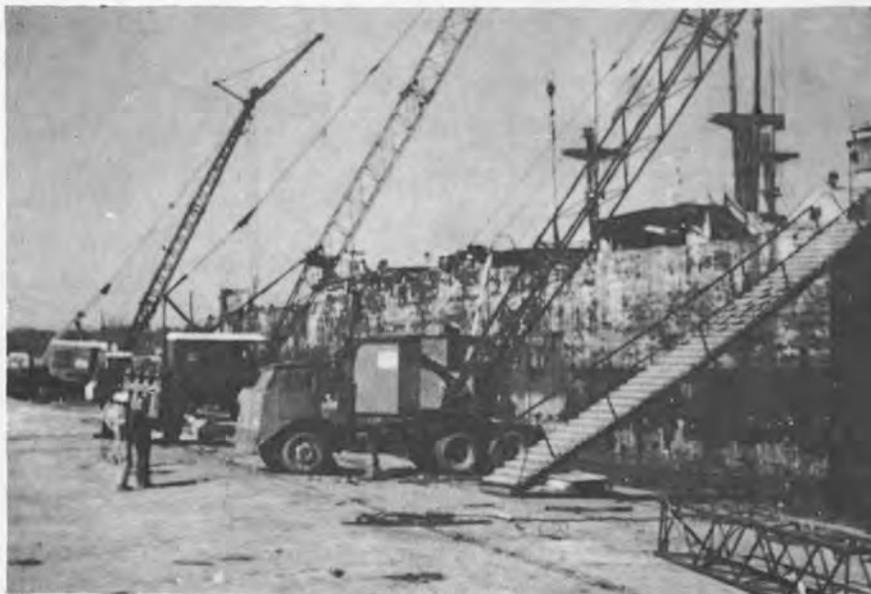
After a lively discussion of the paper, Commander Rounseville stated that the Coast Guard regulations were being updated and revised to meet the requirements of the advancing boating technology.

Irving Trust Co. Opens Marine Dept.

Irving Trust Co. announced that it has established a new marine transport department for the purpose of handling shipping industry accounts, loans and business development. Heading the new department is Augustus L. Putnam, formerly the bank's regional vice president for Europe. Assisting him are Joseph Metzger, vice president; Donald A. Conzo, assistant vice president, and Richard C. Pouch, assistant secretary.

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John Kavanaugh Named President Of Two Canada Towing Firms



John Kavanaugh

P.E.E. Kleyn van Willigen, chairman of the board of Eastern Canada Towing Limited, Halifax, Nova Scotia, has announced the appointment of John Kavanaugh as president and general manager of Eastern Canada Towing Limited and Point Tupper Towing Company Limited.

He succeeds A.G. Sullivan who reached retirement age, but who continues as a director. Mr. Kavanaugh is also a member of the board of directors of both companies.

Raytheon/Sorensen Name Kenneth Lent To Marketing Post



Kenneth W. Lent Jr.

Kenneth W. Lent Jr. has joined Raytheon Marine Company and Sorensen Company, Manchester, N.H., as marketing communications manager, a new position. He will direct all sales promotion effort for the Raytheon and Apelco lines of marine radars, radiotelephones, depth sounders, navigation aids and other marine electronic products. In addition, Mr. Lent is responsible for sales promotion on the Sorensen power supplies.

A veteran of 15 years' industrial promotion experience, he was most recently product information manager for General Electric's Aerospace Electronics Systems Department, Utica, N.Y., specializing in aerospace electronics promotion. From 1966 to 1968, Mr. Lent was advertising specialist for GE's Aircraft Equipment Division, Lynn, Mass. Before that, he directed promotional efforts in several military product areas for GE's Heavy Military Electronics Department, Syracuse, N.Y. Mr. Lent was a navigator in the U.S. Air Force at McClellan Air Force Base, Calif.

He is a graduate of Syracuse University, from which he received a bachelor of science degree in 1954.

Harry P. Hart Assoc. —New Firm Established In Jacksonville, Fla.

Comdr. Harry P. Hart, Public Information Officer of the United States Merchant Marine Academy since 1960, will leave Kings Point July 1 to establish a public relations and advertising agency in Jacksonville.

His company, to be known as Harry P. Hart Associates, will be

located at 754 Gulf Life Tower, Jacksonville, Fla.

Before he joined the Academy staff, Commander Hart was vice president of Thomas P. Swift Associates, New York City, specializing in corporate public relations. He was a staff member of The New York Times for many years.

Commander Hart attended Long Island University, Columbia University, School of Communication Arts of Fordham University, and

the Defense Information School. He has lectured at L.I.U., Fordham, and the City University of New York. During World War II, he served as a ship's officer in all theaters of war.

While at the Academy, Commander Hart has handled everything from sports to science, including the stories on the Nuclear Study Center, where officers for the N/S Savannah were trained, and the nation's first National Maritime Research and Development Center, located on the Academy grounds.

We're now 'TRACOR MARINE' You won't miss our 'MAS'

We've grown and changed a lot since 1960, when Marine Acoustical Services was formed, to provide vessel and underwater-sound engineering services to the emerging oceanographic research industry.

In 1968, after being acquired by TRACOR, Inc., we contracted our name to MAS—and three years later evolved into TRACOR/MAS, with the opening of our shipyard in Port Everglades.

We believe that "Tracor Marine" is a name that reflects better the wide range of marine services we presently offer (and plan to expand). So *think* of us as Tracor Marine. . . encompassing two operating divisions:

SHIPYARD DIVISION — Offering a full range of ship repair and overhaul service (every day of the week, around the clock), this division serves the marine industry throughout the Caribbean area, with a 1,000-ton floating dock, our 4,200-ton Syncrolift, complete machine and metal working shops, and skilled marine craftsman.

OCEAN TECHNOLOGY DIVISION — Carrying on the work of the "old" MAS, this division serves not only the U.S. Navy but numerous commercial clients. Underwater sound is still a big part of Ocean Technology Division activity, but we also provide expertise in such areas as research vessel operations, hydrographic surveys, core drilling, pollution prevention and control, ocean engineering and construction, and submarine cable installations.

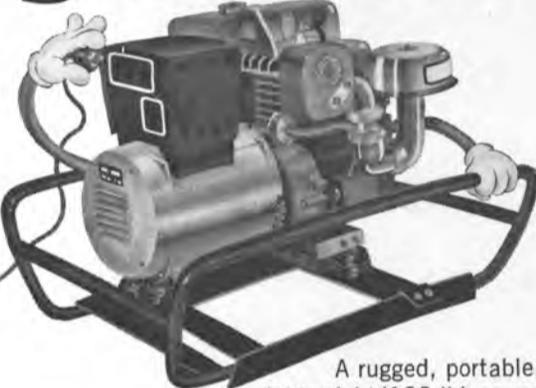
The future? Significant growth and new services—but all will be marine-oriented: Tracor Marine-oriented.

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Patterson-Kelley Names John Carp Manager Heat Exchanger Div.

John R. Carp has been named manager, Heat Exchanger Division, Patterson-Kelley Company, East Stroudsburg, Pa., it was announced by F. Linton Patterson III, executive vice president. The appointment becomes effective July 1.

Mr. Carp will assume the duties of Charles E. Drake, Patterson-

Kelley vice president-engineering, who retires on that date.

Patterson-Kelley is a leading manufacturer of packaged water heaters and steam generators for commercial, marine, industrial and institutional applications, as well as process blending and drying equipment, and heat exchangers for the chemical process industries.

Mr. Carp began his career with Patterson-Kelley in 1956 as a design engineer. In 1961, he was as-

signed to P-K's New York office as industrial heat-exchanger salesman. For the past 10 years, he has been assistant district manager of the New York office.



John R. Carp

He is a member of ASHRAE (American Society of Heating, Refrigeration and Air Conditioning Engineers) and an associate member of ASSE (American Society of Sanitary Engineers).

Mr. Carp is a graduate of Notre Dame University with a B.S. degree in chemical engineering. He also attended Lehigh University graduate school for advance heat transfer study.

In 1954-56, he saw military service, assigned to the Army Chemical Center, Edgewood, Md., as a member of its scientific and professional personnel program.

Harold A. Reinauer Elected Director In AWO's Region 5

Harold A. Reinauer, president of Reinauer Transportation Companies, Inc., Newark, N.J., was elected a director of The American Waterways Operators, Inc., in Region 5 at a meeting of members of that region in New York City. (Region 5 encompasses the North Atlantic area.)

Mr. Reinauer was elected to serve out the term of Robert J. Hughes, president of James Hughes, Inc., New York, N.Y., as a director-at-large for a term that expires in February 1974. Mr. Hughes automatically became a director-at-large upon his election as chair-

man of the board of the Association last February.

AWO was host at a reception and luncheon that followed the morning business session, which was attended by more than 70 persons, including representatives of the U.S. Coast Guard, Army Corps of Engineers, Maritime Administration and the Bureau of Customs.

James P. McAllister, president of McAllister Lighterage Line, Inc., New York, N.Y., AWO's Region 5 vice president, presided at the business meeting and luncheon. James R. Smith, president of AWO, reported on legislative and regulatory matters of major interest to the Association.

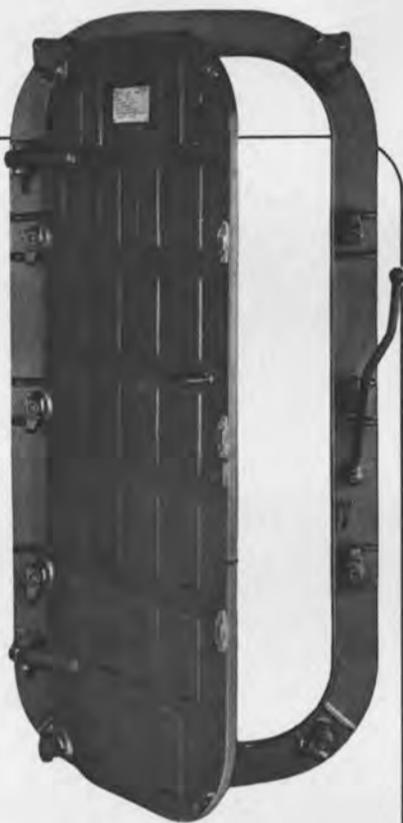
An informal talk relating to the outstanding safety record of the barge and towing industry was given by Mr. Hughes. The AWO board chairman pointed out, among other things, that records show that in the performance of inland waterborne freight service, the total fatality per billion-ton miles in 1968 was 0.54; for rail freight service, the total fatality per billion-ton miles was 2.5, and for motor carrier freight service, the total fatality per billion-ton miles was 10.8 the same year. He noted that in the area of safety, the barge and towing industry is guided and governed by some of the most highly developed regulatory controls in existence to safeguard the movements of oil and the so-called dangerous cargoes.

United Brands Co. —Formerly United Fruit Moves Traffic Office

United Brands Co., formerly United Fruit Co., has moved its New York traffic office to 33 Rector Street, according to an announcement by Robert S. Finz, the company's manager of traffic sales.

United Brands operates a regularly scheduled service from New Orleans, La., to Panama and the Canal Zone, and also acts as agents for Honduran Line's regular services from the Gulf to Jamaica and Central America.

QAWT Raised Doors available in specified sizes and test pressures.



choose from 35 standard door styles...

you get almost off-shelf service at off-shelf savings!



WEAT and WT Raised Doors with optional 4-, 6- or 8-dog.

Complete working inventories of door sub-assemblies mean delay-free fabrication of your order, whether a "single" or a ship set. Moreover, Overbeke-Kain's standardized welding fabrication methods assure cost-saving efficiency and on-time delivery. Meets all maritime and Navy standards.



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FROM DOWN UNDER: The vessel shown above built for the Queensland Department of Aboriginal and Island Affairs was recently launched by Carrington Slipways Pty. Ltd., Australia, to work in the Torres Strait Islands. The Melbidir, built at the Carrington Yard in Tomago, New South Wales, will operate out of Torres Strait, serving as a passenger and cargo vessel. She has accommodations for a master, an engineer, two cadets, and 12 crewmen. At any time, she can carry 10 departmental officers, 12 berthed passengers, and 20 seated deck passengers. Her cargo capacity of 157 tons includes 11 tons of refrigerated space, and she is powered by twin T8 Kelvin engines, each of 220 hp that will give the vessel a speed of 11 knots and a range of 2,500 miles. The Melbidir is the fourth launching for Carrington this year. Other projects under way for the year include three more vessels for Australian Offshore Services, a division of P & O Australia, and two ferries for Sydney Harbour. Carrington Slipways is receiving inquiries from overseas for their 85-foot tugs, which have become a specialty with this shipbuilding company.

A.C. Novacek Elected Chairman Of PROSA Executive Committee



Arthur C. Novacek

Arthur C. Novacek has been elected chairman of the executive committee of the Puerto Rico Ocean Service Association, it was announced in San Juan by Hiram D. Cabassa, chairman of the organization representing the four major carriers in the \$4-billion Puerto Rican trade.

Mr. Novacek is president of Seatrain Lines Container Division, based in Port Weehawken, N.J., and also serves as a director of the Puerto Rico Chamber of Commerce in the United States.

Other PROSA line members include Sea-Land Service, Transamerican Trailer Transport Inc., and Gulf-Puerto Rico Lines. The U.S. Department of Commerce has described Puerto Rico's ocean freight service as the finest in the world.

