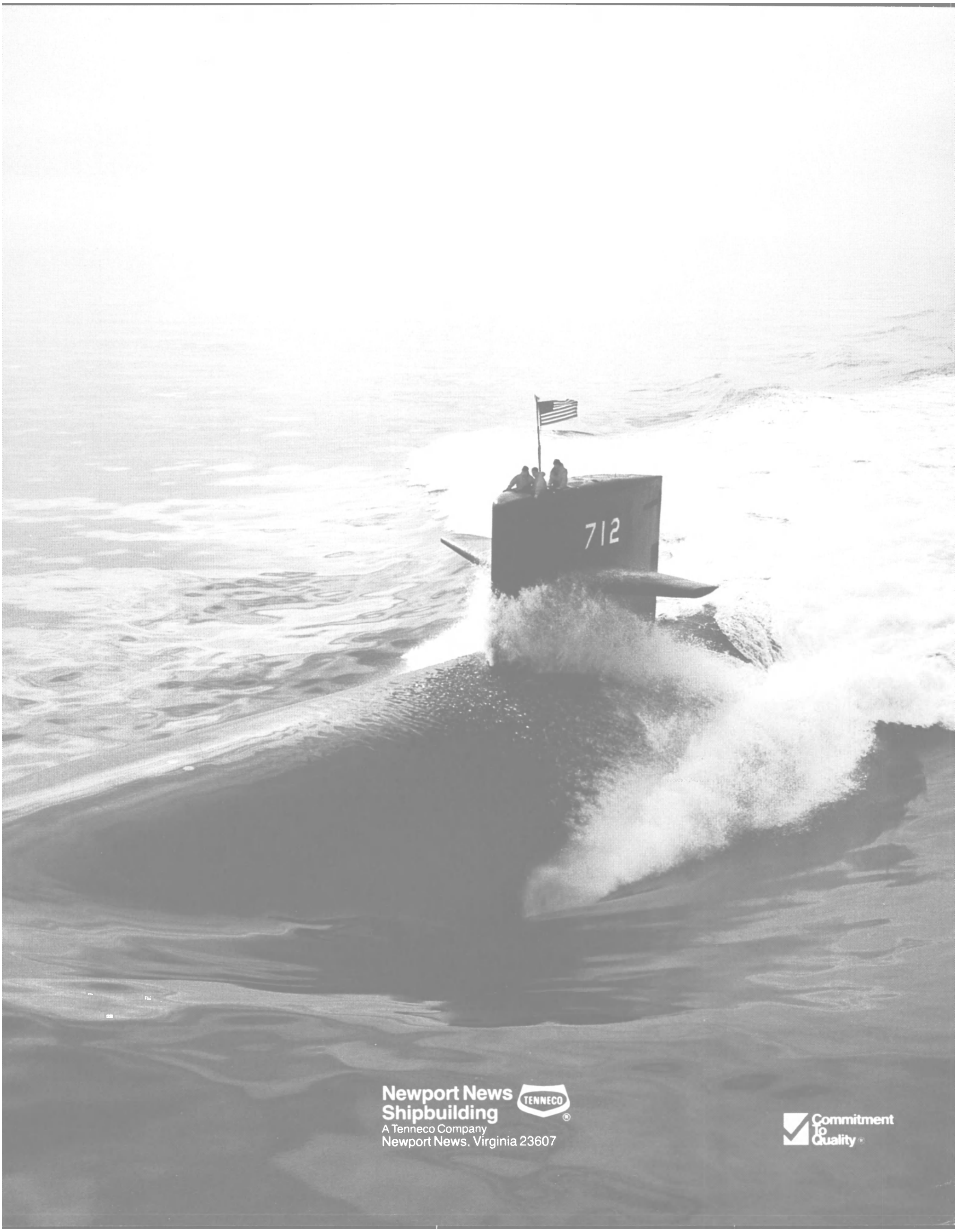
MARITIME REPORTER
AND
ENGINEERING NEWS

Hamburg Harbor

SMM '88 – THE HAMBURG SHOW PREVIEW

NAVAL TECHNOLOGY & SHIPBUILDING

SEPTEMBER 1988 ISSUE



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Officine Mariotti Yard To Perform Conversion For $118.8 Million

The Genoa shipyard of Officine Mariotti recently received a 150 billion lire (about $118.8 million) contract for the conversion of a container vessel into a luxury cruise ship.

The contract, awarded by Italian cruise operator Costa Cruises, calls for the conversion of the 15,932-grt Italia into a cruise ship for the Mediterranean market. The vessel will be renamed the Costa Marina and is expected to be delivered in April 1990. She will be deployed on seven-day cruises.

One of the appealing factors in the selection of the Italia for conversion to a cruise ship by Costa was her Pielstick propulsion plant. The vessel's primary propulsion plant, which consists of two 12-cylinder and two 16-cylinder Pielstick engines, produces a total output of 26,000 bhp and a speed of 23 knots. Costa required a 22-knot cruising speed for her vessel.

The Costa Marina will be owned by a newly established shareholding company called Mediterranean Cruise Lines, 55 percent controlled by Costa Crociere, and the rest by the ship supplier Zerbone Catering and the tourist operator Quiriconi.

The conversion is part of a major cruise line upgrading by Costa, which has spent more than $450 million to modernize its fleet.

For free literature detailing the shipbuilding and repairing facilities and services of Officine Mariotti,

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Only specialists can build four floating drydocks within one year...

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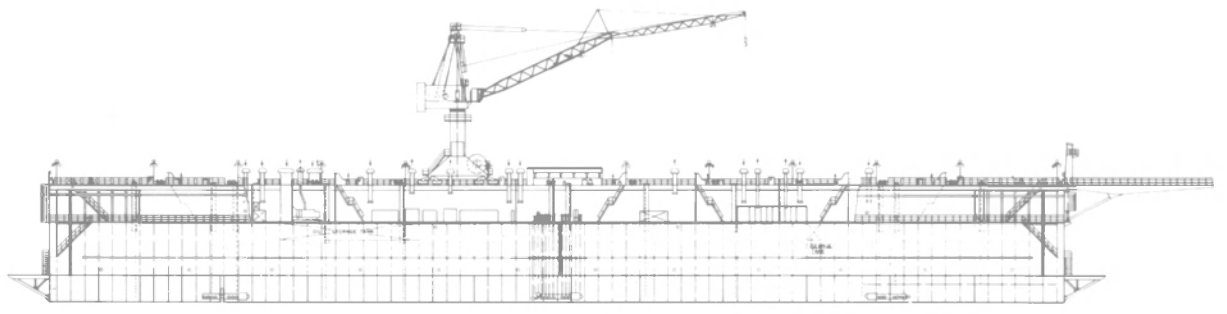

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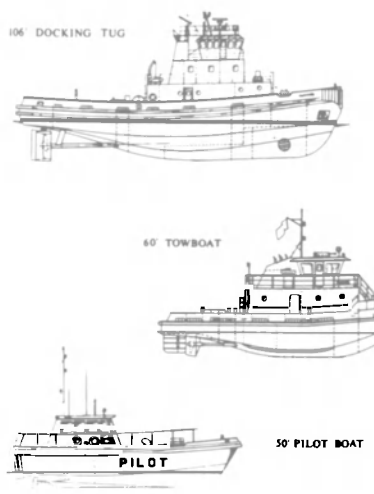
Trinity Marine Group Awarded $13-Million Jordanian Contract To Build Five Workboats

The Trinity Marine Group has been awarded an approximate $13-million contract for the construction of five workboats for the Jordan Ports Corporation of the Hashemite Kingdom of Jordan.

The U.S. AID (Aid for International Development) contract calls for construction of two 106-foot docking tugs, two 60-foot towboats and one 50-foot pilot boat.

John Dane III, president of the Trinity Marine Group, said construction of the four larger, all-steel boats has begun at Moss Point Marine, Inc., in Escatawpa, Miss. Equitable Shipyards, Inc., in New Orleans, La., is building the steel and aluminum pilot boat.

The docking tugs will work in the Gulf of Aqaba, helping to maneuver ships to anchorage and to and from piers. They will each be 106 feet 6 inches in length, with a 34-foot molded breadth, and 16-foot molded depth.



Each of the tugs will be powered by two General Motors EMD-8-645F7BA engines developing a total of 3,200 bhp. They will be equipped with controllable pitch propellers inside steerable Kort-type nozzles.

The tugs will also be equipped with four 1,600-gpm water/foam fire monitors and each boat will have accommodations for a crew of eight.

The two 60-foot towboats will move barges and lighters to and from ships at anchorage, and tow barge-mounted derricks for loading and unloading ships and lighters. The towboats will also assist in docking ships, but will not be equipped with towing knees common to American towboats.

Each of the towboats will have a beam of 22 feet and a depth of 8.5 feet. They will be powered by two Cummins KT19-M diesel engines developing a total of 850 bhp.

The pilot boat will have a 15-foot beam and a 7-foot molded depth. She will transport ships' pilots to the Gulf of Aqaba.

The pilot boat will have a lightweight steel hull and an aluminum superstructure. She will be powered by two Detroit Diesel 8V71T diesel engines developing 349 hp each.

The two tugs will be delivered nine months from contract finalization and the towboats and the pilot boat will be delivered six months after formal contract signing.

Mr. **Dane** said the contract also includes a two-year spare parts program and a training program for crew training in ship handling and maintenance.

For free literature completely describing the boatbuilding services offered by the Trinity Marine Group,

Circle 107 on Reader Service Card

$4.1-Million Contract Won By Seacor To Support Naval Training Schools

Systems Engineering Associates Corporation (Seacor) has been awarded a $4.1-million contract by the U.S. Navy to support naval training schools throughout the U.S. Under this four-year contract, Seacor provides technical and logistics services.

It's Time To Prepare For MARPOL Compliance*

Editor's Note:* This exclusive article has been excerpted from a special report by **Peter P. Lombard, president, American United Marine Corporation, and **Flemming D. Christensen,** A/S Vesta.

Starting December 31, 1988, the U.S. Coast Guard will begin enforcing Annex V of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution by Ships, 1973, known as MARPOL 73/78.

Known as "Regulations for the Prevention of Pollution by Garbage by Ships," it defines garbage to include victual, domestic and operational wastes and deals specifically with nonbiodegradable substances such as plastics.

In an article in its August 1, 1988 edition, *Time* reported that beaches around the world were being contaminated with industrial, human and hospital wastes. Large amounts of marine life are being killed as a direct or indirect result of man-generated pollution.

Time estimates that merchant fleets dump at least 450,000 plastic containers overboard per day. The U.S. Navy, in an effort to lower its plastic waste disposal, has canceled an order for 11 million plastic bags and is testing alternative methods for dealing with garbage and trash.

Under Annex V of MARPOL 73/78, disposal into the sea is entirely prohibited for certain materials. These include all plastics such as synthetic ropes, nets, and garbage bags. These materials must not be discharged at any time, except for the purposes of securing the safety of the ship or saving life at sea.

Other items may be disposed of as far as possible from land, but not within certain minimum distances. These distances vary with the types of waste.

Certain sections of the sea, because of their particular oceanographical and ecological conditions, are designated as "special areas." Within these special areas, which include the Mediterranean, Black, Red and Baltic Seas and the gulf area located northwest of the line between Ras al Hadd and Ras al Festah, all waste disposal is entirely prohibited except for the discharge of food wastes, which must be dumped at least 12 nautical miles from the nearest land.

In addition, movements are now underway to designate the Gulf of Mexico and other ocean sections as special areas, possibly after the rules go into effect at the end of this year.

A further provision of the regulations states that the disposal of any materials regulated by Annex V is prohibited from fixed or floating platforms engaged in the exploration, exploitation, and associated offshore processing of seabed mineral resources, and from all other ships when alongside of or within 500 meters of such platforms.

The implementation of Annex V is going to require some changes in the way most oceangoing vessels deal with their refuse.

At present, three alternative

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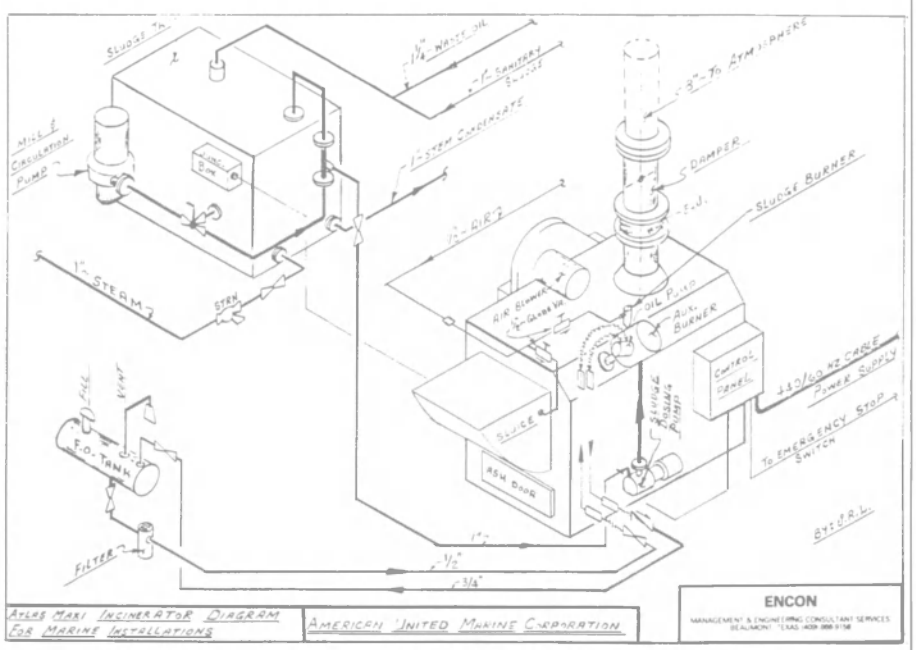

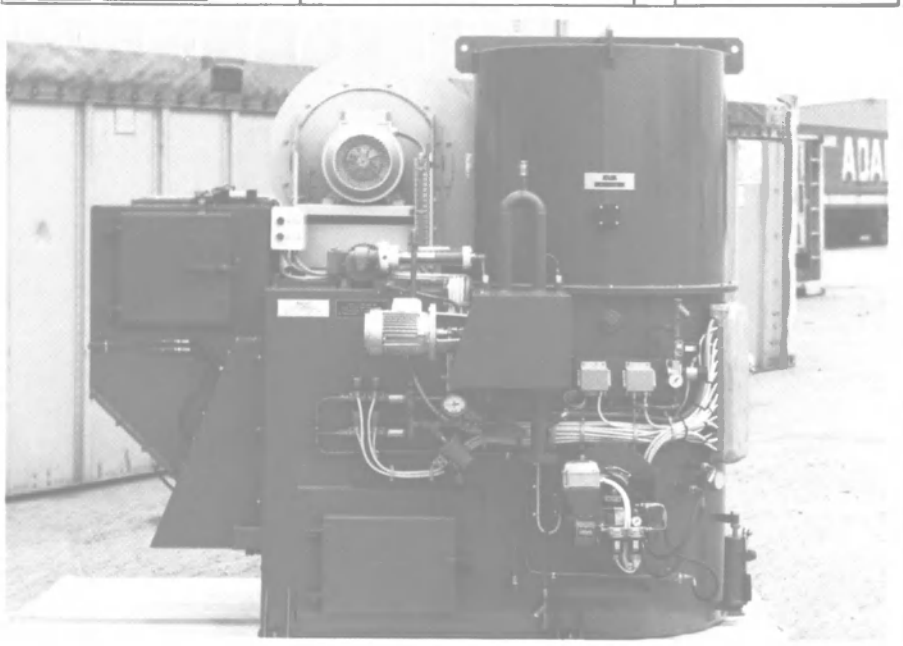

MARPOL

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methods of dealing with the problem exist. These are: (1) onboard storage until the vessel reaches a port with disposal facilities; (2) compaction and storage until onshore disposal; and (3) incineration.

Space requirements, problems of odor, insect control and general sanitation, make the first method, storage and shore disposal, unattractive. Additionally, problems may be encountered scheduling the necessary number of stops at ports with adequate disposal facilities.

Although the second method, trash compaction, partially solves the problem of space requirements, it still requires the scheduling of stops at ports with disposal facilities.

Annex V provides that if wastes, such as foodstuffs, paper products, rags, glass, metal and similar refuse, have been comminuted or ground to the point where they will pass through a screen with openings no greater than 25 millimeters, the minimum distance from shore required for ocean discharge is reduced to three nautical miles. Also, food wastes which have been comminuted to 25 millimeters or less, can be discharged from floating or fixed platforms located more than 12 miles from land, and from other ships when alongside or within 500 meters of the platform.

In other words, simply reducing the particle size of refuse to 25 millimeters or less lowers the ship-to-shore dumping limit from 12 to 3 miles.

However, the most efficient method of fulfilling the newest MARPOL requirements is through the use of an onboard incinerator. Vesta/Atlas incinerators, for example, all produce ash residues which meet Annex V requirements.

Incinerators are offered in a wide variety of models to meet every combination of requirements, depending on what type of materials are to be burned and how much.

Requirements for shipboard incinerators are governed by 46 CFR Part 63, and the safety requirements for them are found in 46 CFR 58 and 46 CFR 56. When purchasing an incinerator, it is important to ascertain that it meets all these requirements, and is so certified by the manufacturer.

While incinerators do require a moderately large initial investment for purchase and installation, they have the advantages of providing a completely reliable and efficient method for disposing of waste materials without any expenses for or dependence on disposal facilities in ports of call.

Modern incinerators, with their two-chamber design, produce no particulate emissions in the exhaust gases because of complete combustion during the retention in the second chamber. They can be shipped either as one-piece units, or knocked down for assembly onboard, simplifying retrofits on existing vessels.

A number of factors are important for evaluating the best methods for solving the waste disposal problem of each individual vessel. For example:

(1)*Type of power*—steam ships will be concerned with disposing of solid garbage and trash. Motor ships will have the same types of waste as the steam vessels with the addition of oil sludges, which require special techniques for holding and disposal.

(2)*Use of vessel*—the volume of the material to be disposed of will vary greatly depending on the use of the vessel—whether it carries passengers, freight, crude oil or liquid products, containerized cargoes, and other types.

(3)*Trade routes*—the routes followed by ships can have a big effect on disposal handling. Largely coastal operations, for example, have the disadvantage of never being far out enough to dump but also have the advantage of being always close to ports with disposal facilities. These vessels traveling through the MARPOL "special areas" must be prepared to deal with the special prohibition in those areas.

(4)*Business arrangements*—the choice of disposal methods may be affected by the type of business arrangements of the vessel—such as whether it is in a fixed market, an open (spot) market, or a long-term charter arrangement. For example, some long-term charter agreements may specifically require incineration capabilities.

For determining the disposal capability required for a particular vessel, the following rule-of-thumb formulas are generally applied: (1)*for solid waste*—number of people on board multiplied by 3 equals the kilograms of solid waste per 24-hour period; (2)*for sludge waste*—engine capacity in kilowatts by 0.0024 by 24 equals the liters of sludge per 24-hour period, including lubricating oil.

For disposing of these wastes by incineration, the energy released is as follows: solid waste 3,200 kilocalories per kilogram; oil sludge 6,000 kilocalories per liter.

After these requirements values are computed, an incinerator is chosen which will handle the necessary kilocalories, while operating 12 hours in each 24-hour period.

Steps toward installation of an incinerator which will result in full compliance with Annex V ordinarily proceed on a schedule similar to the following one:

(1) The vessel is surveyed (one to two days) and a location for the incinerator is chosen (usually in the engine room or, in case of space limitations, a self-contained, pre-wired and piped module is available for easy deck installation), and utilities connections are located.

(2) Development of drawings, which will be submitted to regulatoizations (ABS) (one to two weeks). These drawings will include: (a) the general arrangement of the incinerator installation; (b) diesel oil piping system, showing the connection points at the incinerator and the diesel oil supply point; (c) electrical system, showing the power supply and cable connections to the incinerator control panel; (d) exhaust gas piping for the incinerator, to either a common or independent stack; (e) foundation support; (f) detailed isometric drawing for diesel oil, electric cabling, and exhaust stack; (g) detailed installation specification write-up, which can be used by owners, shipyards, riding crew, or installation operators; (h) complete electrical and mechanical bills of materials; and (i) one set of reproducible drawings.

(3) Installation by two men, in a matter of days.

(4) Commissioning and start-up in one day.

When these steps have been completed, shipowners and operators can be assured that they are capable of complying with all waste disposal regulations which are planned for the foreseeable future.

A special advantage of Vesta/Atlas incinerators is that they are manufactured by both A/S Vesta, Copenhagen, and their subsidiary, Klinge Products, Inc., York, Pa., for fast local delivery both in Europe and the U.S. American United Marine Corporation, Saugus, Mass., in the exclusive U.S. agent for A/S Vesta.

For a free copy of the special report by **Peter P. Lombard** and **Flemming D. Christensen,** as well as further information on waste disposal regulations and systems and on Vesta/Atlas systems,

Circle 113 on Reader Service Card

R.J. Bazzini Associates To Represent Advanced Control Systems

Robert J. Bazzini, P.E. of R.J. Bazzini Associates, a company that specializes in the application and sale of engineered equipment and systems, recently announced that his company has been named the representative of Advanced Control Systems, Incorporated, for the East Coast.

Advanced Control Systems designs and markets a boat operating system which has the capability of reducing diesel propulsion system operating costs.

For free literature describing the services of both R.J Bazzini Associates and Advanced Control Systems,

Circle 59 on Reader Service Card

Versatile Pacific Delivers $80-Million Icebreaker 'Henry Larsen'

The Canadian Coast Guard recently took delivery of the Can$97-million (about $80-million) icebreaker Henry Larsen, the largest of 12 icebreakers built so far by Versatile Pacific Shipyards Inc. of North Vancouver.

The Henry Larsen has dimensions of about 327.5 feet overall length and 64.6 feet beam with a displacement of 8,290 tons at 23.7 feet draft. The vessel can accommodate a crew of 72, has a cruising range of 15,000 nautical miles, a cruising speed of 15.5 knots, and a total shaft horsepower of 12,000 kw through two propellers.

Versatile Pacific is currently completing the definitive design of the proposed Can$347-million (about $284.5-million) Polar 8 icebreaker, which will be one of the largest icebreakers ever constructed.

For free literature giving full information on the facilities and capabilities of Versatile Pacific Shipyards,

Circle 54 on Reader Service Card

Emerling Named President TANO Marine Systems

R.W. Emerling

R.W. (Pete) Emerling has been named president of TANO Marine Systems, Inc., which designs and manufactures automation and control systems for military ships and industrial applications.

Mr. **Emerling,** who has been with TANO since its formation in 1972, is in charge of all sales, engineering, customer service and manufacturing personnel. He has served in a variety of engineering and executive positions while with the company.

Mr. **Emerling** is subcommittee co-chairman for the Shipbuilding Committee of the American Society for Testing and Materials.

TANO Marine Automation Systems have been installed on more than 240 ships for the U.S. Navy, Coast Guard, Military Sealift Command and U.S. merchant marine. TANO Marine Systems, Inc. is a subsidiary of TANO Corporation.

For more information and free literature,

Circle 29 on Reader Service Card

New Radars By Simrad Offer Desirable Selection —Literature Available

Simrad/Anritsu's new radars, according to the manufacturer, offer superior short range performance, and exceptional resolution and definition. They include the following selection.

The RA720UA (0.25 - 60 NM, 5 kw) and RA721UA (0.25 - 96 NM, 10 kw), which Simrad describes as compact, affordable and offering outstanding performance and reliability, have 12-inch monochrome displays.

The RA711CA (0.25 - 60 NM, 5 kw) and RA712CA (0.25 - 96 NM, 10 kw) have 11-inch color displays and boast a high level of performance.

The AR-C12A has a large 14-inch color display and a 10-kw transmitter combined with, according to Simrad, superior detection, extremely high resolution and definition.

All Simrad/Anritsu radars feature full function menus with self-test facilities, a high level of user programming ability, one-year parts and labor warranty, and the full support of Simrad's comprehensive dealer network.

For further information and free literature on radars by Simrad,

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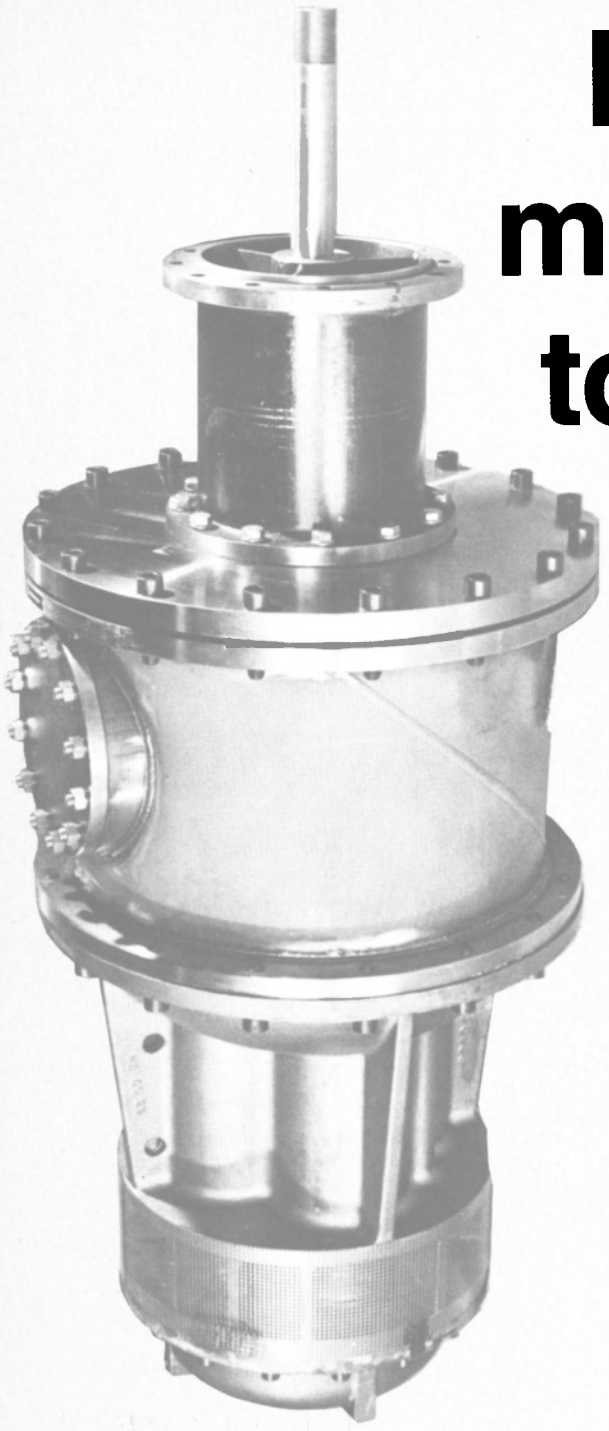
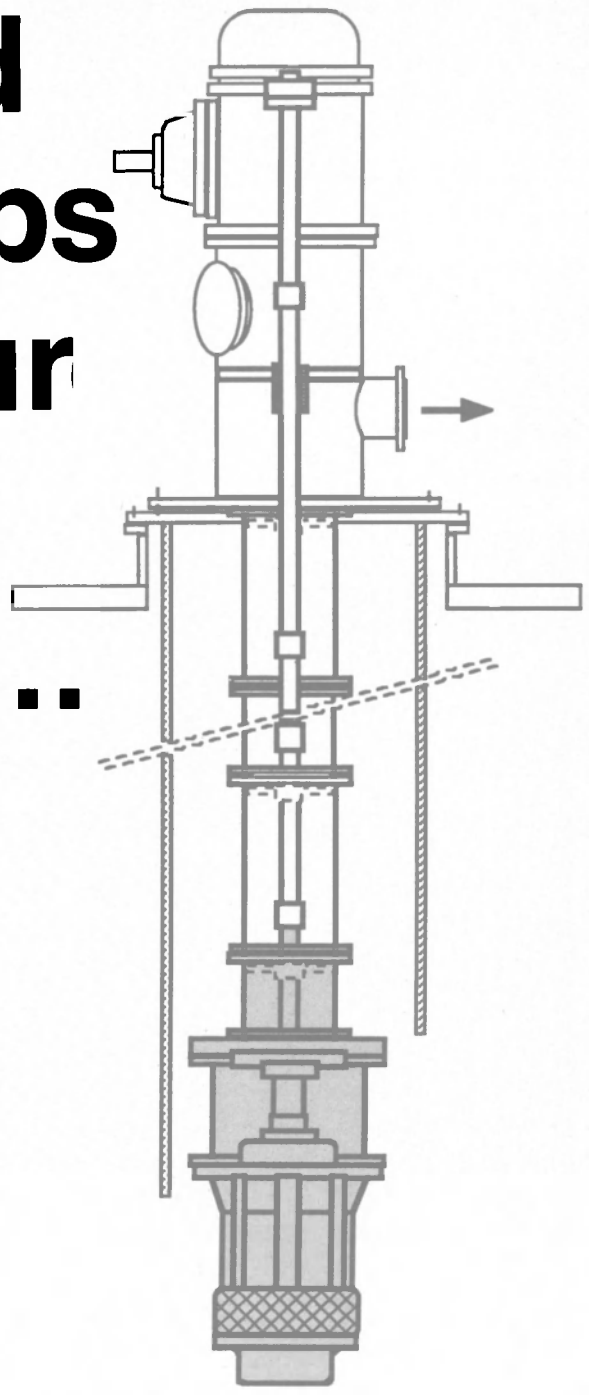


Engineered marine pumps to solve your special problems...



The Leistritz five-rotor, single-flow screw pump on the left was specially designed to unload asphalt and #6 fuel oil from an ocean-going barge.

The pump is one of two we designed and built for an East Coast barge operator. These pumps, each with a capacity of approximately 5000 BPH, are the largest of their type ever installed aboard a U.S. vessel.

The diesel-driven pumps operate at 145 PSIG, at a viscosity of 3000 SSU and temperatures to 340° F.

The entire pump assembly, including the column assembly and discharge head, is shown in the schematic at right.

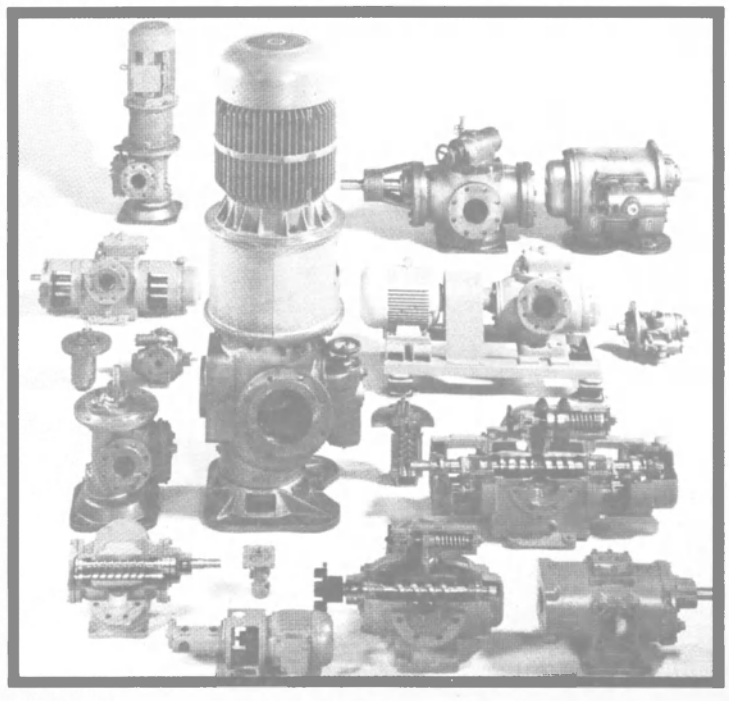
plus a full line of standard units.

While engineering and manufacturing marine pumps to solve all kinds of fluid-handling problems has been a Leistritz specialty for more than 60 years—we make a full line of *standard* pumps, too.

The line includes two, three and five-screw pumps for lube-oil service, fuel-oil service, hydraulics, sludge handling, cargo loading and unloading. And these pumps serve both shipboard and off-shore applications worldwide.

So whether you have a special pumping problem to be solved, or an application that a standard pump can handle, you can count on Leistritz for a pump design that will—without compromise—meet your exact pumping requirements. And at the same time, you'll get the quality, reliability and efficiency that Leistritz is known for.

To find out more about Leistritz pumps and services for the marine industry, call Sven Olson at 201-934-8262, or write Leistritz Corporation, 165 Chestnut Street, Allendale, New Jersey 07401.



Leistritz

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Ulstein Group Becoming A Major Force In Ship Equipment

Following amalgamation with the BMV Group (Bergens Mekaniske Verksteder A.S.), the Ulstein Group has become one of the largest companies in Norway producing equipment for ships. Ulstein has held a majority interest in BMV in recent years and has now considered it appropriate to combine the two groups. This means that the Ulstein Group, with over 2,000 employees, stands out as a central force in the sale of Norwegian ship design and equipment in international markets.

The company Ulstein International A.S. will be responsible for the marketing and sale of what will be one of Europe's broadest product ranges to ships from one supplier.

This wealth of resources will provide the Ulstein Group with the increased investment potential throughout its 30 companies established in nine countries. Investment areas will include the sole remaining Norwegian-owned engine manufacturer Bergen Diesel, deck machinery, rudders, propellers, steering systems, tank systems and electronic remote control equipment. They will also include the extensive activities in the field of ship design carried out by three of these companies.

