

# MARITIME REPORTER AND ENGINEERING NEWS

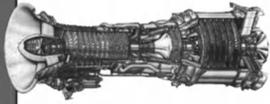
## Marine Safety & Environmental Technology

A Focus on new hull designs, navigation equipment and the latest developments  
conforming to environmental safety standards and regulations . . .

. . . SEE INSIDE



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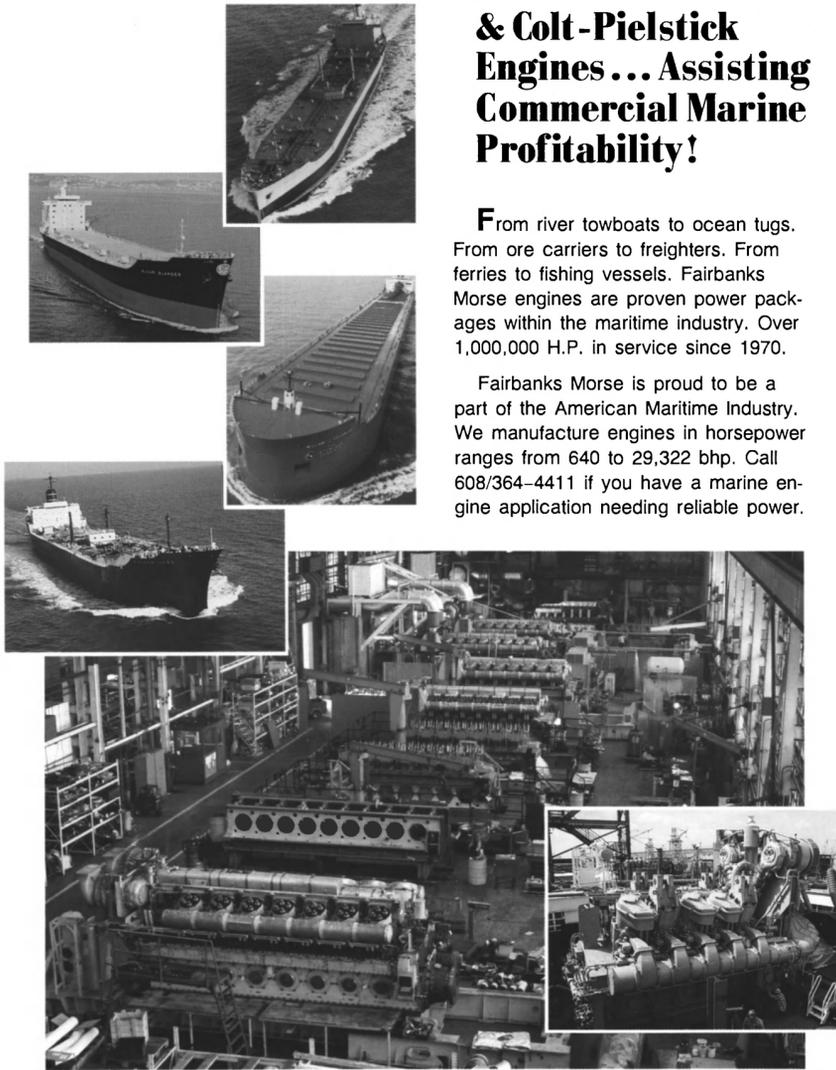
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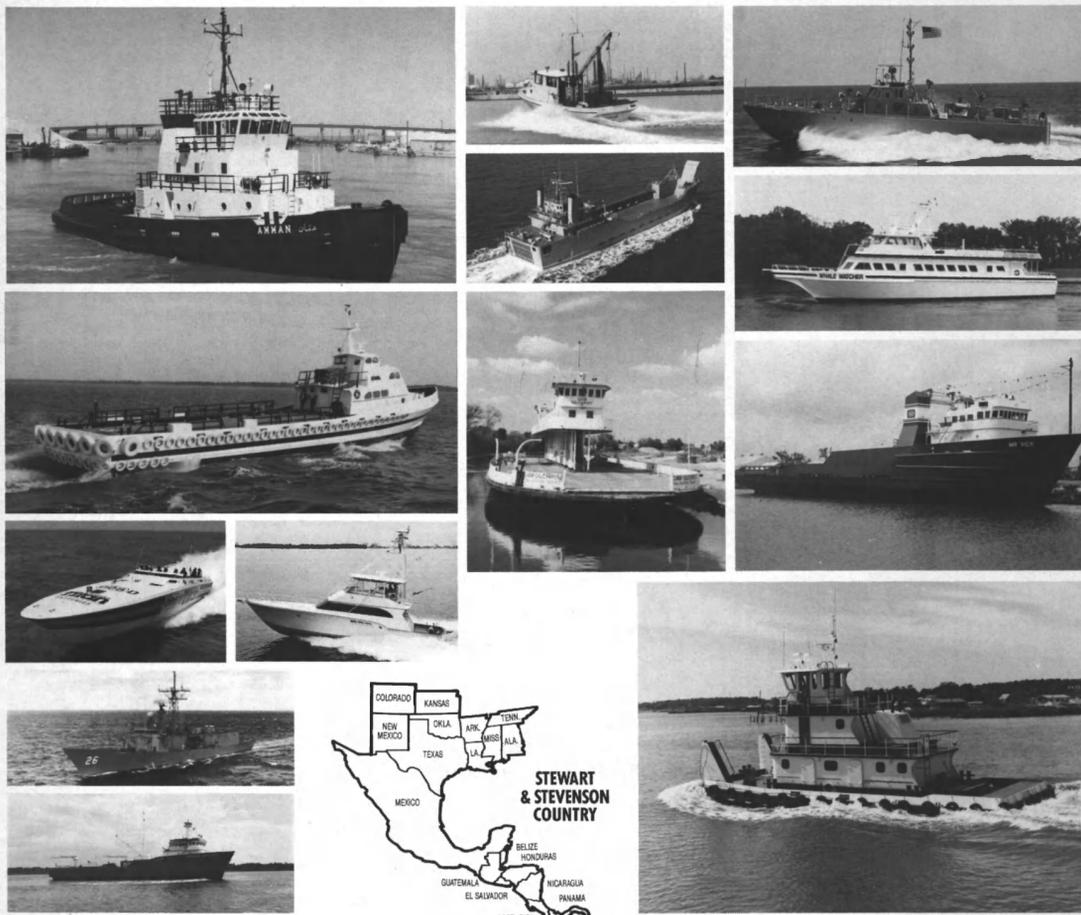
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## ON THE COVER