Mr. Novacek joined Seatrain, one of the world's largest container lines, which recently expanded service to Puerto Rico, in 1970, as senior vice president of marketing. Previously, he served as president of Grace Lines, held a top position with Transamerican Trailer Transport in 1966-67, and started his maritime career with Isbrandtsen Steamship Company.

A 1948 graduate of the U.S. Merchant Marine Academy, Mr. Novacek earned his master of business administration degree from New York University's Graduate School of Business.

PROSA was established several years ago with the sanction of the Federal Maritime Commission to make Puerto Rico's ocean freight service, vital to the island's economic health, even more efficient by developing an on-going dialogue with shippers and consignees. A "problem solving" agency, PROSA is not empowered to set freight rates or even discuss them.

Insulation Panels For LNGs Ordered From Cryogenics Structures

Cryogenics Structures Corp., Northvale, N.J., a Baltek Corp. affiliate, announced it has received an order amounting to \$22,500,000 for insulation panels to be installed in three LNG tankers being built by Newport News Shipbuilding. Delivery of the insulation panels, scheduled to begin by early 1975 and to continue through 1976, are for tankers being constructed by Newport News Shipbuilding for the El Paso Natural Gas Co.

Maritime Fruit Carriers' First Quarter Revenues Show Record Increase

Maritime Fruit Carriers Company Limited, New York, N.Y., worldwide shipping concern, has reported substantially increased revenues and net income for the quarter ended March 31, 1973.

Revenues for the first three months of 1973 rose to \$19,985,000 compared to \$13,015,000 during the compar-

able period in 1972. Of these amounts, \$18,390,000 in the 1973 quarter and \$12,640,000 in the 1972 period were derived from shipping operations.

In addition, the 1973 revenue figure does not include \$4,944,000 of income from surrender of tax benefits. The company did not realize any such income in the first quarter of 1972.

Net income increased to \$2,498,000 compared to \$1,044,000 in the similar period last year. The company noted

that of first quarter 1973 net income approximately \$1,050,000 represents income from surrender of tax benefits, net of direct expenses and attributable income tax reserves.

On a fully diluted basis, per share net income for the first three months of 1973 was equal to \$.55 based on 4,904,894 shares outstanding. In the comparable period last year, fully diluted earnings per share amounted to \$.26, based on 4,869,059 shares outstanding.

First, judge a shipbuilder by what it's done.

Since 1921 we have been designing and building marine equipment and systems for operation all over the world.

1. We built the world's first offshore drilling tender. It brought in Louisiana's first tideland oil discovery.

2. We built the first self-propelled drilling ships in the world. Four of them. They continue to set standards of operational success.

3. We built a tug/barge container system for the distribution of products to shallow-water ports in the Caribbean. Then we built a 208-foot roll-on/roll-off trailership to make the first system even better.

4. We built the world's first LASH barges and we built the world's first SEABEE barges. Now we are the largest builder anywhere of these major components in a new transportation system



that is changing the living habits of millions of people.

And we continue to create change in the ocean industries.

Then, judge it by what it's doing.

We are one of the largest builders in the world of a great variety of vessels and marine equipment.

1. We're building offshore towing and supply ships for major companies working in oil fields throughout the world. Ships designed and constructed for efficient anchor handling and rig towing and the carrying of bulk and liquid cargo.

2. The crewboats we're building are in operation in every offshore oil and gas producing area. Lake Maracaibo. Cook Inlet. Southeast Asia. The Persian Gulf. The Gulf of Mexico. High-speed vessels meeting drilling, exploration, and production schedules every day carrying men and cargo.

3. We're building oil barges, deck cargo barges, liquid cargo barges, pipelaying barges, dredge tenders, LASH switching boats, ocean-going and harbor tugs, fire tugs, and staging tugs. Offshore quarters units and derricks.

4. We have improved and expanded our facilities to build bigger and better vessels, and to stay on the leading edge of change.

We built the marine equipment and systems that the ocean industries grew up on.

We're continuing to build them to keep the ocean industries growing.



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C-E Tulco Signs Agreement With British Firm To Develop Concrete Offshore Platforms

Combustion Engineering, Inc., Windsor, Conn., has announced that its Tulsa-based subsidiary, C-E Tulco, has signed an agreement with Taylor Woodrow Construction Ltd., London, England, for combining skills and resources to develop new concepts for offshore oil production platforms.

The agreement combines the concrete construction expertise of Taylor Woodrow with the pre-engineered oil production-processing capabilities of C-E Natco (an operating unit of C-E Tulco). The agreement provides for joint activity in the construction of offshore platforms at a time when both the United States and Western European countries are concern-

ed over revitalizing exploration and development of new petroleum sources. Most recently, President Nixon provided for the tripling of offshore acreage available under Federal oil and gas leases in the Gulf of Mexico.

Currently, offshore production platforms are built of steel and attached to the seabed with pilings. One objective of the C-E Tulco/TWC agreement is to introduce unique concepts of concrete design into the construction of offshore platforms. The pact will combine the capabilities of both companies in developing and marketing pre-engineered concrete and composite (concrete and steel) gravity-based offshore fixed platforms. These platforms will be available in various stages of prefabrication and on a turnkey basis.

Taylor Woodrow Construction, Ltd. has extensive experience in engineered projects for

the oil, gas, coal and electrical industries, and is also a leading supplier of prestressed concrete pressure vessels for nuclear power stations.

C-E Tulco, through its operating units, C-E Natco and C-E Crest, is a leading supplier of onshore and offshore oil and gas production processing equipment and associated design and engineering services.

Marine Management Systems Appoints William Oakes VP

The appointment of William R. Oakes to the newly created post of vice president in charge of marine systems for Marine Management Systems, Inc. was announced by Eugene D. Story, company president.

Mr. Oakes joined MMS in 1970 as manager of marine systems after serving for 10 years in various engineering positions with Mobil Oil's marine transportation department, Esso International's tanker department, and Bethlehem Steel's shipbuilding division.

A graduate of the Massachusetts Institute of Technology, where he majored in naval architecture and marine engineering, Mr. Oakes earned his M.B.A. degree in finance in 1966 at the Babson Institute of Business Administration. He is a member of The Society of Naval Architects and Marine Engineers.

Marine Management Systems, Inc., based in Stamford, Conn., designs and implements computer systems exclusively for the international marine industry.

Albina Engine & Machine Appoints Integrity Marine

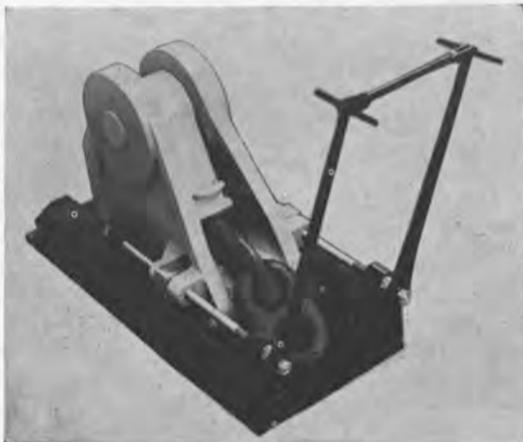
Bruce Hobbs, president and general manager of Albina Engine and Machine Works of Portland, Ore., has announced the appointment of Integrity Marine (a division of Integrity Shipping Company) of Philadelphia as representative.

Albina Engine and Machine Works (a Dillingham Company) is a well-known well-staffed and well-equipped ship repair firm specializing in drydocking, overhauls and voyage repair work.

Coordinating with Integrity Marine is Jackson Marine Corporation (Robert M. Catharine). Jackson Marine maintains an office at 405 Park Avenue, New York, N.Y. 10022. Additional agency offices are located in New Orleans, La., and San Francisco, Calif.

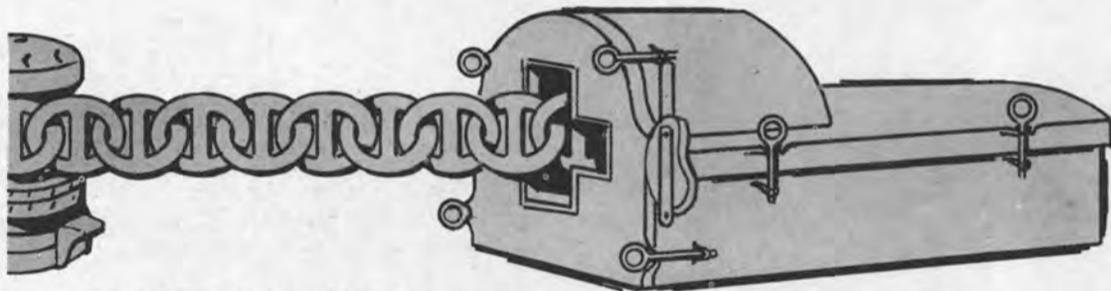
Integrity Marine maintains offices at 817 Mall Building, Philadelphia, Pa. 19106.

Lockstad Superior Equipment PROVEN AT SEA



ADJUSTABLE CHAIN STOPPER

The Lockstad Adjustable Chain Stopper is safer—surer—faster—easily adjusted by one man. Adjusts to lock the anchor chain in the desired position. Operated hydraulically or, by ratchet-screw. For new construction and conversion of existing vessels whether fitted with a horizontal or vertical type windlass. Eliminates devil's claws, turnbuckles, bow stoppers and utilizes less space. The one stopper that serves the dual purpose of transferring chain load to the vessel's structure and houses the chain in a snugly stowed position.



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Now in use by all leading vessel operating companies. Prevent flooded chain lockers, eliminate hazardous and expensive methods of pouring concrete. Lockstad developed cover secures in place in matter of minutes and can be removed in seconds. Cover makes a complete thorough seal around the ring of the chain pipe. Used for vertical or caspen type windlasses. Our company will supervise each initial installation.

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Delta Steamship Lines
U.S. Coast Guard
Keystone Shipping Co.

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Waterman Steamship Co.
City Service Oil Co.
Atlantic Richfield Co.
Pocahontas Fuel Co.
Marine Transport Co.

Lockstad Co. Inc.

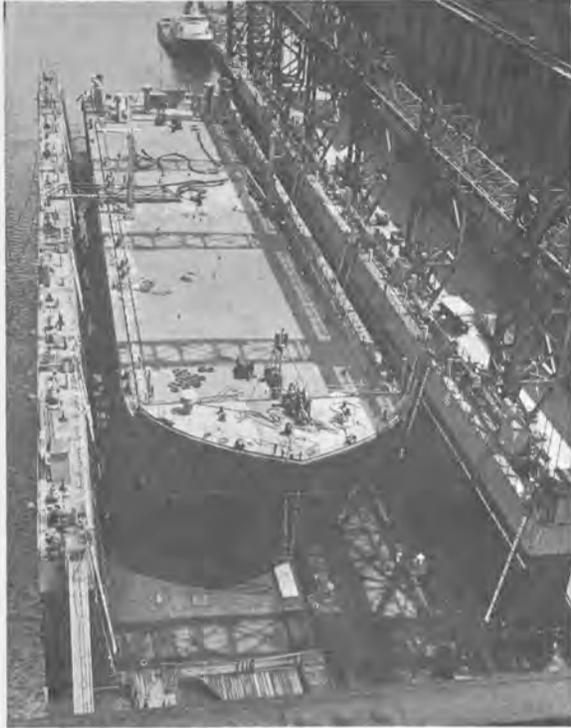
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INTERIM WORK AT QUINCY: The Irving Sealion, a large oil transport barge operated by a subsidiary of Irving Oil Co. of Canada, is shown in drydock at General Dynamics, Quincy Shipbuilding Division, for repairs. The barge, emptied of all oil before coming to Quincy, is 360 feet long and normally serves the Gulf of St. Lawrence. Shipyard management is continuing to aggressively pursue repair and conversion work, which will provide interim employment for the various trades until the start of construction of liquefied natural gas ships later this year.

Seatrain Appoints Nolan R. Gimpel

Arthur C. Novacek, president of Seatrain Lines, Inc., Container Division, Weehawken, N.J., has announced the appointment of Nolan R. Gimpel to the position of port manager, Wilmington, N.C. Mr. Gimpel was formerly port manager in Philadelphia, Pa.

Richard R. Taubler, Inc. Moves To New Offices

Richard R. Taubler, Inc., firm of naval architects and marine engineers, have recently moved from 44 Court Street to 50 Court Street, Brooklyn, N.Y. 11201.

The organization also maintains offices at 125 Clyde Street, West Sayville, N.Y. 11796.

Colt Industries Publishes Informative Bulletin On Shipboard Sewage System

The ENVIROVAC sewage system for marine applications is described in detail in a new six-page full-color bulletin now available from Colt Industries' Water and Waste Management Operation.

The informative bulletin presents solutions to many existing and future marine sewage collection problems and describes the advantages of the proved ENVIROVAC system. The bulletin includes a schematic diagram showing a typical ENVIROVAC installation in a large ferryboat.

Mobile units that can be used for ship construction areas are also available.

The ENVIROVAC system is expressly designed to save water and overcome the weaknesses of typical shipboard sewage disposal systems. The basic, patented system and ENVIROVAC components have been proving their worth in ships and on land all over the world since 1959.

The ENVIROVAC concept holds great interest for both governmental authorities and ship-owners and operators. Here are a few reasons why.