In recent years, the Ulstein Group has increased investment in the development of high-technology ship-equipment and design. Greater resources have also been directed toward the development of service functions in the production companies.

Shipbuilding and repairing will continue to play a significant role in the activities of the Ulstein group through BMV Laksevag A/S in Bergen and Ulstein Hatlo A/S in Ulsteinvik and subsidiaries.

For more information and free literature on the Ulstein Group,

Circle 40 on Reader Service Card

Textron Marine Wins USCG Contract Worth $2.3 Million

Textron Marine Systems (TMS), a division of Textron Inc., was awarded a $2.3-million contract for the detail design and construction of a U.S. Coast Guard 47-foot prototype motor lifeboat, according to an announcement by company president **John J. Kelly.**

The contract also contains an option to order five additional motor lifeboats after completion of the prototype.

The all-aluminum motor lifeboats will be built at the TMS facility in New Orleans, La. Construction will begin early next year and completed in December 1989.

The Coast Guard plans to use the new motor lifeboats to replace 100 20-year-old lifeboats currently in service.

For free literature on the boatbuilding and designing services offered by TMS,

Circle 10 on Reader Service Card

Oregon Ports Group Offers New Eight-Page, Full-Color Brochure On Facilities

The Oregon Ports Group (OPG), comprised of four deepwater ports in Astoria, Coos Bay, Portland, and St. Helens, is offering a new eight-page, full-color brochure describing the facilities and capabilities of the four ports, as well as pointing up that as a group, they cooperate to assure a favorable business environment within Oregon for fabrication projects.

Describing the OPG as a marketing association supporting oil industry projects, the brochure states that the Oregon legislature recently rewrote key segments of the state electrical safety code to make it easier for Oregon ports to compete in fabricating oil modules destined for use on the Alaskan north slope.

Colorful maps and photographs accompany the descriptive material in the brochure.

For more information and a free copy of the brochure from the Oregon Ports Group,

Circle 64 on Reader Service Card

JJH Inc. Appoints Ismail Kizilkaya VP

Richard R. Hopkins, president of JJH Inc., recently announced the appointment of **Ismail (Chet) Kizilkaya** to the position of vice president. In his new capacity, Mr. **Kizilkaya** will be responsible for government business development and management of related corporate functions involving naval ship projects.

Mr. **Kizilkaya** brings to this position over 30 years of experience in naval and commercial ship design, of which the last 18 years have been dedicated to the engineering management and technical direction of various special projects.

$7.8-Million Navy Contract Awarded E-Systems, Inc.

E-Systems, Inc., a major producer of defense electronic systems and products, was recently awarded a U.S. Navy contract valued at approximately $7.8 million for production of AN/WSC-3 "Whiskey-3" shipboard radio terminals.

The contract was awarded by the Navy's Space and Naval Warfare Systems Command after a competitive procurement. The work will be performed by E-Systems Communications Manufacturing Division (CMD) in St. Petersburg, Fla.

The Whiskey-3 is a UHF transceiver used by the Navy for long-haul tactical communications via satellite, and for line-of-sight communications with other ships and aircraft. It is the U.S. Navy's standard UHF terminal and is currently in use by 17 allied navies.

For more information and free literature from E-Systems,

Circle 58 on Reader Service Card

Dixie Carriers To Build And Operate Barges For Norwegian Firm

Dixie Carriers, Inc., a subsidiary of Kirby Exploration Company, Inc., has entered into a multiyear agreement with Odfjell Westfal-Larsen Tankers of Bergen, Norway, for the construction and operation of three specialty tank barges.

The barges, to be constructed by Platzer Shipyard, Inc., Channelview, Texas, a quality builder of barges and other equipment for industrial use, will feature multigrade stainless steel cargo tanks with separate piping, pumping and vapor emission control systems. Furthermore, the barges will be equipped with closed gauging systems, separate ballast tanks and an innovative hydraulically driven deepwell pump system supplied by Frank Mohn A/S (Framo) of Bergen, Norway.

These special barges will be capable of safe and simultaneous handling and carriage of a wide variety of petrochemicals and other specialty bulk liquid products, including cargoes that presently move by truck and rail only.

Odfjell Westfal-Larsen Tankers (OWLT), a pioneer and leader in the ocean transportation of specialized petrochemicals, owns and operates one of the world's largest fleets of sophisticated chemical tankers involved in worldwide transportation.

As part of its cargo consolidation program, OWLT has contracted with Dixie to handle certain domestic transportation needs involving cargoes to and from OWL Tankers at its Baytank Marine Terminal on the Houston Ship Channel, thus saving costly port time for the ships. The Port of Houston serves as home port for OWLT's fleet of advanced chemical tankers.

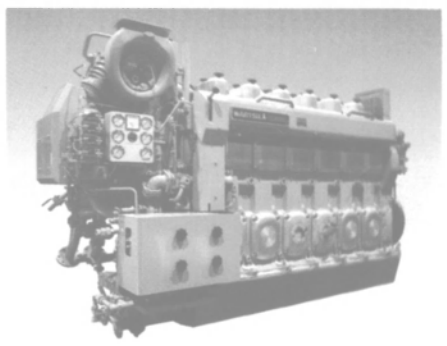
Dixie, a marine transportation service company, transports liquid cargoes, primarily petrochemicals, on the inland waterways system. Dixie's other subsidiaries provide offshore transportation of both dry and liquid products, diesel repair and harbor services.

Joseph H. Pyne, president of Dixie Carriers, stated that besides meeting the needs of OWLT, the new barges would enable his firm to compete in the specialty chemical handling market now dominated by the truck and rail industries.

The new barges will be ready for service during the first part of 1989. Dixie and OWLT are also presently in the process of converting existing barges to multigrade units which will be in service in late summer of this year.

PROPULSION UPDATE

Wartsila Engines Selected To Power 2 New Bulk Carriers And Re-Engine A Cargo Carrier



Lasco's new bulk carriers will be equipped with Wartsila Vasa 22/26 auxiliary engines. Pictured is a six-cylinder in-line version of the engine.

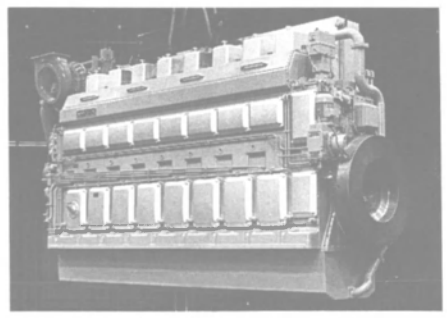
Two new bulk carriers ordered by the principals of Lasco Shipping Co. of Portland will be equipped with Wartsila Diesel's Vasa 22/26 auxiliary engines. The 64,000-dwt vessels are under construction at Jiangnan shipyard in Shanghai.

The contract includes three Wartsila Vasa 4R22/26 auxiliary engines per vessel, each developing 540 kw at 720 rpm. The auxiliaries will burn the same 380 cSt heavy fuel as the main engines. The auxiliary engines for the first vessel will be delivered in early 1989, and for the second, at the end of the same year.

The Vasa 22/26 selected for the Lasco Shipping vessels is a powerful new medium-speed auxiliary engine which is well-suited for power production in different types of vessels. Rigid design components combined with an optimized combustion process guarantees reliable and economical operation at all loads, even on the lowest grade heavy fuels.

The Vasa 22/26 has a cylinder bore of 220 mm and a piston stroke of 260 mm. The output range is 540-3,000 kw at speeds ranging from 720 to 1,100 rpm. The Vasa 22/26 is manufactured in 4-, 6-, and 8-cylinder in-line versions and 8-, 12-, and 16-cylinder V-versions.

The 7,500-dwt dry cargo carrier Rosadaniela, owned by Transpapel Naviera C.A. of Venezuela, will be refitted with new propulsion machinery. The vessel will have its existing main engine replaced with one eight-cylinder, 3,300-kw Wartsila Diesel heavy fuel engine type Vasa 32. It will also be fitted with a new reduction gear, a new CP-propeller and new remote control system. Wartsila Diesel will supply all the equipment and be in charge of both project planning and management. The vessel will be refitted by the Venezuelan company Tenaval C.A. at the Dianca shipyard in Puerto Cabello, Venezuela. Re-engining is scheduled for completion by the end of August of this year.



The Rosadaniela will be refitted with a Wartsila Vasa 8R32 main engine with an output of 3,300 kw. Shown is an eight-cylinder Vasa 32 engine.

Wartsila Diesel is a leading designer and manufacturer of medium-speed fuel engines in the 500 to 16,000-kw range. The company also delivers complete propulsion packages for different vessel types and sizes.

For further information and free literature on Wartsila Diesel engines,

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Korea Shipbuilding Delivering Six Tankers To Norwegian Owners

Five years after they were ordered, delivery by Korea Shipbuilding & Engineering Corp. (KSEC) of six advanced combination carriers worth $171 million has begun to two Norwegian owners. KSEC said four of the 37,000-dwt products/ore/bulk/oil carriers were built for Klaveness Co. and two for Havtor Co. under contracts signed in 1983 for delivery in 1986.

When the original delivery time arrived, the Norwegian firms cited technical problems with the vessels and refused to accept delivery unless the price was cut. After long-running arbitration, KSEC reduced the price of each vessel by $6 million.

Klaveness announced that with technical alterations, the six vessels will be able to trade as originally intended.

Canadian Government To Spend $624.4 Million For 12 Minesweepers

Canadian Defense Minister **Perrin Beatty** recently announced plans to design and build 12 minesweeping vessels to fill a gap in Canada's aging naval fleet. The contract is valued at 750 million Canadian dollars (US$624.4 million).

J.Y. Clarke, president of the Canadian Maritime Industries Association, said the project would provide a boost to medium-sized Canadian shipyards, which don't have the capacity to handle the larger frigate and submarine contracts. He estimated that 75 percent of the work could be done in Canada.

The vessels will be equipped with 40-millimeter Bofors guns and remote-control minehunting systems. They will be manned by the 3,000-strong naval reserve which, under Canada's new policy is responsible for maritime coastal defense

SMM '88

13th Ship, Machinery & Marine Technology International Trade Fair

Hamburg, West Germany, September 27-October 1

Today, more than ever before, the international shipping and shipbuilding industries are undergoing unprecedented change and evolution. In shipbuilding, offshore and marine technology, harbor and waterway construction, new technologies and new products are causing a revolution that will decide who will remain competitive now and in the future.

The 13th Ship, Machinery & Marine Technology International Trade Fair, SMM'88, will address this marine evolution when it opens September 27 at the Congress Centrum Hamburg, Hamburg, West Germany. With some 30,000 trade visitors expected to attend, SMM '88 will be one of the largest international events of its kind. The event is committed to bringing together top-level representatives of the companies that provide new technologies, products and services to the marine industry and the companies that utilize them. For five days, some 500 direct exhibitors from around the world will fill 12 exhibition halls with state-of-the-art products and services. The main exhibition sections are shipbuilding, oceangoing ships' propulsion systems, marine technology equipment, rudder and maneuvering systems and control, and measuring and regulating technology.

However, SMM '88 will feature more than just new products and services. The event will present the full scope of the developments in the marine industry, including new solutions and technologies that represent potential progress and growth for the entire industry. All in all, SMM '88 will provide a comprehensive overview of the entire international market in the areas of shipbuilding, marine and offshore technology and port and waterway construction. Some of the topics covered in these categories will include: marine architecture, shipyard equipment, ship machinery and equipment, safety on board, marine technology, development and consultancy services, harbor construction and equipment, and information and communication systems.

The International Shipping and Marine Technology Market exhibition has a successful record as an international meeting place for key decision-making industry representatives.

Last held in 1986, SMM '86 drew 765 exhibitors from 20 countries. Over 40 % of the attendees of SMM '86 came from abroad, indicating that the show has a high international profile. This year's show is expected to draw visitors from such countries as China, Korea, Taiwan, Singapore, Venezuela, the Soviet Union, the Netherlands, Norway, Finland, Poland, Brazil, Egypt, Bulgaria, Greece and the United States.

According to Exhibition Survey SMM '86, about 31% of all the exhibitors made sales totaling in excess of a million deutsche marks at the event.

In addition to the various areas covered by SMM '88, this year the international port fair PORTEX '88, which will feature port and harbor equipment products and services, has been integrated into the event.

Marine Technology

Marine technology is one key theme of SMM '88. The marine offshore technology exhibits will be concentrated for the first time in one building—Hall 1, part of the complex of new halls in Hamburg. The exhibits include underwater equipment, ocean mining plant and equipment systems, stationary offshore plants and equipment and supply systems.

Marine technology is a field covering all the technical activities concerned with research into and the use and protection of the seas.

The importance of the presentation of West German R&D findings in marine technology is underlined by the demands of internationally renowned scientists such as Prof. **Konstantin Kokkinowrachos,** chairman of the German Committee for Marine Research and Marine Technology, for the intensification of national and international cooperation in the field, including that between universities and industry. A further keynote theme at SMM '88 will be information and exhibits concerned with scientific and technical cooperation with developing and newly industrializing countries aimed at an improved exploitation of the seas, i.e.—fishing and aquacultures or harvesting the protein-rich krills in the Antarctic.

The committee led by Professor **Kokkinowrachos** is also the organizer behind an SMM '88 congress entitled "Europe and the Sea—Marine Sciences and Technology in the 1990s." Whereas seaweed and eelgrass will only play a marginal role in the generation of power in the years to come, innovations from the field of offshore technology will increase in significance for other maritime areas. In this respect, particular attention should be paid to the research work being undertaken at Hamburg-based Harburg Technical University, which is one of the exhibitors at SMM '88. Harburg University is playing an important role in furthering the understanding of the complicated interrelationships between substances and of mechanical stress and the chemical effects of exposure to seawater.

In addition, the International Congress on Ship's Technology (ICST '88) will be held in conjunction with SMM '88 on September 28. The theme of ICST '88 will be the "Contribution on the Economy and Safety in Ship Technology." Highlighting the congress will be a presentation by Dr. **G.A. Lustgarten** and **K. Aeberli,** Sulzer Brothers AG, Winterthur, on "Two-Stroke Diesel Engines for Cost-Effective Ship's Operation."

Among the exhibitors at SMM '88 will be Hamworthy Engineering, which will be occupying Stand 2052 in Hall 2. The company's Pumps and Compressors subsidiary will display its new ranges of air-cooled compressors and centrifugal pumps.

Diesel engine manufacturers MAN B&W Diesel and MAN Nutzfahrzeuge, Werk Nurnberg, will present their complete line of marine engines, turbochargers and services in Hall 6, Stand 6078. Complete engines and components, videos, slides and wall charts will be on display.

In Hall 7, at Stand 7001, Markishes Werk Halver (MWH), specialists in components connected with the exchange of gases in combustion engines, will present its latest program of inlet and exhaust valves, valve inserts, valve springs, valve guides, valve cages and valve rotators.

Circle 215 on Reader Service Card ➔

Of particular interest to diesel engine users will be the company's patented Turnomat valve rotator, which ensures a definite valve rotation speed.

The latest developments in the Evac Vacuum Toilet System will be demonstrated at the stand of Triton Belco AG, the West German distributors for OY Wartsila AB Evac of Finland. Several working units will be on display, including the popular "silent" toilet, a toilet with Evac's new electronic flushing control and the company's newest addition, the "toilet of the future."

At the stand of their West German subsidiary, ASEA-Hagglunds GmbH, Hagglunds Marine & Offshore AB will present their full range of deck crane technology. Low-profile versions of Hagglunds G2 and L2 type cranes will be on display, as well as the company's "hinged cab" wire-luffing cranes. An adajecent stand will display the hydraulic products of the Hagglunds Denison group of companies.

Liebherr-Werk Nenzing, another marine lifting equipment and crane specialist, will also be exhibiting at SMM '88. The company will present its production line of offshore cranes, including the North Sea-proven BOS type and its series of ram luffing offshore cranes, RL type, with their low overall height

(continued)

SMM '88

(continued)

and horizontal boom storage features.

ICST '88
Conference Program

"Contribution on the Economy and Safety in Ship Technology"

9:30 a.m.—Opening of the congress by **Ernst A. Harm,** chairman of "Verein der Schiffs-Ingenieure zu Hamburg eV."

Introduction by **Reinhard Mau,** Germanischer Lloyd.

Lecture Group I—Moderator: **W. Schottelndreyer,** Association of German Shipowners.

10 a.m.—"Emergent Shipping Marine Hull Insurance Judgement on Technical Risks, Underwriter's Point of View," by Captain **Fuchs,** Allianz Versicherung.

10:30 a.m.—"Ship's Safety Aspects," by **J.A. Witt,** Cabinet Council.

11 a.m.—"New Trends in Ship's Operation," by **G. Fischer,** Germanisher Lloyd.

11:30 a.m.—discussions and coffee break.

12:30 p.m.—"Optimized Power Output and Safe Propulsion Plant Operation—Discrepancy or Harmony?" by **Eckhard Moeck** and **Siegfried Bludszuweit,** author.

Lecture Group II—moderator: **G. Peters,** Hamburg Technical School.

1 p.m.—lunch break.

2:30 p.m.—"The FRECON-Shaft-Generator and Frequency Converers for Electrical Drives—Two Examples to Produce and Consume Electric Energy Economically," by **Peter Andersen** and **Othmar Jakoby,** Siemens AG.

3 p.m.—"International Service of Ship's Plants," by **Gerd Lohmann,** Blohm & Voss AG.

3:30 p.m.—"Two-Stroke Diesel Engines for Cost-Effective Ship's Operation," by **G.A. Lustgarten** and **K. Aerbeli,** Sulzer Brothers AG.

7 p.m.—End of conference.

SMM '88
Exhibitors

ABB-ASEA Brown Boveri
AB Elektronik
ABG-Pumpen
ACEBI
AEG Aktiengesellschaft
AGPOL
Ahlmann Maschinenbau
AKZO Coatings
Alfa-Laval
Alki Hydraulik
Allweiler Marine
Alsthom Chantiers de l'Atlantique
AMOT Controls
AMRI
Anschutz
Aqua Signal
Aquamaster-Rauma Repola
Armaturen-Wolff
Assfalg
AVIT
Lardet Babcock
Barry Controls
Fritz Bartel
Barthels & Luders
Willi Becker
Bedia Maschinenfabrik
Behne Apparatebau
Julius Fr. Behr
Behrenspumpen
Belzona Marine Engineering
Ben Marine
BEST
Bestobell Mobrey
Binder Magnete
Bischoff U. Hensel
Blohm & Voss
Bloksma
Bode
Ingenieurburo Bonke
Boge Kompressoren
August F.M. Bohnhoff
Bolit
Boll & Kirch
J.H. Bornemann
J. Bornhoft
Rich. Ad. Brandt
Braunschweiger Huttenwerk
Bremer Vulkan
Broneske
Le Bronze Industriel Deutschland
Bruel & Kjaer
Feodor Burgmann
Byggmaterial
Castrol Marine Division
Cedervall & Sohne
H. Cegielski
Centa Antriebe
Centromor
China State Shipbuilding Corp.
Chris-Marine AB
Citroen Engrenages
Holger Clasen
Clayton
CMR Controle
Cofrena
Compagnie Marseillaise De Reparations
Consulium Systems
Conver-OSR
John Crane
Cummins Diesel Deutschland
DAF Diesel
Dammstoff
Damen Shipyards
Danish Export Group
Deckma
Deerberg Systems Marine Division
Depa
Depac
Desch Antriebstechnik
Deugra
Deutsche Bundespost
Deutz MWM

Diesel & Gas Turbine
Dok-En Werf-Maatschappij
Wilton-Fijenoord
Domeyer, Albert Diedr. Schiffssicherheit
Dorman Diesels
Karl Dose
Dragerwerk
Dresser/Europe
DSG D. Schmidt Pneumatik-Hydraulik
EB Nachrichtentechnik
Fr. C. Ehlers Kabelwerke
H.E. Eissing
Electrolux Foodservice
Eleusis Shipyards
Elna
Engel & Meier Schiffselektronik
Facet
Fachhochschule Hamburg
Fare Armatur AB
Fare Armaturen
Dr. Fahrentholz
Fastnet Radio Marine-Decoder & Computer
Fehrmann
Ingenieurgesellschaft Feistel-Eckhardt
R.W. Fernstrum
Ferropilot
Fincantieri-CNI
Finnlands Aussenhandelsverband
Georg Fischer
A. Friedr. Flender
Ford Werke
Fredrichs Armaturen
Frydenbo-Mjolner
Gall & Seitz
Ganz Danubius
Peter Gast Shipping
Gea Luftkuhlergesellschaft
Gea Ahlborn
Dr. Geislinger
Gemo Generatoren und Motoren Vertriebs
Geodata Systems
Gesellschaft Zur Forderung
Der Meerestechnik
Gisma Steckverbinder
Goetze
Gottwald
Friedrich Graepel
Gromex
Grosshandels-Und Lagerei-
Berufsgenossenschaft
Guascor Gutierrez Ascunce Corporation
GVT
Hagenuk Vertriebs und Serviceges
KG Hamann Wassertechnik
Hamburgische Schiffbau-Versuchsanstalt
P. Hammelman Maschinenfabrik
Hamworthy Engineering
Hansa-Flex Hydraulik
Hapag-Lloyd
Ernst Hatecke
Hatlapa
Haux-Life-Support
HDW-Nobiskrug
Georg Hechelmann Nachf.
Ernst Heinrich
Hempel Farben (Deutschland)
Wilhelm Hilzinger
Herion-Werke
Herka Handelsgesellschaft
Hilbert Marine
HKS
Alfred Hodt
Holland Marine Equipment
Hollming
Hojbjerg Maskinfabrik
Honeywell-Elac-Nautik
Ludwig Hunger
IABG
IBAK Helmut Hunger
IBH Antriebstechnik
IFE
IMO
Ina Walzlager
Intering
International Farbenwerke
International Trade Publications
Interschalt
ITT VAF Instruments
Ludwig Jahn
Japan Ship Machinery External
Trade Association
Jastram-Werke
C.C. Jensen
A. Johnson
Jonge Poerink
M. Jurgensen
Jurong Shipyard
Fritz A. Kahler

A. van Kaick
KaMeWa
Dietmar Kammer
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Gunther Klein
Klockner Moeller
Klockner Stahl
Klockner-Werke
Klockner-Wilhelmsburger
Uwe Kloska
Gebr. Kluver
Aug. G. Koch
Wilhelm Kopp
Koser-Marine-Kiel
Kolbenschmidt
Koraboimpex
Oskar Krautler
Kraft
Krupp Atlas Elektronik
Krupp MaK
Krupp Stahl Vertriesgesellschaft
KvaernerBrug
Kvaerner Eureka
Kvaerner Ships Equipment
Langerer & Reich
Wilhelm Layher
LBL-Elektrotechnik
Lehmann & Michels
Leistritz
Les Cables de Lyon
Lethe Metallbau
Freidrich Leutert
Liebherr-Werk Nenzing
F.A.C. Van Der Linden
Lippold Hydraulik
Lips
Lloyd Werft Bremerhaven
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Shipyards

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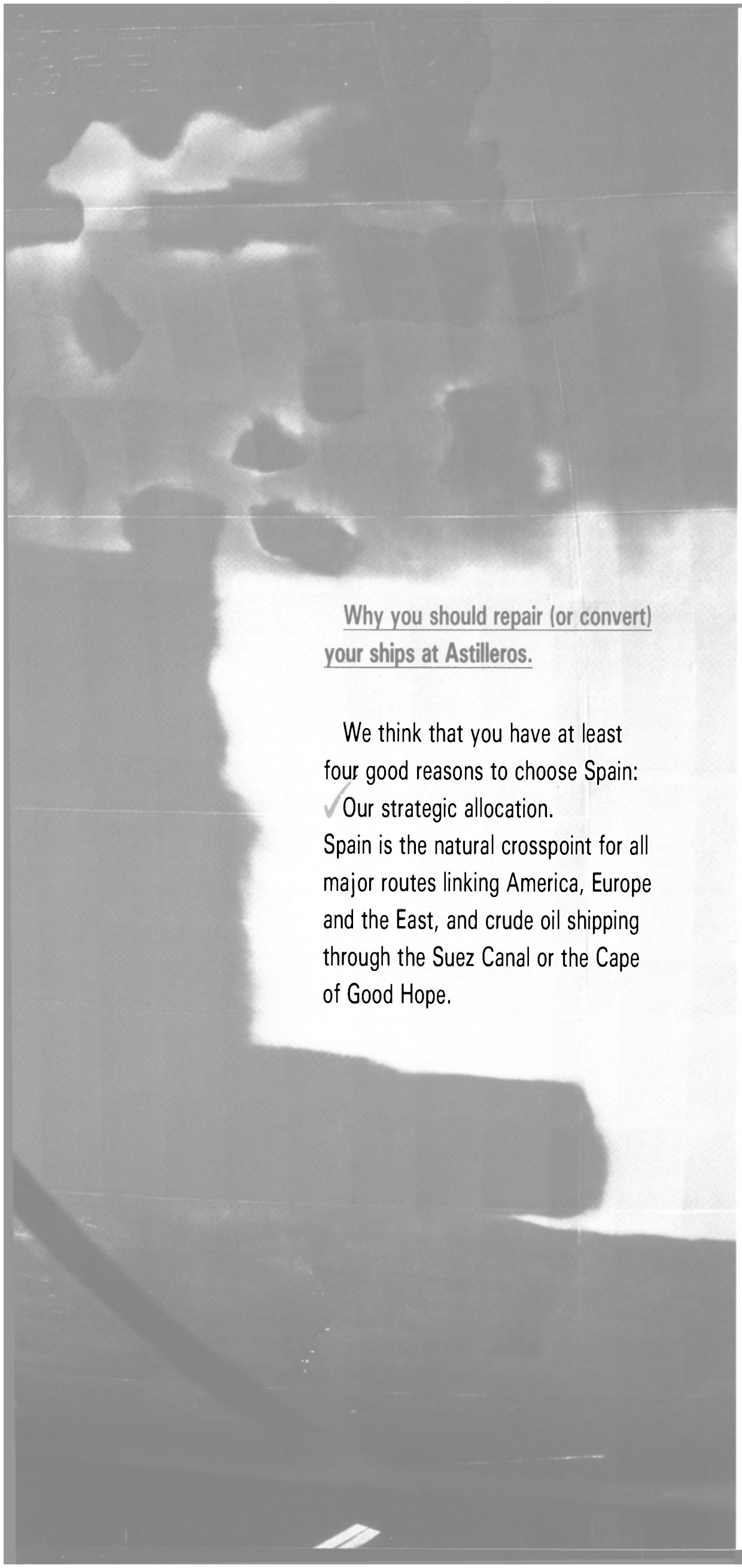
The Shipbuilders of Spain



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Yugoslav Shipbuilding

(continued)

Split Shipbuilding is presently in the process of erecting a building berth with five turning slipways for the construction of vessels and offshore structures. The new berth is expected to be able to handle ships up to 1,050 feet long, 282 feet wide and weighing as much as 65,000 tons.

The concept of the turning slipway was developed by Split and the Faculty of Engineering and Shipbuilding, Zagreb and the Naval Institute, Zagreb, as a simple, economic solution for both side and longitudinal launching.

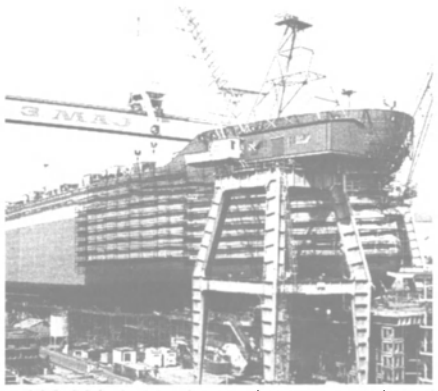
The Shoushone Spirit, a 100,000/110,000-dwt tanker being built for American owners, was recently launched at the Rijeka yard of 3. Maj Shipbuilding.

Intended for the carriage of crude oil of up to 10.5 tons/cubic meters specific gravity, the tanker was ordered by Teekay Shipping. She is 809-1/2 feet long, has a breadth of 139.3 feet, and draft of 47.3 feet.

The main propulsion engine for the tanker is a slow-speed, reversible, turbocharged Sulzer-3. Maj 5 RTA 72 diesel engine rated at 10,330 kw at 78 rpm. The engine is designed to operate on both diesel and heavy fuel up to 420 cSt at 50 degrees C (4,000 Redwood at 38 degrees C).

The vessel will have a total of 16 cargo tanks and two slop tanks for the carriage of four segregated cargoes simultaneously. The cargo tanks will have a 98 percent capacity of 123,000 cubic meters.

The tanker was constructed in accordance with the rules of the Lloyd's Register of Shipping for the



A 110,000-dwt tanker under construction at 3. Maj's Rijeka yard. The ship is being built for Teekay Shipping.

class +100A1 +LMC, UMS, IGS, OIL TANKER. The degree of automation aboard conforms to rules and requirements of the class for unattended machinery space.

For free literature detailing the shipbuilding services and facilities of Yugoslav shipyards,

Circle 112 on Reader Service Card

Lys Line Orders Second Paper Carrier From Titovo Shipyard

Simonsen & Slang's Lys Line of Norway recently ordered a second 3,400-dwt paper and forest products cargo carrier from the Yugoslavian shipyard Titovo Brodogradiliste, Kraljevica.

The cargo carrier will have a overall length of 295.2 feet, beam of 55.8 feet and draft of 19.2 feet and she will be specially designed for the needs of paper and forest products.

The vessel is expected to be delivered in late 1989 or early 1990, while the first carrier is scheduled for a July 1989 delivery.

PROPULSION UPDATE

3.MAJ Diesel Works Builds First Sulzer RTA 72 Engine Ever

From the moment of its introduction into the market seven years ago, the RTA series of Sulzer marine diesel engines set new dimensions to operating economy and reliability, and maintenance.

In 1984, the so-called "-8 series" engines, covering cylinder bores of 380, 480, 680, 760, and 840 mm, with a stroke-to-bore ratio of about 2.9, were complemented by the "-2 series" engines covering cylinder bores of 520 and 620 mm, and of a higher stroke-to-bore ratio of 3.46.

During 1985, the demands from the market called for an increase in the maximum speed and output of the "-2 series" engines. This is also the time when a new engine type, the RTA 72, with a complementary bore size of 720 mm was introduced. In its design concept, the RTA 72 is fully in line with the previous engines of the "-2 series" which, among others, means it is available in versions of up to eight cylinders maximum.

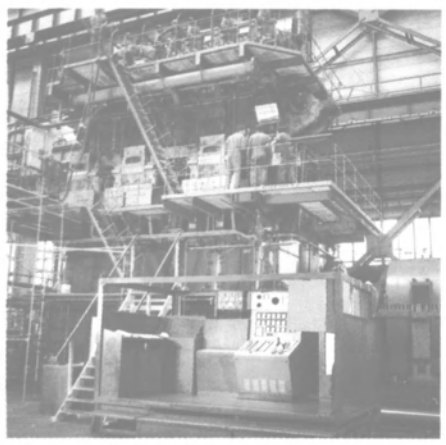
Main performance data of the RTA 72 engine: Two-stroke, single-acting, slow-speed, turbocharged engine; Output range 1,410-2,570 kw/cylinder; Speed range 66-91 rpm; stroke 2,500 mm; Cylinder bore 720; and Spec. fuel consumption at mcr 171 g/kwh.

Acceptance testing on the 5 RTA engine built by 3.MAJ, which has extensive experience in manufacturing RTA engines under license, were recently completed. The first engine of this bore size ever built in the world, it will be installed aboard a motor tanker. Its particular performance data are the following: output, 10,550 kw; speed, 78 rpm; and sfc at mcr, 169 g/kwh.

In addition to possible variations in combinations of output speed (determining the layout field), the flexibility offered by the RTA 72 engine—actually by all the RTA types—has been further extended to optional possibilities of installing: Two-stage air cooler, providing an excellent possibility of recovering waste heat energy removed through the compressed scavenge air (4.5 percent of engine output); Standard optional power take-off for the connection of an alternator to the main engine for ship's electrical power generation, which for this particular engine features up to 1,350 kw; and Standard optional efficiency-booster using recovered exhaust gas energy directly at the engine crankshaft for further fuel savings—with the 5RTA 72, the recovered energy can be as high as 800kw, which in terms of fuel consumption means a fuel saving of about 5.5 g/kwh.

Design features of the RTA 72 engine: Sturdy engine structure with low stresses and small deflections, consisting of bedplate, columns and cylinder block, pretensioned by vertical tie rods; Single-wall bedplate with integrated thrust block. Standardized, large surface main bearing shells; Robust A-shaped columns, assembled with stiffening plates or of monoblock design; Single cast iron cylinder jackets, bolted together to form a rigid cylinder block; Lamellar cast iron, bore-cooled cylinder liners with load-dependent cylinder lubrication; Solid, forged, bore-cooled cylinder covers with bolted-on exhaust valve cage; Camshaft gear drive housed in a special double column placed at the driving end; For larger bore engines, where required, balancers mounted on the engine; Injection pump and exhaust valve actuator combined in common units for two cylinders, each camshaft driven; and Constant-pressure turbocharging system (highly efficient uncooled turbochargers) with uniflow scavenging assisted by auxiliary blowers for low load operation. Possibility for in-service cleaning of charge air coolers.