This month's issue focuses on the immense impact of the Oil Pollution Act of 1990 and other recent marine environmental legislation. Adm. Arthur E. (Gene) Henn, the newly appointed Chief, Office of Marine Safety, Security and Environmental Protection, U.S. Coast Guard, heads the list of authors who examine the implications of this ground-breaking legislation. The cover features the oil skimmer Valdez Star, built by Goudy & Stevens Shipyard, East Boothbay, Maine. Inset, lower left, shows General Electric's LM2500 marine gas turbine, a popular choice for naval propulsion. Cover Design: Alex Brown/Artwork Production.

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**\$1.2 Million Contract Won By Bender For Work On Pioneer Commander**

Bender Shipbuilding & Repair Co., Inc., Mobile, Ala., was awarded a \$1.2 million contract for work on the S/S Pioneer Commander, a 530-foot cargo ship which has been in a MarAd Active Reserve Status in New Orleans, La.

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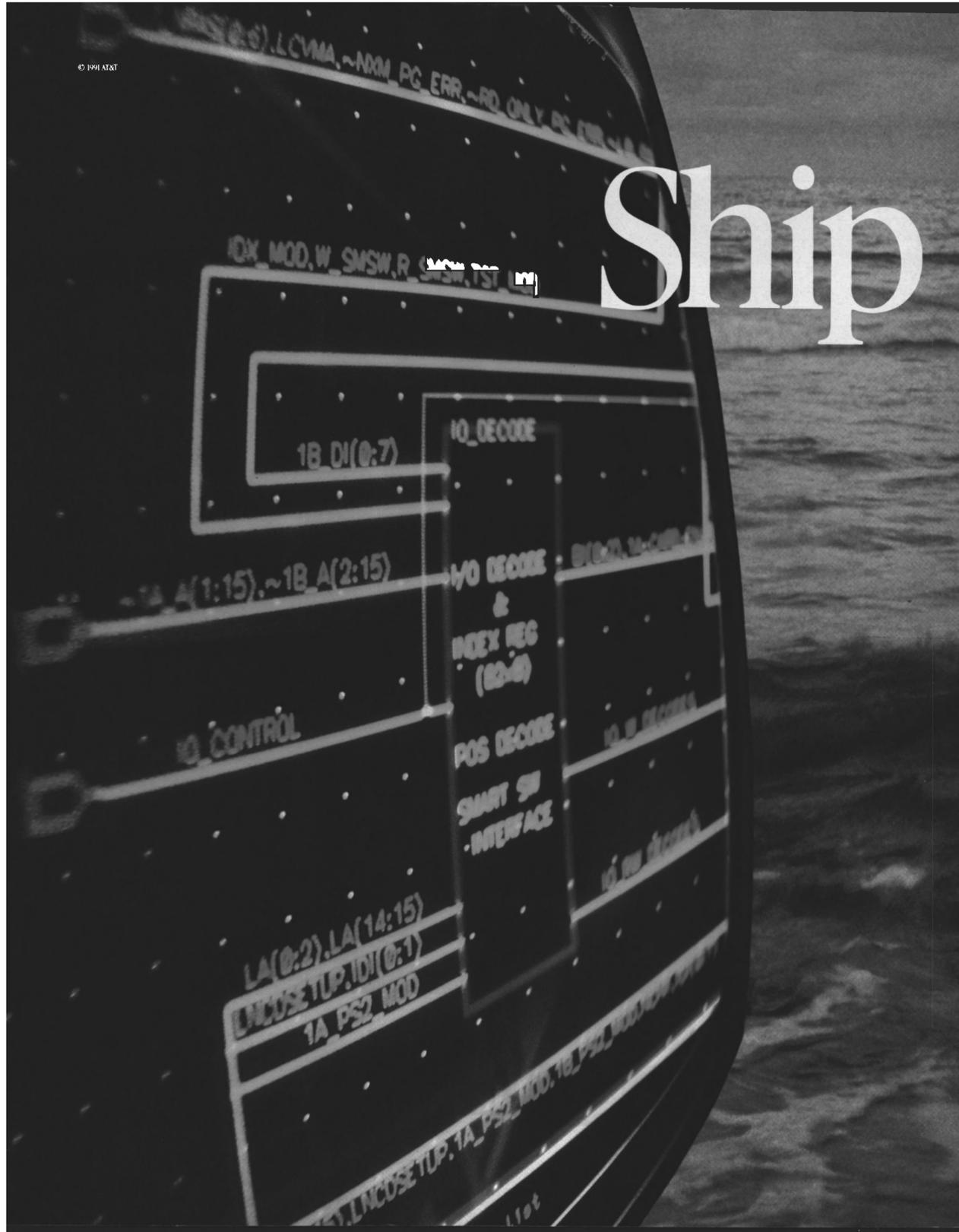
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### \$4.3 Billion Offshore Investment Planned By Malaysia

Over the next five years, more than M\$12 billion (about \$4.3 billion) will be pumped into the offshore sector in the Malaysian states of Sarawak and Sabah to tap over 760 million barrels of oil reserves and boost gas production.

The capital expenditure program will bring numerous new fields on stream, increase recovery in existing producing areas, and enhance the gas transportation system.

Shell, which has a major presence in the area, expects its share of the investment to total M\$8.1 billion (about \$2.9 billion) from 1991-96.

Most of the money will be spent in Sarawak, which will provide the 11 tons of cubic feet of additional

feedstock gas for the expansion of Malaysian LNG production at Bintulu.

There will also be extensive development work in the oil sector, however, with production in the area expected to rise from 284,000 barrels per day this year to 338,000 barrels per day in 1995.