ENVIROVAC uses air as well as water. And

the water that's needed is minimal. Three pints per flushing.

ENVIROVAC can separate black water (toilet waste) from gray water (wash waste) to conserve storage space on ships, save possible treatment costs.

How ENVIROVAC works. The flushing cycle of the ENVIROVAC vacuum toilet takes seven seconds, including water spraying, for cleaning and filling the bowl. Approximately three pints of water are required. And, because air enters the vacuum toilet at each flushing, it also serves to ventilate the area.

The tremendous savings in water are obvious when compared to a conventional household toilet requiring four to six gallons of water for each flushing. Many ships use such toilets.

In the ENVIROVAC system, the black water discharge pipe is held under a constant vacuum

of about one-half atmosphere (7½ psi) produced by a small vacuum pump. The toilet is connected to the piping, and its valve mechanism is activated when flushing and held open for three seconds. This allows atmospheric air to enter the vacuum system. Waste, in the form of a liquid plug, is forced by the air at high speed through piping connected to an approved collecting tank.

The entire system is simple to install, and the small two-inch steel or PVC piping can easily be designed to be compatible with other piping systems on new or older ships. And, because it is a vacuum system, piping can be run up and around bulkheads and obstructions. Roll and pitch doesn't affect the system.

A copy of the bulletin can be obtained by writing to Colt Industries, Water and Waste Management Operation, Beloit, Wis. 53511.

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\$2.4-Million Order For Pipe Tensioners To Western Gear Corp.

Western Gear Corporation, Lynwood, Calif., has received orders valued at approximately \$2.4 million from J. Ray McDermott & Company, New Orleans, La., for three automatic pipe tensioning systems to be installed aboard three McDermott lay barges on projects for the worldwide offshore construction industry. The proprietary pipe tensioners are

of the wheel-type of an advanced design and similar to more than a dozen of the machines previously furnished McDermott by Western Gear's Heavy Machinery Division in Everett, Wash.

McDermott has ordered the pipe tensioners, each barge-set with a 108,000-pound tension capacity, for its existing Lay Barge 25 off Singapore, and for the Lay Barges 27 and 28 under construction in Japan.

Each barge, of the center-slot type, will have two pipe tensioners working

in tandem, six in all for the total order. Deliveries in Singapore and in Japan are scheduled for mid-1973.

The Western Gear pipe tensioners handle pipe up to 40 inches in diameter, and are 28 feet long, 13 feet wide, and 14 feet high, weighing approximately 122,000 pounds each, and capable of hauling in and paying out pipe at speeds up to 85 fpm. The lengths of heavy pipe, welded into a pipeline aboard the barges, are controlled by the massive tensioning machines as the line moves off the stinger

of a catenary toward final placement on the ocean floor.

Prime power for the machinery for the two barges (each 410 feet long and 120 feet wide) under construction will be provided by two electro-hydraulic power units of 200 hp each, from a below-deck station. Cummins Diesel-hydraulic power units will provide backup power. The Lay Barge 25 system will have three Detroit Diesel-hydraulic power units providing power for the tensioners. Western Gear electronic sensing controls with hydraulic backup controls, will provide highly reliable, automatic tensioning on the extensive equipment.

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E. Canadian Section Meets In Montreal



Shown at the Eastern Canadian Section meeting, left to right: **Monroe D. Macpherson**, chairman of the Committee on Sections; **R.C. Truax**, Section chairman; **Phillip Eisenberg**, national president of SNAME, and **Robert G. Mende**, national secretary of SNAME.

The Eastern Canadian Section of The Society of Naval Architects and Marine Engineers held its annual general meeting in Montreal, Canada, on April 24.

Phillip Eisenberg, national president of SNAME, elected to visit the Section at this time, accompanied by **Robert G. Mende**, national secretary, and **Monroe D. Macpherson**, chairman of the Committee on Sections.

The retiring chairman of the Eastern Canadian Section, **R.C. Truax**, was presented with the Society's Certificate of Appreciation by Mr. **Eisenberg**.

Gordon German was elected chairman for the 1973-74 season.

Following the business portion of the meeting, **Paul Preville**, vice president-steamships, Clarke Transportation Canada Ltd., presented a most interesting paper titled "A Canadian Experience in Containerization."

In the paper, Mr. **Preville** discussed the operation and management of containerization and highlighted the many problems encountered. A color film was viewed as part of the presentation, beginning with the building of a containership, to the eventual unloading at its destination.



Author **Paul A. Preville** (left), vice president, steamships, Clarke Transportation Canada Ltd., is shown with **R.C. Truax**, chairman of the Eastern Canadian Section.

St. Louis Ship/ARTCO Contract Signing



Pictured at the signing, left to right (front row): **H.T. Pott**, chairman, Pott Industries Inc.; **E. Renshaw**, president, St. Louis Ship; **W.R. Murphy**, president, American River Transportation Co., and **R.L. Erickson**, secretary, ARTCO; (second row): **R.P. Conerly**, president, Pott Industries; **R.J. Patrick**, vice president-engineering, St. Louis Ship; **A. Zang**, vice president-production, St. Louis Ship; **Z.G. Tobin**, vice president-sales, St. Louis Ship, and **M.R. O'Daniels**, marine department, ARTCO.

A formal contract signing was recently held at St. Louis Ship's office to cover the three 8,400-hp triple-screw towboats recently ordered by American River Transportation Co. (ARTCO) of St. Louis, Mo.

All three towboats are scheduled for delivery in 1974 and will feature St. Louis Ship's exclusive Hydrodyne Hulls and latest Kort nozzle design. Overall dimensions are 200 feet by 50 feet, by 11 feet 6 inches.

The "Artco Triplets" have been appropriately named for American

rivers as a reminder of America's great rivers. The vessels will be christened the M/V St. Mary's River, M/V Hudson River, and M/V Potomac River.

American River Transportation Co. is a wholly owned subsidiary of Archer Daniels Midland Company, and was formed January 1, 1972. In less than two years they will have constructed and/or acquired a total of 305 barges. At present, ARTCO has a total of seven chartered towboats operating exclusively in their service.

New System Improves Icebreaking Capabilities Of Seagoing Vessels

Details of a new Pneumatically Induced Pitching System (PIPS), designed to improve the icebreaking capabilities of seagoing vessels, were recently given by Arctic Engineers and Constructors, a joint venture of Raymond International Inc., Houston, Texas, and Global Marine Inc., Los Angeles, Calif.

An experimental prototype system installed in the tug Amherstburg for midwinter tests in ice-covered waters demonstrated the system's ability to facilitate icebreaking passage and to increase the maneuverability and speed of an icebreaker. A model of an icebreaking drill ship (IBDS) incorporating the PIP system was displayed at the recent 5th Annual Offshore Technology Conference held in Houston.

The PIP system induces large amplified vertical bow motion at the natural pitch frequency of a given ship's hull. It can be adapted to ship's of all sizes and types and can be used in Arctic waters or wherever icebreaking capabilities are required. Modification of hulls is minimal with the PIP system, a factor which allows expansion of icebreaking capabilities without excessive costs for modification or for design or fabrication of special vessels.

One of the earliest PIPS applications was the incorporation of the system into the design of an offshore

drilling ship for Arctic operations. Ice basin model tests of the icebreaking drill ship have been completed at the HSVA facilities in Hamburg, West Germany, and the Wartsila facilities in Helsinki, Finland.

Arctic Engineers and Constructors was formed in 1971 to provide research, design, engineering and testing of specialized equipment suitable for Arctic operations in support of the energy industries. In addition to the PIPS and the IBDS systems, Arctic Engineers and Constructors has developed a variety of advanced systems and equipment for Arctic drilling, pipelaying and construction. This includes the ACT-100, the world's heaviest air cushion transporter designed for year-round Arctic use and application to operations in swamps and marshlands.

Seaspan International Appoints W.D. Traill

A.M. Fowles, vice president-administration of Seaspan International Ltd., North Vancouver, British Columbia, has announced the appointment of **W.D. Traill** as comptroller.

Prior to this appointment, Mr. **Traill** held various positions in the Marine and Shipyards Divisions.

Seaspan's operations include coastal and deepsea transportation as well as shipbuilding, and is one of the Genstar group of companies.

American Legion Presents Trophy To President



The American Legion's most important annual maritime award, the Robert L. Hague American Legion Merchant Marine Trophy, was presented to President **Nixon** on May 23, 1973, in a brief ceremony in the Oval Office at the White House. The President was presented the award because of the far-reaching magnitude of the Administration-sponsored Merchant Marine Act of 1970. Above, the President poses with (from left to right) **Walter L. Vaughan**, Commander of the Robert L. Hague Marine Industries Post #1242, Senator **Jacob K. Javits** of New York, and **James R. Wilson**, director of The American Legion's National Security and Foreign Relations Division. The actual presentation was made by Commander **Vaughan**. The trophy will remain in the White House for one year, at which time it will be returned to the Robert L. Hague Post, and President **Nixon** will receive a miniature.

E.L. Post & Co. Appoints Distributor In Piraeus, Greece

Walter L. Vaughan, manager of E.L. Post & Co., Inc., 233 Broadway, New York, N.Y., recently announced the appointment of **C. Cartoudis & D. Mandicopoulo** of Piraeus, Greece, as the official sole distributors and warehouse sales agents for Post's Babbitt metals in the Eastern Mediterranean area. Two tons of their leading brand, Post's Dubl-Du-T Motor Metal and Motor Marine were recently shipped on the Export Leader of American Export Lines, destined for their warehouse at Salaminos 25, Piraeus 23, Greece. Post, known as the House of Babbitt, has been supplying the marine industry with Babbitt metal for almost a century.

Lockstad To Supply Chain Pipe Covers For Three Margate Tankers

Lockstad Co., Inc. of 179 West 5th Street, Bayonne, N.J., recently announced the receipt of an order for three sets of chain pipe covers from National Steel & Shipbuilding Co. The patented chain pipe covers will be installed aboard the three 38,300-dwt Margate tankers now being constructed at NASSCO's San Diego yard.

Lockstad stated their covers are now specified for approximately 80 percent of the larger vessels currently under construction in U.S. yards, including the LASH vessels being built at Avondale Shipyards and the majority of the tankers now under construction at Bethlehem Steel's Sparrows Point shipyard.



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Revised Edition Available On MarAd Standard Specifications For Merchant Ship Construction

The Maritime Administration has announced the publication of the latest edition of its Standard Specifications under the title "Standard Specifications for Merchant Ship Construction" dated December 1972. This document supersedes the previous issue dated March 1968. It has been updated and broadened to include text for applicability to the container, LASH, OBO, and tanker vessels, in addition to the general cargoship. Volume of text has been condensed to eliminate detail repetition of requirements of regulatory bodies, MarAd administration requirements as contained in the contracts, and restrictive shipyard practices unless essential for quality control.

The purpose of the MarAd Standard Specifications is to provide guidance to the maritime industry in the preparation of detail ship specifications, especially where construction differential subsidy is involved. They are complete in all aspects of required contract work and embody the following pertinent features:

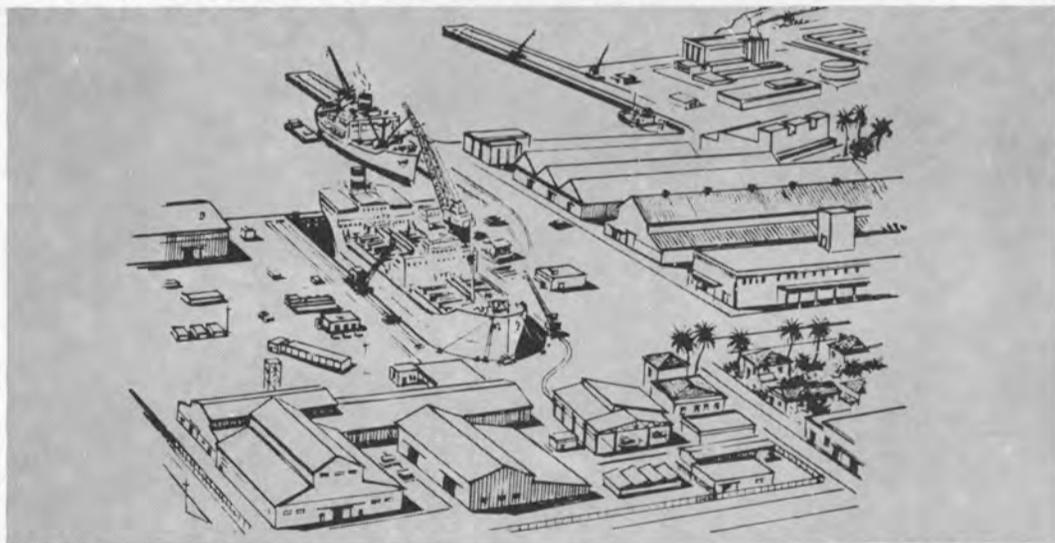
- Establish levels of quality as a bench mark for construction differential subsidy.
- Identify current requirements of regulatory bodies.
- Reflect latest technological developments.
- Indicate measures of standardization to encourage mass production techniques.
- Include standard text to reflect legal aspects of contract work.