Service Results—The exhaust valve, introduced at Sulzer as a novelty for two-stroke diesel engines, has fully justified the designers' assurances of the exhaust valve actually not being a novelty for Sulzer. The exhaust valve, positioned symmetrically, made of a top quality material (Nimonic), and operating at relatively low temperatures, has



The first Sulzer RTA 72 engine ever built was recently completed by 3.MAJ Diesel Works, a division of 3.MAJ Associated Shipbuilding Industry.

demonstrated excellent service performance and proved to be an excellent solution (more than 12,000 hours of operations between repairs-regrinds).

As for the cylinder liner wear, according to the latest results reported from m/v Malinska (both the ships and the engine built by 3.MAJ) after 5,214 hours of operation, a wear of 0.004-0.008 mm/1,000 h has been measured which is a very good rate. It is to be added that the measuring has been carried out by Sulzer, who follows its field tests on this ship.

For free literature giving full information 3.MAJ Diesel Works,

Circle 104 on Reader Service Card

For more information and free literature on Sulzer

Circle 105 on Reader Service Card

Brian Rafferty Joins Ingram Barge Company

Brian E. Rafferty has joined Ingram Barge Company as marketing manager. In making the announcement, **Les Sutton,** president, noted that Mr. **Rafferty** will be responsible for the company's day-to-day marketing operations.

Prior to joining Ingram, Mr. **Rafferty** was a marketing manager, in charge of South American Services, for Lykes Brothers Steamship Company, Inc. in New Orleans. He has also served as a systems analyst with Lykes Brothers.

Ingram Barge Company is a subsidiary of Ingram Industries Inc., headquartered in Nashville, Tenn. Ingram Industries Inc. is a privately held, diversified corporation engaged in inland marine barging and aggregate supply, consumer product distribution, coal production and sales, oil exploration and production, the manufacture of oil and gas wellhead equipment, and insurance.

Kelvin Hughes Successful At Posidonia Exhibition

Orders for radar systems valued in excess of $620,000 were finalized by Kelvin Hughes Ltd., a subsidiary of Smiths Industries PLC, during the Posidonia Exhibition in Pireas, Greece.

The orders for more than 20 ARPA-based radar systems were taken from 12 different shipowners. Most of these radar systems have been retrofitted to vessels in order to comply with the IMO Solas 1984 regulation for vessels between 15,000 and 20,000 GRT, which states that ARPA systems are to be fitted before September 1, 1988.

The total sales of Kelvin Hughes ARPA radars into Greece so far this year now exceeds 70 systems.

Alan Eldret, the director of Kelvin Hughes Merchant Marine business, said: "The Posidonia Exhibitions have always been successful for Kelvin Hughes, but this year even more so. These orders are a result of having the right products for the marketplace with Radtrak and our new Concept range, and sustained effort by our local agent Elkime Ltd., working closely with our own salesmen. We believe Kelvin Hughes to be the major supplier of modern ARPA-based navigational radar systems into the Greek market." For more information and free literature on radar systems from Kevin Hughes,

Circle 62 on Reader Service Card

ELECTRONICS UPDATE

Harris Announces New Digital HF-SSB Radio System

Harris Corporation's Long Range Radio Division has developed a new, extremely compact HF radio system designed with advanced, digital signal processing techniques. The RF-5000 was introduced at the 42nd AFCEA international exhibition held recently in Washington. Also introduced was Harris's full line of state-of-the-art military communications equipment.

In a unit weighing only 15 pounds, the RF-5000 Series digital radio system provides built-in high-speed data modem, adaptive HF (ALE) frequency management, ECCM (frequency hopping), digitized voice and burst transmission capabilities, at a greatly reduced cost. Near-term product improvement plans include embedded voice encryption.

The tactical 20, 125, or 400-watt vehicular or fixed-station system features a common receiver-transmitter with optional plug-in communications system upgrade modules. The receiver-transmitter is just 7 inches wide, 5.5 inches high, and 12.1 inches deep.

The RF-5000 Series digital HF-SSB radio system from Harris Corporation.

The RF-5000 Series radios can provide adaptive HF (ALE), ECCM, and high-speed modem waveforms in MIL-STD 188 standards. The programmable digital modem allows co-resident, new high-performance waveforms along with existing waveforms (such as FSK). This simplifies conversion to new equipment while maintaining interoperability with existing assets, a key concern in military planning today.

A complete line of 20, 125, and 400-watt power amplifiers and fast-tuning antenna couplers are available for applications in tactical vehicular and fixed-station communications networks.

Standard features include 1.6 to 30-MHz frequency coverage in 10 Hz steps; 99 preset channels; channel scanning; over-the-air or keypad programming; built-in test to the module level; and ruggedized, submersible construction.

A detachable front panel allows remote control up to 50 meters away. Multiple transmission waveforms and Forward Error Correction (FEC) support 2400 baud operation for optimal performance in single-frequency or frequency-hopping mode. A Linear Predictive Code (LPC) module digitizes voice signals for transmission in an advanced ECCM environment.

Harris Corporation, Rochester, N.Y., is a $2.1-billion supplier of information, communication and semiconductor systems, products and services to government and commercial markets worldwide.

For more information and free literature on the Harris HF-SSB Radio System,

Circle 102 on Reader Service Card

Jamesbury Expands Line Of Economical, Corrosion Resistant Vane Actuators

An expanded line of Jamesbury® vane actuators is now available for economical service for a wide range of automatic on-off valve applications. Addition of the V400 double-acting model and V100 SR spring-return unit extends the vane's torque output capacity to 500 ft./lbs. and 95 ft./lbs., respectively. The complete line now includes three double-acting models with torque output capabilities for operating Jamesbury Double-Seal® ball valves to 8 inches, and Wafer-Sphere® butterfly valves to 16 inches. Three spring-return models cover valve sizes up to 4 inches and 8 inches, respectively.

According to Jamesbury, the thermoplastic polyester/stainless steel construction of these quarter-turn actuators make them especially well-suited for use in virtually any corrosive and acidic environment. Compact, lightweight design allows their use in locations where space or piping support is limited.

The actuator consists of top and bottom symmetric housing, molded shaft/vane, three O-ring seals, and fasteners. Units have broad pressure/temperature ratings: maximum supply pressures to 125 psi, temperature range -20 degrees F to +140 degrees F.

For more information and free literature on Jamesbury vane actuators,

Circle 56 on Reader Service Card

ARCO Alaska To Build Nine Huge Modules In Port Of Portland

The director of construction and logistics for ARCO Alaska, **Jack Purl,** recently said that ARCO Alaska will construct nine huge Alaskan oil field modules in the Port of Portland this fall as part of the company's "sealift" operation. The 1,500-ton modules will be built on a 240-acre site at the Port's shipyards on Swan Island.

Construction of the modules under the estimated $20-million contract is expected to continue until July 1989, and the project is expected to generate between 400 and 500 jobs at its peak.

The modules will be about the size of 10- to 12-story buildings, Mr. **Purl** said—between 150 and 200 feet long, about 50 to 80 feet wide and between 80 and 100 feet tall.

The project is part of ARCO Alaska's annual sealift operation that has taken oil field equipment to Alaska's North Slope every year since 1975.

Marine Travelift Offers 50BFM Mobile Boat Hoist —Literature Available

Marine Travelift, Inc. recently announced the development of a Model 50BFM, 50-ton-capacity mobile boat hoist, designed to "fill the gap" between the company's 35- and 70-ton-capacity units.

The 50BFM features the "beam forward" design which allows forward sling adjustment behind the front beam and permits more clearance and faster boat handling. The concept also allows exact positioning of front and rear slings to achieve precise load balance.

Marine Travelift's 50BFM was engineered to permit marinas to handle the larger boats in the industry, faster. Greater usable lifting heights are possible with direct connection of slings to sling blocks.

For complete details, prices and delivery information on the 50BFM or for complete design details and specifications on the complete line of Marine Travelift Mobile Boat Hoists with capacities from 15 to 500 tons,

Circle 60 on Reader Service Card

MarineSafety Providing Simulator Training For Apprentice Pilots —Literature Available

In the first program of its kind in the U.S., the California State Board of Pilot Commissioners has contracted with MarineSafety International to provide visual shiphandling simulator training for all apprentice pilots.

The first apprentice pilot course for the State Board of Pilot Commissioners was held recently in the MarineSafety Shiphandling Simulator Training Complex in Newport, R.I. Five apprentice San Francisco pilots attended the eight-day course which was specially designed to complement the pilot's apprentice program with the bar pilots. Ship maneuvers were conducted in a computer model of San Francisco Bay and the Oakland area and in a generic area especially designed to provide challenging maneuvering and docking problems.

The purpose of the simulator training is to accelerate the learning gained from "hands-on" experience. Using the simulators, the Marine Safety instructors can control conditions such as weather and traffic and create emergency conditions which might occur only once in a pilot's lifetime.

The eight-day training program includes training modules (a module consists of instruction, simulator exercises and critique) such as entering a harbor, port approaches, piloting in restricted visibility, use of automated radar plotters, handling in narrow channels, working with tugs, docking and emergencies.

MarineSafety, a wholly owned subsidiary of FlightSafety International, provides shiphandling training for the U.S. Navy and commercial shipping companies, using simulators at Kings Point, N.Y. and Newport, R.I.

For free literature giving complete information on courses offered by MarineSafety International,

Circle 41 on Reader Service Card

Damaged Navy Frigate Transported From Gulf By Heavylift Ship

The mine-damaged U.S. Navy frigate USS Samuel B. Roberts (FFG-58) was recently loaded onto the heavylift vessel Mighty Servant 2 at Dubai, United Arab Emirates, for transport back to the U.S. for repairs.

According to Dutch company Wijsmuller Transport, who operates the Mighty Servant 2, the U.S. Navy selected dry transport of the frigate because of the method's safety and speed. Because of the severe hull damage sustained by the frigate when she struck a mine in the Persian Gulf, a wet tow would have been risky. On board the Mighty Servant 2, the keel of the USS Samuel B. Roberts is completely supported and she is not exposed to the battering forces of the sea.

Following her loading, welders secured the USS Samuel B. Roberts to the deck of the Mighty Servant 2 by seafastenings, so that the vessel would not shift during the 7,800 nautical mile voyage.

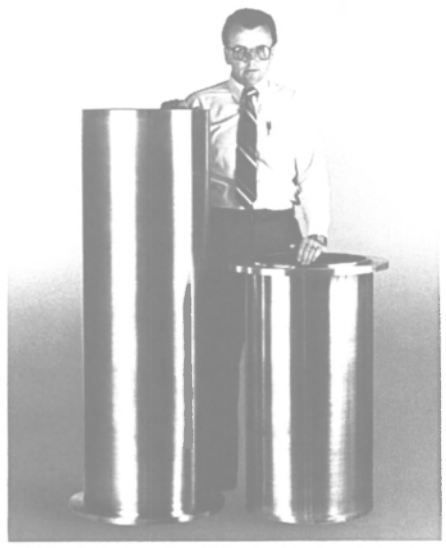
During the voyage, the Mighty Servant 2 will provide the frigate with water and electricity, so that the frigate's 40-man crew can perform some maintenance during the trip.

Wijsmuller operates a fleet of eight semisubmersible heavylift vessels and has extensive experience in transporting large, heavy and awkward cargoes such as drill rigs, dredging equipment, floating plants, etc.

For free literature detailing Wijsmuller's services,

Circle 63 on Reader Service Card

New BFGoodrich Plant Now Manufacturing Cutless Brand Bearings



LQMoffitt's **Robert Gilson**, director of sales and marketing, with 14-inch I.D. Cutless bearings produced at new BFGoodrich plant in Wilmington, N.C.

Cutless® brand bearings and related marine products marketed by LQMoffitt, Inc. are now in full production at the new BFGoodrich facility in Wilmington, N.C.

The manufacturing operations for these products were relocated from Akron, Ohio, to the Wilmington plant for improved service to LQMoffitt customers, advanced facility capabilities, and increased production area.

Among the Cutless bearings produced and shipped are 14-inch I/D full-molded brass-shell bearings slated for installation on a national and international oceangoing tugboat.

LQMoffitt is a subsidiary of BFGoodrich and the exclusive marketing arm for its marine industry products. Sales offices for LQMoffitt remain at the company's Akron headquarters.

For additional information and free literature,

Circle 28 on Reader Service Card

CRSA, Hyundai Sign Steamship Service Pact

The Columbia River Shippers Association (CRSA), Portland, Ore., and Hyundai Merchant Marine, Seoul, South Korea, have signed a steamship service contract that will bring containerized import cargoes from the Far East by ship to Portland at reduced rates for local businesses.

The contract is the first executed by the CRSA with a steamship line. The agreement provides for Hyundai to carry to Portland a minimum of 500 forty-foot containers between July 1, 1988 and February 28, 1989.

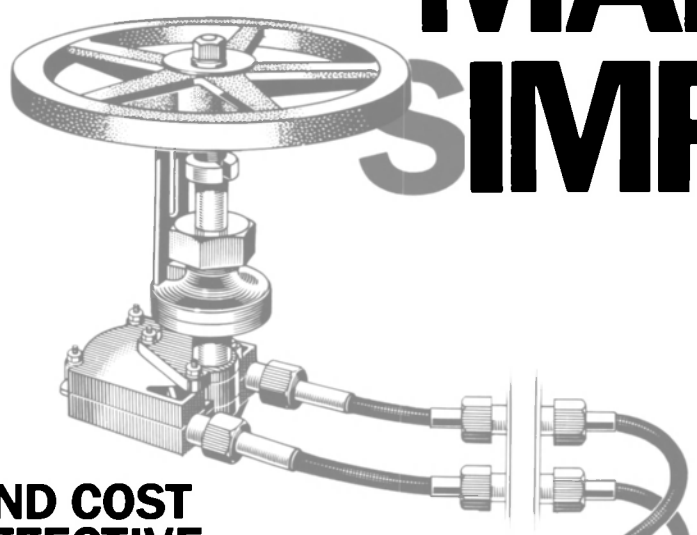
NAVAL TECHNOLOGY & SHIPBUILDING

a special supplement to

MARITIME REPORTER AND ENGINEERING NEWS

September 1988

REMOTE VALVE ACTUATION MADE SIMPLE

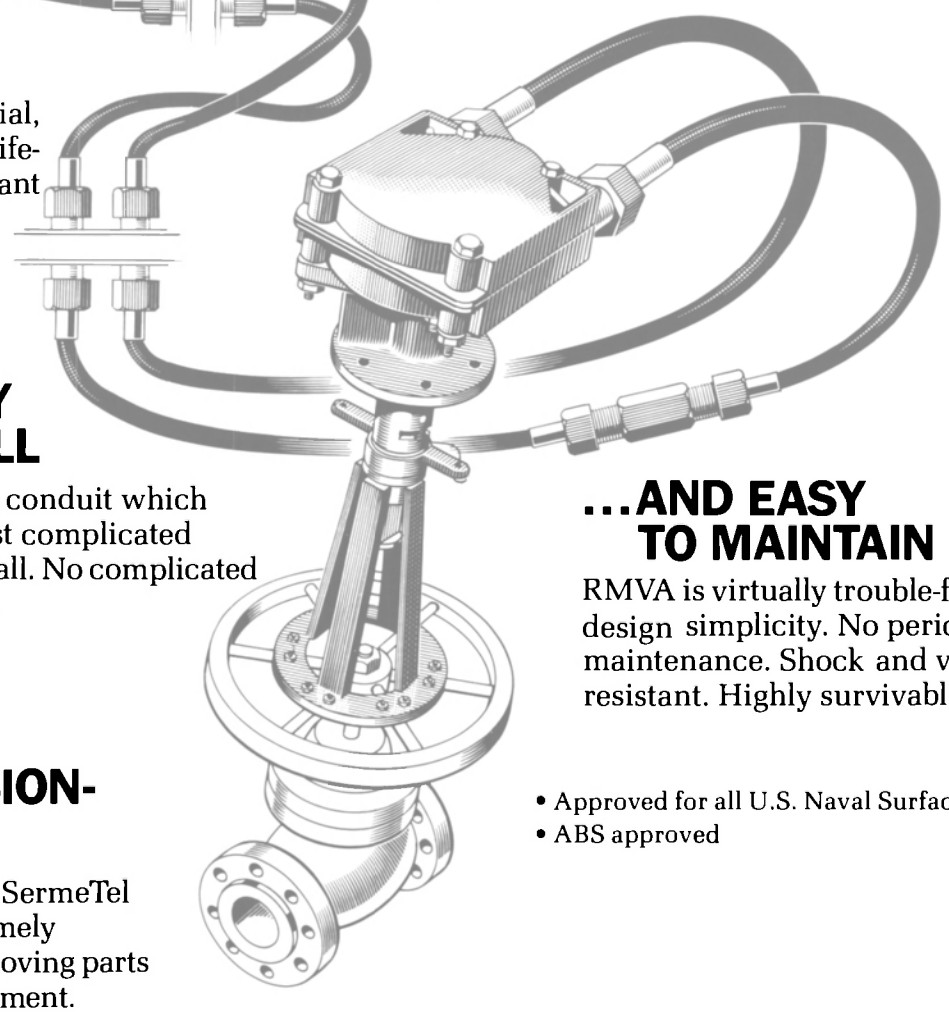


...AND RELIABLE

Teleflex-RMVA is based on a simple tension-tension, closed-loop actuating concept. Helical cable, operating in a conduit, converts rotary to linear motion and then back to rotary.

...AND COST EFFECTIVE

RMVA can reduce your material, installation, maintenance and life-cycle costs. Savings are significant compared with complex reach rod installations.



...AND EASY TO INSTALL

RMVA uses flexible conduit which makes even the most complicated routings easy to install. No complicated gear boxes or joints.

...AND EASY TO MAINTAIN

RMVA is virtually trouble-free, due to design simplicity. No periodic maintenance. Shock and vibration resistant. Highly survivable.

...AND CORROSION-RESISTANT

RMVA uses materials and SermeTel coatings which are extremely corrosion-resistant. All moving parts operate in a sealed environment.

- Approved for all U.S. Naval Surface Ships
- ABS approved

The Teleflex Remote Mechanical Valve Actuator (RMVA) has proven its dependability in cruel environments aboard naval vessels.

Specify RMVA by Teleflex. It's simple. It works. It's proven. Call or write for your complete RMVA Design Manual.

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Circle 159 on Reader Service Card

U.S. NAVY SHIP REPAIR AND MODERNIZATION

Review of a Major Forecast and Appraisal of Business Opportunities Available to Equipment Manufacturers and Ship Repair Firms

By Dr. James R. McCaul, President
International Maritime Associates, Inc.

Over the next ten years the U.S. Navy will spend more than $50 billion on ship repair and modernization. Logical concerns are where these dollars will be spent, what portion will be earmarked for specific geographical areas, how much will flow through commercial shipyards, how much will be spent on equipment replacement and upgrade, etc.

A new IMA study addresses these issues and provides a ten-year forecast (1989-1998) of scheduled ship maintenance, overhauls and emergent repairs. Also in the report is a five-year (1984-1988) analysis of market share for firms involved in Navy ship and equipment repair.

The guided-missile frigale USS Curtis (FFG-38). US Navy Photo.

Navy Maintenance Practices

Forecasting ship maintenance and modernization requires an understanding of the Navy's four basic ship maintenance strategies: regular overhaul cycle, engineered/extended operating cycle, phased maintenance and progressive maintenance.

Regular overhaul cycle—Traditional Navy maintenance strategy has been to schedule periodic, lengthy ship overhauls during which repairs and planned alterations are accomplished. A typical cycle is approximately 36 months between major overhauls. The overhaul takes 8 to 12 months.

Of the 505 active ships in the fleet as of December 1987, only 21 continue to adhere to this traditional maintenance strategy. The Navy plans to completely drop this pattern of maintenance once the 21 ships are retired.

Engineered operating cycle—This strategy was introduced in 1974 for ballistic missile submarines. The objective was to match submarine overhaul intervals to a length compatible with new long life reactor cores. Finding it successful, the EOC concept was extended to surface ships in the late 1970's. Under EOC maintenance, overhauls are scheduled at intervals as great as 15 years. Between overhauls, intermittent depot level availabilities are scheduled which last 2 to 4 months' duration.

As of December 1987, 283 of the 505 active Navy ships were placed in an EOC maintenance cycle.

Phased maintenance—This maintenance strategy was first employed in the late 1970's. Initially it was used for the Atlantic fleet combat stores ships. The concept has now been extended to additional classes and as of December 1987 covered 141 of the 505 active ships in the fleet.

The general idea of phased maintenance is to perform short, frequent phased maintenance availabilities (PMAs) in place of regular lengthy overhauls. Ships are generally scheduled for PMAs of 2 to 4 months' duration of 15- to 18-month intervals. The work is generally ac-

(continued)

U.S. NAVY

(continued)

complished under multiship, multiyear contracts where one contractor is responsible for a particular group of ships.

Progressive maintenance—In the 1970s the Navy initiated a new ship logistics concept which emphasizes performing maintenance and repair at intermediate and depot level activities. The guided missile frigate (FFG 7), hydrofoil patrol boat (PHM 1) and Trident submarine (SSBN 726) have been designed with this maintenance concept as an objective. Crew size has been minimized and equipment is designed for component removal and replacement.

For the FFG 7 class, a prescribed set of maintenance actions are to be performed at intermediate maintenance availabilities (IMAs) and selected restriced availabilities (SRAs). IMAs are scheduled at six-month intervals, with three weeks planned for maintenance work. SRAs are to be scheduled every two years, lasting about four weeks. Every ten years a major modernization is scheduled.

Spending Pattern for Maintenance and Modernization

Navy spending for ship maintenance and modernization has increased from about $1.6 billion in 1975 to $5.6 billion in 1987. Taking into account the growth in fleet size, average maintenance expenditure per ship has grown from $2.3 million per year to $7.8 million per year during this period. Average modernization expenditure has increased from $.9 million to $2.5 million per ship/year.

Budget pressures have recently created a buildup in deferred maintenance. The clearest evidence is the decline in maintenance and modernization expenditure per ship over the past four years. In 1985 the Navy spent an average of $11.4 million per ship for maintenance and modernization. This figure is projected to be $8.5 million in 1988 and $8.7 million in 1989.

Exhibit 1 gives the details for maintenance and modernization expenditures from 1975 through 1989.

Despite the recent dip, the long-term trend in ship maintenance and modernization expenditures is clearly upward. Deferred maintenance can only be deferred so long. Eventually ships and/or equipment will fail in operation. There is no doubt that Navy ship maintenance and modernization is a long-term growth market—which should interest many firms.

Exhibit 1—Trend in Maintenance & Modernization Budget
($ in millions)

				# of	Average per Ship		
	MAINT.	MOD.	TOTAL	SHIPS	MAINT.	MOD.	TOTAL
FY75	$1,140.5	$ 434.5	$1,575.0	496	$2.299	$0.876	$ 3.175
FY76	1,490.5	569.8	2,060.3	484	3.080	1.177	4.257
FY77	1,903.4	669.2	2,572.6	477	3.990	1.403	5.393
FY78	2,563.5	545.2	3,108.7	468	5.478	1.165	6.643
FY79	2,508.9	772.3	3,281.2	473	5.304	1.633	6.937
FY80	2,642.5	763.1	3,405.6	479	5.517	1.593	7.110
FY81	3,195.0	952.7	4,147.7	491	6.507	1.940	8.448
FY82	3,632.3	932.8	4,565.1	513	7.081	1.818	8.899
FY83	4,201.2	896.6	5,097.8	513	8.189	1.748	9.937
FY84	4,214.7	1,086.5	5,301.2	523	8.059	2.077	10.136
FY85	4,779.6	1,397.7	6,177.3	542	8.818	2.579	11,397
FY86	4,179.7	1,398.6	5,578.3	540	7.740	2.590	10.330
FY87	4,244.4	1,344.7	5,589.1	546	7.774	2.463	10.236
FY88 (est)	3,632.0	1,024.4	4,656.4	545	6.660	1.880	8.544
FY89 (est)	3,747.4	1,077.0	4,824.4	553	6.776	1.950	8.724

Exhibit 2—Projected Number of Ships in an Illustrative Homeport

Year	88	89	90	91	92	93	94	95	96	97	98
Ship Type											
AD	1	1	1	1	1	1	1	1	1	1	1
CG 16/26	1	1	1	1	—	—	—	—	—	—	—
CG-47	2	3	3	3	3	3	3	3	3	3	3
CV	1	1	1	1	1	1	1	1	—	—	—
CVN	—	—	—	—	—	1	1	1	1	1	1
DD-963	2	2	2	2	2	2	2	2	2	2	2
DDG 2/37	4	4	4	3	3	3	3	3	2	1	—
DDG-51	—	—	—	1	1	1	1	2	3	4	4
FF-1037	3	—	—	—	—	—	—	—	—	—	—
FF-1052	4	4	4	4	4	4	4	4	4	4	4
FFG-1	1	—	—	—	—	—	—	—	—	—	—
FFG-7	12	12	12	9	9	9	9	9	9	9	9
MCM	—	—	1	1	1	1	1	1	1	1	1
MHC	—	—	—	—	2	2	2	2	2	2	2
MSO	3	3	3	2	2	—	—	—	—	—	—
Total—	33	31	29	27	29	28	28	29	28	28	27

Exhibit 3—Projected Work Starts for Ships Stationed at the Illustrative Homeport

Work	SRA	PMA	DSRA	DPMA	ROH	EDSRA
Ship Type						
AD	—	—	1	—	1	—
CG 16/26	1	—	—	—	—	—
CG-47	8	—	3	—	3	—
CV	1	—	—	—	1	—
CVN	1	—	1	—	—	—
DD-963	6	—	2	—	2	—
DDG 2/37	—	8	—	3	—	—
DDG-51	4	—	1	—	1	—
FF-1037	—	3	—	—	—	—
FF-1052	12	—	4	—	4	—
FFG-1	—	—	—	—	—	—
FFG-7	21	—	18	—	—	9
MCM	2	—	1	—	1	—
MHC	2	—	2	—	2	—
MSO	3	—	—	—	—	—
Total—	61	11	33	3	15	9

Forecast Procedure

IMA's new report segregates work into captive and regional markets. Captive work includes scheduled availabilities and emergent jobs which the Navy generally restricts to performance in the homeport area. This includes most short term availabilities lasting less than six months. Regional work includes overhauls and other availabilities exceeding six months' duration which are generally bid coastwide.

To project the size of individual markets, IMA first projected the number of ships in each class to be homeported at specific locations over each of the next ten years. Then using the scheduled maintenance pattern for each ship, IMA projected the number of short- and long-term maintenance availabilities during the ten-year forecast period. These availabilities were then converted to revenues based on a history of completed contract prices for various types of work. Various assumptions were tested in the forecast procedure.

Illustrative Results

Exhibit 2 shows IMA's projection of the number of ships to be homeported in an illustrative major East Coast location. The figures for 1988 are the number of ships actually at the location as of July 1988. Future figures take into account the number of ships to be added or deleted from the homeport over the next ten years. Some deletions are ships scheduled for retirement. Other deletions are ships scheduled for transfer to other homeports as part of the strategic homeport concept. In estimating the ships to be added, IMA took into account the delivery schedule for ships now on order and ships planned for funding over the next five years.

Captive business—Exhibit 3 shows the number of scheduled job starts attributable to the ships at this location. As shown, we estimate a total of 61 SRAs, 11 PMAs, 33 DSRAs and 3 DPMAs to be generated by the ships in this homeport. This work is generally captive to the local area—provided there is sufficient competition for the contracts. In addition there is a base of emergent work—also captive to the local area—which has been estimated in the report.

Regional business—Overhauls of Navy ships are open to coastwide competition. This regional market has been estimated for both the Atlantic/Gulf and Pacific coasts. Both a projection of overhaul job starts and revenues associated with this work are provided in IMA's report.

Other business—Separate from the above, IMA has projected the number of job starts and associated revenues over the period

1989-1998 from overhaul and repair of MSC ships, the RRF fleet and Navy service craft. Both MSC and RRF work tend to be regionally competitive. Navy service craft maintenance and repair tend to be captive to a local area.

Market Share

IMA's report provides a complete tabulation of Navy ship repair and marine equipment repair contracts over the past five years. The data are arranged by contractor and show the value of the initial contract and subsequent modifications/change orders. Market share percentages are calculated for each of the five years—showing each contractor's percentage of the market.

Significance of the Information

The ten-year forecast will be useful in long-term business planning. Ship repair firms can identify future business for which there will be only local competition vs. business for which competition will be coastwide. Equipment manufacturers can identify the number of maintenance and modernization availabilities by ship type. Both ship repair firms and equipment manufacturers can assess their market share over the past five years.

The full report is available for $550. It can be ordered by contacting International Maritime Associates, Inc., 835 New Hampshire Ave., NW, Washington, DC 20037, telephone (202) 333-8501; fax (202) 333-8504. Telephone orders will be accepted.

Major Navy Contracts

The following special section highlights the latest U.S. Navy contract awards for shipbuilding, ship repair and maintenance, shipboard communications, weapons, etc. The section covers contracts awarded between the dates of June 6 and July 7, 1988. For contracts prior to these dates, refer to the Naval Technology & Shipbuilding Supplement in the July issue of MR/EN.

June 6

General Ship Corporation, East Boston, Mass., was awarded a **$7,487,452** firm-fixed-price contract for Extending Drydocking Phase Maintenance Fixed (EDPMF) availability for USS Glover (FF-1098). Work will be completed in April 1989. The Naval Sea Systems Command, Washington D.C., is the contracting activity (N00024-85-H-8157).

June 9

General Dynamics Corporation, Electric Boat Division, Groton, Conn., was awarded a **$26,573,880** modification to a previously awarded contract for the AN/BSY-1(V) combat system and the retractable bow planes on SSNs 754, 755 and 757. Work will be completed February 28, 1990. The Supervisor of Shipbuilding, Conversion and Repair, Groton, Conn., is the contracting activity (N00024-84-C-2063).

General Dynamics Corporation, Electric Boat Division, Groton, Conn., was awarded a **$55,826,120** modification to a previously awarded contract for the AN/BSY-1(V) combat system and the retractable bow planes on SSNs 751 and 752. Work will be completed February 28, 1990. The Supervisor of Shipbuilding, Conversion and Repair, Groton, Conn., is the contracting activity (N00024-83-C-2039).

June 10

Newport News Shipbuilding, Newport News, Va., was awarded a **$612,000,000** fixed-price-incentive contract for two SSN-688 class submarines. Work will be completed in August 1993. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-88-C-2195).

Northwest Marine Iron Works, Portland, Ore., was awarded a **$4,775,510** firm-fixed-price contract for the overhaul and drydocking of USNS Kawishiwi (T-AO-146), a Military Sealift Command oiler. The Military Sealift Command, Pacific, is the contracting authority (N00033-85-H-0307).

Halter Marine Incorporated, New Orleans, La., was awarded a **$20,879,116** contract for one (AGOR-23) oceanographic research ship. Work will be performed in Escatawpa, Miss., and is expected to be completed December 1, 1990. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-88-C-2223).