Shell's upstream operations during the five-year period will bring on stream the 144 million barrel Kinabalu field in block SB-1, discov-

ered in 1989 and appraised last year.

The steep rise in engineering costs is an important issue facing Shell in its development plans.

Shell's upstream manager in the area said the cost of bringing a small structure on steam has doubled in the last year to around M\$10 million (about \$3.6 million).

### Strategic Sealift—All Ahead Full? Or All Stop?

The Shipbuilders Council of America is receiving mixed signals from the Navy and the Department of Defense (DoD) as to the speed with which the sealift program will move to contract award.

On the Navy side, a notice appeared on July 9 in the "Commerce Business Daily" (CBD) announcing a survey by the Naval Sea Systems Command (NAVSEA) of "potential U.S. sources for the design and construction of strategic sealift ships." According to the CBD announcement, the Navy "anticipates a two-phased design/construction approach with multiple contracts for the detail design/construction of the ship(s)."

The Navy is contemplating construction of a 950-foot ship and a 700-foot ship, each with a 105.5-foot or Panamax beam. The initial design contract will be restricted to U.S. shipbuilders capable of constructing the ships. The ships must be built in U.S. shipyards. In addition, domestic manufacture of propulsion and auxiliary systems has been mandated by the Congress. Interested shipbuilders have 30 days from the date of the CBD announcement to respond.

The Shipbuilders Council understands that on July 11, the Navy briefed Secretary of Defense **Dick Cheney** on its plans for sealift execution. The plans include, among other options, using the 950-foot ship mentioned in the CBD notice for Prepositioning and Reduced Operating Status (ROS) missions. The 700-foot ship option would have commercial viability—perhaps as a car carrier—and would be chartered by the government to commercial operators with the understanding that it would be made available in time of national need.

Meanwhile, there are indications that the DoD, rather than moving rapidly forward with implementation of this vital program, may subject it to the long, drawn out procedures of the full Defense Acquisition Board process. Already, there has been talk that DoD bureaucrats want to take control of the program through the assignment of an Acquisition Category 1 (D) classification, which could require full DoD review at every laborious step. This process, which is suitable for B-2s and nuclear submarines, is bureaucratic overkill for sealift and will further delay contract awards.

These sealift ships are simple and should be built to commercial standards as cheaply as possible. There is no new technology involved in their construction; similar ships are under construction around the globe.



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Maritime Reporter/Engineering News

**Bazan-MAN B&W Engines Power Oceanographic Research Ship 'Hesperides'**



Four generating sets, two of them driven by 1,400-kw 14V 20/27 Bazan-MAN B&W engines (in the picture) and two by 7L 20/27 engines, are the prime movers for the diesel-electric propulsion plant of ocean research ship Hesperides.

Four Bazan-MAN B&W engines with a total output of 4,200 kw are the prime movers of the diesel-electric propulsion power plant installed aboard the oceanographic research ship Hesperides. The vessel, which will take part in the scientific investigation projects scheduled for southern continent's coming summer season in the Antarctic, was constructed by the Cartagena Factory of the Empresa Nacional Bazan. The engines were built in the engine factory of E.N. Bazan, also located in Cartagena.

The operating conditions of oceanographic research vessels require a propulsion plant that performs well at low speed, the possibility of fine turning of propulsion power, low noise and rapid response. The special requirements were decisive factors in the choice of diesel-electric propulsion and, concretely, these Bazan-MAN B&W engines, as prime movers for the propulsion plant.

The Hesperides is driven by two direct-current 1,400-kw engines at 184/220 rpm each, mounted in tandem and directly coupled to the shafting.

Four three-phase alternate-current diesel generators supply the power required by the main engines and all the auxiliary services installed onboard.

The new vessel, delivered in May, will be operated by the Spanish Navy at the service of the Higher Council of Scientific Investigation, and has been defined as "the new flagship of Spanish scientific research."

With a length between perpendiculars of about 255 feet, her hull is reinforced for ice navigation. Aside from the most advanced navigational and dynamic positioning facilities available, this ship is also equipped with a complete oceanographic research laboratory.