It is intended further to update the MarAd Standard Specifications periodically to reflect continuing technological developments and pertinent results of research and development investigations; for example, the recently completed study of regulatory constraints and design practices prepared for the Maritime Administration by the Newport News Shipbuilding and Dry Dock Company (report has not as yet been completely incorporated in these Specifications). Future editions will also include applicable text for LNG, tug-barge combinations and other specialized designs, as well as other forms of propulsion machinery (diesel, gas turbine, nuclear, etc.), in addition to the steam turbine already in the current text.

Copies of these latest Specifications are available from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Va. 22151, at a cost of \$12.50 per copy. (Refer to Publication No. COM-72-11469)

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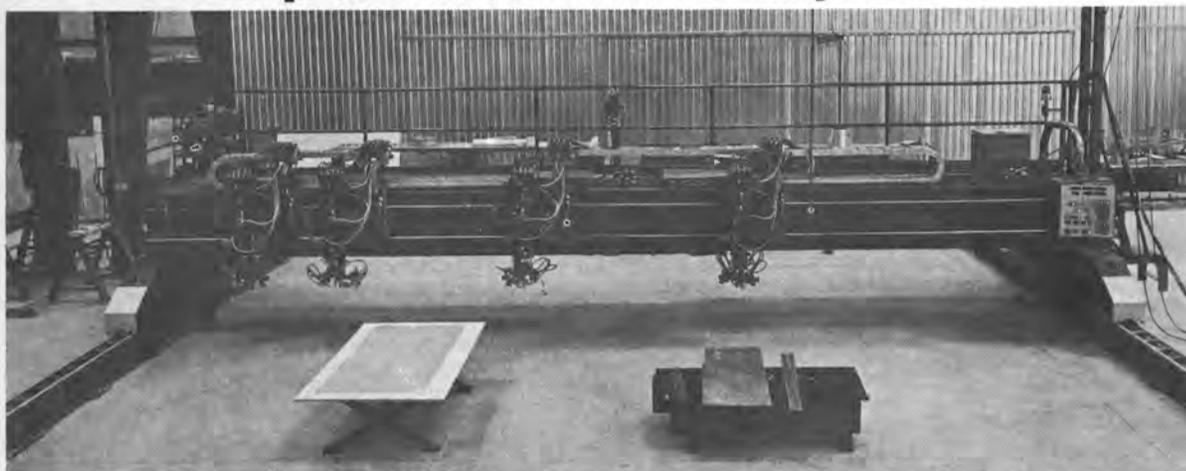
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"BUT, SIR, YOU SAID 'HEAVE TWO'!"

Sun Shipbuilding And Dry Dock Installs Computer-Controlled Flame Cutting Machine



Overall view of Heath/Liquid flame cutting machine built for Sun Shipbuilding & Dry Dock Co. The machine has four three-torch cutting stations, and it can simultaneously perform edge profile work on two 16-foot-wide plates.

A computerized gantry-type flame cutting machine, the first entirely built from components of United States manufacture and also the first machine of its type ever built by Heath/Liquid, was shipped to Sun Shipbuilding and Dry Dock Company, Chester, Pa., immediately following a demonstration at Fort Collins, Colo.

The principles involved in the development of this machine for hull plate fabrication are equally applicable to the cutting and preparation of steel, stainless steel and aluminum used in building large machine tools and assemblies of all types.

The new machine, of box girder construction, weighs 11 tons, and measures 8 feet in height, 36 feet in width, and 12 feet in length.

This gantry-type burning machine is equipped with four rotary master cutting stations with a cluster of three torches at each station. These stations are capable of performing double bevel and land work on similarly shaped but not identical contour cutting applications.

A tape system is used to issue commands to a Nova 1220 32,000-word memory minicomputer manufactured by Data General Corp. Programming enables orthogonal rotary torch orientations so that the cross-axis of the torch cluster remains perpendicular to the surface being burned at all times. Corner slowdown, off-plate turnaround, preheat dwell, pierce rate control, and other intricate burning signals are stored in the computer's memory. To protect the drive system during high-speed acceleration or deceleration, a preprogrammed maximum acceleration or deceleration rate is fed into the drive motors. The computerized gantry has a burning width of 32 feet. It can simultaneously perform edge profile work on two 16-foot-wide plates and has an effective burning length of 100 feet.

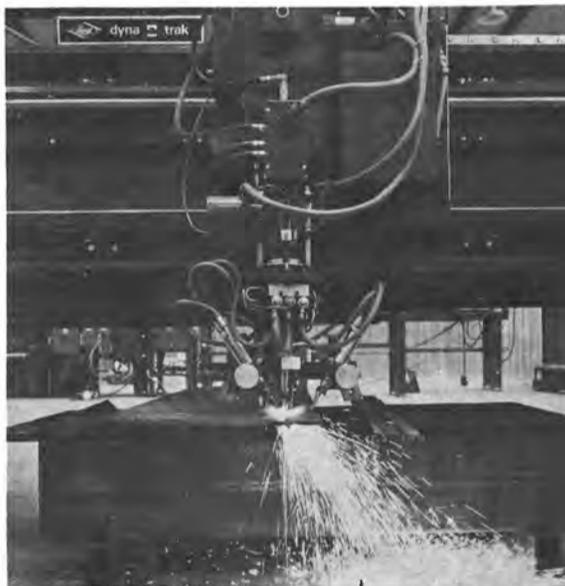
Heath Engineering Company is privately owned and was established in Fort Collins, Colo., in 1944. Liquid Carbonic Corporation, located at 135 South LaSalle Street, Chicago, Ill. 60603, became exclusive distributor of Heath equipment in 1971. Liquid Carbonic is a subsidiary of Houston Natural Gas Corporation.

Buckingham Will Head Aerojet Ship Design

W.L. Buckingham has joined Aerojet Surface Effect Ships Division, Tacoma, Wash., as manager of ship design.

The SES Division designs, develops and builds advanced seagoing and amphibious naval vessels for travel on a cushion of air at far higher speeds than ships of conventional design can attain.

During 21 years of commissioned Navy serv-



Each work station has a torch mounted vertical to the work piece and bevel torches oriented at angles to the work surface.



Discussing the design principles of the machine are, left to right: **Russell Nickerson**, Nickerson Engineering Corp., responsible for electro-mechanical aspects of the machine; **E.A. Cameron**, Altek Corp., responsible for computer control of the system; **Arthur Millay**, superintendent-administrative, Sun Shipbuilding & Dry Dock Co., and **G.H. Johnson**, president of Heath Engineering Co.

ice prior to his retirement in the rank of commander, Mr. Buckingham developed and introduced many innovative ship design ideas for saving weight and space.

For three years prior to joining Aerojet, he was senior project engineer and manager of production planning at Litton Ship Systems in Culver City, Calif., and Pascagoula, Miss.

A 1949 graduate of the U.S. Naval Academy, Mr. Buckingham also earned a bachelor's degree in marine engineering and a master's degree in naval architecture from Webb Institute of Naval Architecture, Long Island, N.Y.

Midland Insurance Names New Officers

The board of directors of the Midland Insurance Company has announced the election of two new vice presidents. **Cornelius J. Duffy** was elected vice president, personnel/administration, and **Robert F. Leonard**, vice president, finance.

It was also announced that **Lawrence E. Small** was appointed assistant vice president, and **Robert F. Berens**, **John G. Corday** and **Jon M. Livers** were appointed to the post of assistant secretary.

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General Electric FN4-FN30	1500 KW
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FN3-FN20 10030 RPM	600 KW
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5645 RPM	500 KW
General Electric	
DORV 618N 10059 RPM	400 KW
Worthington 6097 RPM	400 KW
Allis Chalmers 8000 RPM	300 KW
Allis Chalmers 5645 RPM	300 KW
De Laval 5692 RPM	300 KW
General Electric	
DORV 325 5636 RPM	300 KW
Joshua Hendy (Terry Design)	
HM-5 5965 RPM	300 KW
Westinghouse Non-Recessed	300 KW
Westinghouse Recessed	300 KW
Worthington 6097 RPM	300 KW
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DS 60-25 5660 RPM	250 KW
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Derrick Boat ("Montgomery"), steel, 99'6" x 52' x 6' molded, 5/16 plate, stiff leg 85' boom, Hook capacity 20 T @ 75' radius, 2 drum hoist, separate book hoist, all diesel electric with one CAT D398 500 kw CAT genset, 2 spuds and 5 kw Onan aux. genset. Elevated operators cab. Clamshell capacity 20,000 lbs. Fuel oil capacity 25,000 gals. Some spare parts available.
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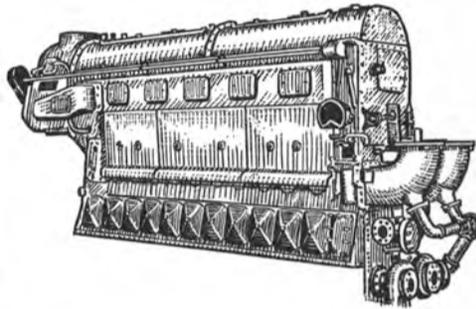
Size A 1/4	Size A3	Size A8
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Size A1	Size A5	Size A12
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SPERRY GYRO COMPASSES



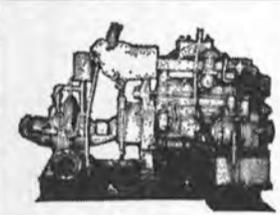
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MARINE DIESEL ENGINES

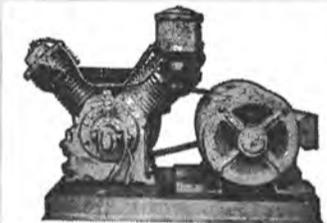


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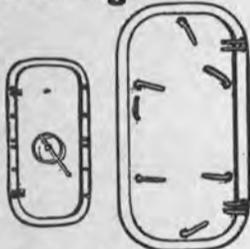


2—BUDA, Model 6-LD-468, Diesel Engines, 6 cylinders, 100 BHP, Marine, Gardner-Denver, centrifugal Pumps, Bronze, horizontally split case, 1000 GPM, 280' head, 6" suction and 5" discharge.



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

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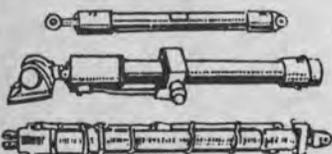
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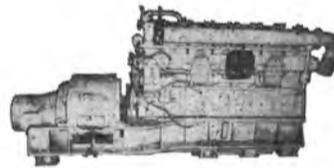
1—SPERRY No. 2, 5 HP, 230 Volts DC, complete with Steering Winch, Controller Panel, Ballast Resistor, Electro-Mechanical Steering Stand—with Steering Wheel (with Pull-out Knob).

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Bore	Overall Stroke	Rod Diameter	retracted length	Action
10"	12"	3.75"	45 1/2"	double
10"	26"	3.75"	58 1/2"	single
2"	8"	1 1/2"	20"	double
2.5"	15"	1.12"	25 1/2"	double
3"	8"	1.37"	15 1/2"	double
6"	8"	4"	144"	double

MARINE DIESEL GENERATORS



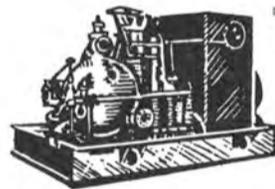
4—COOPER-BESSEMER, Marine . . . Model FSN 6, 6 cylinders, 375 HP, 900 RPM with General Electric generators, 250 KW 440/3/60.

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



4—GENERAL MOTORS, Model 3-268A, marine, 150 BHP, 1200 RPM, 3 cylinders, with 100 KW Generators, 450/3/60.

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



TURBINE GENERATORS

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

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

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

4—GENERAL ELECTRIC, Type FN3-FN20, 500 KW, 450/3/60.

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

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

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

SUBMARINE DIESEL GENERATOR ENGINES

(Without Generators)

2—GENERAL MOTORS, Model 16-278A, 1600 HP, 750 RPM.

2—FAIRBANKS-MORSE, Model 38-D8-1/8, 16 cylinder, O.P., 1600 HP, 720 RPM.

STERN ANCHOR WINCHES



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

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Model CWP-3, Vertical 24" Planetary Capstan Windlasses, Single Wildcat — using 1 1/4" Anchor Chain, Single Gypsy with 20 HP motor, 230 volts DC, complete with Contactor Panel, Master Switch, and Resistors.

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HYDE, VERTICAL, Single Wildcat, for 1 1/8" Anchor Chain, single gypsy, with 20/5 HP Motor, 440/3/60.

ANCHOR WINDLASSES

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 2 1/8" Chain, 65 HP, 230 DC, complete.

4—AMERICAN HOIST AND DERRICK COMPANY, horizontal, double wildcat—for 2 1/4" chain double gypsy, 70 HP, 230 Volts DC, with electric controls.

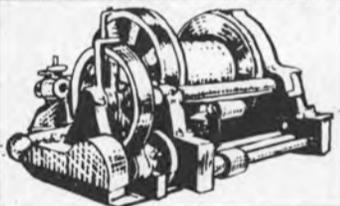
3—HESSE-ERSTED, horizontal, double wildcat, 2 1/8" chain, 60 HP, 230 DC.

1—HYDE HORIZONTAL ANCHOR WINDLASS double wildcat—for use with 2 1/8" 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

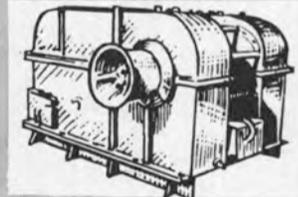
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Single drum, capacity 2000' of 2" wire rope, cylinder size 9" bore by 10" stroke.