June 13

Atlantic Dry Dock Corporation, Fort George Island, Fla., was awarded a **$8,747,000** firm-fixed-price contract for Extended Drydocking Selected Restricted Availability (EDSRA) for USS Samuel Eliot Morison (FFG-13). Work will be completed May 1, 1989. The Naval Sea Systems Command, Washington, D.C., is the contracting

(continued)

U.S. NAVY

CURRENT NAVY & COAST GUARD VESSELS UNDER CONTRACT AT U.S. YARDS

(As of July 1988)

SHIPYARD / Navy Designation	NAME	APPROX. CONTRACT $	EST. DELIVERY
Avondale Shipyards			
T-AO-193	Walter S. Diehl	116,000,000	8/88
T-AO-194	John Ericsson	97,500,000	2/90
T-AO-196	Kanawha	95,025,000	11/90
T-AO-195	Leroy Grumman	101,000,000	5/89
T-AO-197	Pecos	100,633,789	3/90
T-AO-187 Class	unnamed	109,600,000	9/91[8]
LSD-44	Gunston Hall	166,000,000	8/88
LSD-45	Comstock	153,400,000	2/89
LSD-46	Tortuga	153,400,000	4/89
LSD-47	unnamed	150,000,000	11/89
LSD-48	unnamed	150,000,000	5/90
LSD-49	unnamed	157,400,000	11/93
Bath Iron Works			
CG-58	Philippine Sea	252,800,000	1/89
CG-60	Normandy	191,800,000	9/89
CG-61	Monterrey	191,800,000	12/89
CG-63	Cowpens	193,300,000	4/90
CG-64	Gettysburg	193,300,000	11/90
CG-67	unnamed	236,041,276	4/92
CG-70	unnamed	226,123,977	6/93
DDG-51	Arleigh Burke	321,000,000	7/90
DDG-53	John Paul Jones	189,900,000	7/92
DDG-51 Class	—	22,600,000[1]	5/92
DDG-51 Class	—	23,100,000[1]	5/89
Bethlehem-Sparrows Point			
T-AGS-39	Maury	66,000,000	8/88
T-AGS-40	Tanner	66,000,000	2/89
Bollinger Shipyard			
WPB (16)	unnamed	99,306,516	2/90
General Dynamics-Electric Boat			
SSN-752	Pasadena	280,100,000	10/88
SSN-754	Topeka	324,500,000	2/89
SSN-755	Miami	324,500,000	6/89
SSN-757	Alexandria	283,000,000	10/89
SSN-760	unnamed	258,166,750	2/90
SSN-761	unnamed	258,166,750	6/90
SSN-762	unnamed	258,166,750	10/90
SSN-763	unnamed	258,166,750	2/91
SSN-688 Class	unnamed	347,400,000	4/93
SSBN-738-740	—	42,000,000	12/93[3]
SSN-21 Class	—	28,900,000[3]	—
SSBN-734	Tennessee	523,700,000	12/88
SSBN-735	Pennsylvania	531,600,000	8/89
SSBN-736	unnamed	500,870,000	4/90
SSBN-737	unnamed	616,400,000	12/90
SSBN-738	unnamed	674,100,000	12/91
SSBN-739	unnamed	615,000,000	12/92
SSBN-734 Class	—	48,400,000[3]	12/88
SSBN-740	unnamed	644,000,000	7/94
Halter Marine			
T-AGOS-13	Adventurous	14,250,000	8/88
T-AGOS-14	Worthy	14,250,000	12/88
T-AGOS-15	Titan	13,844,067	3/89
T-AGOS-16	Capable	14,031,914	7/89
T-AGOS-17	Intrepid	14,031,914	11/89
T-AGOS-18	Relentless	14,031,914	3/90
T-AGOR-23	unnamed	20,900,000	—
Ingalls Shipbuilding			
CG-57	Lake Champlain		8/88
CG-59	Princeton	325,500,000	10/88
CG-62	Chancellorsville	238,600,000	6/89
CG-65	Chosin	242,600,000	11/90
CG-66	Hue City	193,980,662	10/91
CG-68	Anzio	163,980,664	4/92
CG-69, 71, 72 & 73	unnamed	769,142,667	1/94
CG-47 Class	—	215,982,000[6]	1/94
CG-47 Class	—	44,128,775[5]	—
CG-47 Class	—	3,608,809[6]	10/89
DDG-52	John Barry	162,149,000	9/91
LHD-1	Wasp	1,365,700,000	3/89
LHD-2	Essex	402,494,000	4/92
LHD-3	Kearsage	378,685,000[4]	1/93
DD-963 & DDG-993 Class	—	14,100,000[1]	3/93
Intermarine USA			
MHC-51	Osprey	20,926,936	4/91
Lockheed-Gulfport			
LCAC (2)	unnamed	24,800,000	88
LCAC (7)	unnamed	115,586,281	—
LCAC	—	31,759,154[6]	90
Lockheed-Seattle			
LCAC (7)	unnamed	115,586,251	6/91
LCU (Army-7)	unnamed	26,000,000	—
Lockheed-Savannah			
LCUs (Army-12)	unnamed	—	7/88-11/89
Marinette Marine			
MCM-2	Defender	46,000,000	8/88
MCM-4	Champion	42,000,000	12/88
MCM-7	Patriot	51,848,816	10/89
McDermott Inc.			
SWATH T-AGOS-19	Victorious	25,424,347	2/90
YTT 8 & 9	unnamed	21,700,000	—
YTT 10	unnamed	10,913,817	5/90
NASSCO			
AOE-6	Supply	290,097,944	4/91
Newport News Shipbuilding			
CVN-72	Abraham Lincoln	1,550,000,000	12/89
CVN-73	George Washington	1,550,000,000	12/91
CVN-74	John C. Stennis	3,700,000,000	96
CVN-75	unnamed		98
SSN-688 Class	—	22,000,000[1]	10/88
SSN-723	Oklahoma City	225,100,000	5/88
SSN-750	Newport News	278,000,000	8/88
SSN-753	Albany	319,000,000	7/89
SSN-756	Scranton	259,833,000	9/89
SSN-758	Asheville	259,833,333	1/90
SSN-759	unnamed	259,833,333	6/90
SSN-760	unnamed	55,000,000[6]	—
SSN-764	unnamed	257,118,500	2/91
SSN-765	unnamed	257,118,500	5/91
SSN-766	unnamed	257,118,500	8/91
SSN-767	unnamed	257,118,500	11/91
SSN-688 Class (2)	unnamed	612,000	—
SSN-21 Class	—	325,000,000[7]	2/94
SSN-21 Class	—	28,900,003[3]	—
Pennsylvania Shipbuilding			
T-AO-191	Benjamin Isherwood	111,000,000	10/88
T-AO-192	Henry Eckford	111,000,000	5/89
Peterson Builders			
MCM-3	Sentry	57,900,000	7/88
MCM-5	Guardian	57,900,000	6/89
MCM-6	Devastator	48,287,461	8/89
MCM-8	Scout	48,287,461	6/90
Robert E. Derecktor Shipyard			
WMEC-911	Forward	30,160,000	9/88
WMEC-912	Legare	30,160,000	5/89
WMEC-913	Mohawk	30,160,000	5/89
TB (Army-2)	unnamed	16,500,000	89
Tacoma Boatbuilding			
T-AGOS-11	Audacious	9,295,000	6/89
T-AGOS-12	Bold	9,295,000	10/89
Textron Marine			
LCAC-13-24 (12)	unnamed	187,000,000	89/-6/91
LCAC	—	4,760,374[2]	9/88
Todd Pacific-San Pedro			
FFG-61	Ingraham	96,100,000	11/88

Footnotes: 1. Lead yard services contract; 2. Engineering and technical services contract. 3. Design contract; 4. Contains $26 million for advanced procurement of material for LHD-4; 5. Yard planning services; 6. Long lead procurement; 7. Detail design contract; 8. Contains options for one T-AO in FYs 89, 90 & 91.

KEY TO NAVY DESIGNATIONS

AOE	Fast Combat Support Ship	LCM	Landing Craft, Mechanized	MHC	Mine Hunter, Coastal	T-AGS	Surveying Ship*
CG	Guided Missile Cruiser	LCU	Landing Craft, Utility	MSH	Mine Hunter	T-AO	Oiler*
CVN	Aircraft Carrier, Nuclear	LHD	Amphibious Transport Dock	SSBN	Ballistic Missile Sub, Nuclear	TB	Tugboat
DDG	Guided Missile Destroyer	LSD	Dock Landing Ship	SSN	Submarine, Nuclear	WMEC	Medium Endurance Cutter†
FFG	Guided Missile Frigate	LSV	Logistic Support Vehicle	SWCM	Special Warfare Craft, Medium	WPB	Patrol Boat†
LCAC	Landing Craft, Air Cushion	MCM	Mine Countermeasures Ship	T-AGOS	Ocean Surveillance Ship*	YTT	Warping Tug

*Assigned to Military Sealift Command
†Coast Guard

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MIL-STD-45662
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NICKEL-COPPER
NICKEL-COPPER-ALUMINUM
STAINLESS STEEL
SILICON BRONZE
NAVAL BRASS
BRASS
TITANIUM
ALUMINUM

PARTIAL LISTING OF
FASTENER SPECIFICATIONS

MIL-S-1222
MIL B- 857
FF-S-86
ANSI B18.2.1
ANSI B18.2.2
ASTM F 593
ASTM F 594

NICKEL-COPPER FASTENER STOCK PROGRAM

HEX HEAD CAP SCREWS

Length \ Diameter	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
1/2	*	*							
5/8	*	*	*						
3/4	*	*	*	*	*				
7/8	*	*	*		*				
1	*	*	*	*	*	*	*		
1 1/4	*	*	*	*	*	*	*		
1 1/2	*	*	*	*	*	*	*		
1 3/4	*	*	*	*	*	*	*		
2	*	*	*	*	*	*	*	*	
2 1/4	*	*	*	*	*	*	*	*	*
2 1/2	*	*	*	*	*	*	*	*	*
2 3/4		*	*		*	*	*	*	*
3	*	*	*	*	*	*	*	*	*
3 1/4						*	*	*	
3 1/2			*	*	*	*	*	*	*
3 3/4						*	*	*	
4			*	*	*	*	*	*	*
4 1/2						*	*		
5						*	*	*	*
5 1/2						*	*		
6						*	*	*	*

FINISH NUTS	*	*	*	*	*	*	*	*	*
THREADED ROD	*	*	*	*	*	*	*	*	*
FLAT WASHERS	*	*	*	*	*	*	*	*	*
LOCK WASHERS	*	*	*	*	*	*	*	*	*
SOCKET CAP SCREWS	*	*	*	*	*	*	*		

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U.S. NAVY

CURRENT NAVY, COAST GUARD & MARAD OVERHAUL, REPAIR & CONVERSION CONTRACTS AT U.S. SHIPYARDS

(As of July 1988)

SHIPYARD	SHIP	TYPE OF WORK	$VALUE	COMP
Alabama Dry Dock	USS Lexington (AVT-16)	PM	10,131,466	8/90
Atlantic Dry Dock	USS Underwood (LSD-36)	DSRA	7,466,000	8/88
Avondale Shipyards	USS Boone (FFG-28)	SRA	9,998,452	7/88
	USS John J. Hall (FFG-32)	DSRA	11,170,581	9/88
	USS Radford (DD-968)	ROH	20,700,000	5/89
Bath Iron Works	4 USCG cutters	ROH	117,452,000	89
	USS Koelsch (FF-1049)	OH	12,000,000	8/88
Bender Shipbuilding & Repair	USS Redstone (T-AGM-20)	DD & OH	5,429,704	9/88
Braswell Shipyards	USNS Neosho (T-AO-143)	DD & OH	7,366,392	8/88
	USNS Vega (T-AK-286)	REP	1,500,000	9/88
Charleston Naval Shipyard	USS Andrew Jackson (SSBN-619)	OH	112,058,684	3/90
	USS Woodrow Wilson (SSBN-624)	OH	120,928,007	3/89
	USS Henry L. Stimson (SSBN-655) & USS Mariano J. Vallejo (SSBN-658)	REF	19,673,812	8/89
Colonna's Shipyards	USS Richard E. Byrd (DDG-23)	DSRA	4,280,000	7/88
Continental Maritime	USS Lang (FF-1060)	PMA	3,200,000	10/88
	USS Hoel (DDG-13)	PM	4,500,000	9/88
	USS Rentz (FFG-46)	DSRA	4,400,000	12/88
DMI Shipyard	MSB-1	ROH	41,057,000	—
General Ship Corporation	USS Stephen W. Groves (FFG-29)	EDSRA	10,969,490	7/88
Houston Ship Repair	Mount Washington (NDRF)	REP	549,000	5/88
Ingalls Shipbuilding	USS Stark (FFG-31)	REP	28,700,000	8/88
	USS Wisconsin (BB-64)	MOD	221,768,170	10/88
	USS Richmond K. Turner (CG-20)	ROH	28,780,830	8/88
	USS San Jacinto (CG-56)	PSA	7,000,000	10/88
Jonathan Shipyard	USS Saginaw	PM	9,900,000	6/90
Long Beach Naval Yard	LPH Class Ships	PM	8,096,132	10/90
Metro Machine	Atlantic Fleet LPDs	PM	5,334,400	8/91
	USS Bowen (FF-1079)	OH	6,900,000	—
	USS John King (DDG-3)	DSRA	3,089,604	9/88
	USS Claude V. Ricketts (DDG-5)	DSRA	4,100,000	10/88
Moon Engineering	USS Conynham (DDG-17)	REP	1,484,444	—
NASSCO	4 LSTs	PM	3,500,000	90
	3 LSTs	MAINT	5,858,543	—
	USS Elliott (DD-967)	ROH	27,779,349	9/88
Newport News Shipbuilding	USS Pittsburgh (SSN-720)	SRA	7,055,300	7/88
	USS Enterprise (CVN-65)	OH	34,277,751	9/88
	USS Newport News (SSN-750)	PSA	3,400,000	1/89
	Surface Ship Support Barge	REP	48,095,123	7/89
	USS Oklahoma City (SSN-723)	PSA	3,367,692	—
	USS Key West (SSN-722)	PSA	38,000,000	12/88
	USS George C. Marshall (SSBN-654)	REF	11,172,200	10/88
	USS Lewis & Clark (SSBN-644)	REF	10,751,500	7/88
	USS Jacksonville (SSN-699)	TEST	8,000,000	8/88
Norfolk Naval Yard	USS Baton Rouge (SSN-689)	SRA	5,462,494	10/88
	USS Memphis (SSN-691)	SRA	8,486,562	10/88
Norfolk Shipbuilding	AO-178, 179 & 186	PM	38,900,000	—
	USS Lawrence (DDG-4)	REP	4,966,666	—
	Mormacsea & Mormacsaga (RRF)	UPG	7,973,482	—
Northwest Marine Iron Works	USS Anchorage (LSD-36)	ROH	15,300,000	11/88
	USNS Kawashiwi (T-AO-146)	DD & OH	4,775,510	—
	USS Okinawa (LPH-3)	ROH	14,091,106	1/89
Pennsylvania Shipbuilding	USS Patterson (FF-1061)	PM	5-10 mil/yr.	91
Philadelphia Navy Yard	USS Independence (CV-62)	SLEP	240,000,000	—
Portsmouth Naval Yard	USS Kamehameha (SSBN-642)	ROH	112,100,000	11/88
	USS Albuquerque (SSN-706) & USS Philadelphia (SSN-690)	SRA	11,416,336	11/88
Puget Sound Naval Yard	USS Nimitz (CVN-68)	REP & OH	—	89
	USS Alexander Hamilton (SSBN-617)	ROH	110,713,798	11/88
Robert E. Derecktor	USS Connole (FFG-12)	ROH	2,500,000	—
Service Engineering	USNS Spica (T-AFS-9)	OH	10,700,000	—
	AE-29, -32-34	PM	4,154,000	89
Southwest Marine	USS Dubuque (LPD-8)	OH	10,000,000	—
	USS O'Brien (DD-975)	REP & UPG	2,300,000	11/89
	USS Jarrett (FFG-33)	EDSRA	12,900,000	10/89
	USS George Philip (FFG-12)	EDSRA	10,758,483	4/89
	USS Tripoli (LPH-10)	PMA	3,036,390	7/88
	USS Wichita (AOR-1) & USS Kansas (AOR-3)	REP	41,600,000	—
	USS Pluck (MSO-464)	SRA	1,041,000	—
	LST-1185, -1186 & 1191	OH	35,000,000	87-89
	USS Okinawa (LPH-3)	ROH	16,114,285	7/88
	USS Durham (LKA-114)	DD	7,611,149	7/88
	USS Anchorage (LSD-36)	ROH	15,048,870	11/88
	USS Stein (FF-1065)	ROH	9,148,194	10/88
Tacoma Boatbuilding	USNS Hayes (T-AG-195)	CONV	33,878,232	3/90
Tampa Shipyards	T-ACS-7 & 8	CONV	43,158,333	10/88
Todd-Seattle	USS Camden (AOE-2)	REP	12,643,642	7/88
	8 WHECs	OH	234,903,000	2/91
Todd-San Pedro	USS Crommelin (FFG-37)	REP &DD	4,200,000	9/88
USCG-Curtis Bay	14 buoy tenders	SLEP	8,500,000	—
	16 WMECs	MAINT	—	—

Legend: CONV-Conversion; DEACT-Deactivation; DSRA-Docking Selected Restricted Availability; EDSTRA-Extended Docking Selected Restricted Availability; MAINT-Maintenance; MODIF-Moficiation; MMA-Major Maintenance Availability; OH-Overhaul; PM-Phased Maintenance; PMA-Phased Maintenance Availability; PSA-post-Shakedown Availability; REF-refit; REP-Repair; ROH-Reglar Overhaul; SER-Service; SLEP-Service Life Extension Program; SRA-Selected Restricted Availability; UPG-Upgrade.

Ingalls Shipbuilding Christens U.S. Navy Cruiser Chancellorsville

The Aegis guided missile cruiser USS Chancellorsville (CG-62) was recently christened at ceremonies at the Pascagoula, Miss., shipyard of the Ingalls Shipbuilding division of Litton Industries.

Principal speaker for the ceremony was the Hon. **Trent Lott,** U.S. Representative from Pascagoula, Mississippi's Fifth Congressional District. **Mrs. Edward H. Martin** was chosen by the Navy as the ship's sponsor.

The 567-foot, 9,500-ton Aegis cruiser is powered by four GE LM2500 marine gas turbines and is equipped with Aegis combat equipment, the most advanced surface ship air defense system in the world.

The Chancellorsville is equipped with the MK 41 vertical launching system, a multiwarfare missile launching system capable of firing missiles against air, surface and underwater threats.

Currently in its 50th year of shipbuilding, Ingalls was chosen as the lead builder for five of the latest classes of Navy surface combatants.

Since 1975, Ingalls has delivered 50 major warships into the Navy's fleet, including eight Aegis cruisers. As lead shipbuilder of the Aegis cruiser program, Ingalls has been contracted to build a total of 19 of the 27 cruisers Congress has authorized for construction since 1978.

For free literature detailing the shipbuilding facilities and services of Ingalls,

Circle 109 on Reader Service Card

The USS Chancellorsville (CG-62) is guided to an outfitting berth at Ingalls Shipbuilding, Pascagoula, Miss. The amphibious assault ship USS Wasp (LHD-1), the lead ship of a new class being built by Ingalls, is in the background.

Major Navy Contracts

(continued)

activity (N00024-85-H-8111).

E.R. Paul Company, Walnut, Calif., was awarded a **$5,641,731** firm-fixed-price contract to purchase and install two package type steam boilers for use in testing steam-driven naval shipboard machinery and devices. The contract also contains provisions for training. Work will be performed in Puget Sound, Wash. (75 percent), and Pearl Harbor, Hawaii (25 percent), and is expected to be completed late in 1989. The Naval Regional Contracting Center, Washington, D.C., is the contracting activity (N00600-88-C-0366).

June 17

Avondale Industries Incorporated, Shipyards Division, New Orleans, La., was awarded a **$157,411,537** fixed-price-incentive contract for design and construction of LSD-49, the lead ship of the LSD-41 (cargo variant) class, and the associated technical manuals, training, Coordinated Ships Allowance List (COSAL) material, studies, services and drawings. Work will be completed in November 1993. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-88-C-2048).

MagneTek ALS, Anaheim, Calif., was awarded a **$28,626,300** firm-fixed-price contract for the MK-84 solid state frequency converter production program for CG-69, CG-70, CG-71, CG-72 and CG-73. Work will be completed in December 1990. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-88-C-5141).

Automar I Corporation, Washington, D.C., was awarded a **$43,154,906** firm-fixed-price contract including options for the charter of MV American Eagle, a roll-on/roll-off dry cargo ship that will be used to transport Department of Defense cargo. The contract performance period is 17 months with two 17-month options. The ship will be delivered at a mutually agreeable date on or before November 3, 1988. The Military Sealift Command, Washington, D.C., is the contracting activity (N00033-88-C-1117).

June 20

Avondale Industries Incorporated, Shipyards Division, New Orleans, La., was awarded a **$109,646,935** fixed-price contract for one T-AO-187 class ship with options for one ship per year in fiscal years 1989, 1990 and 1991. Work will be completed in September 1991. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-88-C-2050).

June 21

Alaska Tug and Salvage Incorporated,

(continued on page 47)

Hampton Roads SNAME Discusses Improving Producibility Of American Fast Attack Submarines

At a recent dinner meeting of the Hampton Roads Section of The Society of Naval Architects and Marine Engineers, Lt. Comdr. **Blaine R. Brucker** presented a talk on "Seawolf Producibility" to members and guests gathered at Fisherman's Wharf in Hampton, Va.

Commander **Brucker,** USN, currently serves as Producibility Manager of PMS350, the Seawolf Advanced Submarine Acquisition Program Office at NavSea. In this position, he is responsible for coordinating the deliverable product of the design yards participating in the detail design of the Seawolf.

The U.S. Navy's Seawolf Advanced Submarine Program is vitally interested in improving the producibility of the next generation of American attack submarines. This program is an important milestone on the road to modernization of the shipbuilding industry through the infusion of new technology. The Seawolf Program has accepted the role of providing leadership in the drive to produce affordable submarines into the 21st century. Newport News Shipbuilding, Electric Boat Division, and NavSea have teamed to improve the efficiency of construction through new technology.

The Seawolf design approach includes putting forth a major effort to present a design that supports the implementation of technology and captures the necessary attributes for efficient construction of this new class of attack submarine. Commander **Brucker** provided an overview of these challenges in the implementation of a producibility program for the next class of fast attack submarines.

THE LATEST ADVANCEMENTS IN PROPULSION SYSTEMS FOR TODAY'S NAVIES

Photo: USS Oliver H. Perry FFG-7, built by Bath Iron Works.

Some of the most powerful, technologically advanced propulsion systems ever assembled are the driving hearts of today's fast, sleek, maneuverable naval combatants and support vessels. Many new classes of cruisers, destroyers, frigates, corvettes and other warships and support craft of the United States Navy, as well as the world's navies, are equipped with improved main and cruise engines, propellers and gears. Major naval equipment manufacturers are constantly improving their propulsion system products and components in an effort to provide the international naval market with the most durable, quietest, most powerful and most fuel-efficient propulsion systems.

This article offers a brief review of some of the latest propulsion systems that are in use by the world's naval fleets.

Technical reports, product literature and brochures are available free of charge from the manufacturers included in this review. If you would like additional information, just circle the appropriate Reader Service Number(s) on the postpaid card bound into the back of this issue. See the table at the end of this review for the proper Reader Service Number for each manufacturer.

ENGINES

When the Ticonderoga Class Aegis guided-missile cruiser USS Leyte Gulf was recently commissioned, she became the 100th U.S. Navy ship to be powered by GE LM2500 marine gas turbine engines. Powered by four LM2500s, the Leyte Gulf (CG-55) is cable of speeds in excess of 30 knots.

The LM2500 has been selected by the U.S. Navy and 16 other navies around the world for propulsion applications aboard such vessels as patrol hydrofoil missileships, guided-missile frigates, Spruance (DDG-963) and Kidd (DDG-993) Class destroyers and the new Arleigh Burke (DDG-51) Class destroyers.

During the first quarter of this year, GE's Marine & Industrial Engines & Services Division, Cincinnati, Ohio, received an order for 12 LM2500 marine modules for the next group of Canadian Patrol Frigates. There were naval orders for 22 LM2500s in 1987.

One of the division's latest orders is from the Naval Sea Systems Command on behalf of the Portugese Navy for six LM2500 marine gas turbines.

The turbines will be used in conjunction with MTU diesel engines in a CODOG (Combined Diesel or Gas Turbine) machinery arrangement to provide power for three MEKO 200 frigates of the Vasco da Gama Class.

The Marine & Industrial Division of GE also recently celebrated the launching of the first LM500-powered naval ship—a Standard Flex 300 fiberglass multipurpose surveillance/minesweeping craft christened by the Royal Danish Navy.

Called the Flyvenfisken, the 177-foot ship is powered by an LM500 CODAG (Combined Diesel and Gas Turbine) arrangement, which couples the 6,000-shp LM500 with two 2,700-bhp MTU 16V396 diesel engines driving three propellers.

The Allison Gas Turbines Division of GM is another large supplier of marine gas turbine engines to international navies. Allison 570-KF marine gas turbines were selected in a COGOG (Combined Gas Turbine or Gas Turbine) by the Royal Canadian Navy for cruise power for their 5,000-ton Tribal Class destroyers. Allison's 570-KF's are also being used to boost propulsion aboard the Swedish Navy's Spica III Stockholm Class fast patrol boats. In this application, the drive system uses a singular stage epicyclic reduction gear and a 15-degree V-drive to turn a CP propeller. The 320-ton ghp hull vessel has a boost speed of 38 knots.

The British Royal Navy selected Paxman Valenta 12RP200CZ power modules, each having a continuous power output of 1.3 MW 440/600 V, three-phase, 60Hz at 1,200 rpm, to provide power for the propulsion systems for their antisubmarine frigate. The units will be utilized in a CODLAG (Combined Diesel Electric and Gas Turbine) propulsion system.

A CODOG (Combined Diesel or Gas Turbine) plant featuring twin Rolls-Royce Spey SM1C turbines will be used in the Royal Dutch Navy's new M-Class frigates.

In addition, the Japanese Navy's Dawn Mist, the lead ship in a new class of 4,200-ton full load destroyers, will be powered by a Spey COGAG system consisting of four Kawasaki-RR Spey turbines with a total power output of 54,000 shp.

Stewart & Stevenson Services, Inc., Houston, Texas, was awarded a $21.2-million U.S. Navy contract to supply fifteen 2,500-kw gas turbine-powered generator sets. The equipment will provide ship's service power for five Ticonderoga Class (CG-47) Class Aegis cruisers being built for the Navy.

Previously, Stewart & Stevenson Services had been awarded the contract to deliver 66 generator sets for the first 22 Aegis cruisers.

Steam turbines, widely used in nuclear propulsion applications, such as in the case of the Nimitz Class aircraft carriers, can be found in use aboard the U.S. Navy's 58,000-ton Iowa Class battleships. Both the battleships Iowa and Missouri are powered by a propulsion plant consisting of eight boilers and four GE geared steam turbines. GE Naval & Drive Turbine Systems supplies advanced steam propulsion and ships service turbine generator systems to U.S. Navy vessels ranging in size from the largest aircraft carriers to the smallest auxiliary ships.

The USS Wasp (LHD-1), the lead ship of the Navy's newest amphibious assault ship, has a power plant which uses two Westinghouse steam turbines, developing a combined 70,000 shp, with two Combustion Engineering boilers, to drive the ship at speeds of more than 20 knots.

Two of U.S. Navy's newest classes of ships feature Colt-Pielstick diesel engine propulsion. Landing Ship Dock (LSD) vessels, with full load displacements of 15,745 tons, are equipped with four medium-speed Colt-Pielstick diesel engines for a total ship's horsepower of 33,000. Additionally, each of the Navy's Henry J. Kaiser Class (T-AO-187) oilers are powered by two 10-cylinder PC4.2 Colt-Pielstick diesel engines manufactured by the Fairbanks Morse Division of Colt Industries Inc. The big diesels are capable of burning heavy fuels up to 3,500 sec Redwood at 100 degrees F. The fuel rate guarantee is 136 grams/metric horsepower hour.

On board another U.S. Navy support vessel, the new AOE-6 Class Fast Combat Support Ship, five Caterpillar 3608 diesel generator sets will provide 2,500 kw each, totaling 12,500 kw. Caterpillar has a 20-engine contract with National Steel Shipbuilding Company (NASSCO), which is building the lead ship of the class. Caterpillar will deliver the first five gensets for the lead ship in early 1989.

The recently launched mine countermeasure ship USS Devastator (MCM-6) is powered by four 600-hp Isotta Fraschini diesel engines and is fitted with two 200-hp Hansome Electric motors. For maneuverability, the Devastator is equipped with a 350-hp Omnithruster bowthruster, which is connected to a GE drive motor. Her electric power is furnished by three 60-Hz, 375-kw Tech Systems generators.

With their acquisition of Isotta Fraschini, Fincantieri's Engine Division can now offer a power range of engines which extends from 200 hp to 40,000 hp.

Fincantieri's GMT model A230-20 diesels, rated at 3,900 hp at 1,200 rpm, are used aboard the Italian Navy's Lupo Class frigates for cruis-

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- Chevron AW Hydraulic Oils for gears, compressors, and hydraulic systems.
- Chevron NL Gear Compounds for heavily loaded reverse and reduction gears.
- Chevron Marine Oil 220X for stern tube bearings and open cranks on steam engines.
- Chevron Ultra-Duty, Pinion Grease MS, Dura-Lith Grease EP, and Polyurea EP Greases for bearings, couplings, gears, and deck hardware.

Chevron

Circle 10 on Reader Service Card

"We make Navy gears weighing over 20 tons with tooth accuracy down to 50 millionths of an inch. The finest Swiss watches don't come anywhere near that."

John Mezakowski
Finish Lathe Operator
Lynn, Massachusetts

Fifty millionths of an inch. That's 1/60th the diameter of a human hair. That's the kind of precise tolerance dedicated GE people like John meet daily in the manufacture of advanced gears for the U.S. Navy. High power density hardened and ground gears that are smaller, lighter and quieter than conventional units. Gears for GE propulsion systems that power sophisticated submarines, aircraft carriers, destroyers and other vessels. This dedication to accuracy is the reason GE has been the principal supplier of fully integrated propulsion systems to the U.S. Navy for over 75 years. It's the reason we're aboard nearly every class of ship from the smallest auxiliary to the largest super carrier. Our superior quality gives America's fleet the technical edge to move faster, run quieter, perform more efficiently and cruise longer between overhauls.

Propulsion quality is very real to John. He depended on it while in the Navy, and now his son does aboard a GE powered sub. Of quality, John says, "We make the best gears and propulsion systems because we have the right people and equipment to do the job. While many of the people who work at Gear Plant today

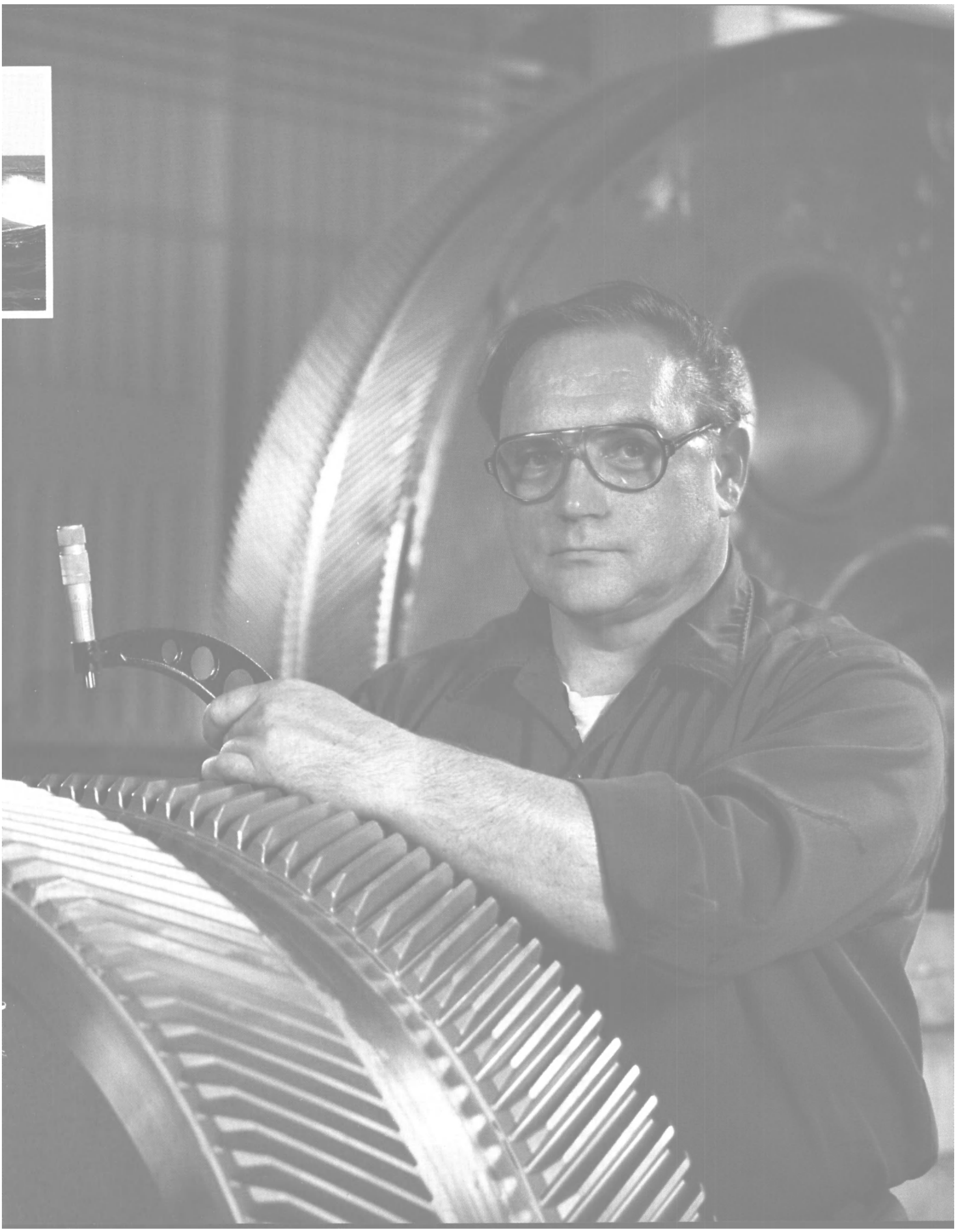
grew up hearing about GE from their dads who worked here, others were drawn by our reputation. Most of them have around 15 years of experience, too. That's what makes this place work. Besides, the Company spent over $25 million so we would have the best manufacturing and test equipment here in Lynn. And that's not just my opinion. Customers tell us our plant is the best equipped in the world. That really means something!"

Committed GE men and women like John work hard to give the Navy the most advanced technology, the highest quality, the lowest cost and on-time delivery. They intend to carry-on this Proud Tradition of leadership as they work to advance the U.S. Navy mission into the 21st Century.

GE People:
Qualified, Committed, Proud

GE Naval & Drive Turbine Systems

Circle 301 on Reader Service Card



Naval Propulsion Systems

(continued)

ing power. GMT engines have also been used for cruise propulsion in Italian Maestrale Class frigates and Animoso Class destroyers.

Sulzer Brothers engines are on a wide variety of naval auxiliary vessels and research ships. For example, Argentina's naval auxiliary vessel Cabo San Antonio is equipped with four Sulzer 6ZH40 diesel engines.