The generator sets, made up of the four Bazan-MAN B&W engines described above, are adequately designed to provide the ship's propulsion power and to supply the electrical installations for all her auxiliary services.

For further information on Bazan-MAN B&W engines,  
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**MMS Awarded Contract By Coscol Marine**

Marine Management Systems (MMS) has been awarded a contract to implement their Spare Parts Inventory Management (SPIM) and Planned Maintenance (PMS) systems for Coscol Marine, the ship operating subsidiary of The Coastal Corporation, according to an announcement by MMS vice president

**Don Logan.**

Under the contract, MMS is in the process of installing the systems at Coscol's Houston, Texas, operations office, as well as onboard the tanker Coastal New York. MMS is scheduled to implement an additional SPIM/PMS system onboard the Coastal Eagle Point. Both shipboard systems will interface via satellite communications with Coscol's office system. Further, the shipboard systems will utilize MMS' latest bar code technology to facilitate

inventory control and update.

Ongoing support for the project will be handled by MMS technical staff in Stamford, Conn.

MMS has been providing computerized vessel management systems for over 20 years, and currently supports more than 400 active systems worldwide, operating at over 200 shipboard and shoreside locations.

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**Navy Solicits Offers  
For Initial Design  
Of New Sealift Vessels**

Details about the kind of new military cargo vessel it wants for an enhanced sealift fleet were revealed by the Navy recently when it solicited offers for the initial design of two types of sealift ships.

The two designs being pursued,

the Naval Sea Systems Command said, are a ship to lift vehicles and supplies from the U.S. to a war zone, and a so-called prepositioned ship, or depot vessel, stored with equipment and anchored in selected areas of the world.

To be built to commercial standards and specifications, the ships will have a maximum sustained speed of 24 knots, a range of 12,000 nautical miles, and lengths of 700 feet to 950 feet will be examined. In

addition, they will be roll-on/roll-off ships that maximize the number of tanks, helicopters and other vehicles that can be carried. Cranes will also be installed.

A Navy press statement said the action marks the initial efforts for the acquisition of strategic sealift ships necessary to logistically support overseas operations like Desert Shield/Desert Storm.

The solicitation, according to a Navy official, is only for the prelimi-

nary design of a new sealift vessel, a Navy official said. A Pentagon mobility requirements study due in November will provide a clearer picture of what the Navy wants in terms of numbers and types of sealift ships and aircraft, along with the mix of new and used vessels that will be required. Right now, the Navy is looking at a range of 22 to 45 additional vessels, he said.

The Navy is seeking initial designs now, the official explained, because it wants to be in a position to exercise Congressional intent as soon as possible, and so that it can implement the requirements study quickly.

The Navy, in the solicitation, is seeking comment on the possible major conversion of existing ships and wants information on the potential commercial charter viability of the initial designs. However, the Navy said, these enhancements must not detract from the military mission of the ships.

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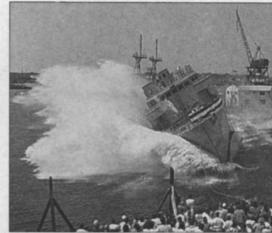
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**Peterson Builders  
Launches MCM-11 At Yard  
In Sturgeon Bay, Wisconsin**



The MCM-11 Gladiator shown during launching ceremonies at the yard of Peterson Builders in Sturgeon Bay, Wis.

Peterson Builders, Inc., recently christened and launched the 224-foot wooden MCM-11 Gladiator, Mine Countermeasure Ship, at its yard in Sturgeon Bay, Wis.

The Gladiator is the eighth MCM launched at PBI in a series of 11 MCM ships contracted with the U.S. Navy. Peterson Builders is one of the few remaining shipyards with the expertise, facilities and knowledge to construct large wooden ships today. PBI is entering its fifth decade of minecraft ship construction and has built minecraft for 13 different navies around the world.

The mine countermeasure ships accommodate a crew of 81, and are the Navy's largest wooden hulled ship. A wide variety of special skills, equipment and materials are utilized in laminating the ship's major structure from large timbers of Douglas fir, white oak and Alaskan cedar.