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Single speed, double drum, 7450 # at 220 FPM.

Single speed, single drum, 7450 # at 220 FPM.

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(Without Generators)

2—GENERAL MOTORS, Model 16-278A, 1600 HP, 750 RPM.

2—FAIRBANKS-MORSE, Model 38D8-1/8, 16 cylinder, O.P., 1600 HP, 720 RPM.

STERN ANCHOR WINCHES

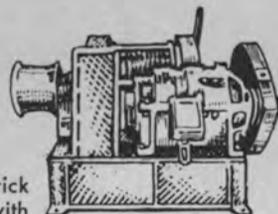


2—ALMON A. JOHNSON Stern Anchor Winches as removed from L.S.T. Vessels, line pull rating 100,000 pounds at 10 FPM in low gear, complete with Contractor Panels, Resistors, and Master Switches.

CARGO WINCHES

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Single Speed, Single Drum



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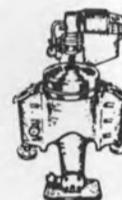
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150 GPH—440 AC
—230 DC

350 GPH—230 DC

600 GPH—230 DC



Marine Synchronous Motors

8—General Electric, 6000 HP, 2700 Volts, 3 phase, 93 1/3 cycles, Type 28, 400 RPM, continuous duty, Typical Serial #5985657.

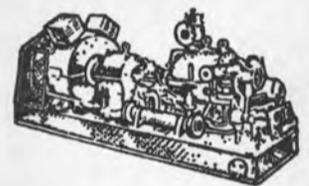
TURBINE GENERATORS

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

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

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

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



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

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

GENERAL ELECTRIC, Type ATB-2, 1563 KVA, 1250 KW, 450/3/60.

ALLIS-CHALMERS, 440 PSI, 740°F, 300 KW, 120/240/DC

TERRY, TM5, 440 PSI, 740°F, 300 KW, 120/240 DC.

JOSHUA HENDY, 300 PSI, 550°F, with Westinghouse Generator, 300 KW, 120/240 DC.

WORTHINGTON, Form S4, 440 PSI, 740°F to a Westinghouse Generator, 250 KW, 440/3/60, and to a 90 KW, 120 DC.

DELAVAL, 450 PSI, 750°F, 300 KW, 120/240 DC.

UNIT WINCHES

American Hoist and Derrick Company

U3H—SINGLE DRUM, Single speed (4)
Line Pull: 7450# — 223 FPM,
6360# — 237 FPM,
3720# — 287 FPM.

U6H—DOUBLE DRUM, Single speed (2)
Line Pull: 7450# — 223 FPM,
6360# — 237 FPM,
3720# — 287 FPM.

Motor: Westinghouse, 50 HP, 230 Volts DC, 1900 RPM, Model 288212, 183 Amperes, compound wound, Frame 9 UW, horizontal.

Unit Winches complete with Contactor Panels, Resistors, Master Switches.

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Marine Pumps

CENTRIFUGAL

DC - HORIZONTAL

1—ALLIS-CHALMERS, 40 GPM, 30.2 ft. hd., with Allis-Chalmers Motor, 5 HP, 230 DC, 575/1150/RPM.

1—WORTHINGTON, Size 3UB1, 400 GPM, 280' head, with Westinghouse Motor, 50 HP, 230 DC.

1—WESTCO, 100 GPM, 100 PSI, 2" suction, 3" discharge, Imperial Motor, 10 HP, 120 DC.

2—WORTHINGTON, Size 8L1, 2100 GPM, 138.5 TDM, with Westinghouse Motors, 100 HP, 230 DC.

1—WARREN, Size 8DM11 1/2, 1175 GPM, 11.1 PSI, with Reliance Motor, 10 HP 230 Volts DC.

1—WORTHINGTON, 3 1/2" suction, 3" discharge, 150 GPM, 23.8 PSI, with Diehl Motor, 3.47 HP, 230 DC, 1750/3500 RPM.

3—GOULDS, 250 GPM, 100 PSI, Figure 3380, 4"x3", with 30 HP Motors, 230 DC.

4—WORTHINGTON, Size 8L1, 2100 GPM, 138.5 TDM, 100 HP, 230 DC.

4—WORTHINGTON, Size 12LA1, 4000 GPM, 67.3 TDM, 100 HP, 230 DC.

5—WORTHINGTON, Size 4L1, 400 GPM, 83' head, 15 HP, 230 DC.

2—ALLIS-CHALMERS, Type 5G, Size 5x5, 650 GPM, 29' head, 7 1/2 HP, 230 DC.

2—ALLIS-CHALMERS, Type SS-L, Size 4x2, 45 GPM, 2 HP, 230 DC.

AC - HORIZONTAL

2—WARREN, 60 GPM, 50 PSI, 1.87 HP, 440/3/60, 3500 RPM.

1—WARREN, 17 GPM, 110 PSI, 3 1/2 HP, 440/3/60, 3500 RPM.

1—WARREN, 600 GPM, 50 PSI, 8 1/4 HP, 440/3/60, 1135 RPM.

1—GARDNER-DENVER, 750 GPM, 360' head, 6" suction, 5" discharge, 3500 RPM, with G.E. Motor, 100 HP, 440/3/60.

1—WARREN, Size 3-SED-8, 150 GPM, 26.2' hd., with Westinghouse Motor, 3.96 HP, 440/3/60.

4—WORTHINGTON, 200 GPM, 100 PSI, 3 1/2" suction, 3" discharge, Size 2UB1, with Wagner Motor, 25 HP, 440/3/60.

1—GARDNER-DENVER, 5" suction, 3" discharge, 350 GPM, 336' head, 50 HP, 440/3/60, 3500 RPM.

1—CARVER, 400 GPM, 100 PSI, 3 1/2" suction, 2 1/2" discharge, 3500 RPM, 35.7 HP, 440/3/60.

2—WORTHINGTON, 875 GPM, 10 PSI, 1160/860 RPM, with Westinghouse Motor, 4.45 HP/7.92 HP, 440/3/60.

3—WORTHINGTON, 6" x 6", 550 GPM, 25' head, 6 HP, 440/3/60, 1750 RPM.

2—BUFFALO, 250 GPM, 100 PSI, Class CCS, Size 4 x 3 1/2", with Westinghouse Motors, 25 HP, 440/3/60.

(Continued)

AC - HORIZONTAL

1—GOULDS, 2000 CFM, 470' head, Size 8x10, 350 HP, 2300/3/60.

3—ALLIS-CHALMERS, 35 GPM, 100' head, Size 2x1 1/2, 3 HP, 440/3/60.

DC - VERTICAL

1—AURORA, 4" x 3", with G.E. Motor, 25/40 HP, 230 DC, 1310/1750 RPM.

1—INGERSOLL-RAND, Size 8VCM, 8" suction, 8" discharge, with Westinghouse Motor, 15 HP, 230 DC, 850/1210 RPM.

1—INGERSOLL-RAND, 4" suction, 3" discharge, with Westinghouse Motor, 15 HP, 230 DC, 1310/1750 RPM.

1—WARREN, 6" suction, 3" discharge, with G.E. Motor, 5 HP, 440/3/60, 1725 RPM.

1—DAYTON-DOWD, 5" suction, 4" discharge, with Century Motor, 15 HP, 230 DC, 1310/1750 RPM.

2—ALLIS-CHALMERS, 170 GPM, 208' head, Type CF2V, 6" suction, 3 1/2" discharge, 20 HP, 230 DC.

2—ALLIS-CHALMERS, 30 GPM, 208' hd, Type CF2V, 2 1/2" suction, 1 1/2" discharge, 7 1/2 HP, 230 DC.

1—ALLIS-CHALMERS, 12,500 GPM, 10.4 PSI, Type LS-V, Size 20" x 20", 100 HP, 230 DC.

1—ALLIS-CHALMERS, 2520 GPM, 14.4 PSI, Size SE-V, 12" x 12", 30 HP, 230 DC.

2—ALLIS-CHALMERS, 600 GPM, 30 PSI, Type SGV, 5" x 5", 20 HP, 230 DC.

1—ALLIS-CHALMERS, 450 GPM, 120 PSI, 4" x 3", 50 HP, 230 DC.

3—GARDNER-DENVER, 1500 GPM, 56' head, 8" suction, 6" discharge, with 30 HP Motors, 230 DC.

1—WORTHINGTON, Type 20 LAS1, 13,000 GPM, 11.5 PSI, 100 HP, 230 DC.

2—DELAVAL, 80 GPM, 75 PSI, 5/10 HP, 230 DC.

1—WORTHINGTON FIRE & BUTTERWORTH, Size 3 UBS, 400 GPM, 300 PSI, 75 HP, 230 DC.

4—ALLIS-CHALMERS, Type SGV, 600 GPM, 30 PSI, 20 HP, 230 DC.

AC - VERTICAL

1—DE LAVAL, 155 GPM, 59.9 PSI, 440/3/60.

1—WARREN, 17 GPM, 55 PSI, with Westinghouse Motor, 4.26 HP, 440/3/60.

1—INGERSOLL-RAND, Size 2VHMA, 65 GPM, 75 PSI, 440/3/60.

1—BUFFALO, Size 6, 875 GPM, 10 PSI, 6.3 HP, 440/3/60.

2—WORTHINGTON, 275 GPM, 56.6 PSI, 22.9 HP, 440/3/60.

3—DAYTON-DOWD, 1160 GPM, 15 PSI, 10 HP, 440/3/60.

3—ALLIS-CHALMERS, 68 GPM, 114' head, 7 1/2 HP, 440/3/60.

ROTARY PUMPS

DC - HORIZONTAL

3—NATIONAL TRANSIT, 50 GPM, 50 PSI, 3x2 1/2, with G.E. Motor, 3 HP, 230 DC.

DC - VERTICAL

1—WORTHINGTON, Size 4GRVS, with Westinghouse Motor, 15 HP, 230 Volts DC, 1310/1750 RPM.

2—QUIMBY, Size 4D, 225 GPM, 50 PSI, 15 HP, 230 DC, 540/740 RPM.

2—QUIMBY, Size 5, 6 x 5, 400 GPM, 48 PSI, 25 HP, 230 DC.

2—QUIMBY, Size 6, 500 GPM, 70 PSI, 40 HP, 230 DC.

1—QUIMBY, Size 2 1/2, 17 GPM, 405 PSI, 7 1/2 HP, 230 DC.

2—QUIMBY, Size 5, 400 GPM, 60 PSI, 30 HP, 230 DC.

2—WORTHINGTON, Type 3GRVS, 90 GPM, 75 PSI, 7 1/2 HP, 230 DC.

Rotary, AC - Vertical

2—NORTHERN, Size 7020, 10 GPM, 350 PSI, 200 RPM, 3.65 HP, 440/3/60, 1720 RPM.

2—BLACKMER, Size IN5INV, 50 GPM, 50 PSI, geared, 2 HP, 440/3/60.

HYDRAULIC PUMPS

WATERBURY, some Model A, some Model B, piston type Pumps, Size 2, Size 5, Size 10, Size 20, Size 50.

BOILER FEED PUMPS-STEAM

Size 11 x 7 x 18 vert. simplex

Size 11 x 7 x 24 vert. simplex

Size 12 x 8 x 24 vert. simplex

Size 12 x 8 1/2 x 12 vert. simplex

Size 14 x 9 x 24 vert. simplex

TURBINE DRIVEN FIRE PUMPS

4—INGERSOLL-RAND, 1200 GPM, 98 PSI, Size 5UV, with Elliott Turbines, 84.3 HP, 3550 RPM, 1 stage, impulse type.

FAIRLEADS

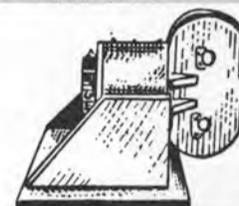
Designed and Manufactured by ZIDELL EXPLORATIONS, INC.

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.

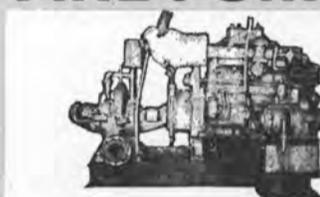
Dependable and Ruggedly built to perform consistently year after year with minimum maintenance.



Model Design \$1350 each

PRICES ARE F.O.B. PORTLAND, ORE.

FIRE PUMPS



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

CLYDE 17-DE-90 WHIRLEY CRANES

LIFTING RATE: 25 tons at 50 Ft. 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.) 7 1/2 HP, 230 DC.

POWER: Diesel electric (DC)

FORGED STEEL LINE SHAFING

1000 Tons of miscellaneous line shafting — Call on your requirements.

We also have . . .

Machinery & Equipment

From: AP2 & AP3 VESSELS

C2-SB1 VESSELS

C3-S1-A3 VESSELS

AND LIBERTY SHIPS

Marine Generators

8—General Electric, 4600 KW, 2700 Volts, 93.3 cycles, 3 phase, Form HL, Arm. Amps 984.