Additionally, 5RTA76 series engines with PTO were installed on the 615-foot T-5 tankers built by Tampa Shipyards.

Bombardier Inc. of Montreal, which purchased Alco Power Inc. in 1984, supplied 42 Paxman Valenta engines to Bollinger Machine Shop & Shipyard Inc., for installation aboard Island Class patrol boats for the U.S. Coast Guard. The engines, which develop 2,880 bhp each at 1,500 rpm, will be used as main propulsion on the patrol boats. The engines will drive through ZF reverse/reduction gears. Electrical power for each craft is provided by two 99-kw generators driven by Caterpillar 3304T diesels.

Deutz MWM has begun delivering 24 self-contained generating sets of 850 kw each to the Canadian Navy for their new patrol frigates. Deutz MWM sold 32 sets of an almost identical configuration to the German Navy for use aboard their F-122 Bremen Class frigates.

Diesel engine manufacturer Krupp MaK, which has more than 100 years' experience in naval equipment, offers a number of medium-speed, four-stroke heavy fuel engines in the output range from 740 to 9,900 kw (1,000-13,500 hp).

For example, Krupp MaK offers the heavy-fuel engines M453C and the M332, both of which boost low fuel consumption. The company reports that both engines feature excellent ratio of maximum to mean piston pressures, but moderate, and therefore, safe, operational values.

The U.S. Coast Guard awarded a $9.2-million contract to the Electro-Motive Division (EMD) of General Motors for 32 propulsion engines, as part of an ongoing program to modernize existing Coast Guard vessels which are being used throughout the coastal waters and the Great Lakes.

EMD propulsion was also selected to power the U.S. Army's newest logistic support vessels (LSVs). Each 273-foot LSV is powered by two EMD 16-1645-E2 diesel engines to speeds of about 12 knots.

The 270-foot Medium Endurance Coast Guard Cutters under construction at Robert E. Derecktor Shipyards in Middletown, R.I., are each powered by a pair of 3,500-hp Alco diesel engines to speeds of about 19.5 knots. The ship's service electricity is provided by two 475-kw Caterpillar gensets.

Smaller Military Vessels

Within the past year, each of a series of seven Spanish Customs Service patrol boats were fitted with a pair of Deutz MWM TBD 234 V-12 diesel engines. Rated at 1,000 hp each, the engines directly drive Riva Calzoni IRC 41 DL waterjets to propel the 47-foot craft to speeds of about 54 knots. The engines extremely low fuel consumption allows the vessels to operate for long periods of time and in greater sea radius.

Cummins 4BT3.9-M turbocharged four-cylinder diesel engines power Zodiac Hurricane rigid inflatible boats (RIBs) employed by the Canadian Coast Guard. Each of the 3.9-liter Cummins B Series diesels develop 100 horsepower at 2,500 rpm. The boats, which cruise at a speed of 14 knots, are propelled by a Parker waterjet propulsion system. The U.S. Coast Guard and Navy are both testing Cummins 6BT- and 4BT-powered Hurricane RIB demonstrators and a prototype.

MonArk Boat delivered a 28-foot search/rescue patrol boat to the U.S. Coast Guard, which is powered by twin Volvo Diesel AQAD41/290 engines, each rated for 200 hp at 3,800 rpm. The all-aluminum craft, which features a semi-V planing hull, can obtain speeds in excess of 38 knots.

The U.S. Navy's 135-foot landing craft utility (LCU) vessels, which

displace about 404 tons at full load, are powered by two Detroit Diesel 12V71TI diesel engines that develop a total of 850 shp.

Detroit Diesel engines also power two Halter Marine-built Ecuadorian Navy patrol boats. The 44-foot drug interdiction boats are each fitted with two military rated Detroit Diesel 8V71TI diesels driving through Twin Disc 509 down angle gears which give the boats a service speedof 26 knots.

Danish Osprey 55 Class fast offshore patrol boats delivered last year by Danyard, are each powered by two MAN B&W Diesel 12V 23/50 diesel engines, supplied by Alpha Diesel of Frederikshavn, Denmark, with 23VO20 reduction gears, controllable-pitch propeller equipment and Alphatronic remote control. The craft can reach speeds of more than 20 knots.

Twin MAN B&W D2840 LE diesel engines rated at 635 hp at 2,300 rpm power PT Class patrol boats built by Singapore Shipbuilding and Engineering for the Government of Brunei Darussalam for the Royal Brunei Police Force. The 48-foot craft can obtain speeds of about 33 knots.

Tempest Marine-built USCG fast coastal interceptors are powered by a pair of turbocharged and aftercooled Caterpillar 3208T diesel engines, which produce a combined 750 hp at 2,800 rpm. The craft are fitted with Twin Disc reduction gearing and Record propellers and can obtain speeds in excess of 43 knots.

PROPELLERS, THRUSTERS & WATERJETS

One of the leading suppliers of controllable-pitch propellers to the U.S. Navy is the Bird-Johnson Company, Walpole, Mass. Bird-Johnson propellers have been selected for the Arleigh Burke, the lead ship of the new class of Navy Aegis destroyers, aboard Ticonderoga Class cruisers, Henry J. Kaiser Class oilers, Landing Ship Dock vessels and Mine Countermeasure Ships.

Last year, Bird-Johnson was selected to supply two 23-foot, six-bladed propellers for the lead ship of the AOE-6 Class Fast Combat Support Ships.

West Germany's Schaffran Propeller Lehne & Co. manufactures CP and monobloc propellers of 3,000 to 7,000 mm to their own designs for all kinds of vessels. One example of a military installation is aboard the FRG Coast Guard patrol boat Falshoft, which is equipped with a three-bladed, 1,200-mm Schaffran CP propeller.

A number of international navies, including the Italian, Venezuelan, Peruvian and Iraqi, use Lips CP and reverse pitch propellers. One of the latest U.S. Navy installations is on the Wasp (LHD-1), the lead ship of the amphibious assault class.

Schottel propulsion systems—rudderpropellers, thrusters and jets—are in use in naval fleets all over the world. The firm manufactures over 20 different types of Schottel Rudderpropellers, a combined steering/propulsion unit, covering a power range of 15-5,000 kw (20-7,000 hp). The units are rotable through a full 360 degrees, proving propulsive steering in any direction. Over 19,000 Schottel propulsion units are in use worldwide.

Another new U.S. Navy class ship, the MHC-51 coastal minehunter Osprey, will reportedly feature Voith-Schneider propulsion equipment. The vessel is under construction at Intermarine USA's Savannah, Ga., yard.

Sulzer-Escher Wyss five-bladed CP and reverse pitch propellers are featured on the FRG's Bremen Class frigates, as well as on a number of Canadian, Indonesian, Saudi Arabian and South Korean naval ships.

Three new U.S. Navy Torpedo Test Craft being built by McDermott Shipyard, Amelia, La., will be equipped with Omnithruster hydrojet maneuvering and propulsion systems. The YTTs, -9, -10 and -11, will be fitted with 350-hp Omnithruster Mark II hydrojet Model JT 700TDs. The hydrojet units will offer the craft precise handling, position keeping and automatic heading.

In addition, the recently launched USS Devastator (MCM-6) is fur-

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Naval Propulsion Systems

(continued)

nished with a 350-hp Omnithruster bowthruster for precise handling and maneuverability.

Michigan Wheel's Towmaster Nozzle/Rudder System, with its triple-rudder design, offers excellent maneuverability and turning efficiency. The Towmaster System has been proven in over 100 applications.

Ulstein Trading Ltd. A/S of Norway has developed the High Lift Rudder, with a bulbous leading edge, active flap and vane elements, offers excellent steering ability at high-speed ship operation.

South Korean Donghae Class corvettes are equipped with KaMeWa CP and reverse-pitch propellers.

GEARS

Cincinnati Gear Company, Cincinnati, Ohio, supplied huge carburized and hardened and precision ground gears for the U.S. Navy's T-AO-187 Class oiler program, as well as supplying Textron Marine Systems with eight gas turbine-powered gearboxes and 24 couplings and clutches for the LCAC program underway at the yard. The lead ship of the AOE-6 Class will also feature Cincinnati Gear equipment—two dual input locked train reduction gears incorporating a hydraulic reversing coupling.

Four Inhauma Class corvettes built for the Brazilian Navy by A.M.R.J. Rio de Janeiro are equipped with Renk reduction gears. Renk also supplied the reduction gearing for some of the FRG's Bremen Class F122 frigates.

Another Navy supplier, Falk, offers the RW Series of marine drives. The series features high-efficiency gears, long bearing life and simplified maintenance.

The COGAG propulsion system aboard the destroyer Arleigh Burke includes GE reduction gearing. Over the past few years, GE has invested more than $25.5 million in its advanced hardened and ground gear facility at Lynn, Mass., and now has one of the world's finest gear facilities in the world. The complex is dedicated to the design, manufacture and test of superior and hardened and ground Navy gears.

Two other major suppliers of reduction gearing to the international naval market are Westinghouse and Western Gear. Westinghouse reduction gears are aboard the amphibious assault ship Wasp, as well as Spruance and Kidd Class destroyers and Ticonderoga Class cruisers.

Western Gear has supplied reduction gears for both the Oliver Hazard Perry Class (FFG-7) and Adelaide Class (Australian) frigates.

Reader Service Numbers For Manufacturers In This Review

Manufacturers	Reader Service #
Engines	
Alco/Bombardier	66
Allison Gas Turbines	67
Caterpillar	68
Colt-Pielstick (FM)	69
Combustion Engineering	70
Cummins	71
Detroit Diesel	72
Deutz MWM	73
EMD (GM)	74
GE Gas Turbines	75
GE Steam Turbines	76
GMT	77
Isotta Fraschini	78
Krupp MaK	79
MAN B&W	80
MTU	81
Rolls-Royce	82
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Bird-Johnson	87
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Lips	89
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Omnithruster	91
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Riva Calzoni	93
Schaffran	94
Schottel	95
Sulzer-Escher Wyss	96
Ulstein	97
Voith-Schneider	98
Gears	
Cincinnati Gear	99
Falk	1
GE Gear	2
Renk	3
Twin Disc	4
Western Gear	5
Westinghouse Gear	6
ZF	7

Major Navy Contracts

(continued)

Tukwila, Wash., was awarded a **$7,455,559** firm-fixed-rate, indefinite quantity, indefinite delivery contract for intermodal transportation of containerized and bulkbreak cargo between Seattle, Wash., and the Naval Air Station, Adak, Alaska. The contract performance period is 24 months and will begin July 1, 1988, and end June 30, 1990. The Military Sealift Command, Washington, D.C., is the contracting authority (N00033-88-D-8503).

Amclyde Engineering Products, Saint Paul, Minn., was awarded a **$9,281,467** firm-fixed-price contract to construct a refueling crane at Portsmouth Naval Shipyard, Kittery, Maine. Work is expected to be completed in February 1991. The Naval Facilities Engineering Command, Northern Division, Philadelphia, Pa., is the contracting activity (N62472-85-C-1460).

Charleston Naval Shipyard, Charleston, S.C., was the successful offeror in a competitive program between public and private sector shipyards for the Extended Refit Period (ERP) for USS James Madison (SSBN-627). The ERP is being assigned on a firm-fixed-price basis. The price for this effort is **$10,128,650.** Work will be completed in December 1989. The Naval Sea Systems Command, Washington, D.C., is the requiring activity.

June 22

General Electric Company, Government Electronic Systems Division, Syracuse, N.Y., was awarded a **$33,300,000** modification to a previously awarded cost-plus-incentive-fee contract for MK-116 Mod 7 antisubmarine warfare control system computer software for DDG-52, DDG-53, DDG-54, CG-65, CG-66, CG-67 and CG-68. Work will be completed in February 1991. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-84-C-6362).

Sealift Tankships Incorporated, Oyster Bay, N.Y., was awarded a **$24,443,030** firm-fixed-price contract including options for the time charter of the MV Noble Star, a multipurpose breakbulk ship. The contract performance period is 17 months with two 17-month options. The ship will be delivered at a mutually agreeable date between January 9th and 13th, 1989. The Military Sealift Command, Washington, D.C., is the contracting authority (N00033-88-R-1102).

June 27

Unisys Corporation, Great Neck, N.Y., was awarded a **$9,288,170** fixed-price contract for refurbishment services for AN/SPG-55B radars. Work will be completed in May 1989. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N000024-88-C-5648).

Martin Marietta Aero and Naval Systems, Baltimore, Maryland, was awarded a **$6,650,000** modification to a previously awarded cost-plus-fixed-fee contract for technical engineering services in support of the MK-41 vertical launching system. Work will be completed October 31, 1988. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-86-C-5417).

June 30

Newport News Shipbuilding and Dry Dock Company, Newport News, Va., was awarded a **$2,949,631,605** modification to existing contract N00024-88-C-2055 to provide for the construction of CVN-74 and CVN-75. The new total target price of this fixed-price incentive contract is **$3,674,000,000.** Work will be completed in June 1998. The Naval Sea Systems Command, Washington, D.C., is the contracting activity.

General Dynamics Corporation, Electric Boat Division, Groton, Conn., was awarded a **$347,400,000** fixed-price-incentive contract for one SSN-688 class submarine. Work will be completed in April 1993. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-88-C-2196).

The General Instrument Corporation, Government Systems Division, N.Y., New York, is being awarded a **$3,600,000** contract to upgrade two existing sonar systems aboard USNS Silas Bent and USNS Kane. The contract also provides for a shore-based system for improved communications and data processing. Work will be performed in Westwood, Mass. (80 percent), and Narrangansett, R.I. (20 percent), and is expected to be completed in 1989. The Office of Naval Research, Washington, D.C., is the contracting activity (N00014-88-C-6020).

July 1

General Electric Company, Syracuse, N.Y., was awarded a **$278,161,093** firm-fixed-price contract for 14 AN/SQQ-89 surface ASW combat systems for CG, DD and FFG class ships. Work will be performed in Syracuse, N.Y. (56 percent); Portsmouth, R.I. (13 percent); Glen Burnie, Md. (12 percent); Baltimore, Md. (5 percent); Moorestown, N.J. (5 percent); Minneapolis, Minn. (5 percent); Glendale, Calif. (2 percent); and Boston, Mass. (2 percent), and is expected to be completed in December 1991. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-88-C-6219).

General Dynamics Corporation, Valley Systems Division, Rancho Cucamonga, Calif., was awarded a **$40,838,750** modification to a previously awarded cost-plus-incentive-fee contract for final acceptance

(continued)

Major Navy Contracts

(continued)

test equipment for the rolling airframe missile. Work will be completed November 30, 1990. This contract combines purchases for the U.S. Navy (50 percent) and for the Federal Republic of Germany (50 percent) under the existing Memorandum of Understanding. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-85-C-5350).

Loral Systems Group, Goodyear Aerospace Division, Akron, Ohio, was awarded a **$21,626,225** modification to a previously awarded firm-fixed-price contract for ordnance alteration (ORDALT) Mod 0/1 kits for MK 60 CAPTOR underwater mines. Work will be completed in December 1990. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-86-C-6097).

Martin Marietta Aero and Naval Systems, Baltimore, Md., was awarded a **$3,367,884** modification to a previously awarded cost-plus-fixed-fee contract for materials and services for the MK 41 Vertical Launching System (VLS) life cycle support facility. Work will be performed in Ventura, Calif., and is expected to be completed September 30, 1988. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-85-5526).

FMC Corporation, Naval Systems Division, Minneapolis, Minn., was awarded a **$5,049,986** modification to a previously awarded cost-plus-fixed-fee contract for material and engineering services in support of the MK 41 Vertical Launch System. Work will be completed September 30, 1988. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-86-C-5442).

General Dynamics Corporation, Electric Boat Division, Groton, Conn., was awarded a **$41,970,000** cost-plus-fixed-fee contract for design agent services for SSBNs 738, 739 and 740. Work will be completed in December 1993. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-88-C-2148).

July 6

National Projects Incorporated, Boise, Idaho, was awarded a **$33,012,777** firm-fixed-price contract for the construction of a ship support complex at the Naval Station, Pascagoula, Miss. Work is expected to be completed in September 1990. The Naval Facilities Engineering Command, Southern Division, Charleston, S.C., is the contracting activity (N62467-86-C-0292).

July 7

Vessel Charters Incorporated, New York, N.Y., was awarded a **$22,237,611** firm-fixed-price contract with options for the time charter of SS American Trojan. The ship will be used as part of the Navy's Afloat Prepositioning Force. The contract period is 17 months with two 17-month options and will be delivered between January 9th and 13th, 1989. The Military Sealift Command, Washington, D.C., is the contracting authority (N00033-88-C-1142).

Ryan Marine Delivers Towed Array Barge To U.S. Navy

Ryan Marine, Inc. of Port Bienville, Miss., recently delivered to the U.S. Navy a Towed Array Support Barge to be utilized at the Trident Refit facility at Kingsbay, Ga.

Ryan Marine has been in operation for over two years in the Pearlington, Miss., area performing repair work on both government and commercial vessels.

The Navy-Trident project represents the first government new construction job performed by Ryan.

The 40-acre shipyard is conveniently located adjacent to the Gulf Intracoastal Waterway as well as being in close proximity to both the Port of New Orleans and the Port of Gulfport, Miss.

For free literature giving full details on Ryan Marine,

Circle 43 on Reader Service Card

U.S. Navy Torpedo Boats To Use Omnithruster Hydrojet Systems

According to Omnithruster Inc. president **Charles M. Aker,** three new U.S. Navy YTT Class torpedo and mine testing vessels will be equipped with Omnithruster hydrojet maneuvering and propulsion systems.

McDermott Shipyard, Amelia, La., has contracted for Omnithruster Mark II hydrojet Model JT700TDs for YTTs -9, -10 and -11, which are under construction at the yard. The 350-hp units are equipped

with a microprocessor-based 1200A control system.

YTTs, which have a length of 185 feet, 45-foot beam and draft of 12 feet, are used to test underwater ordnance at the Naval Undersea Test Facilities and recover the spent torpedoes for further testing.

"A prime necessity for this application is precise maneuvering, position keeping and automatic heading control," stated Mr. **Aker.**

As an industry leader, Omnithruster has created a number of innovative and future-oriented designs and products to improve the overall efficiency and reliability of marine transportation, including lower-acoustical noise systems for both military and non-tactical commercial vessels. Omnithruster also produces specialized ice management systems for polar class high-performance ships.

Omnithruster hydrojet maneuvering and propulsion systems operate efficiently whether the vessel is in light ship conditions or deep-drafted and while underway or when station-keeping. Systems are currently installed in many vessel types from tugs, barges and fishing boats to icebreakers, large cruise liners, minesweepers, tankers, research, seismic, and hydrographic vessels.

For free literature detailing the features and applications of Omnithruster systems,

Circle 12 on Reader Service Card

Moss Point Delivers Third Of Four Logistic Support Vessels To U.S. Army

Moss Point Marine, Inc., Escatawpa, Miss., has delivered the General Brehon B. Somervell, the third of four 273-foot logistic support vessels (LSV) being built for the U.S. Army in a $40.8-million contract.

The Army contract is being administered by the U.S. Navy and its Supervisor of Shipbuilding, Conversion, and Repair (SUPSHIPS) in Pascagoula, Miss.

Speaking at the ship's christening, **James B. Emahiser,** the Army's first program executive officer for troop support said: "This new generation of logistics support vessel will enable the Army to fulfill its logistics-over-the-shore (LOTS) mission by providing a ship which is not dependent upon external cranes nor port facilities. ... Its ramps, fore and aft, will provide drive-through capabilities, facilitating the transport of containerized, bulkbreak, and roll-on/roll-off cargoes from ship-to-shore at ... the world's ports and unimproved beaches."

The all-steel Somervell is 273 feet long, with a 60-foot beam, and 16-foot 5-inch depth. Her two General Motors EMD-16-645-E2 diesel engines can propel the ship at approximately 12 knots, and she can transport between 900 and 2,000 short tons of cargo with a range of over 5,500 nautical miles. Crews will consist of six officers and 24 enlisted men.

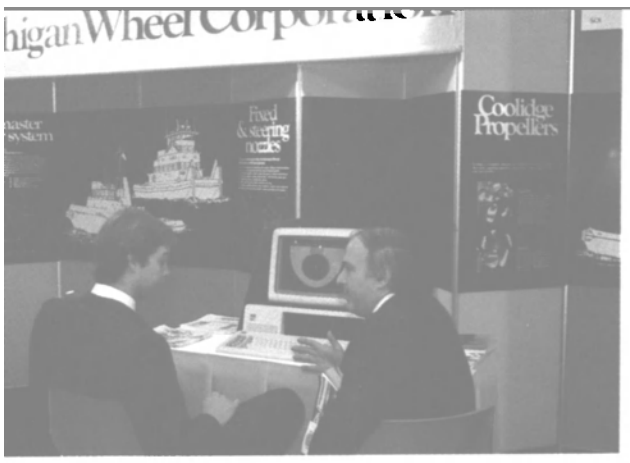
The supply ship is named in honor of Army General **Brehon B. Somervell,** who was head of the Army Service Forces during World War II which provided most of the logistics support for troops overseas. While on detached service, he served as chief of the Works Progress Administration (WPA) in New York City, and supervised various projects, including the construction of La Guardia Airport. Another of his construction projects included the building of the Pentagon in 1940.

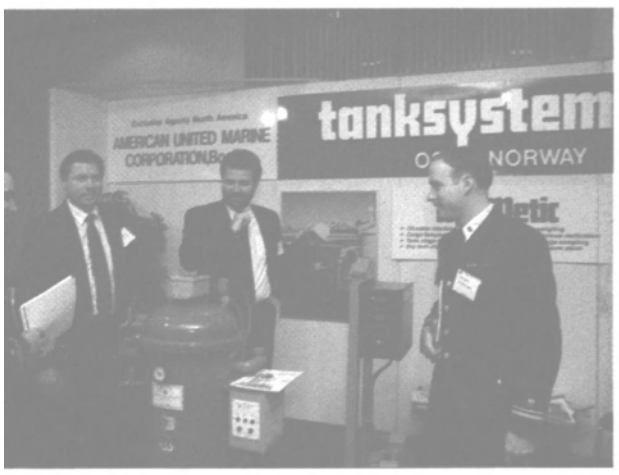
Mr. **Emahiser** said the General Somervell will be assigned to the 604th Transportation Detachment, Washington Army National Guard in Tacoma. The ship will be used throughout the Northwest Pacific to support the 9th Infantry Division (motorized), I Corps, and the Washington and Alaskan National Guard. The vessel will also participate in joint exercises with British and Canadian forces.

Moss Point Marine, Inc. is part of the Trinity Marine Group which is owned by Trinity Industries, Inc. of Dallas, Texas. Other members of the shipbuilding group are Halter Marine, Inc., with shipyards in Moss Point, Miss., and Lockport, La., Equitable Shipyards, Inc., with facilities in New Orleans, and Madisonville, La., and Gretna Machine and Iron Works, Inc., Harvey, La.

For free literature giving full information of the facilities and capabilities of Moss Point Marine,

Circle 57 on Reader Service Card





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PACIFIC MARINE EXPO

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THE ADVERTISING LEADER in 1987, a larger number of advertisers placed more pages of advertising in Maritime Reporter than in the No. 2 magazine.

Harold M. Thibodeaux (left), president, Con-Tech Power Systems, Inc., and **Gerry Thomas,** sales engineer, Siemens Energy & Automation, Inc., dockside of the U.S. Army's LSV-4, built by Moss Point Marine, Inc., New Orleans, La.

Con-Tech Supplies Siemens Electrical Control Components For Logistic Support Vessels

Con-Tech Power Systems of Pearlington, Miss., marked a significant milestone, when it was selected to supply the entire list of electrical control components required for the Logistic Support Vessel (LSV) construction program at Moss Point Marine, Inc., New Orleans, La.

The selection of Con-Tech as the sole supplier of the entire electrical component package is significant because it is rare that one manufacturer produces the wide variety of controls necessary to outfit a ship of an LSV's size, 274 feet overall length, and then be able to supply the equipment at a competitive price.

Similar in design to World War II landing craft, LSVs have RO/RO cargo capability with a wide variety of systems powered and operated electrically—from the bow loading ramp to the steering gear at the stern.

Michael Roberts, president of MTR Design Consultants, Metarie, La., was assigned the critical job of designing the major electrical and control systems on board the LSVs. Mr. **Roberts** put together a package consisting of the electrical I-inline diagrams and load specifications for the main and auxiliary generators, electrical distribution panels and the various horsepower ratings of the servo control motors on the board the vessel. The package was then sent out for bids to certain suppliers who are familiar with this kind of project. After reviewing the bids, Moss Point and MTR selected Con-Tech.

"When we reviewed the bids," said Mr. **Roberts,** "we decided to go with Con-Tech because they offered the low bid and all the switching, distribution and control components were specified from a single, well-known manufacturer—Siemens."

Harold Thibodeaux, president of Con-Tech, said, "Working with MTR to develop the necessary circuitry and controls diagrams came first. The next step was to procure the equipment from Siemens, then assemble the equipment within our facility. We then apply our expertise and technology to the already existing Siemens technology and put together a marine package."

Con-Tech was contracted to develop and supply materials and equipment in three general categories—a ship service switchboard design, a complete listing of components, as well as the components themselves.

Generator control consists of a main generator motor control panel with a manual paralleling capability, and a distribution switchboard with over 40 molded case circuit breakers. A separate control panel and switchboard for the emergency generator was also constructed by Con-Tech.

A five-section motor control center handles power and reduced-voltage distribution to the various individual motor starter controls. Approximately 20 reduced-voltage, single- and three-phase starters activate the steering gear, ventilation equipment, air compressors and many other systems on board the vessels.

Mr. **Thibodeaux** said the success of this project was due in part to the benefits realized from sourcing controls from a single supplier. "First of all, our bid situation was greatly enhanced because we were able to source from one supplier. Secondly, the cooperation from **Gerry Thomas,** Siemens sales engineer, also went a long way in providing us with the numbers we needed to win the contract."

For free literature detailing the full line of Siemens electrical control components offered by Con-Tech Power Systems,

Circle 108 on Reader Service Card

Pacific Ship Awarded Maintenance Contract For Aircraft Carriers

Pacific Ship Repair & Fabrication, Inc., a San Diego ship repair company, has been awarded a one-year contract to provide maintenance, upkeep and repair for aircraft carriers homeported in San Diego, Calif.

The indefinite quality contract will initially be funded by the Naval Sea Systems Command for $1,416,429, which is 5 percent of the firm's winning proposal price of $28,328,585.

Technology Applications Awarded $10-Million HM&E Contract

Technology Applications, Inc. (TAI), Norfolk, Va., a professional and technical services firm, has been awarded a $10-million, three-year contract by the Naval Supply Center in Norfolk to provide engineering and technical support services for Hull, Mechanical, and Electrical (HM&E) systems/equipment on Atlantic Fleet ships for the Naval Sea Support Center, Atlantic (CENLANT). TAI's Engineering and Industrial Support Division has provided similar services to the Navy since 1985.

Reliable Combustion Engineering waste heat recovery boilers are helping the Navy cut the cost of turning seawater into drinking water aboard the *Ticonderoga* (CG-47) class guided missile cruisers.

And that's not all our waste heat recovery boilers do. They generate high-quality saturated steam for ship's heating as well as steam for the galley, laundry and de-icing system.

Annual projected fuel savings for a CG-47 class ship is estimated at more than $200,000. (Based on three waste heat boilers per ship, operating an average of 5,000 hours a year, with a steam usage of 7,000 pounds per hour; fuel at $20 per barrel.)

Achieving savings like these obviously requires high reliability. And our boilers have proven they can deliver. With over 80,000 accumulated operating hours aboard the *Ticonderoga, Yorktown, Vincennes,* and *Valley Forge* and at the NAVSSES test facility in Philadelphia, our equipment has operated without a single boiler-related failure.

What's more, the boilers are designed with maintenance in mind by incorporating ample access to the gas and water sides. This has contributed to the excellent operating record.

Powerful ideas like our waste heat recovery boilers are typical of Combustion Engineering's commitment to the U.S. Navy.

For more information, write:
Combustion Engineering, Inc.
Dept. CEP1-MR
P.O. Box 500
Windsor, CT 06095-6052

COMBUSTION ENGINEERING

Circle 206 on Reader Service Card

MacKay Communications Wins U.S. Navy YTT-9 Electronic Package

MacKay Communications, Inc. of Raleigh, N.C., has been awarded a subcontract to supply the electronic equipment and perform a turn-key installation on the U.S. Navy Torpedo Test Craft (YTT-9) to be delivered to the Naval Undersea Weapons Engineering Station.

MacKay has contracted with McDermott Inc., shipyard operations of Amelia, La., to provide and install the communication/navigation/positioning system. They will also perform a complete EMI survey and control plan.

MacKay's Military Maintenance and Repair Group, based in Jacksonville, Fla., will be the installing activity, managed from the Elizabeth, N.J., headquarters.

For free literature giving information on MacKay Communications,

Circle 44 on Reader Service Card

Blohm & Voss Yard Wins $26.4-Million Contract To Lengthen Ferry

The Hamburg yard of Blohm & Voss has been awarded a $26.4-million contract to lengthen and convert the 6,800-grt ferry Peter Wessel for Larvik Line.

Under the contract, Blohm & Voss will lengthen the ferry by about 74 feet, as well as modernize the entire vessel.

Jamesbury Corp. Acquires Hammel Dahl, Inc. —Literature Available

Jamesbury Corp. recently announced that it has purchased all the outstanding shares of Hammel Dahl, Inc., of Warwick, R.I. Hammel Dahl is a manufacturer of process control valves for the chemical processing, power, air separation, and related industries. It employs approximately 130 people.

In a joint statement, officials of both companies stated that Jamesbury, which has owned 30 percent of the shares in Hammel Dahl for the past five years, plans to expand the business through its worldwide sales and marketing network. The acquisition also broadens the product lines Jamesbury presently offers to its diverse markets.

A Jamesbury spokesman stated that the acquisition is not expected to have any impact on employment levels in its Worcester and Shrewsbury plants.

Jamesbury, a subsidiary of Combustion Engineering, Inc. of Stamford, Conn., is a leading manufacturer of valves, actuators and associated controls.

For more information and free literature,

Circle 117 on Reader Service Card

MMA Seeks Executive Secretary

The Marine Machinery Association (MMA), Washington, D.C., has announced that the organization has reluctantly accepted the resignation of Mr. **Dan Marangiello,** executive director. Mr. **Marangiello** is leaving MMA to devote full time to his own business interests. He was the founding executive director of MMA and an officer since the organization's inception in 1984.

The MMA membership now consists of 70 of the world's leading and largest manufacturers of marine equipment. All are major long-time suppliers to the U.S. Navy, as well as the Coast Guard, Military Sealift Command, the Corps of Engineers and the commercial marine sector.

The group works closely with the Navy to insure the continuing supply of dependable, quality equipment and spare parts, and to effect economies and help resolve supply, maintenance and repair problems whenever possible.

Those interested in the part-time position of executive secretary of the MMA or in more information regarding membership in the MMA may contact: Marine Machinery Association, 1700 K Street, N.W., Suite 903, Washington, D.C. 20006.

New Product Tanker Group Formed By Norwegians

A new product tanker shipping group has been formed in Norway by the shipping company Erling H. Samuelsens Rederi A/S of Koppange, and Oslo-based Fearnley Finans (Prosjekt) A/S.

Two ships have been purchased by the group, the Wind Spirit and Wind Splendour, for a price of $11 million to $13 million each. The vessels were built in Finland in 1977.

The new shipping group will be managed by Wind Tankers A/S. Wind Product Tankers A/S, a new operating company, will be responsible for marketing the two vessels.

The new group plans to have as many as eight product tankers in its fleet by the end of this year. As part of the Norwegian International Ships Registry, the first two ships will fly the Norwegian flag.

ELECTRONICS UPDATE

Sperry Marine's New Rascar Wins Wide Type-Approval Acceptance

Sperry Marine's new Rascar series of rasterscan radar/ARPAs with touchscreen control have received type-approval certification from regulatory agencies in the United Kingdom (DOT), West Germany (DHI), the Netherlands (PTT), and the U.S. (FCC), Rascar product marketing manager **Bruce Angus** recently announced.

In addition to the main Rascar systems, the "soft" Interswitch control and the flexible Adaptive interface have also been type-approved. The latter permits a Rascar display with touchscreen control to operate as a stand-along ARPA display when interfaced with another manufacturer's radar.

Sperry Marine, a subsidiary of Newport News Shipbuilding Company, has shipped more than 100 Rascar systems to date and, with an additional order-book in excess of 100 systems, the widest acceptance by users and regulatory agencies is being realized.

Rascar is currently undergoing type-approval tests in Italy (RINa), Poland (PRS), East Germany (DRSK), Romania (RNR), and Japan (JG). Further Rascar type-approvals are planned to suit the schedules of other national authorities.

Mr. **Angus** commented that the unsolicited favorable reaction to Rascar by approval agencies and by first-time Rascar users has demonstrated how simple it is to learn and operate this new radar with ARPA. For further information and free literature on Sperry Marine's new Rascar series of raster-scan radar/ARPAs,

According to Rascar product marketing manager **Bruce Angus,** Sperry Marine's new Rascar not only meets customers' wishes for aesthetics and ergonomics, it provides one of the best overall performances of any commercial radar available.

Circle 103 on Reader Service Card

USCG Opens Door To Commercial Emergency Towing

In an action not necessarily connected with the recent Public Hearings on emergency towing, the Coast Guard's publishing of a Final Rule, effective September 15, 1988, states that anyone wanting to engage in towing of disabled boats for financial consideration will be able to do so. The only requirement is to have a Coast Guard license of any level, and an endorsement on that license for "Assistance Towing."

"Assistance Towing" is defined in the Code of Federal Regulations as "towing a disabled vessel for consideration."

This could mean using your own boat to bring in a disabled sailboat stuck on a sandbar, or a motorboat that ran out of gas, and charging for the service.

To qualify, one must hold a license (motorboat operator, Ocean operator, master or mate) and pass a written examination based on assistance towing safety, equipment and procedures.

In order to meet the demand for this endorsement, Sea School has announced a series of one-day (or two evening) prep courses to cover this specialized towing exam. For more information on this Final Rule, call the License Information Hotline toll free at (1-800) 237-8663.

OMSA Chief Mayberry To Retire In October

Capt. **William Mayberry,** who directed the Offshore Marine Service Association (OMSA) for nearly 15 years, will retire from his post on October 31.

Richard Currence, chairman of the board of the national trade organization of offshore vessel operators and suppliers, said a search has begun for a successor to Captain **Mayberry.**

Captain **Mayberry** joined OMSA as its first executive director after having served 26 years in the U.S. Coast Guard. Last year, the board of directors changed his title to president.

OMSA promotes the goals and interests of companies providing support to all phases of offshore oil, mineral, construction, and pipelaying industries. Its offices are located at 1440 Canal Street, Suite 1709, New Orleans, La. 70112.

Seebeckwerft Receives $38.9-Million Order To Build Rail Ferry

Seebeckwerft of Bremerhaven, West Germany, recently received a DM65-million ($38.9-million) order from the Railship Group to build a 10,000-dwt rail/freight ferry. She is the third ferry of this type to be ordered by Railship from Seebeckwerft over the last few years.

The vessel, the Railship III, which is expected to be delivered in February 1990, will be powered by two Wartsila Diesel 9R46 engines rated at 8,145 kw at 450 rpm and will have two auxiliary 4R32 Wartsila diesel engines which produce 1,620 kw. The ferry will be about 622 feet long, with a molded breadth of 71 feet and service draft of 19 feet. She will be equipped with about 2,000 meters of rail track on three decks and will be of similar design as Railship II, which was built by Seebeckwerft and delivered in 1984 to the Railship Group. The lower decks of the vessel will be designed for carriage of dangerous cargoes.

The ferry will be used for service between Travemunde, West Germany, and Hanko, Finland.

For free literature on the shipbuilding, converting and repairing services of Seebeckwerft,

Circle 115 on Reader Service Card

GE Wins $32.3-Million Addition To Navy Contract

A $32.3-million addition to a Navy contract was recently announced by General Electric Co. The original contract was for Trident submarine communications equipment.

Autodata Division Of Acurex Expands Data Acquisition Capabilities

The MDAS 7000 Data Acquisition System, recently acquired by the Autodata Division of Acurex Corporation from TransEra Corporation of Provo, Utah, combines high-speed acquisition rates, large channel capacity, and extensive process analysis capability at an affordable price.

The MDAS 7000 is highly modular and can be configured for almost any application. There are over 30 I/O cards that include standard analog and digital plus anti-aliasing, thermocouple, RTD, bridge, relay outputs and stepper motor control. There are three standard communication interfaces, RS-232, RS-422 and GPIB (IEEE-488).

Using the Motorola 68000 M processor, operating at 10 mHz, and a high-speed D/A converter, scanning speeds of 200,000 samples/sec are possible, with a single channel burst mode of 625,000 samples/second.

The MDAS 7000 offers disk and tape drive options that store acquired data directly in a streaming mode. This allows uninterrupted acquisition of large quantities of data at the fastest possible rates. The on-board mass storage of data can be in the form of DOS compatible floppy disks, up to 80 megabytes of hard disk, and/or digital tape. Two MBytes of on-board RAM is also available. The raw or reduced data can be directly sent to a graphic display, plotter or host computer.

A powerful software language, TBASIC, is available to simplify data manipulation and signal analysis. This special engineering BASIC was developed for MDAS and is especially useful in developing custom application software. TBASIC offers extensive graphic routines and computational capabilities to make easy work of data analysis. TBASIC's integrated GPIB syntax makes intelligent instrument control easy. It also supports all the popular 3rd party IEEE-488 controller cards.

The addition of this product line expands Autodata's current data acquisition capabilities into industrial testing laboratories as well as automotive, aerospace, and research testing environments.

For additional technical information and free literature,

Circle 116 on Reader Service Card

Circle 304 on Reader Service Card ➔

Watercom Announces New And Expanded Subscriber Service

Representatives of Waterway Communications Systems, Inc. (Watercom®) and International Telecharge, Inc., Dallas, Texas, recently announced that a contract between the two organizations has been signed. ITI will provide Watercom telephone subscribers with operator-assisted long distance services.

Watercom is the only direct-dialed Automatic Marine Telephone System (AMTS) serving the inland marine industry. Watercom already provides direct dial telecommunications services to commercial vessels operating along 4,000 miles of inland waterways, including the Ohio, Illinois, and Mississippi rivers and the Gulf Intracoastal Waterway. Other capabilities of the system include fax transmission and data services.

With the ITI service, Watercom subscribers will now be able to charge calls to all Bell calling cards, VISA, MasterCard, American Express, Discover, Carte Blanche, or Diners Club credit cards or call collect.

Watercom is a registered trademark of Waterway Communications Systems, Inc.

For more information and free literature,

Circle 48 on Reader Service Card

Shipbuilding & Metal Fabrication Conference Set For October 4-5

The Shipbuilding and Metal Fabrication Technology Conference will be held on October 4-5, 1988 at the Radisson Hotel Hampton in Hampton, Va.

The conference, sponsored by the American Welding Society and their Tidewater Section, will focus on new materials and technologies in the shipbuilding and metal fabrication industries.

Geared for design engineers, materials specialists, welding and industrial engineers, tank fabricators, manufacturing supervisors, QA and QC personnel, marine engineers and naval personnel, the conference will address four major areas of change in shipbuilding and metal fabrication technology: new methods of construction/fabrication; new materials in shipbuilding and fabrication; process and control innovations in construction and fabrication; and future directions of welding and metal fabrication markets worldwide.

For further information, contact: the AWS Education Department, American Welding Society, 550 N.W. LeJeune, P.O. Box 351040, Miami, Fla. 33135; or telephone: 1-800-443-9353.

Matrix Desalination Offers Free Literature On 'Gold Series' Watermakers

Matrix Desalination, Inc. of Ft. Lauderdale, Fla., is offering free literature on their 'Gold Series'™ watermakers which are designed and built for applications where reliability is essential.

Matrix Gold Series watermakers are ideal for charter yachts, cruise ships, merchant and naval vessels, hotel resorts, basically wherever breakdowns and a lack of fresh water cannot be tolerated.

Matrix Desalination's technical staff in Florida is comprised of merchant and naval engineers, with the director of engineering being a licensed chief engineer who has in excess of 25 years of service in British nuclear submarines. The company's design and construction department knows firsthand what is required for producing potable water at sea.

For more information and a free copy of the literature on the Gold Series of watermakers from Matrix Desalination,

Circle 37 on Reader Service Card

Sal Berté Forms Saber Communications —Literature Available

Sal Berté recently announced the formation of Saber Communications, a Houston-based company that will specialize in the representation of high-quality products for marine dealers in both the commercial and pleasure-craft marketplaces. In addition, the company will offer marketing and technical consultant services on a national basis.

Saber Communications has already established a Telemarketing Division whose day-to-day operations are run by Mr. **Berte's** sons **Carl** and **Sal Jr.,** offering automatic Telemarketing services, a product called Telehold which solves the customer-on-hold problems, and as a WaynePaging franchisee, offering Paging equipment with voice mail and toll-free 800 services.

Mr. **Berte** is presently vice president of NMEA, and on the board of directors of RTCM. He was formerly general sales manager with Radio-Holland USA, B.V., and director of marketing for the Communications Systems Division of North American Philips, and brings over 20 years of high-tech communications and marine electronic experience to Saber. He has successfully created and operated nationwide networks of over 200 dealers for both former companies.

For more information and free literature on Saber Communications,

Circle 50 on Reader Service Card

Trinity Marine Expands Ship-Repair Capabilities With 2,000-Ton Drydock

The Trinity Marine Group, New Orleans, La., has expanded its ship-repair and conversion capabilities with the addition of a 2,000-ton, 162-foot floating drydock.

John Dane III, president of the Trinity Marine Group, said the dock's length, and 59-1/2-foot distance between wingwalls, provide the capacity to accommodate a wide range of vessels up to 250 feet.

Trinity also operates a 4,000-ton, 160-foot drydock with 120 feet between wingwalls at its Equitable Shipyards, Inc., facility in New Orleans.

The latest drydock can be utilized at any of the group's six shipyards.

In addition to the Equitable/New Orleans facility, the Trinity Marine Group includes Equitable's Madisonville, La., yard; Halter Marine Inc., shipyards in Moss Point, Miss., and Lockport, Miss.; Moss Point Marine, Inc., Escatawpa, Miss.; and Gretna Machine & Iron Works, Inc., Harvey, La.

For free literature describing the shipbuilding, ship-repair and conversion services offered by the Trinity Marine Group,

Circle 11 on Reader Service Card

$40-Million Order Won By AESA For 140,000-Dwt Oil Tanker For CNN

An option to build a second 140,000-dwt oil tanker at the Puerto Real yard of Astilleros Espanoles SA has been taken up by Nacionale de Navegacion (CNN), bringing to five the number of Suezmax tankers on order at the state-owned facility in southern Spain.

The 899-foot-long by 141-foot vessel will be equipped with Burmeister & Wain main machinery developing 18,300 bhp and a service speed of 14 knots. Astilleros Espanoles said the engineroom would be fully automated and the ship would operate with a crew of 18.

The price of the new tanker is expected to be upwards of $40 million

Construction of the new tanker provides a further 750,000 man-hours of work for Puerto Real, which will be working at full capacity by next year.

For free literature giving full information on the facilities and capabilities of Astilleros Espanoles,

Circle 33 on Reader Service Card

14-Page Leslie Catalog Features G-Series Valves, Regulators

The Super G-Series of pressure reducing valves and temperature regulators from Leslie Controls, Inc. is described in a new full-color 14-page catalog now available.

The Super G-Series is a family of valves combining the simplicity of a self-contained regulator with the performance of more sophisticated control systems. Only two moving parts in the valve body assures minimum maintenance.

The literature features photos and schematic drawings, operational information, performance and material specifications and ordering information.

For more information and free copies of the 14-page catalog from Leslie Controls,

Circle 51 on Reader Service Card

The 564-foot by 78.7-foot Monterey will operate as a luxury cruise vessel in the interisland Hawaiian cruise market.

Wartsila Completes Conversion And Refurbishment Of S/S Monterey To Luxury-Class Cruise Liner

Wartsila Marine Industries has completed the conversion and refurbishment of the S/S Monterey at its Turku Repair Yard, and the vessel has been re-delivered to her owners, Aloha Pacific Cruises, Alexandria, Va.

The 564-foot-long Monterey will transit via Kristiansand, Norway, where it will be bunkered for the Atlantic crossing to Bethlehem Steel Corporation's Sparrows Point yard in Maryland, for installation of new stabilizers.

The Monterey was originally built by Bethlehem Steel at Sparrows Point in 1952 as the first of five Mariner-type cargo vessels.

As required by the Jones Act, structural steel work in connection with the conversion has been given to U.S. yards and the outfitting and interior work was done in Finland.

After the conversion, the vessel will fulfill the present pollution prevention rules and regulations.

The work included refurbishing the old passenger cabins, addition of 127 new cabins and 22 crew cabins, and extension of public room and technical systems to serve the increased number of passengers. A new conference center, veranda lounge, pool area with jacuzzis, lounge and other amenities have been added, and other public rooms were completely renewed. Also, the latest navigation and communication equipment was installed.

After a cruise around the U.S. coast to Hawaii, the Monterey will start operating in the interisland Hawaiian cruise market.

For literature containing full information on the facilities and capabilities of Wartsila Marine,

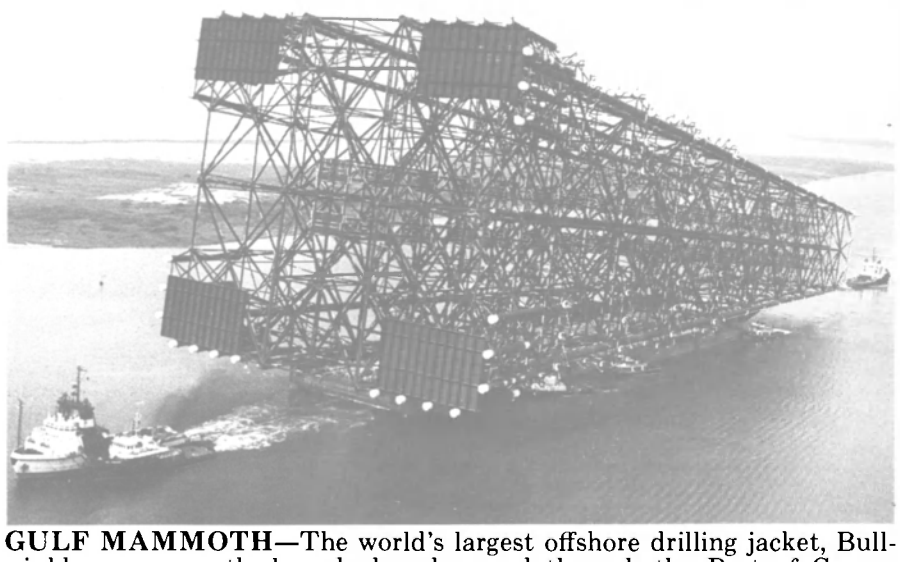
Circle 100 on Reader Service Card

KOS Announces Corporate Changes

Thomas P. Tatham, managing director of Braspertise, Limited (Braspertise) a United Kingdom firm, and **Joe W. Key,** president of Key Ocean Services, Inc. (KOS), a Texas corporation, jointly announced recently that Braspertise has become a major investor in KOS. KOS will own and lease storage tankers and floating production, storage and offloading (FFPSO) units and market their proprietary Uni-Turret Mooring System and High Pressure Multi-Product Fluid Swivel.

For more information and free literature,

Circle 39 on Reader Service Card



GULF MAMMOTH—The world's largest offshore drilling jacket, Bullwinkle, was recently launched and moved through the Port of Corpus Christi. When the deck and drilling units are installed, the 50,000-ton Bullwinkle will stand 1,615 feet above the seafloor—161 feet higher than the Sear's Tower in Chicago, the world's tallest building. She was built by Gulf Marine Fabricators, Corpus Christi, for Shell Offshore Inc. for use in the Green Canyon section of the Gulf of Mexico.

PROPULSION
UPDATE

New Propeller Boss Cap Fins Provide Significant Improvement In Efficiency

A result of concentrated research effort for the past two years, Propeller Boss Cap Fins (PBCF) are said to show significant economic features for all vessels.

To date, research for improving propeller efficiency due to vortexes in the slipstream of the propeller has concentrated on the loss of efficiency due to the propeller tip vortex. There have been many designs and devices tested for reducing this effect.

Until recently, very little research has concentrated on the efficiency loss due to the propeller hub or boss. Theoretical calculations for propeller performance which includes the influence of the hub have only recently become possible.

The result of joint research efforts by Mitsui OSK Lines Ltd., West Japan Fluid Engineering Laboratory Co. Ltd., and Mikado Propeller Co. Ltd. since September 1986, PBCF is designed to decrease the induced resistance due to the vortexes generated by the boss cap.

PBCF is a simple device, having the same number of fins attached to the boss cap as that of the ship's propeller. The fins serve to control the flow over the propeller hub, thus diffusing the vortexes created by the hub. This effect is seen clearly in the two photographs of the model tests, included with this article. Pro-

(continued)

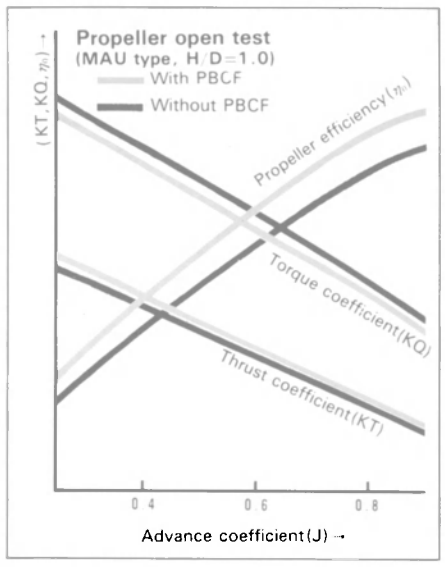
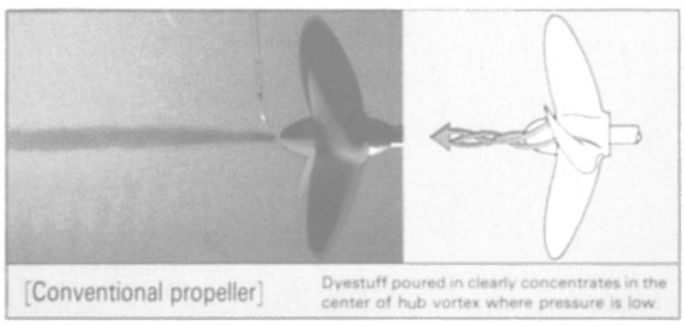
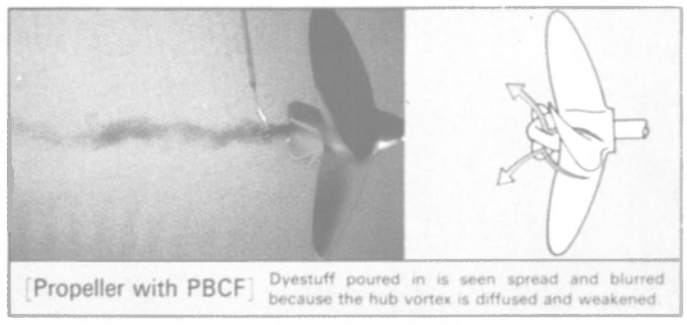


Figure 1

Photo showing the process of pouring visible chemical dyestuff.





Propeller Boss Cap Fins

(continued)

peller open water model tests have shown gains in efficiency of 3 percent to 7 percent and resistance/self-propulsion tests conducted on a 6-meter model indicated gains of 2 percent to 5 percent. A graphical summary of the model tests are shown in Fig. 1.

Speed trials conducted in September 1987 for the Mercury Ace, a 44,979-grt car carrier of Mitsui OSK Lines Ltd., fitted with PBCF, demonstrated a real ship efficiency improvement of 4 percent. Trials were conducted simultaneously with a like sister ship without PBCF. Fig. 2 shows the graphical results of these trials.

On-ship trials have also shown that installation of PBCF has no effect on maneuverability.

As PBCF controls the flow behind the propeller—it has little dependence on the hull form like other energy-saving devices. As a result, PBCF is effective on ships of any type. PCBF is said to be especially effective for high-speed ships with a high propeller pitch ratio.

Smaller and lighter than conventional energy-saving devices set around the propeller, PBCF can also be manufactured at low cost. The investment can be recovered in as little as one year.

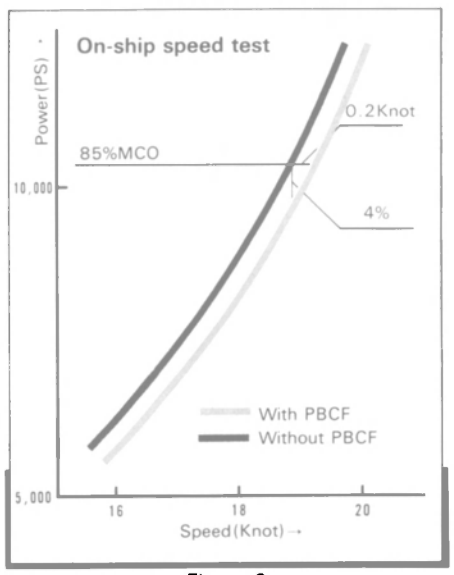


Figure 2

An important feature is that installation of PBCF can be performed in a very short period of time for a new ship under construction or a ship in operation. Installation simply requires the removal and replacement of the propeller boss cap with PBCF. With a ship in drydock, this can be accomplished in only four to five hours. The added weight also has an insignificant effect on shaft alignment and bearing loads.

PBCF has the same number of fins attached to the boss cap as that of the ship's propeller. Installation simply requires the removal and replacement of the propeller boss cap with PBCF.

Since January of this year, PBCF has been fitted on over 23 ships of several types. All are said to have experienced significant increases in propulsion efficiency ranging from 3.2 percent to 6.7 percent. The average increase in efficiency has been 4.2 percent

For more information and a copy of the technical paper on the development of PBCF,

Circle 8 on Reader Service Card

AWO Reelects Knight Chairman Of The Board

The American Waterways Operators, an Arlington, Va.-based trade association, recently announced that **Arthur M. Knight,** executive director of Reinauer Industries of Newark, N.J., has been reelected chairman of the board of directors.

folds are cooled by sea water. Engine compartments were insulated at the deck and bulkheads to reduce noise.

Electronics aboard the Phoenix III include a Regency Model 7200 VHF/ADF, Furuno FCV-661 depth finder, LC-90 loran, and FCR-904 radar; Si-Tex DT-2 depth sounder; and a Federal PA-300M siren.

One mission of the boat will be to speed rafts to passengers who evacuate downed airplanes into the water. The boat carries 20 MRP-10S Switlik rescue platform type inflatable rafts on forward and aft decks.

Munson designed and built a trailer capable of launching the boat in salt water. The three-axle trailer is galvanized and its bearings and brakes are salt-water corrosion resistant.

For free literature on the boatbuilding services offered by Munson,

Circle 111 on Reader Service Card

New Joint Venture Formed For China's International Maritime Exhibition

The Cahners Exposition Group (CEG) and the Seatrade Organisation recently announced the formation of a joint venture company to organize China's international maritime exhibition, "Marintec China" and "Marintec Offshore China," which has been held in Shanghai every two years since 1981. The event is held in cooperation with the Shanghai Society of Naval Architecture & Marine Engineering (SNAME).

CEG's and Seatrade's extensive worldwide network of offices and agents will combine to promote and develop the scope of the event internationally and in China.

A major international conference will take place at the same time as the exhibition, bringing together a wide range of sea transportation experts from the business as well as the technical communities.

The Seatrade Organisation has its own strong links with the People's Republic of China and publishes the Chinese language magazine "Maritime China" in association with the China Ocean Shipping Company, and with the support of the Ministry of Communications.

Marintec China and Marintec Offshore China will next be held at the Shanghai Exhibition Centre, People's Republic of China, from November 28 to December 2, 1989.

For further information, contact **Tony Nash,** The Seatrade Organisation, Fairfax House, Causton Road, Colchester CO1 1RJ, United Kingdom, phone 0206 45121, telex 98517 DISOP G, fax (0206) 45190.

Nola Centurion Opens Fabrication Facility In Braithwaite, La.

With contracts totaling more than $2.5 million, Nola Centurion Fabricators, a division of Nola Fleet Management, Inc., recently announced the opening of its Braithwaite, La., fabrication facility.

From their 30-acre site at Mile 80.7 on the Mississippi River, Nola Centurion offers services ranging from sophisticated inspection techniques for repair to engineering and fabrication for commercial and industrial projects, and launching of vessels or offshore rig assemblies up to 250 feet.

One current contract includes the complete refurbishing of 112 barges of a 515-barge fleet operated by Forest Lines, Inc. of New Orleans. "Even though we're located on the river, we don't want people to think we're limited to marine construction," said **Joe Martin,** vice-president of operations. "We support a wide range of industries—petrochemical, marine, and commercial construction. We perform maintenance, fabrication and construction projects throughout the river parishes. Our facilities allow us to transport by rail and truck as well as by the river."

Past contracts for the petrochemical industry have included maintenance, fabrication and construction work.

For free literature describing the complete services offered by Nola Fleet Management,

Circle 45 on Reader Service Card

ELECTRONICS UPDATE

New Low-Cost Weather Chart Recorder From Alden Doubles As Computer Printer

Alden Electronics, Inc., Westborough, Mass., recently announced the introduction of the Alden Faxmate™ Weather Chart Recorder. The Faxmate is one of the lowest-cost recorders of its type on the market.

According to **Armand Bouchard,** Faxmate product manager, "Alden is introducing the Faxmate to provide an economical means for all mariners to be able to acquire vital weather and oceanographic charts while underway. As an added bonus, the Faxmate can double as a printer for an IBM PC or compatible computer, since it features a standard Centronics interface."

Designed to operate with any HF or ham radio, the Faxmate provides mariners with surface analyses charts which show current locations of storms as well as prognoses which predict the indicated speed and direction of these storms. Many transmit sites now broadcast sea surface temperature, mixed layer depth and the location of warm and cold water eddies which are so helpful in locating various species of fish.

The Faxmate complements Alden's current line of Marinefax recorders which have won the coveted National Marine Electronics Association Award for reliability and performance for the last eight consecutive years.

The low-cost Alden Faxmate Weather Chart Recorder doubles as a printer for onboard computer.

For further information and free literature on Alden's Marinefax recorders,

Circle 9 on Reader Service Card

Northwest Marine Gets $4.8-Million Contract To Drydock MSC Oiler

Northwest Marine Iron Works, Portland, Ore., was recently awarded a $4,775,510 contract by the U.S. Navy's Military Sealift Command (MSC) to perform the drydocking and maintenance overhaul of the fleet oiler USNS Kawishiwi (T-AO-146).

Raytheon Marine Introduces A Combination Loran With Raster Scan Plotter

Raytheon has introduced a combination Loran with Raster Scan Plotter. According to the company, Raytheon's new Rayplot 700 and 700L Raster Scan Loran/Plotters make it easy to plot and tract a vessel's location and route on ultra-bright, 7-inch electronic charts. And, the company reports, Rayplot's high-capacity memory cards enhance its electronic charts with land areas "shaded" to clearly differentiate between land and water.

The credit-card-sized ROM or RAM cards (Read Only Memory/ Random Access Memory) slip into the front of the Rayplot display units. ROM Chart Cards (4,000 points of memory) provide electronic charts digitized from NOAA charts. Readily available for all areas having Loran-C coverage, they show shorelines, landmarks, and navigation aids. The RAM Store/ Recall Cards (4,100 point memory capacity) let operators modify and save charts which are customized with event marks, waypoints, and other important navigation data. In addition, an internal memory of 4,100 points consists of four groups of event/destination marks with up to 500 points each, plus 100 points for waypoint memory. Five-year lithium batteries provide memory backup.

The Rayplot is available as a plotter only (Rayplot 70000 or plotter with built-in Loran-C receiver (Rayplot 700L).

Raytheon's Rayplot 700 and 700L have passed Raytheon's tough environmental tests for shock, vibration, temperature extremes, and resistance to corrosion. Installation of these compact units is simple. They can be mounted on table-top, bulkhead or overhead, in any protected area not exposed to rain or water spray. Raytheon offers a two year limited parts warranty with one year free labor from its worldwide service network.

Raytheon Rayplot 700L Raster Scan Loran/Plotter.

For more information and free literature from Raytheon Marine Company,

Circle 106 on Reader Service Card

Houston Marine Services Acquires Economy Boat's Gulf Coast Operation

Houston Marine Services, Inc. (HMS) of Houston, Texas, recently announced it has purchased the operating assets of Economy Boat

High-Performance Ropes Described In New Catalog From Samson Ocean Systems

A new 16-page catalog and price list from Samson includes construction and technical data on 19 different high-performance ropes for use by utilities in various applications.

Major products include high-strength, low-stretch and enhanced abrasion-resistance ropes using the new high-modulus fibers, Samthane protective coatings and Parallay braid designs for maximum strength-to-weight ratios and cost efficiency.

In addition to complete specification tables for the various types of rope, the catalog contains a listing of the characteristics and recommended use for each

For more information and free literature from Samson Ocean Systems,

Circle 17 on Reader Service Card

Devoe Marine And Devoe Napko Coatings Divisions Merge As Devoe Coatings Company

Grow Group, Inc. of New York, N.Y., recently announced the merger of Devoe Marine Coatings Co. Division and Devoe Napko Protective Coatings Division. The new company will be known as Devoe Coatings Company.

In making the announcement at a meeting of 150 Devoe sales representatives, **Joseph M. Quinn,** Group vice president of Grow Group and president and chief executive officer of Devoe Coatings Company, said: "As Devoe Coatings Company we will be better equipped to continue our growth in the supply of high-performance paints and coatings to the marine, industrial and offshore industries on a worldwide basis. The combined product line, sales force, technical service representation and distribution network will increase the high-quality service our customers have come to expect from Devoe." Making the launch of a dynamic growth program targeted at the industrial maintenance market, Mr. **Quinn** told the audience that Devoe industrial coatings will soon be made available through Devoe retail stores in selected geographical areas across the country.

Robert H. Osmer has been appointed executive vice president and chief operating officer for Devoe Coatings Company. **Andrew R. House,** formerly vice president and general manager of Devoe Napko Protective Coatings Division, has been promoted to vice president-marketing for Devoe Coatings Company.

Devoe Coatings Company is a division of Grow Group, Inc., one of the nation's leading producers of specialty chemical coatings and paints.

For more information and free literature,

Circle 21 on Reader Service Card

Munson Delivers Cummins Triple Engine, Hamilton Jet Boat For Lake Erie Use

The 36-foot patrol/rescue boat CX50 is powered by three Cummins diesel engines, each coupled with Hamilton waterjet for safe operation in the shallow debris-strewn waters on the eastern end of Lake Erie.

Munson Manufacturing Inc. of Edmonds, Wash., recently delivered a new 36-foot patrol/rescue boat, designated the CX50, to the Sheriff's Department of Chautauqua County in western New York.

The 17,000-pound boat—light for its size—is equipped with Cummins's latest model 6BTA5.9-M diesels and Hamilton's newest model 27l waterjet propulsion units for safe operation in shallow, debris-strewn waters. Each of the three turbocharged, aftercooled in-line, six-cylinder diesels develops 250 horsepower at 2,600 rpm. Each waterjet unit has a thrust of up to 2,600 pounds.

The 12-foot-beam boat is fully equipped with a dive ladder and platform, tow post, overnight cabin with galley and marine head and an array of electronic equipment, including a radar unit and Loran-C radio navigation unit. Fuel capacity totals 250 gallons and fresh water capacity, 30 gallons.

The CX50 will be placed into rigorous service. The patrol/rescue boat will be assigned to patrolling 30 miles of Lake Erie coastline, where Coast Guard vessels usually are unavailable as a first line of defense against storms as well as illegal drugs. Another primary mission is boating law enforcement. The boat will be based at Dunkirk, on Lake Erie.

For free literature giving complete information on Cummins diesel engines,

Circle 36 on Reader Service Card

For more information and free literature on the shipbuilding facilities of Munson Manufacturing,

Circle 30 on Reader Service Card

Intercon Receives MarAd Go-Ahead For Additional Four Twin Cargo Cranes

Intercontinental Engineering-Manufacturing Corporation (Intercon) recently received notice from the Maritime Administration to proceed with the manufacture of four pedestal-type, twin cargo cranes. The option follows the initial contract requirement for six twin cranes presently in process.

Singlely operated, each crane is rated at 30 long tons at 121-foot outreach, and 60 long tons at 121-foot outreach when operated in dual (two single cranes teamed) mode. All functions of the twin cargo cranes are electrohydraulically powered.

One shipset of twin cranes will be installed aboard the Navy's auxiliary craneship T-ACS 9, with the remaining shipset on T-ACS 10. Contract completion is scheduled for December 1989.

For free literature giving full information on products manufactured by Intercon,

Circle 55 on Reader Service Card

Sembawang Shipyard Wins $7.3-Million Contract

Sembawang Shipyard Limited has won a major S$15-million (about $7.3 million) contract to reconstruct and refurbish a complete accommodation unit of a supertanker.

The contract to rebuild the 239,435-dwt Liberian registered tanker S/T Rova was awarded to Sembawang Shipyard by Olaya Shipping Corporation.

For free literature giving details on the facilities and capabilities of Sembawang Shipyard,

Circle 53 on Reader Service Card

Call For Papers For Conference On Advanced Marine Systems

The Intersociety Advanced Marine Vehicles Conference and Exhibit, which will be held June 5-8, 1989 at the Hyatt Regency Hotel in Crystal City, Washington, D.C., is soliciting unclassified abstracts and papers on a wide range of topics related to advanced marine systems.

The conference and exhibit provides a forum for technologists, potential commercial and industrial users, military planners, regulators and operators to exchange and discuss new ideas in the field of advanced marine systems.

Papers are being solicited for the following topics: mission and application scenarios; advanced monohull systems; air cushion systems, SWATH vehicles; seaplanes; subsurface vehicles and ROVs; wing-in-ground-effect vehicles; hydrofoils; surface effect ships; planing hulls; hybrid and nonconventional craft; competition marine craft; multi-hull craft; design methodologies; sea-based space launch systems; AMV testing facilities and techniques; at-sea launch and recovery techniques; institutional and regulatory issues; and AMV operations and economics.