ANCHOR CHAIN

Used, good, with or without test certificate



1-3/8" size

1-1/2" size

2-1/16" size

2-1/4" size

2-5/8" size

2-3/4" size

3-3/8" size

MONTHLY MARINE SPECIALS

FOR SALE

- A. **STEEL DIESEL TUG**—Reb. 1955
119' x 28' x 15' 1600 H.P. \$250,000.00
- B. **ALL STEEL CARFLOAT**—Built-1930
285' x 40' x 10.6' \$ 30,000.00
- C. **12" SUCTION DREDGE**—Built-1956
78.1' x 24' x 4.5' \$ 90,000.00
- D. **DOUBLE-ENDED FERRY BOAT**—Built-1935
75' x 34' x 6' 150 Pass-8 Veh. \$ 25,000.00
- E. **3 COVERED AND 3 DECK BARGES**—Built-1954
90' x 30' x 9' 350-Ton Cap. \$7,500.00 ea.



**MOWBRAY'S
TUG & BARGE
SALES CORP.**

21 West St. New York N.Y. 10006
TELEPHONE (212) 943-7070

UNUSED 1-5/16" IDEAL WINDLASS



For 1-5/16" chain—on 36" centers. 15 H.P.—115 volts DC—1750 R.P.M.—6000 lb. line pull.

THE BOSTON METALS COMPANY

313 E. Baltimore St. Baltimore, Md. 21202
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M.G. SETS



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

INPUT: 115 VDC—6.1 amps—3600 RPM. AC OUTPUT: 425 watts—4.55 amps—110/1/60. Ball bearing. 137/8" long—7 9/16" wide—10 1/2" high. Has radio noise suppression filter. Net wt. 58 lbs—83 lbs packed for shipping.

\$89.50 EACH

UNUSED—10 KW—120/1/60 M.G. SET



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

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

exciter. Motor starter by Cutler-Hammer. AC generator has voltmeter and ammeter. Bassler voltage regulator.

**RECONDITIONED
BOGUE M.G. SET
230 VDC Input
7.5 KW 120/1/60 Output**



Model 2635—2 bearing. INPUT: 15 HP.—230 VDC—57 amps continuous—1800 RPM. OUTPUT: 7.5 KW—10 KVA—83.5 amps—120/1/60—0.8 P.F.

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

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

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FOR SALE — USED EQUIPMENT

DERRICK BOATS

Hull 40' x 40' x 6', all 5/16" plates, 7,500 gal. fuel oil with one Dravo C-10 Whirler Crane mounted in center. CAT D339 drives Dravo 3-drum hoist, 67' boom handles, 1 1/2 cu. yd. clamshell. Derrick Barge. PRICE: **\$15,000**

Derrick Boat, steel, 44' x 80' x 6' molded 3/8" plate, Clyde stiffleg Model L1272, 70' boom hook capacity 14 T @ 70' radius, three-drum Clyde hoist, 2 spuds, CAT D326 air-start with Twin Disc clutch. Elevated operators cab. GM 373 powers Quincy compressor and 5 kw Delco generator, clamshell capacity 14,500 lbs. PRICE: **\$60,000**

Derrick Boat ("Montgomery"), steel, 99'6" x 52' x 6' molded, 5/16 plate, stiff leg 85' boom, Hook capacity 20 T @ 75' radius, 2 drum hoist, separate boom hoist, all diesel electric with one CAT D 398 500 kw CAT genset, 2 spuds and 5 kw Onan aux. genset. Elevated operators cab. Clamshell capacity 20,000 lbs. Fuel oil capacity 25,000 gals. Some spare parts available. PRICE: **\$250,000**

- 40 Barges
100' x 26' x 6'6"—\$7,000 to \$15,000 each
- 2 Barges
115' x 27' x 7'—\$20,000 each
- 2 Barges
130' x 30' x 7'6"—\$35,000 each
- 2 Barges—Side Dump Scows
115' x 28' x 7'6"
600 ton capacity—\$50,000

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4800 Grand Avenue
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Washington, D.C. 20007
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**1000 GPM—125 LB
BRONZE FAIRBANKS-MORSE
FIRE & GENERAL SERVICE PUMP**



PUMP: Mfg by Fairbanks-Morse.. Horizontally split case — 1000 GPM—281' head — 3545 RPM. Suction pressure flooded—6" suction—5" discharge. Steelflex coupling. MOTOR: Fairbanks-Morse—440/3/60—squirrel cage—3600 RPM—class A insulation. Type KZK—continuous duty—dripproof—ambient temp. 50°C. Complete with Cutler-Hammer controller (reduced voltage magnetic starter). DIMENSIONS: 5' 5" OAL—23" OAW—2' 11" OAH. UNIT HAS HAD VERY LITTLE USE.

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**Attention: Offshore Contractors, Dredgers!
1200 KW—525 Volt DC DIESEL SET
Completely Self-Contained on Railroad
Flat Car—Ex-Navy Emergency Unit**

GENERATOR: Allis-Chalmers — 525 VDC — 2290 amps—750 RPM—self-ventilating—horizontally split casing. DIESEL: G.M. 16-278A—8 3/4 x 10 1/2 — 1700 BHP—720 RPM. Unit includes control panel & switches—excitation sets—aux. lighting generator driven by GM 2-71 2-cyl. 4 1/2 x 5 engine at 1200 RPM. Generator is 120 VDC. Also included are silencers and mufflers.

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

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

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**CLYDE
7 x 10
DOUBLE DRUM
WINCHES**



Drum 8500 lbs @ not less than 120 FPM; 13,000 lbs at no specific speed. Gypsy head 22,500 lbs static pull. Foot brake to hold 17,000 lb. pull. Steam cylinders with standard 250 PSI.

DIMENSIONS:
9' 5 3/4" wide over winch heads
5' 10 1/2" wide over bedplate
4' 1" deep over bedplate
6' 5" overall—brake pedal, etc.
2" steam—2" exhaust

Drums 16" diameter—20" wide—33 13/16" over flanges. Rebuilt by U.S.N. equal to new.

THE BOSTON METALS COMPANY

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



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

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NATIONAL METAL'S CURRENT T-2 INVENTORY

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

TURBOGENERATORS

525 KW GENERAL ELECTRIC AUXILIARY TURBOGENERATOR UNIT

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

538 KW WESTINGHOUSE TURBOGENERATOR UNIT

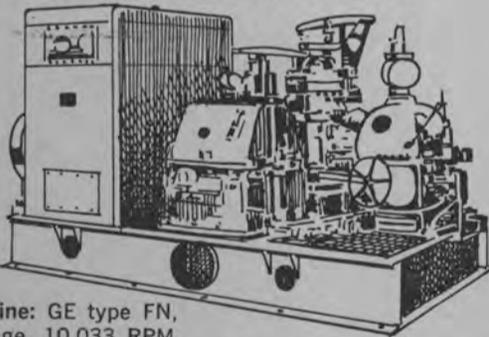
Complete with L.O. Coolers and exciters. Turbine: Westinghouse 538 KW, 5010 RPM. Inlet pressure 435 psi. Temp. 750 degrees F. TT. Exhaust pressure 28 1/2 hg vac. Generators: (1) 400 KW, 450 VAC, 3 pole, 60 cycle, PF 80%, 1200 RPM, ship's service. (2) 32.5 KW, 125 VDC, 1200 RPM, variable voltage exciter. (3) 110 KW, 125 VDC, 1200 RPM, constant voltage generator. (4) 5 KW, 125 VDC, 1200 RPM, ship's service Generator-Exciter. Reduction Gear: Ratio 5010/1200 RPM.

535 KW GENERAL ELECTRIC TURBOGENERATOR UNIT

Complete with L.O. Coolers and exciters. Turbine: General Electric Mfg. drawing P-8453535, 3 stages, type DORV-325, 5645 RPM, rating 535 KW, inlet pressure 590 lbs., Superheat 325 degrees F., exhaust pressure 1 3/4 ABS. Reduction Gear: General Electric, type S-162-D, Class, 535 KW, Mfg. dwg. T-8453535, 5645/1250 RPM. Generator: General Electric, Dwg. T-8453535, type ATB-976, KNA 500, 450 volts AC, 3 phase, 60 cycle, 400 KW, 642 amps, 1200 RPM, PF .8, Frame 976, Exciter 120 volts DC. Control panel: General Electric, Dwg. 6367270, Type XF-100492, 6 circuits, 450 volts AC.

★★ ALSO AVAILABLE!! ★★

600 KW GENERAL ELECTRIC TURBOGENERATOR UNIT



Turbine: GE type FN, 6-stage, 10,033 RPM.

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

MAIN MOTOR FOR T2

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

5400 KW MAIN GENERATOR

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

PUMP UNITS

CARGO STRIPPING PUMP

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

MAIN FEED PUMP

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

MAIN FEED PUMP

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

MAIN CIRCULATING PUMP

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

MAIN CIRCULATING PUMP

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

MAIN CARGO PUMP UNIT

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

FUEL AND LUBE OIL PUMP

Pump: Quimby, size 2 1/2 head screw, 1200/600 RPM, 15 GPM @ 325 psi disch. press. Motor: General Electric, Model 5KF364PP1, Frame 364, 7.5/3.75 HP, 1160/580 RPM, 440 volts AC, 10/9.7 amps, 3 phase, 60 cycle, complete with controller.

LUBE OIL SERVICE PUMP

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

MAIN CONDENSATE PUMP

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

AIR COMPRESSORS

COMBUSTION CONTROL AIR COMPRESSOR UNIT

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

SHIP SERVICE AIR COMPRESSOR UNIT

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

VALVES

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

TURBINE ROTORS

5400 KW GENERAL ELECTRIC TURBINE ROTOR

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

525 KW GENERAL ELECTRIC TURBINE ROTOR

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

5400 KW WESTINGHOUSE TURBINE ROTOR

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

5400 KW WESTINGHOUSE MAIN TURBINE (Profile type):

5400 KW ELLIOTT TURBINE ROTOR

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

MISCELLANEOUS T-2 EQUIPMENT

MAIN AIR EJECTOR

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

MAIN CONDENSER END

Graham (waterbox).

MAIN CONDENSER END

Westinghouse (waterbox).

MAIN CONDENSER END

Westinghouse (return head).

AUXILIARY CONDENSER END

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

TAIL SHAFTS

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

RUDDER WITH STOCK (complete)

SEND NOW FOR NEW 1973 CATALOG

HUNDREDS OF OTHER ITEMS
ALSO AVAILABLE!



**National
Metal**
AND
STEEL
CORP.

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



**UNUSED
30,000 CFM
AXIAL FANS**

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

**OTHER AVAILABLE
AXIAL FLOW FANS**

115 VOLTS DC
4000 CFM/5000 CFM/6000 CFM/10,000 CFM/12,000 CFM



230 VOLTS DC
Unused 2000 CFM 20AF—mfg. by Joy—0.75 HP motor—3450 RPM—3.4 amps—0.5" static—15" ID—17" flange

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

440 VOLTS AC

1000 CFM—Buffalo A1A4W5—3/4 HP—440/3/60/3450
2000 CFM—220/440/3/60—1.5 HP/3400 RPM
Other sizes from 3,000 CFM to 16,000 CFM

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**NEW 7" RADIUS
PANAMA CHOCKS**

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

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**100,000 lb. Almon Johnson Series 232
Constant Tension Mooring Winches**

5 Available. In very good condition. Series 232 mooring & anchoring winches—automatic self-tensioning. Wide range from 100,000 lb line pull at 10 FPM to 26,000 lbs at 400 FPM. Gypsy line pull 12,000 lbs at 125 FPM. Drum de-clutchable through spiral jaw clutch for free spooling. Driven by 50 HP—230 VDC motors—Westinghouse CK—575 RPM—1/2 hour—75°C rise—stab. shunt—181 amps—max. RPM 1900. Cutler-Hammer brake—18"—type NM. Complete with magnetic control panel, resistor banks & remote control pedestal—mounted master switch.

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**Deck-Mounted
BERGER
FAIRLEADS**

Model 614—1 1/4" line size — 14" sheave — 5" shank opening. Tapered roller bearings. 985 lbs. Approximate base dimensions: 32" x 24" fore and aft.

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AIR CONDITIONING AND REFRIGERATION—REPAIR & INSTALLATION
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AUTOMATIC DRAFTING SYSTEMS
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Waukesha Bearings Corp., P.O. Box 798, Waukesha, Wis. 53186

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Combustion Engineering, Inc., Windsor, Connecticut 06095

BOW THRUSTERS
Murray & Tregurtha, Inc., 2 Hancock St., Quincy, Mass. 02171

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Independent Petroleum Supply Co., 1345 Ave. of the Americas, New York, N.Y. 10019
The West Indies Oil Co., Ltd., St. John's Antigua, W. I.

CARGO HANDLING EQUIPMENT
MacGregor International Organization, 49 Gray's Inn Road, London W.C.1, England

CATHODIC PROTECTION
Engelhard Industries, 430 Mountain Ave., Murray Hill, N.J. 07974

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Wichita Clutch Co., Inc., Wichita Falls, Texas 76307

COATINGS—Protective
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144
Devoe & Reynolds Co., Inc., Subsidiary Celanese Coatings Co., 414 Wilson Ave., Newark, N.J. 07105
EGD Spee-Fla Co., 4631 Winfield Rd., Houston, Texas 77039
Patterson-Sargent, P.O. Box 494, New Brunswick, N. J.
Philadelphia Resins Corp., 20 Commerce Dr., Montgomery, Pa. 18936

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

CONTAINER LASHINGS & COMPONENTS
American Engineered Products, P.O. Box 74 Nichol Ave., McKees Rock, Pa. 15136
W. W. Patterson Co., 830 Brocket St., Pittsburgh, Pa. 15233

CONTROL SYSTEMS
Frederick Cowan & Co., Inc., 120 Terminal Drive, Plainview, L.I. New York 11803
Galbraith-Pilot Marine Corp., 600 Fourth Ave., Brooklyn, N.Y. 11215
Henschel Corporation, 14 Cedar St., Amesbury, Mass. 01913
Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.