One session will be devoted to a student paper competition. Prizes of $200, $100 and $50 will be awarded for first, second and third place. There will also be a poster session for brief project reports and a film video viewing of the latest operations and testing.

Some of the major societies involved in the conference include: The Society of Naval Architects and Marine Engineers; the American Society of Naval Engineers; the U.S. Hovercraft Society; the Wingship Society; and the Canadian Air Cushion Technology Society.

The deadline for submitting abstracts, which should be between 200-400 words, is October 29, 1988. Abstracts should include paper title, principle author, organization, address and telephone number. Notice of acceptance will be issued on November 30, 1988, with final manuscript due March 17, 1989.

Abstracts should be sent to: **H. Weiland,** Intersociety Advanced Marine Vehicles Conference, Conference Committee, P.O. Box 1071, Mercer Island, Wash. 98040.

PROPULSION UPDATE

Propulsion Plant Debut For MAN B&W's Mini-Bore, Two-Stroke Diesel Engine

Free Brochure Available

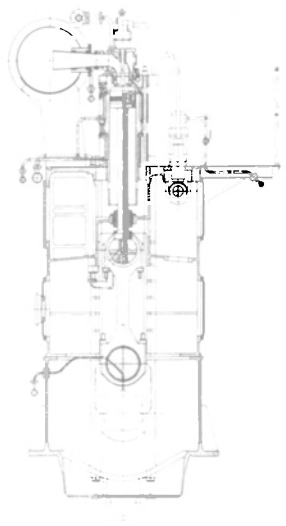
The Japanese feeder containership Rokku Maru features the first MAN B&W S26MC diesel engine installation.

The recent seagoing debut of MAN B&W Diesel's S26MC two-stroke design—plus a growing order backlog—suggest that there is a strong market for what is reportedly the world's smallest low-speed crosshead engine in the small-to-medium oceangoing, coastal and inland ship propulsion market.

The 260-mm bore/980-mm stroke engine was released last year to extend the economic and technical merits of MAN B&W's MC two-stroke program for ships which were previously restricted to four-stroke, medium-speed geared machinery. The S26MC range encompasses four to eight-cylinder models, which offer outputs ranging from 700 kw (950 bhp) to 2,920 kw (3,970 bhp) at speeds of 250 rpm or less, allowing direct-coupling to the propeller.

The overall operational advantages of the new model—including high reliability, low maintenance demands and impressive fuel economy on low grade bunkers—have attracted Asian and European owners. Interest has intensified with the entry into service of the first S26MC marine installation—a six-cylinder model powering the Japanese 126-TEU feeder containership, the Rokku Maru.

S26MC CROSS SECTION



The 6S26MC engine installed aboard the 239-foot containership, which was subcontracted to Hanshin Diesel by MAN B&W licensee Kawasaki, develops 2,185 kw (2,970 bhp) at 250 rpm and is directly coupled to a CP propeller for a design speed of 14.3 knots.

Both the shipowner, Marui Kauin, and shipbuilder, Yamanaka Shipyard, reported that the engine performed well during sea trials with the use of heavy fuel with a 0.9963 specific gravity and 165 cSt viscosity. Very little smoke was observed under all maneuvering conditions, and none at all at full load. Low noise and vibration levels—notable features of the design—also confirmed expectations. Open inspection of the engine revealed no signs of piston ring sticking or coke.

The debut marine installation will provide a convenient practical testbed for longer term monitoring of the S26MC engine on heavy fuel. The operational integrity and performance of the design have already been well proven by the six-cylinder prototype after over a year of exhaustive testing at MAN B&W Alpha Diesel's factory in Frederikshavn, Denmark. The initial development goals have been comfortably met within the engine's potential margins. The prototype 6S26MC engine is now available for sale.

For a free brochure detailing the features and applications of the S26MC engine from MAN B&W Diesel,

Circle 110 on Reader Service Card

Yarrow Wins U.K. Frigates Order Worth $538.5 Million

The U.K.'s Yarrow Shipbuilders recently won an order to build three more Type-23 frigates for the Royal Navy. The order for a fourth ship will be held over until next year when another batch of new vessels will be announced.

Each ship is about 10 million pounds ($17 million) cheaper than the average of three earlier Type-23s ordered in 1986, bringing the price to about 105 million pounds per vessel ($179.5 million).

The three new Duke-class ships—the Iron Duke, Monmouth and Montrose—follow four other Type-23s already under construction, three at Yarrow.

The number of new frigates of all types now on order for the Navy is now 10. Type-23 is the main anti-submarine ship envisaged for service over the next decades.

Plans call for the government to order two new frigates next year, two in 1990, three more in 1991, and again the following year. This will ensure that aging ships are replaced and the escort force of about 50 is maintained.

For free literature giving details on the facilities and capabilities of Yarrow Shipbuilders,

Circle 52 on Reader Service Card

Kiene Diesel Offers Free Literature On Cylinder Pressure Indicator K-100

Kiene Diesel Accessories, Inc. of Addison, Ill., is offering free literature on their cylinder pressure indicator K-100 for reading firing and compression pressures on gas or diesel engines.

The patented K-100 utilizes the "trapped pressure" principle, whereby cylinder pressure is "trapped" within a chamber and the pressure read directly and conveniently on a high-quality bourdon gauge. This field-proven concept reduces the moving part of the indicator to a single lightweight, high-temperature resistance valve, thus eliminating springs, counters, pistons and other operating problems.

The literature contains ordering information on the Model K-100 cylinder pressure indicator, as well as Model K-101 and Model K-107. Also discussed are V-line indicator valves for two or four-stroke/cycle gas or diesel engines.

For more information and free copies of the literature from Kiene Diesel,

Circle 34 on Reader Service Card

Daewoo's Okpo Shipyard Delivers Pan Ocean's Fourth Car Carrier

Daewoo's Okpo shipyard recently delivered Pan Ocean Shipping Co.'s fourth car carrier, the Auto Diana.

The last of the 5,700-car-capacity vessels ordered by Pan Ocean at the South Korean shipyard two years ago, the newly built car carrier will be put into service on the north American and European route to carry South Korea's export cars.

Other vessels delivered to Pan Ocean this year include the Auto Atlas and Auto Benner in March, and the Auto Champ in June.

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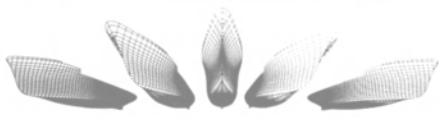

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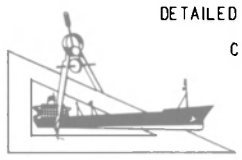

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New Satellite Communications System From Comsat Selected For Blue Riband Competition

Comsat Technology Products, Inc. recently announced that its MCS-9120 Satellite Communications Terminal has been selected for use aboard the Gentry/Continental's Proud Bird—the U.S. competitor in the upcoming challenge for the Blue Riband of the Atlantic.

This will be the first time a maritime satellite communications terminal (Satcom) has been used at continuous high-speeds (averaging 45 knots per hour), as the Gentry/Continental's Proud Bird attempts to break the record for trans-Atlantic crossings. Throughout the running, the MSC-9120 will provide voice telex and fax transmissions enabling the crew to keep abreast of weather updates and progress reports.

Comsat's MCS-9120 is one of the smallest, lightest, maritime satellite communications terminals available. It provides instantaneous, private, direct-dial, voice, data, facsimile, and telex communications through the worldwide Inmarsat satellite network.

Inmarsat is an international cooperative comprised of approximately 50 member countries that oversees operation of its global satellite system. All communication to and from the Satcom passes through a designated Inmarsat satellite and Coast Earth Station which provides access to the international Telex and Telephone networks.

The MCS-9120 is a third generation marine satellite communications (Satcom) system. Comsat developed and introduced the first Satcom to the marine community more than 12 years ago. Comsat Technology Products, Inc. is a wholly owned subsidiary of the Comsat Corporation.

For more information and free literature from Comsat Technology Products,

Circle 26 on Reader Service Card

Samson Sold To Management Group—Will Focus On Expanding Use Of High Performance Ropes

Enserch Corporation of Dallas, Texas, has sold its wholly owned subsidiary, Samson Ocean Systems, Inc., to the company's management group of **Stephen Swiackey,** president and chief operating officer; **Charles E. Smith,** vice president of sales and marketing; and **Daniel Dally,** vice president of finance. This group represents 35 years of combined service in the cordage industry, and has been in position for three years.

The offshore energy business of Samson, located in Coatbridge, Scotland, was recently sold to Bridon Fibres PLC of England. The offshore operation designed and manufactured fiber rope mooring systems for the offshore loading of oil tankers.

According to president **Swiackey,** Samson will now concentrate its engineering, manufacturing and sales on expanding the high performance cordage and rope markets it has developed and served in the U.S. and Canada, including hardware, housewares, commercial fishing, pleasure boating, power transmission and distribution, commercial marine and Department of Defense requirements. This includes the use of recently developed higher tenacity fibers which can be made into ropes with up to 10 times the strength of steel, making it possible to expand applications of synthetic fiber strength members. Current projects include micro-braids for artificial ligaments, zero-stretch halyards for sailboats, higher strength mooring lines for ships and improved net and lead lines for commercial fishing.

For additional information and free literature,

Circle 27 on Reader Service Card

Seaward International Delivers 34 Sea Guard Marine Fenders To U.S. Naval Station In Florida

Seaward International, Inc., Clearbrook, Va., recently announced that it has completed the manufacture, testing and delivery of thirty-four 7-foot-diameter by 14-foot-long Sea Guard® marine fenders for installation at the U.S. Naval Station in Mayport, Fla.

In 1982, Seaward supplied the base with twenty 6- by 12-foot Sea Guard fenders for use in protecting the relatively thin-skinned hulls of the new FFG-class ships being homeported at Mayport. These original fenders provided outstanding performance. As a result, the naval station has systematically been upgrading the fendering at all of its piers and wharves with foam-filled fendering. The recent order brings the total number of Seaward fenders at the base to over 130 fenders.

In late 1987, Ed Waters & Sons Contracting Co., Inc., a Jacksonville, Fla.-based marine construction company, was awarded a contract by the U.S. Navy for the removal and replacement of the existing fender system at four berths on Pier D located at the Mayport Naval Station. Seaward delivered the 34 large fenders within 90 days after the contract award, and the project was completed in less than one-half the allocated contract time. All normal daily port operations were conducted without disruption.

The Sea Guard fenders supplied for this project were manufactured by Seaward International to the U.S. Navy specifications which were developed largely based on the design and performance of the standard Sea Guard marine fender product line. Seaward manufactures and supplies a wide range of marine fenders and flotation equipment to the Navy and commercial marine industries.

For further information on Seaward's other fendering and flotations products,

Circle 24 on Reader Service Card

Woods Hole To Award Contract On Competitive Bid Basis To Pre-Qualified Contractors

The Woods Hole Oceanographic Institution is planning the overhaul and refit of two oceanographic research vessels, the Melville and the Knorr. The scope of work includes lengthening, repowering, propulsion replacement, and general overhaul commencing on or about November 1988 for the first ship and July 1989 for the second ship. The ships presently have a length between perpendiculars of 220 feet, 46-foot beam, 16-foot draft, and are of 2,200 long tons displacement. Work is to be done by a qualified shipyard in the contiguous U.S.

An award will be on a competitive bid basis to pre-qualified contractors. Shipyards desiring to qualify should address letters of interest to: Purchasing Manager, Woods Hole Oceanographic Institution, Woods Hole, Mass. 02543, phone (617) 538-1400, telex 951679.

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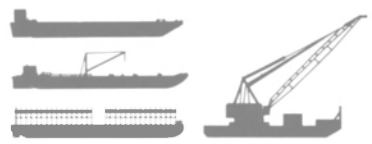

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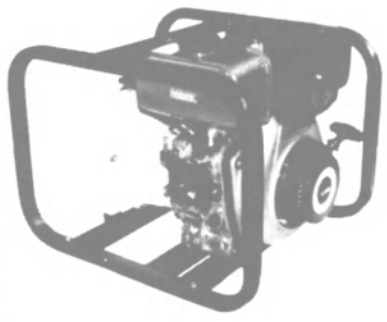

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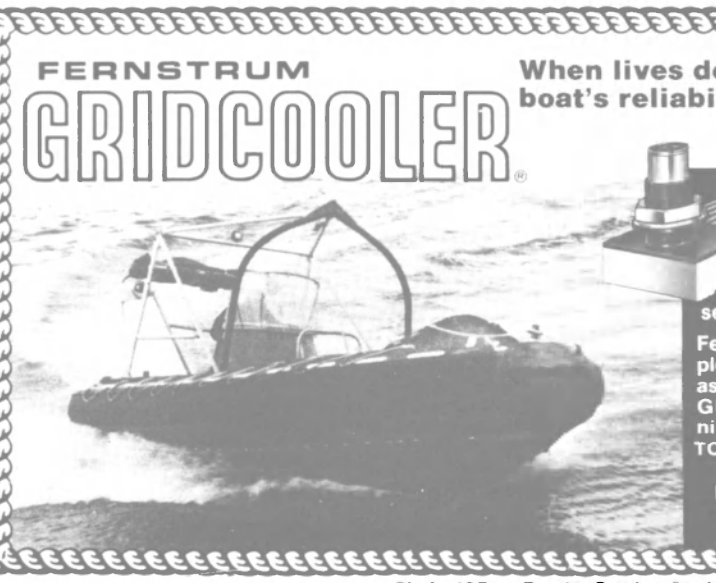

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FOR MORE INFORMATION
ON
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The listings above are an editorial service provided for the convenience of our readers.

Standard Communications Introduces New Marine Radio And Loud Hailer

"The most water-resistant radio and hailer on the market today" is how Standard Communications describes the new Horizon Infinity VHF marine radio and the LF10 loud hailer

The 25-watt Horizon Infinity, in addition to being extremely water-resistant, incorporates an ultra-sensitive Gasfet receiver and more advanced scanning, programming and features including an LCD display that is easier to read in sunlight. It also has a built-in intercom, PA and includes all U.S., International and Canadian channels.

Standard's Horizon LF10 loud hailer has an output of 30 watts of power and features listen-back, four fog horns, a four-station intercom and other alarm signals. Attractive optional-flush mount systems are available for both units.

For free literature containing additional information on the new Horizon Infinity or LF10 loud hailer,

Circle 42 on Reader Service Card

Tidewater Marine Acquires Three Vessels In Exchange For Common Stock

Tidewater Inc.'s marine division, Tidewater Marine Service, has completed an agreement to purchase three utility vessels from Bollinger Machine Shop & Shipyard, Inc. of Lockport, La., and two of its affiliated companies.

The three 800-horsepower, 105-foot utility vessels built in 1980 were acquired in exchange for 168,000 shares of Tidewater Inc. common stock, bringing the company's total shares of common stock outstanding to 22,452,047. Bollinger is a major builder of vessels for the offshore oil and gas industry, as well as the U.S. Navy and U.S. Coast Guard.

The vessels are currently being readied for service in Tidewater Marine's "small boat" division in the U.S. Gulf of Mexico, according to Tidewater Marine president **Richard M. Currence.** "This division has experienced substantial progress, more than doubling in size since its inception in late 1987. We anticipate further fleet expansion if current trends continue," Mr. **Currence** said.

He added that this is the company's third vessel package purchase in eight months.

Tidewater Inc. owns and operates one of the largest fleets of vessels supporting the international offshore oil and gas industry.

Spliethoff's Places $87.3-Million Order For Six Cargo Ships

Dutch ship operator Spliethoff's Bevrachtingskantoor has placed an $87.3-million order in the Netherlands for the construction of six 10,000-dwt multipurpose cargo vessels.

Four of the vessels will be built by Tille Scheepsbouw at the Frisian yard. The other two vessels will be built by Verolme Heusden.

The vessels are expected to be delivered between October 1989 and April 1990.

Swiss Firm Of Eckold AG Offers Free Literature On 'Press-Joining'

The photo shows an Eckold mobile tool for press-joining air ducts.

Eckold AG of Trimmis, Switzerland, is offering free literature on"press-joining," an advanced method of connecting metal sheets, profile sections and components. These can be of either the same or different materials and up to a maximum combined thickness of 5 mm (0.200 inches).

Press-joining requires no heat and no auxiliary materials. Echold says you can forget about rivets, screws, nuts and bolts when connecting light-gaged metal parts, thus saving time and money while also avoiding fumes, surface damage and distortion of the material. All it needs is a hydraulic unit to drive one of the mobile tools which have various throat depths to enable you to press-join air duct parts or other metal components on construction sites or in the shop.

Eckold can also supply tools and stationary machines for multiple joints in a single work cycle.

Press-joining is said to be fast, simple, reliable and easy to inspect. For free detailed literature from Eckold,

Circle 23 on Reader Service Card

◀ For literature on Aeroquip products, circle the appropriate number of the reader service card: Hose & Fittings—**Circle 121;** T-J Cylinders—**Circle 122;** Teflon Hose—**Circle 123;** Quick-disconnect Couplings—**Circle 124.**

BUYERS DIRECTORY

This directory section is an editorial feature published in every issue for the convenience of the readers of MARITIME REPORTER/Engineering News. A quick-reference readers' guide, it includes the names and addresses of the world's leading manufacturers and suppliers of all types of marine machinery, equipment, supplies and services. A listing is provided, at no cost for one year in all issues, only to companies with continuing advertising programs in this publication, whether an advertisement appears in every issue or not. Because it is an editorial service, unpaid and not part of the advertisers contract, MR/EN assumes no responsibility for errors. **If you are interested in having your company listed in this Buyers Directory Section, contact John C. O'Malley at (212) 477-6700.**

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Adrick Marine Corp., 320 Cantor Ave., Linden NJ 07036
Bailey Refrigeration Co., Inc, 2323 Randolph Avenue, Avenel, NJ 07001
Stal Refrigeration AB, Butangsgatan 16, S-60187 Norrkoping SWEDEN

ANODES—Cathodic Protection
Electrocatalytic Inc., 2 Milltown Ct., Unian NJ 07083

BALLAST
Genstar Stone Products, Executive Plaza IV, Hunt Valley, MD 21031
Mineral Research & Recovery Inc., 4565 S. Palo Verde, Ste 203, Tucson AZ 85714

BARGE BUILDING
HBC Barge, Brownsville PA 15417

BARGES—Leasing
McDonough Marine Service, P.O. Box 1825, Parkersburg WV 26101

BASKET STRAINERS
Riley-Beaird, P.O. Box 31115, Shreveport, LA 71130

BEARINGS—Rubber, Metallic, Non-Metallic
Johnson Rubber Co., Duramax Marine Div., 16025 Johnson St., Middlefield, OH 44062
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
Kingsbury Inc., 10385 Drummond Rd, Philadelphia PA 19154
Lucian Q. Moffitt, Inc., P.O. Box 1415, Akron, OH 44309
Waukesha Bearings Corp., P.O. Box 798, Waukesha, WI 53186

BOILERS
Combustion Engineering, Inc., Windsor, CT 06095
Marketec, Inc., 27 Bowers Lane, Chatham NJ 07928

BOILER CLEANING
Asea Stal, 50 Chestnut Ridge Rd., Montvail N.J. 07645
Infrasonik AB (an ASEA Stal Co.). S-612 20 Finspong, SWEDEN

BROKERS
Captain Astad Company, Inc., P.O. Box 350486, Ft Lauderdale FL 33335; P.O. Box 1093, Houma, LA 70360
Bergeron & Associates, P.O. Box 726, Chalmette LA 70044
Jack Faulkner Inc., 2419 Caddy Lane, P.O. Box 371, Flossmoor IL 60422
Mowbray's Tug & Barge Sales Corp., 35 De Hart St., Morristown NJ 07960
Ocean Marine Brokerage Services, P.O. Box 1257, Port Canaveral, FL 32927

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CARGO ACCESS EQUIPMENT
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CARGO HANDLING SYSTEM
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Skarpenord A/S, US Agent: American United Marine Corp., 5 Broadway, Rte 1, Saugus MA 01906

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Milligan Marine Supply Inc., 5832 Harvey Wilson, Houston TX 77020

CHOCKING COMPOUND
Philadelphia Resins Corp., 130 Commerce Dr., Montgomeryville, PA 18936

COMPUTERIZED INFORMATION SYSTEMS
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Wright Austin Co., 3245 Wight St., Detroit MI 48207

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Imo-Delaval, Inc., Gems Sensors Division, One Cowles Rd., Plainville CT 06062
Indikon Division, Metravib Instruments Inc., 26 New St., Cambridge, Ma 02138
NAMCO Controls, 7567 Tyler Blvd, Mentor OH 44060
Teleflex Inc., 771 First Ave., King of Prussia, PA 19406
Valmet Automation A.S., P.O. Box 130, N-3430, Spikkestad, Norway
WABCO, 1953 Mercer Rd., Lexington KY 40511

CRANES—HOISTS—DERRICKS—WHIRLEYS
ASEA-Hagglund, Inc., 50 Chestnut Ridge Rd., Montvale NJ 07645
The Crosby Group, Inc., P.O. Box 3128, Tulsa OK 74101
Del Gavio Marine Hydraulics Inc., 207 W. Central Ave., Maywood NJ 07607 telex: 132610 DELMARINE
Marine Travelift, Inc., 49 E. Yew St., Sturgeon Bay, WI 54235
Morgan Crane Co., Inc. (Hiab SeaCranes and QMC Trident, Ferrari, Fassi marine cranes), 1009 E Chestnut Ave., Santa Ana CA 92701
J.D. Neuhaus, Hebezeuge, D5810, Witten Heven, West Germany
Pettibone-Tiffin Corp., 235 Miami St., Tiffin, OH 44883

DECK MACHINERY—Cargo Handling Equipment
Braden Carco Gearmatic, P.O. Box 547, Broken Arrow, OK 74013
Gearmatic—see 'Braden Carco Gearmatic' above.
Markey Machinery Co., Inc., 79 S. Horton St., Seattle, WA 98134
McElroy Machine & Mfg. Co., Inc., P.O. Box 4455, Biloxi MS 39535
Morgan Crane Co., Inc. (Hiab SeaCranes and QMC Trident, Ferrari, Fassi marine cranes), 1009 E Chestnut Ave., Santa Ana CA 92701

DIESEL ACCESSORIES—CYLINDER LINERS
Acurex Corporation, Autodata Division, 555 Clyde Ave., P.O. Box 7042, Mountain View, CA 94039
Colt Industries Inc. Fairbanks Morse Engine Div. 701 Lawton Ave., Beloit, WI 53511
Diesel America Inc., 5217 River Rd., New Orleans LA 70123
FCS Inc., 22 Main St., Center Brook CT 06409
General Thermodynamics Corporation, 210 South Meadow Road, P.O. Box 1105, Plymouth, MA 02360
Kiene Diesel Accessories, 325 S. Fairbanks St., P.O. Box 386, Addison IL 60101

DIESEL ENGINE—Spare Parts & Repair
Bergen Diesel A/S, P.O. Box 924, N-5001 Bergen NORWAY
Bergen Diesel Inc., 2701 Delaware Ave., Kenner LA 70062
Chrome Locomotives, P.O. Box 197, Silvis IL 61282
Colt Industries Inc. Fairbanks Morse Engine Div. 701 Lawton Ave., Beloit, WI 53511
Cummins Engine Co., Inc., Mail Code 40642, Box 3005 Columbus, IN 47202 3005
Goltens, 160 Van Brunt St, Brooklyn NY 11231
MAN B&W Diesel GmbH, Stadtbachstrasse 1, D-8900 Augsburg 1, Federal Republic of Germany
MAN B&W Diesel, 50 Broadway, 18th Fl., New York, NY 10004
Markisches Werk GmbH, P.O. Box 1442, D-5884 Halver 1, Federal Republic of Germany
Sulzer Brothers Inc., 200 Park Ave., New York, N.Y. 10166

DIVING & SALVAGE
Muldoon Marine Services, P.O. Box 3221, Terminal Island, CA 90731
Parker Diving Service Inc., Berth 69, Los Angeles Harbor, P.O. Box 5272, San Pedro CA 90733

ELECTRICAL EQUIPMENT
Eldec Corporation, 16700 13th Ave West, P.O. Box 100, Lynwood WA 98036
SPD Technologies, 13500 Roosevelt Blvd, Philadelphia PA 19116
Ward Leonard Electric, 31 South St., Mt. Vernon, NY 10550
Zidell Explorations, Inc., 3121 S.W. Moody St., Portland, OR 97201

ELECTRONIC INFORMATION SYSTEMS
Inventory Locator Service Inc., 3820 Premier Ave., Memphis TN 38118

ELECTRONIC SYSTEMS
Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 TX: 125327

ENGINE TEST EQUIPMENT
General Thermodynamics Corp., P.O. Box 1105, 210 S. Meadow Road, Plymouth, MA 02360

EQUIPMENT—Marine
Atlas Copco Rental, 70 Demarest Dr., Wayne, NJ 07470
Thomas Coudon Associates, 6655 Amberton Dr., Baltimore, MD 21227
Kearfott Marine Products, 550 South Fulton Ave., Mount Vernon, NY 10550
Maritime Power Corp., 200 Henderson Street, Jersey City, NJ 07302
Space Machine & Engineering Corp., 2346 16th Ave North, St Petersburg FL 33713

EVAPORATORS
Atlas-Danmark Desalination Systems A/S, Stamholmen 93, 2650 Hvidovre (Copenhagen), Denmark
Equipment Engineering, 666 Baker St., #265, Costa Mesa CA 92626
MECO (Mechanical Equipment), 861 Carondelet St., New Orleans LA 70130
Riley-Beaird, P.O. Box 31115, Shreveport, LA 71130

FANS—VENTILATORS—BLOWERS
Carling Turbine Blower Company, 10 Nebraska St., P.O. Box 88, Worcester MA 01613
Flebu A/S, US Agent: American United Marine Corp., 5 Broadway, Rte 1, Saugus MA 01906
Jon M. Liss Associates, Inc., 411 Borel Ave., P. O. Box 5554, San Mateo, CA 94402
Robinson Industries, P.O. Box 100, Zelienople, PA 16063

FASTENERS
Action Threaded Products Inc., 6955 S. Harlem, Bedford Park, IL 60638
Band-It Division, Houdaille Industries Inc., P.O. Box 16307, Denver CO 80216
Hardware Specialties Co., Ships Division, 48-75 36th St, Long Island City NY 11101
Lee Brass Company, P. O. Box 1229, Anniston AL 36202
Mapeco Products, Inc., 725 Glen Cove Ave., P.O. Box 6, Glen Head NY 11545
Non-Ferrous Bolt & Mfg Co., 4085 Nevso Dr., Suite C, Las Vegas NV 89103
Okabe Co., Inc., 175 Lively Blvd., Elk Grove Village, IL 60007

FENDERING SYSTEMS/BUOYS—Dock & Vessel
Intertrade Ltd., Marine Products Div., 15301 Transistor Lane, Huntington Beach CA 92649
Johnson Rubber Co., Duramax Marine Div., 16025 Johnson St., Middlefield, OH 44062
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
Milligan Marine Supply Inc., 5832 Harvey Wilson, Houston TX 77020
Schuyler Manufacturing, 16901 Woodinville-Redmond Rd, Woodinville WA 98072
Seaward International, Inc., Clearbrook Industrial Park, P.O. Box 98, Clearbrook VA 22624

FILTERS
Marketec, Inc., 27 Bowers Lane, Chatham NJ 07928
Parker Filter Division, 16810 Fulton County Rd., #2, Metamora, OH 43540

FUEL ADDITIVE
U.S. Borax, Industrial Chemicals, 3075 Wilshire Blvd., Los Angeles CA 90010

FURNITURE
Bailey, Carpenter & Insulation Co., 2323 Randolph Avenue, Avenel, NJ 07001

GALLEY EQUIPMENT
Gaylord Industries, 10900 S W Avery St, P.O. Box 1149, Tualatin, OR 97062

GANGWAYS, LADDERS
A.L. Don, 1 Don Plaza, Dock St., Matawan NJ 07747
National Specialty Products, 5727 Heffernan St., Houston TX 77087
Rampmaster Inc., 9825 Osceola Blvd., Vero Beach, FL 32960
Westmont Industries, 10805 Painter Ave., Santa Fe Springs, Los Angeles, CA 90670
Wooster Products Inc., 1000 Spruce St., P.O. Box 896, Wooster, OH 44691

HEAT EXCHANGERS
Alfa Laval Inc., 2115 Linwood Ave., Fort Lee NJ 07024
ITT Standard Heat Transfer Technology, Buffalo, NY 14240
MECO (Mechanical Equipment), 861 Carondelet St., New Orleans LA 70130
Riley-Beaird, P.O. Box 31115, Shreveport, LA 71130

HORNS/WHISTLES
Kahlenberg Bros Co., P.O. Box 358, Two Rivers, WI 54241

HYDRAULICS
Aeroquip Corporation, 300 South East Ave., Jackson, MI 49203
Cunningham Marine Hydraulics Co., 201 Harrison St., Hoboken NJ 07030
Del Gavio Marine Hydraulics Inc., 207 W Central Ave., Maywood NJ 07607; telex: 132610 DELMARINE
Parker Hannifin Corporation, 17325 Euclid Avenue, Cleveland, OH 44112

INCINERATORS
Teamtec A/S, P.O. Box 100, N-4912 Gjeving, NORWAY
A/S Vesta, US Agent: American United Marine Corp., 5 Broadway, Rte 1, Saugus MA 01906

INSTRUMENTATION
Technical Services Group, 2900 Main St., Alameda CA 94501

INSULATION—Cloth, Fiberglass
Bailey, Carpenter & Insulation Co., 2323 Randolph Avenue, Avenel, NJ 07001
The Claremont Company, 174 State Street, P. O. Box 952, Meriden CT 06450
Duracote Corp., 350 North Diamond St., Ravenna, Ohio 44266
Soundcoat, One Burt Drive, Deer Park NY 11729

JOINER—Watertight Doors—Paneling—Ceiling Systems
Astech, 3030 S. Red Hill Ave., Santa Ana. CA 92711
Bailey Distributors, Inc., 2323 Randolph Avenue, Avenel. NJ 07001
Dampa Inc., The Gatehouse at North Park, Suite 106-108, Hunt Valley MD 21030
Simpson Timber Co., Third & Franklin, Shelton WA 98584
Walz & Krenzer Inc., 1390 Mt. Read Blvd., Rochester NY 14606

KEEL COOLERS
R.W. Fernstrum & Co., 1716 Eleventh Ave., Menominee, MI 49858
Johnson Rubber Co., Duramax Marine Div., 16025 Johnson St., Middlefield, OH 44062
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
The Walter Machine Co., Inc., 84-98 Cambridge Avenue, Jersey City, NJ 07307

LIGHTING EQUIPMENT—Lamps, Fixtures, Searchlights
Carlisle & Finch, 4562 W. Mitchell Ave., Cincinnati OH 45232
Phoenix Products Company, Inc., 4769 North 27th Street, Milwaukee, WI 53209

LINEN/BLINDS
American Piping Products Inc., Box 1056, New Hyde Park, NY 11040

LUBE-OIL CENTRIFUGES
T. F. Hudgins, Inc., Spinner II Products, P.O. Box 920946, Houston TX 77292-0945
Keith Dixon Warehouse Supplier, Authorized distributor for Spinner II, 650 Whitehead Rd., Lawrenceville NJ 08648
Hamworthy Engineering Ltd., Fleets Corner, Poole, Dorset, BH17 7LA ENGLAND

MACHINERY MAINTENANCE, REPAIR, OVERHAUL, AND TESTING
AMT, Inc., 2400 NW 39th Ave., Miami FL 33142
Del Gavio, 207 W. Central Ave., Maywood, NJ 07607. Telex: 132610 DELMARINE
Goltens, 160 Van Brunt St., Brooklyn, NY 11231
In-Place Machining Co., 1929 North Buffum St., Milwaukee WI 53212

MARINE LUMBER
McCausey Lumber Company, 36325 Harper Ave., P.O. Box 46129, Mt Clemens MI 48046

MEDICAL SUPPLIES
Universal Marine Medical Supply, 69-06 3rd Ave., Brooklyn NY 11209

METAL MARKERS/LETTERS
Johnston Brothers Enterprises, Inc., P.O. Box 1138, Patterson, LA 70329
J. P. Nissen Company, P.O. Box 188, Glenside PA 19038

NAVAL ARCHITECTS, MARINE ENGINEERS, SURVEYORS
Advanced Marine Enterprises, Inc., 1725 Jefferson Davis Hwy., Arlington, VA 22202
Aero Nav Laboratories, Inc., 14-29 112 St., College Point, NY 11356
American Professional Captains Association, P.O. Box 350398, Ft. Lauderdale FL 33316
American Systems Engineering Corp., P.O. Box 8988, Virginia Beach, VA 23452
Amirikian Engineering Co., Chevy Chase Center Bldg., Suite 505, 35 Wisconsin Circle, Chevy Chase, MD 20015
Amtech Services, Inc., P.O. Box 84148, Seattle WA 98124
Armorica Sales Inc., 2 Marineview Plaza, Hoboken NJ 07030
B.C. Research, 3650 Wesbrook Mall, Vancouver, B.C. Canada V6S 2L2
CDI Marine Co., 900 Regency Square Blvd., Suite 203, Jacksonville, FL 32211
C.T. Marine, 18 Church Street, Georgetown, CT 06829
Childs Engineering Corp., Box 333, Medfield, MA 02052
Crandall Dry Dock Engrs., Inc., 21 Pottery Lane, Dedham, MA 02026
Crane Consultants, 15301 First Ave S., Seattle WA 98148
C.R. Cushing, 18 Vesey St., New York, NY 10007
Arthur D. Darden, 3100 Ridgelake Dr., Suite 101, Metairie LA 70002
Design Associates Inc., 14360 Chef Menteur Highway, New Orleans, LA 70129
E.Y.E. Marine Consultants, Belmont House, 33 Alderney Dr., Suite 350, Dartmouth, NS CANADA B2Y 2N4
Encon Management & Engineering Consultant Services, P.O. Box 7760, Beaumont, TX 77706
Christopher J. Foster, Inc., 16 Sintsink Drive East, Port Washington, NY 11050
Gibbs & Cox, Inc., 119 West 31st Street, New York, NY 10001
John W. Gilbert Associates, Inc., 66 Long Wharf, Boston, MA 02110
The Glosten Associates Inc., 600 Mutual Life Bldg., 605 First Ave., Seattle, WA 98104
Morris Guralnick Associates, Inc., 620 Folsom Street, Suite 300, San Francisco, CA 94107
Hi-Test Laboratories, Inc., P.O. Box 226, Buckingham C.H., VA 23921
C. Raymond Hunt Associates, 69 Long Wharf, Boston MA 02110
Hydrocomp, Inc., 45 James Farm-Lee, P.O. Box 865, Durham, NH 03824
Intramarine, Inc., P.O. Box 53043, Jacksonville, FL 32201
JJH Inc., No. 4 Executive Campus, Culbert Blvd. & Route 70, P.O. Box 5031, Cherry Hill, NJ 08034
R.D. Jacobs & Associates, 11405 Main St., Roscoe, IL 61073
James S. Krogen, 1515 NW 7th St., Suite 124, Miami FL 33125
Rodney E. Lay & Associates, 13891 Atlantic Blvd., Jacksonville, FL 32225
Clyde Leavitt Inc., 13901 Puerto Dr, Ocean Springs MS 39564
Alan C. McClure Associates, Inc., 2600 South Gessner, Houston, TX 77063
McElroy Machine & Mfg Co., Inc., P.O. Box 4454, Biloxi, MS 39535-4454
John J. McMullen Associates, Inc., 1 World Trade Center, New York, NY 10048
MacPherson Maritime Services, 141 Jefferson Ave., Westfield NJ 07090
Fendall Marbury, 9 Neal Street, Annapolis MD 21401
Marine Management Systems Inc., 102 Hamilton Ave., Stamford CT 06902
Marine Power Associates, 1010 Turquois St., Ste 217, San Diego, CA 92109
Maritime Design, Inc., 2955 Hartley Rd., Jacksonville, FL 32217
R.J. Mellusi & Co., 71 Hudson St, New York, NY 10013
Nelson & Associates, Inc., 610 Northwest 183rd St., Miami, FL 33169
Nord Marine Inc., P.O. Box 305, Fair Haven NJ 07701
Northern Marine, P.O. Box 1169, Traverse City, MI 49685
Ocean Oil International Engineering Corp., 3019 Mercedes Blvd, New Orleans LA 70114
Capt. H.L. Olsen, Marine Surveyors Company, P.O. Box 283, Port Jefferson NY 11777
Pyrotech Technical Institute, Delgado Community College, New Orleans, LA
Q.E.D. Systems Inc., 4646 Witchduck Rd., Virginia Beach, VA 23455
M. Rosenblatt & Son, Inc., 350 Broadway, New York, NY 10013 and 667 Mission St., San Francisco, CA 94105
Sargent & Herkes, 225 Baronne St., Suite 1405, New Orleans LA 70112
STV/Sanders & Thomas, Inc., 7900 Westpark Dr., McLean VA 22102
Sea School, 3770 16th Street North, St. Petersburg, FL 33704
Seaworthy Systems Inc., P.O. Box 338, Essex, CT 06426; 17 Battery Pl., New York, NY 10004; P.O. Box 205, Solomons MD 20688; 2 Skyline Pl., 5203

Leesburg Pike, Falls Church VA 22041.
Seaworthy Electrical Systems, 17 Battery Pl. N.Y. N.Y. 10004
George G. Sharp, Inc., 100 Church St., New York, NY 10007
T.W. Spaetgens, 156 W. 8th Ave., Vancouver BC CANADA V5Y 1N2
R.A. Stearn, Inc., 253 N. 1st Ave., Sturgeon Bay, WI 54235
Systems Engineering Associates (SEACOR), 200 East Park Dr., Suite 600, Mt Laurel NJ 08054
TIMSCO, P. O. Box 91360, Mobile AL 36691
Tracor Hydronautics, Inc., 7210 Pindell School Rd., Laurel, MD 20707
VSE Corporation, 1417 No Battlefield Blvd, Chesapeake VA 23320
Thomas B. Wilson, Associates, 1258 North Avalon Blvd., Wilmington, CA 90744

NAVIGATION & COMMUNICATIONS EQUIPMENT
AT&T, 412 Mt Kemble Ave., Room N420, Morristown NJ 07960
Atkinson Dynamics, 10 W Orange Ave., So San Francisco CA 94080
Comsat Maritime Services, 950 L'Enfant Plaza SW, Washington DC 20024
Furuno U.S.A., 271 Harbor Way, S. San Francisco, CA 94080
General Electric Company, Mobile Communications Division, Lynchburg, VA 24502
Harris Corporation, RF Communications Group, 1680 University Ave., Rochester NY 14610
Henschel Corporation, 9 Hoyt Dr., P.O. Box 30, Newburyport MA 01950
ITT Mackay, 441 U.S. Highway #1, Elizabeth, NJ 07202
Kelvin Hughes Ltd., New North Rd., Hainault, Ilford, Essex 1G6 2UR England
Mackay Communications, 441 US Hightway #1, P.O. Box 331, Elizabeth NJ 07207
Naval Electronics, 5417 Jetview Circle, Tampa FL 33634
Norcontrol Simulation A/S, Bekkajordet 8A, P.O. Box 1024, N-3191 Horten NORWAY
Ocean Satellite Televion Ltd., Avmar House, 61 Brushfield St., London E1 6AA ENGLAND
Petroleum Communications Inc. (Petrocom) Head Office: 5901 Earhart Expwy., New Orleans LA 70123; 556 Jefferson St., Suite 100, Lafayette LA 70501; Allied Bank Plaza, Suite 5440, 1000 Lousisian St., Houston TX 77002
Racal Marine Inc., 70 Jackson Dr., Cranford NJ 07016
Radio-Holland USA, Inc., 6033 South Loop East, Houston, TX 77033
Raytheon Marine Company, 46 River Rd., Hudson NH 03051
Raytheon Service Company, 5760 Northampton Blvd., Ste 102, Virginia Beach VA 23455
Robertson Shipmate Inc., 3000 Kingman St., Suite 207, Metairie LA 70006
S P Radio A/S, DK 9200 Aalborg DENMARK
SPT Audio, 8928 Kirby Dr., Houston TX 77054
Sperry Marine Inc., 1070 Seminole Trail, Charlottesville VA 22906
Standard Communications, P.O. Box 92151, Los Angeles CA 90009
Standard Radio & Telefon AB, P.O. Box 501, S-162 15 Vallingby, SWEDEN
Telesystems, 2700 Prosperity Ave., Fairfax, VA 22031 USA
Watercom Communications Systems, 453 E. Park Place, Jefferson IN 47130

OILS—Marine—Additives
B P North America Petroleum, 555 US Route 1, So. Iselin, NJ 08830
Chevron USA, 575 Market St., San Francisco, CA 94105
Texaco, International, 2000 Westchester Avenue, White Plains NY 10650

OIL/WATER SEPARATORS
Alfa Laval Inc., 2115 Linwood Ave., Fort Lee NJ 07024
Centrico, Inc. (Westfalia Separators), 100 Fairway Court, Northvale, NJ 07647
FAST Systems Inc., 1717 Sublette Ave., St Louis MO 63110
Marketec, Inc., 27 Bowers Lane, Chatham NJ 07928
Microphor, Inc., 452 E Hill Rd., P.O. Box 1460, Willits, CA 95490

PAINTS—COATINGS—CORROSION CONTROL
American Abrasive Metals Co., 460 Coit St, Irvington NJ 07111
Palmer International, P.O. Box 8, Worcester, PA 19490
Unitor Ships Service, Unitor Marine Chemicals Division, 3 High St., Rickmansworth, Herts, WD3 1SW UNITED KINGDOM
White Metals Inc., 6300 Midvale, Houston TX 77087

PIPE-HOSE—Cargo Transfer Clamps, Couplings, Coatings, Supports
Aeroquip, 300 South East Ave., Jackson, MI 49203
Deutsch Metal Components, 14800 S. Figueroa, Gardena, CA 90248
Stauff Corporation, 21-23 Industrial Park, Waldwick NJ 07463

PORT SERVICES
Port of Iberia, P.O. Box 897, New Iberia LA 70561

PROPULSION EQUIPMENT—Bowthrusters, Diesel Engines, Gears, Propellers, Shafts, Turbines
ASEA Brown Boveri, 1460 Livingston Ave., North Brunswick NJ 08902
Bird Johnson Company, 110 Norfolk St., Walpole, MA 02081
Bergen Diesel A/S, P.O. Box 924, N-5001 Bergen NORWAY
Bergen Diesel Inc., 2701 Delaware Ave., Kenner LA 70062
Boston Metals Co., 313 E. Baltimore St., Baltimore, MD 21202
Burmeister & Wain Alpha Diesel AS, DK-1400 Copenhagen K, Denmark
Caterpillar In., Engine Division, 100 N E Adams, Peoria IL 61629
Cincinnati Gear Co., 5657 Wooster Pike, Cincinnati, OH 45227
Colt Industries Inc. (Fairbanks Morse Engine Div.), 701 Lawton Avenue, Beloit, WI 53511
Combustion Engineering, Inc., Windsor, CT 06095
Deutz Corp., 7585 Ponce de Leon Circle, Atlanta, GA 30340
Fincantieri, Diesel Engines Division—GMT, Bagnoli della Rosandra 334, Trieste, ITALY
GE Naval & Drive Turbine Systems Department, 166 Boulder Dr., Fitchburg MA 01420
General Motors, Electro-Motive Division, LaGrange, IL 60525
KHD Canada Inc., 180 Rue de Normandie, Boucherville, Quebec J4B 5S7, Canada
KaMeWa, P.O. Box 1010, S-681 01 Kristinehamn, SWEDEN
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
Krupp MAK Maschinenbau GmbH, P.O. Box 9009, D-2300 Kiel 17, WEST GERMANY
Lips Propellers, 3617 Koppens Way, Chesapeake, VA 23323
Marine Gears, Inc., P.O. Box 689, Greenville MS 38707
Markisches Werk, Halve, P.O. Box 1442, D-5884 Halver WEST GERMANY
MAN B&W Diesel, 50 Broadway, New York, NY 10004
MAN B&W Diesel A/S, Ostervej 2, DK-4960 Hoelby, Denmark
MAN B&W Diesel A/S, Alpha Diesel, Niels Juels Vej 15. DK-9900 Frederikshavn Denmark
MAN B&W Diesel GmbH, Stadtbachstrasse 1, D-8900 Augsburg 1 Germany
MAN High Performance Diesels (Nurnberg), 160 Van Brunt St., Brooklyn NY 11231
Michigan Wheel Corp., 1501 Buchabab Ave., SW, Grand Rapids MI 49507
Morrison-Knudsen Company, Power Systems Division, P.O. Box 1928, Rocky Mount NC 27801
MTU of North America, 10450 Corporate Dr, Houston TX 77478
North American Marine Jet P.O Box 1232 Benton, AR 72015
Northwest Marine Services Corp., 6452 So. 144th St., Tukwila WA 98168
Schottel-Werft, Josef Becker GmbH, KG, D-5401 Spay, WEST GERMANY
Sulzer Brothers, Dept. Diesel Engines, CH-8401 Winterthur, Switzerland
Sulzer/Escher Wyss, Ravensburg WEST GERMANY
Ulstein Maritime Ltd., 96 North Bend Street, Coquitlam BC CANADA V3K 6H1
Ulstein Propellers, N-6065 Ulsteinvik, NORWAY
Ulstein Trading Ltd. A/S, N-6-65, Ulsteinvik, Norway
J.M. Voith GmbH, Marine Division, Postfach 1940, 7920 Heidenheim/Brenz, WEST GERMANY Voith Schneider America Inc., 121 Susquehanna Ave., Great Neck, NY 11021
Wartsila Power Inc., 5132 Taravella Rd., P.O. Box 868, Marrero, LA 70072
ZF of North America, Marine Sales, 500 Barclay Blvd, Lincolnshire IL 60069

PUMPS—Repairs—Drives
Del Gavio, 207 W. Central Ave., Maywood, NJ 07607. Telex: 132610 DEL-MARINE
Goltens, 160 Van Brunt St., Brooklyn, NY 11231
Imo-Delaval, Inc., IMO Pump Division, Box 447, Monroe NC 28810
Jim's Pump Repair, 48-55 36th St., Long Island City NY 11101
Leistritz Corporation, 165 Chestnut St., Allendale NJ 07401
Megator Corporation, 562 Alpha Drive, Pittsburgh, PA 15238
Vita Motivator, 99 W Hawthorne Ave., Suite 622, Valley Stream NY 11530
Wilden Pump & Engineering Co., 22060 Van Buren St., P.O. Box 845, Colton, CA 92324

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

ROPE—Manila—Nylon—Hawsers—Fibers
Allied Signal Inc., Fibers Division, 1411 Broadway, New York, NY 10018
American Manufacturing Co., Cordage Div., P.O. Box 52125, Lafayette LA 70505
Samson, Phoenix St., Shirley, MA 01464

SANITATION DEVICES—Pollution Control
Envirovac Inc., 1260 Turret Dr., Rockford, IL 61111
FAST Systems Inc., 1717 Sublette Ave., St Louis MO 63110
Microphor, Inc., 452 E Hill Rd., P.O. Box 1460, Willits CA 95490
Research Products/Blankenship (Incinolet), 2639 Andjon, Dallas, TX 75220

SCALE MODELS
Sturgeon Bay Model Shop, 187 N Ninth Ave., Sturgeon Bay WI 54235

SCUTTLES/MANHOLES
L.S. Baier & Assoc., 7527 NE 33rd Dr., Portland OR 97211
Juniper Industries, 72-17 Metropolitan Ave., Middle Village, NY 11379
Mock Manufacturing Inc., 777 Rutland Rd., Brooklyn, NY 11203

SHIPBREAKING—Salvage
The River Smelting & Refining Co., 4195 Bradley Rd Cleveland OH 44109
The Zidell Explorations, Inc., 3121 S.W. Moody St., Portland, OR 97201

SHIPBUILDING EQUIPMENT
American Marine, P.O. Box 8126, New Orleans LA 70182
Eckold Ltd., CH-7203 Trimmis, SWITZERLAND
Hilman Inc., 2604 Atlantic Ave., Wall, NJ 07719
M.A.N.—GHH, Sterkrade Werfsrabe 112 D-4100 Duisburg 18, West Germany
MAN—GHH, P.O. Box 110240, D-4200 Oberhausen 11, West Germany
NEI Syncrolift, Inc., 8970 S W 87th Ct., Miami FL 33176
Portable Gun Drilling Systems Inc., P.O. Box 123, Auburn WA 98071

SHIPBUILDING—Repairs, Maintenance, Drydocking
Aluminum Boats Inc., 304 Midway Dr., River Ridge LA 70123
Astilleros Espanoles S.A., Padilla 17, 28006 Madrid, SPAIN
Avondale Industries Inc., P.O. Box 50280, New Orleans LA 70150
Bay Shipbuilding Corp., 605 N. 3rd Ave., Sturgeon Bay, WI 54235
Blount Marine, Box 368, Warren RI 02885
Bollinger Lockport & Larose, P.O. Box 250, Lockport LA 70374
Brodosplit Shipbuilding Industry, Put Udarnika 19, P.O. Box 17, 58000 Split YUGOSLAVIA
Burmeister & Wain Skipsvaerft A/S, P.O. Box 2122, Refshaleoen, DK-1015 Copenhagen, DENMARK
Curacao Drydock (U.S.A.) Inc., 26 Broadway, Suite 741, New York, NY 10004
Danyards A/S, P.O. Box 719, DK-9900 Frederikshavn DENMARK
Equitable Shipyards Inc., Trinity Marine Group, Box 29266, New Orleans LA 70189
Fincantieri SpA Cantieri Navali Italiani, Via Cipro 11, 16129 Genoa ITALY
Houston Ship Repair, 1621 Woods Dr., P.O. Box 489, Channelview, TX 77530
Hyundai Corporation, ShipSales Dept., 140-2 Kye dong, Chongro-ku, Soeul, KOREA
Hyundai Mipo Dockyard Ltd., 456 Cheonha-Dong, Ulsan, KOREA
Keppel Shipyard Limited, 325 Telok Blangah Road, P.O. Box 2169, Singapore 0409
Koch Ellis Barge & Ship Service, P.O. Box 9130, Westwego, LA 70094
Paul Lindenau GmbH, & Co., Schiffswerft u. Maschinenfabrik, D-2300 Kiel-Friedrichsort, West Germany
Lisnave, Apartado 2138, 1103 Lisbon, Codex PORTUGAL
Lockheed Shipbuilding and Construction Co., 2929 16th Avenue, S.W., Seattle, WA 98134
M.A.N. GHH Sterkrade, P.O.B. 110240, D-4200 Oberhausen 11, West Germany
Marco, Inc., 2300 W Commodore Way, Seattle, WA 98199
Marinette Maine Corporation, Marinette, WI 54143
Munson Manufacturing, 150 Dayton, Edmonds WA 98020
Newport News Shipbuilding, 4101 Washington Ave., Newport News, VA 23607
Northwest Marine Ironworks, P. O. Box 3109, Portland OR 97208
Portland Ship Repair Yard, 5555 N Channel Ave., Portland, OR 97217
Service Marine Industries, P.O. Box 3606, Morgan City LA 70381
Southwest Marine, Inc., P.O. Box 13308, San Diego, CA 92113
3 Maj Associates Shipbuilding Industry, P. O. Box 117, 51001 Rijeka YUGOSLAVIA
Trinity Marine Group, Box 29266, New Orleans LA 70189
Versatile Pacific Shipyards, Inc., P. O. Box 86099, North Vancouver BC Canada
Wartsila Marin Industri AB, P.O. Box 1090, SF 00101 Helskini, FINLAND
Zidell Explorations, Inc., 3121 S.W. Moody Street, Portland, OR 97201
Zodiac of North America Inc., Thompson Creek Rd., P.O. Box 400, Stevensville, MD 21666

SHIP MANAGEMENT
Texaco Marine Servcies Inc., P. O. Drawer 1028, Port Arthur, TX 77641

SIMULATOR TRAINING
Marine Safety International, Marine Air Terminal, LaGuardia Airport, NY 11371

SILENCERS
Riley-Beaird, P.O. Box 31115, Shreveport, LA 71130

STUFFING BOXES
Johnson Rubber Co., Duramax Marine Div., 16025 Johnson St., Middlefield, OH 44062
Kohlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241

SURVIVAL EQUIPMENT
Parkway/Imperial, 241 Raritan St., So. Amboy, NJ 08879
Viking Life Saving Equipment (America) Inc., 38 NW 11th St., Miami FL 33136

TANK CLEANING
Houston Ship Repair, 1621 Woods Dr., P.O. Box 489, Channelview, TX 77530
Marketec, Inc., 27 Bowers Lane, Chatham NJ 07928

TANK LEVELING INDICATORS
Imo-Delaval, Inc., Gems Sensors Division, One Cowles Rd., Plainville CT 06062
King Engineering Corp., P.O. Box 1228, Ann Arbor MI 48106
Marine Moisture Control, 60 Inip Dr., Inwood, NY 11696

TORSIONAL VIBRATION SPECIALISTS
T.W. Spaetgens, 156 W. 8th Ave., Vancouver, Canada, V5Y 1N2

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Curtis Bay Towing, World Trade Center, Suite 800, Baltimore MD 21202
Jack Faulkner, 1005 W. Harimaw Ct., Metairie, LA 70001
McAllister Bros., Inc., 17 Battery Pl., New York, NY 10004

Miller Electric Offers 'Regency' 200 And 350 Power Sources For Mig Welding

The new Regency 200 and 350 family of single phase, constant voltage, DC power sources for gas metal arc welding (GMAW) are from Miller Electric Mfg. Co. Both units operate with a wide variety of constant speed and voltage sensing wire feeders.

Regency 200 and 350 have a 14-pin Amphenol receptacle consistent with other Miller constant voltage machines, for easy direct connection to Miller constant speed wire feeders: Spoolmatic 3 feeder/gun, Miller 50 series, XR push-pull system. For MIG spot welding, units can be used with Spoolmatic 1C/S gun and control with spot timer, or with spot controls installed in the firm's wire feeders.

Regency 200 is rated 200 amps at 60 percent duty cycle and has six- position voltage adjustment and high/low range for 12 different voltage selections. Regency 350 is rated 350 amps at 60 percent duty cycle. It provides 25 voltage selections with a five-position coarse and five-position fine voltage switch. Volt meter and ammeter are standard. Both units have Cam-Lok output receptacles with mating plugs for secondary connections.

For more information and free full-color literature from Miller Electric,

Circle 14 on Reader Service Card

VALVES AND FITTINGS
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Bailey, Division of CMB Industries, P.O. Box 8070, Fresno, CA 93747
Cajon Co., 9760 Shepard Rd., Macedonia, OH 44056
Chemiquip Products Co., Inc., 3 W. 18th St., New York, NY 10011
Circle Seal Controls, Brunswick Corporation, P.O. Box 3666, Anaheim, CA 92803
Cla-Val Co., P.O. Box 1325, Newport Beach, CA 92663
Crawford Fitting Company, 29500 Solon Road, Solon, OH 44139
Deutsch Metal Components, 14800 S. Figueroa, Gardena, CA 90248
Elliott Manufacturing Co., Inc. (Remote Valve Operating Equipment), P.O. Box 773, Binghamton, NY 13902
Lexair Inc., Airmatic/Beckett, 299 Gold Rush Rd., Lexington KY 40503
Loeffler Machine, US #1 & Robbins Ave., Penndel PA 19047
Newman's Inc., 7500 E Redding Place, Box 1856, Tulsa OK 74101
Nupro Co., 4800 E. 345th St., Willoughby, OH 44094
PBM Inc., RD 6, Box 387A, Sandy Hill Rd, Irwin PA 15642
Pancoast Marine Division, Front & Porter St., Philadelphia, PA 19148
Parker Hydraulic Valve Division, 520 Ternes Avenue, Elyria, OH 44035
Parker Actuator Division, 9948 Rittman Road, P.O. Box 450, Wadsworth, OH 44281-0450
Parker Systems Division, 651 Robbins Drive, Box 3500, Troy, MI 48007 3500
Skarpenord A/S, US Agent: American United Marine Corp., 5 Broadway, Rte 1, Saugus MA 01906
Swagelok Company, 5171 Hudson Dr., Hudson, OH 44236
Tate Andale Inc., 1941 Landsdowne Rd., Baltimore, MD 21227
Teleflex Inc., 771 First Ave., King of Prussia, PA 19406
Waukesha Bearings Corp., 405 Commerce St., P.O. Box 798, Waukesha, WI 53186
Whitey Co., 318 Bishop Road, Highland Heights, OH 44143
Williams Valve Corp., 38-52 Review Ave., Long Island City NY 11101

VIBRATION ANALYSIS
DLI Engineering Corp., 253 Winslow Way West, Bainbridge Island, WA 98110
Vibranalysis Engineering Corp., 4380 S. Wayside, Suite 100, Houston TX 77087

WASTEWATER TREATMENT
EES Corporation/Omnipure, An Eltech Systems Company, 12850 Bournewood Dr., Sugarland TX 77478

WATER PURIFICATION TREATMENTS
Electrocatalytic Inc., 2 Milltown Ct., Union NJ 07083

WATER PURIFIERS
Alfa Laval Inc., 2115 Linwood Ave., Fort Lee NJ 07024
Atlas-Danmark Desalination Systems A/S, Stamholmen 93, 2650 Hvidovre (Copenhagen), Denmark
Everpure, Inc., 660 N. Blackhawk Dr., Westmont, IL 60559
Riley-Beaird, P.O. Box 31115, Shreveport, LA 71130

WEATHER CHART RECORDERS
Alden Electronics, 40 Washington St., Westborough, MA 01581

WELDING
Miller Electric Mfg. Co., P.O. Box 1079, Appleton, WI 54912
Welding Consultants of Wisconsin, 6517 Radburn Lane, Greendale WI 53129

WIRE ROPE
Sling Max, P.O. Box 2068, Aston PA 19014

WIRE ROPE LUBRICATION SYSTEMS
Atlantis Services, 1057 Kings Ave., Jacksonville FL 32207
Dynalube, The Kirkpatrick Group, 415 N. Loop 12 at Pioneer Dr., P.O. Box 150907, Irving TX 75014

WINCHES AND FAIRLEADS
Braden Carco Gearmatic, P.O. Box 547, Broken Arrow, OK 74013
Fritz Culver, Inc., P.O. Box 569, Covington, LA 70434
Gearmatic—see 'Braden Carco Gearmatic' above.
Markey Machinery Co., 79 South Horton St., Seattle, Washington 98134
Nashville Bridge Co., P.O. Box 239 Nashville TN 37202
Smith Berger Marine Inc., 516 S. Chicago St., Seattle, WA 98108

WINDOWS
Kearfott Marine Products, A Singer Co., 550 South Fulton Avenue, Mt. Vernon, NY 10550

WINDOW WIPERS
Marketec, Inc., 27 Bowers Lane, Chatham NJ 07928

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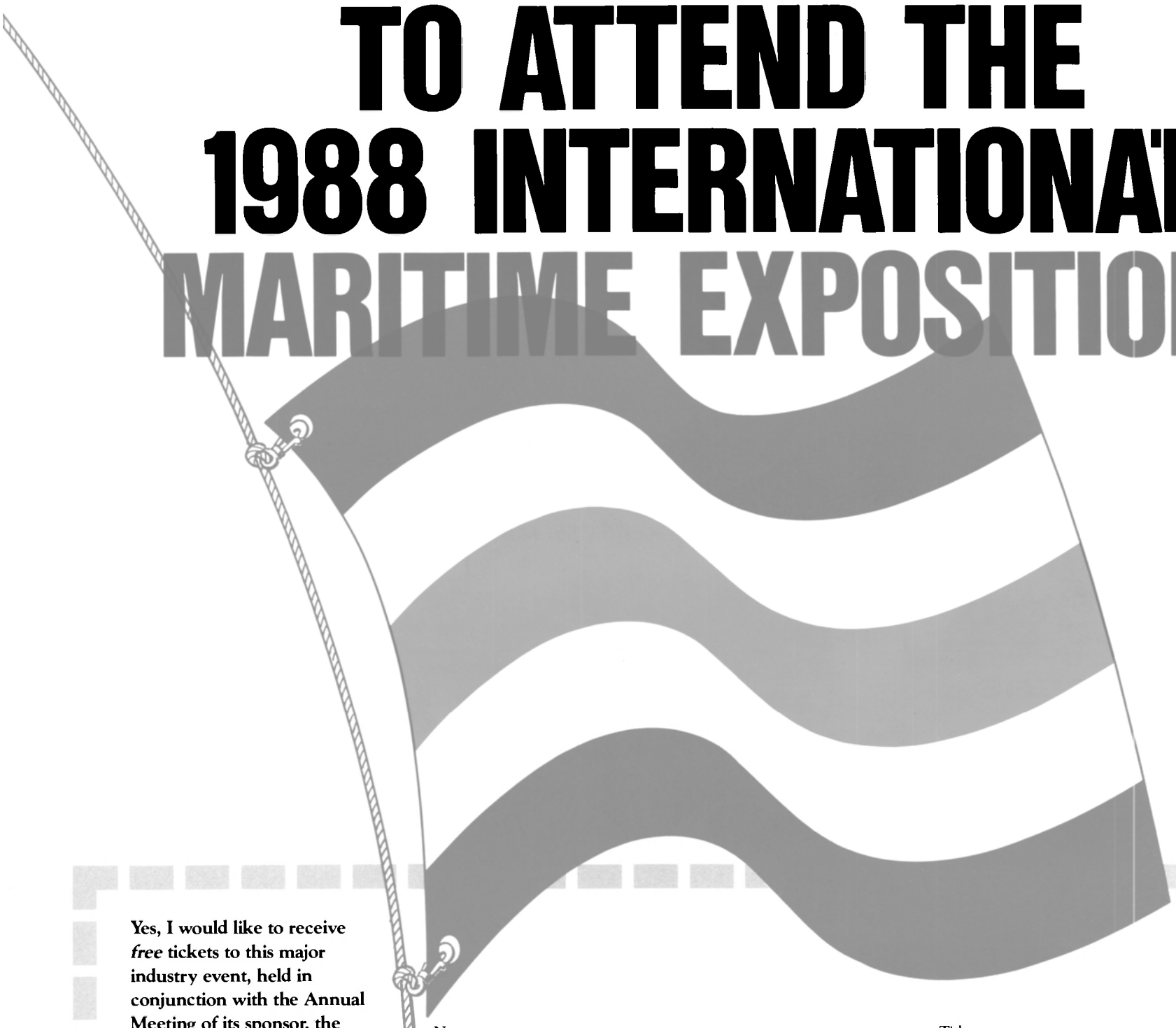

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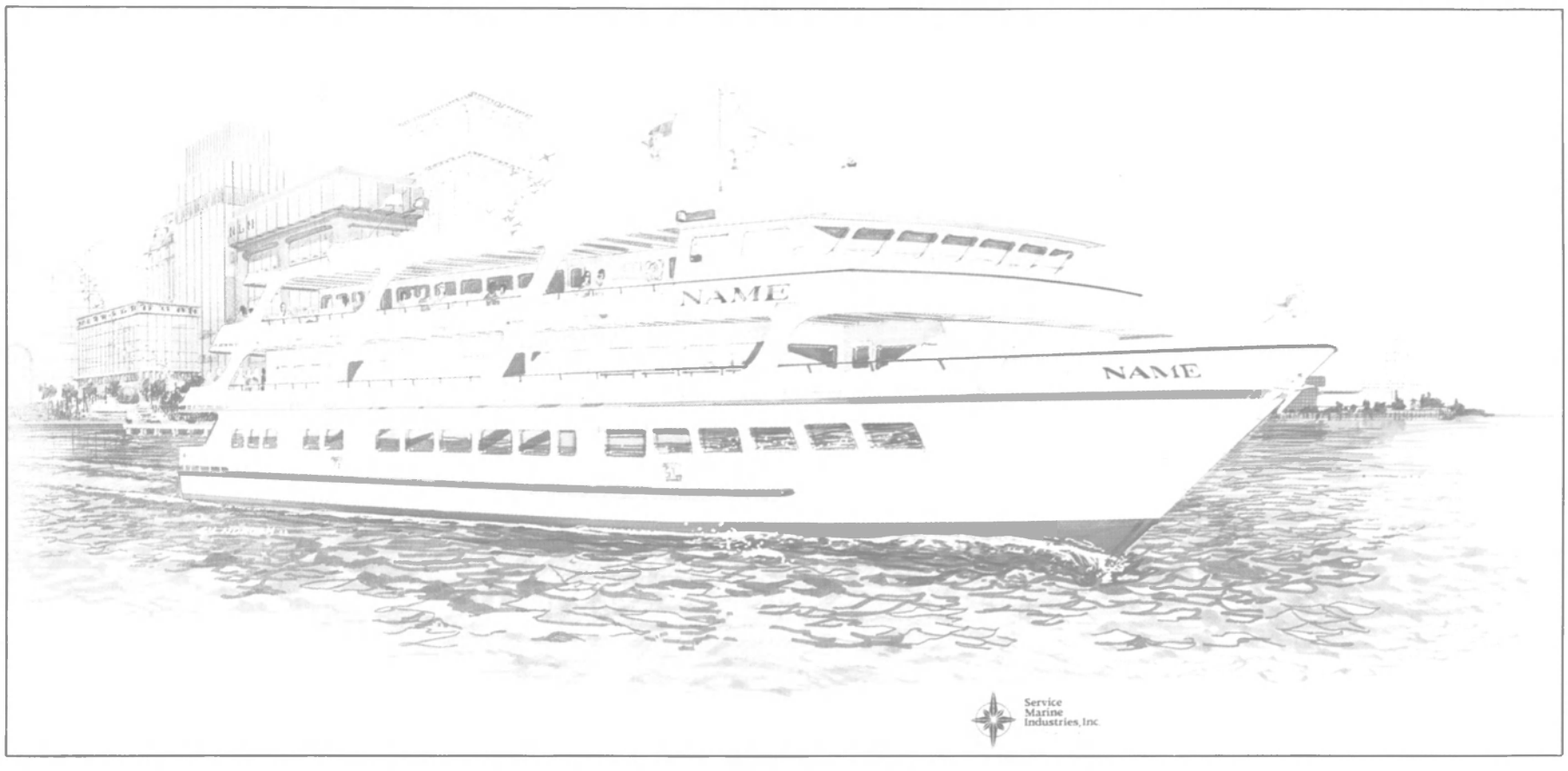

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