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

CRANES—HOISTS—DERRICKS—WHIRLIES
ASEA Marine, Rep. in U.S.A. by Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Conrad-Stork, Div. Stork-Werkspoor, P.O. Box 134, Haarlem, Holland
Houston Systems Mfg. Co., P.O. Box 14551, Houston, Texas 77021
M.A.N. Maschinenfabrik Augsburg-Nurnberg AG, Werk Augsburg, West Germany
Paccoco, Div. Fruehauf Corp., 2350 Blanding Ave., Alameda, Calif. 94501
Star Iron & Steel Co., 326 Alexander Ave., Tacoma, Wash. 98401

CRANE LOAD INDICATORS
W.C. Dillon & Co., 14620 Keswick St., Van Nuys, Calif. 91407
Mark Products, Inc., 10507 Kinghurst Dr., Houston, Texas 77072
Trans-Sonics, Inc., P.O. Box 326, Lexington, Mass. 02173

DECK COVERS (METAL)
Marine Moisture Control Co., 449 Sheridan Blvd., Inwood, N.Y. 11696
Mechanical Marine Co., 900 Fairmount Ave., Elizabeth, N.J. 07027

DECK MACHINERY
Appleton Machine Co., P.O. Box 2265, Iron Mountain, Mich. 49801
ASEA Marine, Rep. in U.S.A. by Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Markey Machinery Co., Inc., 79 S. Horton St., Seattle, Wash. 98134
A. G. Weser, Seebeckwerft, 2850 Bremerhaven 1, Germany

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

DIESEL ENGINES
Alco Engine Div., White Industrial Power, Inc., 100 Orchard St., Auburn, N.Y. 13021
Bruce GM Diesel, Inc., 180 Route #17 S. at Interstate 80, Lodi, N.J. 07644
Caterpillar Tractor Co., Industrial Div., 100 N.E. Adams St., Peoria, Ill. 61602
Colt Industries Inc., Power Systems Div., Beloit, Wisc. 53511
De Laval Turbine Inc., Engine & Compressor Div., 550 85th Ave., Oakland, Calif. 94621
Electro-Motive Division General Motors, La Grange, Illinois 60525
M.A.N. Maschinenfabrik Augsburg-Nurnberg AG, Werk Augsburg, West Germany.
Sulzer Brothers, Ltd., Winterthur, Switzerland

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

DOCK BUILDERS
GHH Sterkrode Ferrostaal Overseas Corp., 17 Battery Place, New York, N.Y. 10004

DOORS—Watertight—Bulkhead
Overbeke-Kain Co., 20905 Aurora Rd., Cleveland, Ohio 44146
Walz & Krenzer, Inc., 20 Vesey St., New York, N.Y. 10007

ELECTRICAL EQUIPMENT
Armstrong Electric Co., Inc., 335 Bond St., Brooklyn, N.Y.
Galbraith-Pilot Marine Corp., 166 National Rd., Edison, N.J. 08817
Harvard Murlin Div., P.O. Box 302, Quakertown, Pa. 18951
Merrin Electric, 162 Chambers St., New York, N.Y. 10007
Oceanic Electrical Mfg. Co., Inc., 159 Perry Street, N.Y. 10014

EVAPORATORS
Aqua-Chem, Inc., Water Technologies Div., Box 421, Milwaukee, Wis. 53201
Bethlehem Steel Corp., Shipbuilding, 25 B'way, N.Y., N.Y. 10004
Riley-Beard, Inc., Maxim Evaporator Profit Center, P.O. Box 1115, Shreveport, Louisiana 71130

FAIRLEADS
Appleton Machine Co., P.O. Box 2265, Iron Mountain, Mich. 49801

FENDERING SYSTEMS—Dock & Vessel
BJ Marine Products, subsidiary of Borg-Warner, P.O. Box 2709, Terminal Annex, Los Angeles, Calif. 90054
Hughes Bros., Inc., 17 Battery Place, New York, N.Y. 10004

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

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

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

LIGHTS—Emergency, Search & Navigation
Elco Corp./Safecraft Div., Maryland Road & Computer Avenue, Willow Grove, Pa. 19090
Snelson Oilfield Lighting Co., 1201 E. Doggett St., Fort Worth, Texas 76104.

LNG SHIP DESIGN AND LICENSING
PDM/GAZ Transport, 919 Third Ave., New York, N.Y. 10022

LNG TANKAGE
Gazcocean U.S.A. Inc., 125 High St., Boston, Mass. 02110
Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa. 15225

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

MACHINERY MONITORS
Bently Nevada Corp., P.O. Box 157, Minden, Nevada 89423

MARINE BLOCKS & RIGGING
Crosby Group, Box 3128, Tulsa, Okla. 74101

MARINE DRIVES—GEARS
Hoffert-Lowe, Inc., 108 Ridge Road, North Arlington, N.J. 07032
Philadelphia Gear Corp., Schuylkill Expressway, King of Prussia, Pa. 19406
Western Gear Corp., Industrial Products Div., P.O. Box 126, Belmont, Calif. 94003

MARINE EQUIPMENT
Comet Marine Supply Corp., 157 Perry St., New York, N.Y. 10014
Homelite Corporation, 70 Riverdale Ave., Port Chester, N.Y. 10573
ITT Henze Service, P.O. Box 1745, Mobile, Ala. 36610
Kearfott Marine Products, 780 South 3rd Ave., Mt. Vernon, N.Y. 10550
Nicolai Joffe Corp., P.O. Box 2445, 445 Littlefield Ave., So. San Francisco, Calif. 94080
Merrin Electric, 162 Chambers St., New York, N.Y. 10007
Metritape, Inc., 77 Commonwealth Ave., West Concord, Mass. 01742
Stow Mfg. Co., 225 Shear St., Binghamton, N.Y. 13902
Vokes Filter Div., (Cardwell Machine Co.), Cardwell and Castlewood Rd., Richmond, Va. 23221
Waukesha Bearings Corp., P.O. Box 798, Waukesha, Wis. 53186

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

MARINE INSURANCE
Adams & Porter, Cotton Exchange Bldg., Houston, Texas
Midland Insurance Co., One State St. Plaza, New York, N.Y. 10004
R.B. Jones Corp., 301 West 11th St., Kansas City, Mo. 64105

MARINE OIL BURNERS
John Zink Co., 4401 So. Peoria, Tulsa, Okla. 74105

MARINE PROPULSION
Babcock & Wilcox Co., 161 East 42nd Street, New York, N.Y. 10017
Combustion Engineering, Inc., Windsor, Connecticut 06095
Jacuzzi Bros., Inc., 11511 New Benton Highway, Little Rock, Ark. 72204
Murray & Tregurtha, Inc., 2 Hancock St., Quincy, Mass. 02171
Port Electric Turbine Div., 155-157 Perry St., New York, N.Y. 10014
Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Tech Systems, Inc., 405 Watertown Rd., Thomaston, Conn. 06787
Turbo Power & Marine Systems, Subsidiary of United Aircraft Corp., 1690 New Britain Ave., Farmington, Conn. 06032

MARINE SURVEYORS
Schmahl and Schmahl, Inc., 1209 S.E. Third Ave., Fort Lauderdale, Fla. 33316

MARITIME FINANCING—Leasing
General Electric Credit Corp., 4 Corporate Drive, White Plains, N.Y. 10604
Rhode Island Hospital Trust National Bank, 15 Westminster Street, Providence, R.I. 02903

NAVAL ARCHITECTS AND MARINE ENGINEERS
J. L. Bludworth, 4030 Wynne St., Houston, Texas
Brett Engrg. Inc., 441 Gravier St., New Orleans, La. 70130
James G. Bronson Associates, 166 Altamont Ave., Tarrytown, N.Y. 10591
Childs Engineering Corp., Box 333, Medfield, Mass. 02052
Coast Engineering Co., 711 W. 21st St., Norfolk, Va. 23517
Crandall Dry Dock Engrs., Inc., 238 Main St., Cambridge, Mass. 02142
Francis B. Crocco, Inc., Box 1411, San Juan, Puerto Rico
C.R. Cushing & Co., Inc., One World Trade Center, New York, N.Y. 10048
Arthur D. Darden, Inc., 1040 International Trade Mart, New Orleans, La. 70130
Design Associates, Inc., 3308 Tulane Ave., New Orleans, La. 70119
Designers & Planners, Inc., 114 Fifth Ave., New York, N.Y. 10011
M. Mack Earle, 103 Mellor Ave., Baltimore, Md. 21228
Christopher J. Foster, 14 Vanderverter Ave., Port Washington, N.Y. 11050
Friede and Goldman, Inc., 225 Baronne St., New Orleans, La. 70112
Gibbs & Cox, Inc., 21 West St., New York, N.Y. 10006
John W. Gilbert Associates, Inc., 58 Commercial Wharf, Boston, Mass. 02110
Morris Gurainick, Associates, Inc., 583 Market St., San Francisco, Calif. 94105
J. J. Henry Co., Inc., 90 West St., New York, 10006
Hydranautics, 6338 Lindmar Dr., P.O. Box 1068, Goleta, Calif. 93017
C.T. Ilariucci & Associates, Tourism Pier #3, San Juan, P.R. 00902
Janzen Engineering Co., 15 Charles Plaza, Baltimore, Md. 21201
James S. Krogen, 2500 S. Dixie Hwy., Miami, Fla. 33133
Littleton Research and Engrg. Corp., 95 Russell St., Littleton, Mass. 01460
Robert H. Macy, P.O. Box 758, Pascagoula, Miss. 39567
Marine Consultants & Designers, Inc., 308 Investment Insurance Bldg., Corner E. 6th St. & Rockwell Ave., Cleveland, Ohio 44114
Marine Design Inc., 1180 Ave. of Americas, N.Y., N.Y. 10036
Marine Design Associates, P.O. Box 2674, Palm Beach, Florida
Rudolph F. Matzer & Associates, Inc., 13891 Atlantic Blvd., Jacksonville, Fla. 32225
John J. McMullen Associates, Inc., 1 World Trade Center, New York, N.Y. 10048
George E. Meese, 194 Acton Rd., Annapolis, Md. 21403
Metritape, Inc., 77 Commonwealth Ave., West Concord, Mass. 01742
Robert Moore Corp., 350 Main St., Port Washington, N.Y. 11050
Nickum & Spaulding Associates, Inc., 71 Columbia St., Seattle, Wash. 98104
Ocean-Oil International Engrg. Corp., P.O. Box 6173, New Orleans, La. 70114
Pearlson Engineering Co., Inc., 8970 S.W. 87th Ct., Miami, Florida 33156
S.L. Petchul, Inc., 8-D So. New River Drive East, Ft. Lauderdale, Fla. 33301
Potter & McArthur, Inc., 253 Northern Ave., Boston, Mass.
M. Rosenblatt & Son, Inc., 350 Broadway, New York, N.Y. 10013
and 657 Mission St., San Francisco, Calif.
George G. Sharp, Inc., 100 Church St., New York, N.Y. 10007
T. W. Spaetgens, 156 West 8th Ave., Vancouver 10, Canada
R. A. Stearn, Inc., 100 Iowa St., Sturgeon Bay, Wisc. 54235
Richard R. Taubler, 50 Court St., Brooklyn, N.Y. 11201
H. M. Tiedemann & Co., Inc., 74 Trinity Pl., New York, N.Y. 10006
Whitman, Requardt & Associates, 1304 St. Paul St., Baltimore, Md. 21202
Yankee Shipwrights, P.O. Box 35251, Minneapolis, Minn. 55435

NAVIGATION & COMMUNICATIONS EQUIPMENT
American Hydromath Co., 55 Brixton Rd., Garden City, N.Y. 11530
Collins Radio Co., M/S 407-321, Dallas, Texas 75207
Edo Western Corporation, 2645 South 2nd West, Salt Lake City, Utah 84115
ELCO Corp./Safecraft Division, Maryland Road & Computer Ave., Willow Grove, Pa. 19090
Electro-Nav, Inc., 501 Fifth Ave., New York, N.Y. 10017
FGM Systems Co., P.O. Box 20778, 2525 Walnut Hill Lane, Dallas, Texas 75220
Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913
Hose McCann Telephone Co., Inc., 524 W. 23rd St., N.Y. 10011
ITT Decca Marine, Inc., 386 Park Ave. South, New York, N.Y. 10016
ITT Mackay Marine, 2912 Wake Forest Road, Raleigh, N.C. 27611
Lorain Electronics Corp., 2307 Leavitt Road, Lorain, Ohio 44052
Magnavox Navigation Systems, 2829 Maricopa St., Torrance, Cal. 90503
National Marine Service, 1750 So. Brentwood Blvd., St. Louis, Mo.
Radlmarine Corp., 20 Bridge Avenue, Red Bank, N.J. 07701
Raytheon Co. Marine Products, 676 Island Pond Rd., Manchester, N.H. 03103
Raytheon Co., Submarine Signal Div., P.O. Box 360, Portsmouth, R.I. 02871

Sperry Marine Systems Div., Charlottesville, Va. 22901, Division of Sperry Rand Corp.
Standard Communications Corp., 639 N. Marine Ave., Wilmington, Calif. 90744
Teledyne Hastings Raydist, P.O. Box 1275, Hampton, Va. 23361
Tracor, Inc., 6500 Tracor Lane, Austin, Texas 78721
The Waterways Co., 3512 Metairie Hts. Rd., New Orleans, La. 70002

OILS—Marine—Additives
ESSO International, Inc., 1251 Avenue of the Americas, N.Y. 10020
Gulf Oil Trading Co., 1290 Ave. of Americas, New York, N.Y. 10019
Shell Oil Co., 1 Shell Plaza, Houston, Texas 77002
Texaco, Inc., 135 E. 42nd St., New York, N.Y. 10017

PAINT—Marine—Protective Coatings
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144
Devco & Reynolds Co., Inc., Subsidiary Celanese Coatings Co., 414 Wilson Ave., Newark, N.J. 07105
International Paint Co., 21 West St., New York, N.Y. 10006
Patterson-Sargent, P.O. Box 494, New Brunswick, N. J.
Porter Paint Company, 400 South 13th Street, Louisville, Ky. 40203
Transocean Marine Paint Association, P.O. Box 456, Delftseplein 37, Rotterdam, Holland

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

PIPE—Cargo Oil
Kubota, Ltd., 22, Funado-cho 2-chome, Naniwa-Ku, Osaka, Japan
Tioga Pipe Supply Co., Inc., P.O. Box 5997, Philadelphia, Pa. 19137

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

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

PROPELLERS: NEW AND RECONDITIONED
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans La. 70150
Coolidge Propellers, 1601 Fairview Ave. East, Seattle, Wash. 98102
Escher Wyss GmbH, P.O. Box 798, Ravensburg, Germany
Federal Propellers, 1501 Buchanan Ave. S.W., Grand Rapids, Mich. 49502
Ferguson Propeller, 1132 Clinton St., Hoboken, N.J. 07030

PUMPS
Colt Industries, Inc., Fairbanks Morse Pump & Electric Div., 3601 Kansas Ave., Kansas City, Kansas 66110
Goulds Pumps, Seneca Falls, N.Y. 13148
Houttuin-Pompen N. V. Sophialaan 4, Utrecht, Holland
Jacuzzi Bros., Inc., 11511 New Benton Highway, Little Rock, Arkansas 72204

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

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

ROPE—Manila—Nylon—Hawsers—Wire
American Mfg. Co., Inc., Noble & West Sts., Brooklyn, N.Y. 11222
Du Pont Co., Room 31H1, Wilmington, Delaware 19898
Jackson Rope Corp., 9th & Oley, Reading, Pa. 19604
Wall Rope Works, Inc., Beverly, N. J. 08010

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

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

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

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

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

SHIPBOARD VENTILATION
Coppus Engineering Corp., P.O. Box 457, Worcester, Mass. 01613
TANK S.A.P.P. Inc., 330 Madison Avenue, New York, N.Y. 10017 and 1020 Springfield Avenue, Mountainside, N.J. 07092

SHIPBREAKING—Salvage
The Boston Metals Co., 313 E. Baltimore St., Baltimore, Md. 21202
National Metal & Steel Corp., 1251 New Dock St., Terminal Island, Cal. 90731
Zidell Explorations, Inc., 3121 S. W. Moody St., Portland, Ore. 97201

SHIP BROKERS
Agemar, P.O. Box 1465, Maracaibo, Venezuela
Hughes Bros., Inc., 17 Battery Pl., New York, N.Y. 10004
Mowbray's Tug and Barge Sales Corp., 21 West St., N.Y., N.Y. 10006
Oaksmith Boat Sales, Inc., Fisherman's Terminal, Seattle, Wash. 98119

SHIPBUILDING STEEL
Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042
Bethlehem Steel Corp., 25 Broadway, New York, N.Y. 10004
Huntington Alloy Products, Div. International Nickel Co., Inc., Huntington, W. Va. 25720
International Nickel Co., 1 New York Plaza, New York, N.Y. 10004

SHIPBUILDING—Repairs, Maintenance, Drydocking
Astilleros Espanoles, S.A. Zurbano, 70, Madrid 10, Spain
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans La. 70150
Barbour Boat Works, Inc., P.O. Box 1069, New Bern, N.C.
Bellard, Crighton & Cie, P.O. Box 2074, Route des Docks, 59, Dunkirk, France
Bellard Murdoch S. A., Kattendijkdok Westkaai 21, Antwerp, Belgium
Bertram Marine, Division of Whittaker, 3663 N.W. 21 Street, Miami, Fla. 33142
Bethlehem Steel Corp., Shipbuilding, 25 Broadway, N.Y., N.Y. 10004
Blount Marine Corp., P.O. Box 360, Warren, Rhode Island 02885
Bludworth Shipyard, Inc., Box 5426, Cypress St., Brady Island, Houston, Texas 77012
Carrington Slipways Pty. Ltd., Tomago, N.S.W. 2322, Australia
Conrad Industries, P.O. Box 790, Morgan City, La. 70380
Curacao Drydock, Inc., P.O. Box 153, Willemstad, Curacao, N.A.
Devcon Corporation, Endicott Street, Danvers, Mass. 01923
Dravo Corporation, Neville Island, Pittsburgh 25, Pa.
Empressa Nacional Bazon, 65 Castellana, Madrid 1, Spain
Equipment Systems, Inc., A Microdot Co., P.O. Box 95, Port Deposit, Md. 21904
Equitable Equipment Co., Inc., P.O. Box 8001, New Orleans, La. 70122
General Dynamics, Electric Boat Division, 99M Eastern Point Road, Groton, Conn. 06340
General Dynamics, Quincy Division, Quincy, Mass. 02169
Halter Marine Services, Inc., Route 6, Box 287H, New Orleans, La. 70126
Havre de Grace, Havre de Grace, Md.
Hillman Barge & Construction Co., Grant Bldg., Pittsburgh 19, Pa.
Hongkong & Whampoa Dock Co. Ltd., Kowloon Docks, Hong Kong
Ishikawajima-Harima Heavy Industries Co., Ltd., 15 William St., New York, N.Y. 10005
Jacksonville Shipyards, 644 E. Bay St., Jacksonville, Fla. 32203
Jeffboat, Inc., Jeffersonville, Ind. 47130

Kawasaki Dockyard Co., 8 Kaigon-dori, Ikuta-ku, Kobe, Japan
Kelso Marine, Inc., P.O. Box 268, Galveston, Texas 77550
Keppel Shipyard (Private) Ltd., P.O. Box 2169, Singapore
Kockums Malmo, Fack, Malmo, Sweden
Litton Industries, 9920 W. Jefferson Blvd., Culver City, Calif. 90230
Lockheed Shipbuilding and Construction Co., 2929 16th Avenue, S.W., Seattle, Wash. 98134
Marathon Manufacturing Company
Marathon LeTourneau Offshore Company, 1700 Marathon Building, 600 Jefferson, Houston, Texas 77002
Marathon LeTourneau Gulf Marine Division, P.O. Box 3189, Brownsville, Texas 77520
Marathon LeTourneau Marine Division, LeTourneau Rural Station, Vicksburg, Mississippi 39180
Marathon LeTourneau Offshore Pte., Ltd., P.O. Box 83, Taman Jurong Post Office, Singapore 22, Singapore
Marathon Shipbuilding Company, P.O. Box 870, Vicksburg, Miss. 39180
Marathon Shipbuilding Company (U.K.) Ltd., Clydebank Bunbartonshire, G81-1YB, Scotland
Maryland Shipbuilding & Drydock, P.O. Box 537, Baltimore, Md. 21203
Matton Shipyard Co., Inc., P.O. Box 428, Cohoes, New York 12047
Mitsui Shipbuilding & Engrg. Co. Ltd., 6-4, Tsukiji 5-chome, Chuo-ku, Tokyo, Japan
Mitsubishi Heavy Industries, Ltd., 5-1 Marunouchi 2-chome, Chiyoda-ku, Tokyo, Japan
Monark Boat Co., P.O. Box 210, Monticello, Ark. 71655
National Steel & Shipbuilding Corp., San Diego, Calif. 92112
Newport News Shipbuilding and Dry Dock Co., Newport News, Va.
Newport Ship Yard, Inc., 379 Thames St., Newport, R.I. 02840
Northwest Marine Iron Works, P.O. Box 3109, Swan Island, Portland, Oregon 97208
Nuclear Service & Construction Co., Inc., 9296 Warwick Blvd., Newport News, Va. 23607
O.A.R.N. (officine Allestimento e Riparazioni Navi) Genoa, Italy
Odense Steel Shipyard Ltd., P.O. Box 176, DK-5100 Odense, Denmark
Paccio, Div. Fruehauf Corp., 2350 Blanding Ave., Alameda, Calif. 94501
Pearlson Engineering Co., P.O. Box 8, Kendall Branch, Miami, Fla. 33156
Perth Amboy Dry Dock Co., Perth Amboy, N.J. 08862
St. Louis Shipbuilding—Federal Barge, Inc., 611 East Moreau, St. Louis, Mo. 63111
Sasebo Heavy Industries Co., Ltd., New Ohtemachi Bldg., Chiyoda-ku, Tokyo, Japan
Savannah Machine & Shipyard Co., P.O. Box 787, Savannah, Ga. 31402
Sembawang Shipyard (Pte) Ltd., P.O. Box 3, Sembawang, P.O. Singapore, 27
Slocum Iron Works, Inc., P.O. Box 2506, 1752 Telegraph Road, Mobile, Ala. 36601
Sumitomo Shipbuilding & Machy. Co., Ltd. 2-1 Ohtemachi 2-chome, Chiyoda-ku, Tokyo, Japan
Swedish Shipbuilding Association, Fack S-402 70, Gothenburg 8, Sweden
Teledyne Sewart Seacraft, P.O. Box 108, Berwick, La. 70342
Todd Shipyards Corp., 1 State St. Plaza, New York, N.Y. 10004
Tracor/Mas, Inc., P.O. Box 13107, Port Everglades, Fla. 33316
Vancouver Shipyards Co., Ltd., 50 Pemberton Ave., North Vancouver, B. C., Canada

SHIP MODEL BASIN
Hydronautics, Incorporated, Laurel, Maryland 20810

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

SHIP STABILIZERS
John J. McMullen Associates, Inc., 1 World Trade Center, New York, N.Y. 10048
Sperry Marine Systems Div., Charlottesville, Va. 22901, Division of Sperry Rand Corp.

STEAM GENERATING EQUIPMENT
Babcock & Wilcox Co., 161 East 42nd Street, New York, N.Y. 10017
Combustion Engineering, Inc., Windsor, Connecticut 06095

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

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

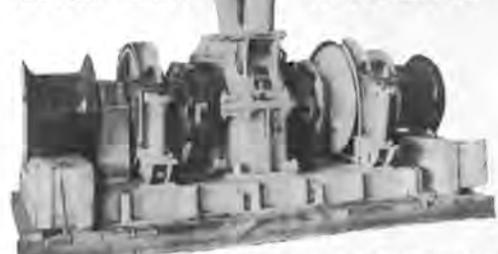
TOWING—Salvage, Lighterage, Barge Chartering
Bay-Houston Towing Co., 805 World Trade Bldg., Houston, Texas 77002
Curtis Bay Towing Co., Mercantile Bldg., Baltimore, Md. 21202
Henry Gillen's Sons Lighterage, West End Ave., Oyster Bay, N.Y. 11771
James Hughes, Inc., 17 Battery Pl., New York, N.Y. 10004
Interstate Oil Transport Co., 214 Transportation Center, Six Penn Center Plaza, Philadelphia, Pa. 19103
McAllister Bros., Inc., 17 Battery Pl., New York, N.Y. 10004
McDonough Marine Service, P.O. Box 26206, New Orleans, La.
Moran Towing & Transportation Co., Inc., One World Trade Center, Suite 5335, New York, N.Y. 10048
Puerto Rico Lighterage Co., P.O. Box 1072, San Juan, P.R. 00902
L. Smit & Co., 11 Broadway, New York, N.Y. 10004
Suderman & Young Towing Co., 329 World Trade Center, Houston, Texas 77002
Turecama Coastal and Harbor Towing Corp., 1752 Shore Parkway, Brooklyn, N.Y. 11214

VALVES AND FITTINGS—Hydraulic—Safety Flanges
Dover Corp. / Norris Division, P.O. Box 1739, Tulsa, Okla. 74101
Hubeva Marine Plastics-Lining, 435 Hamilton Ave., Brooklyn, N.Y. 11231
Marine Moisture Control Co., 449 Sheridan Blvd., Inwood, N.Y. 11696
Mechanical Marine Co., 900 Fairmount Ave., Elizabeth, N.J. 07027

WIRE ROPE
Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042
Bethlehem Steel Corp., Bethlehem, Pa. 18016
United States Steel Corp., P.O. Box 86, Pittsburgh, Pa. 15230

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

UNUSED 1 1/8" HEAVY DUTY LINK BELT WINDLASS



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