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## Boats & Barges

### Ecomarine USA Offers Environmental Services



The ECO-110, a new series of multi-mission environmental vessels commissioned by Ecomarine USA, recently went into service in Miami. Pictured here is an earlier model, the ECO-100, at work in Italy.

The first two of a new series of multi-mission environmental vessels commissioned by Ecomarine USA were recently floated off the assembly line at Bollinger Machine Shop and Shipyard in Lockport, La. After completing sea trials in the

Gulf of Mexico, these state-of-the-art craft, known as the ECO-110, were based in Miami, Fla., where they were put to work picking up marine debris, monitoring and mapping water pollution, and cleaning up oil slicks and other chemical

spills.

Founded in November 1990 and headquartered in New York City, Ecomarine USA provides the most advanced technology and services for oil spill response, marine pollution control, and marine monitoring and mapping. The company leases fleets of environmental vessels to government agencies, businesses and other groups concerned with keeping the nation's waterways clean.

Ecomarine USA's strategy is to form partnerships with regional companies knowledgeable about the local maritime market. The first such joint venture, Ecomarine Florida, was announced earlier this month by Ecomarine USA and Florida Clean Harbors, Inc., a holding company founded by **Donald T. Quinn**, president of Oceanic Steamship Co. With headquarters in Miami, Ecomarine Florida plans to eventually expand its services to include Naples, Tampa/St. Petersburg, Jacksonville and Orlando.

A key feature of Ecomarine USA's services is that potential users—such as oil-spill cooperatives or local municipalities with sewage overflow problems—do not actually buy the boats, but charter them along with the services of a trained crew. And they can potentially share these costs with other users.

Unlike most oil-spill cleanup equipment, Ecomarine USA's multi-mission vessels are designed to be continually at work, ready to be rushed to the scene of an emergency. As a private contractor, Ecomarine

USA is wholly accountable for the maintenance and performance of its equipment.

Ecomarine USA has also commissioned a 65-foot flagship vessel known as the ECO-800. Work on the first ECO-800 is currently under way at Trinity Marine Group's Aluminum Boats division in Crown Point, La., and is expected to be completed later this year. The boat was designed by Boat Craft of Jacksonville, Fla.

Both the ECO-800 and ECO-110 will be equipped with mechanical "jaws" designed to extract debris from the water with a powerful suction mechanism capable of consuming vast volumes of oil and debris. Under ideal conditions, the mechanism can recover up to 40 tons of oil an hour on the ECO-110 and up to 100 tons on the ECO-800.

"Earlier versions of these rugged vessels have proven themselves to be a cost-effective and utterly practical solution to cleaning up waterways," says **William S. Doyle**, a managing director of Ecomarine USA.

Ecomarine USA is a joint venture of OMI Corp., a major shipping company based in New York; Ecoventures Inc., a holding company headed by **Maxwell A. Rabb**, the former U.S. Ambassador to Italy; and Ecolmare SpA. of Sorrento, Italy, one of the world's leading providers of technologically advanced marine-ecology services for government and industry.

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**Atlas Converts Syncrolift To A 'Weightbridge'**



The NEI Syncrolift installation of Todd Pacific Shipyards at San Pedro, Calif., with Matson Lines 22,500-dwt Matsonia overhanging the ship-lift.

NEI Syncrolift, Miami, Fla., a world leader in ship-lift technology, has now transformed the range of operational uses for its unique system by introducing the Atlas Load Monitoring System.

Atlas (Advanced Technology for Load-monitoring on Articulated Syncrolifts) analyzes the load taken by each hoist, and is an innovation developed to enhance the control system fitted to most of the 191 Syncrolifts in operation around the world.

As part of Syncrolift's control and monitoring system, the hoist loads are measured with remarkable accuracy. Atlas then analyzes and totals these to give the exact all-up weight of the vessel on the Syncrolift. The individual hoist loads represent the specific weight/unit length associated with each hoist and, when taken together, these figures provide a load distribution profile for the vessel.

Atlas also analyzes the load distribution profile to determine the location of the vessel's LCG which enables longitudinal trim to be accurately predicted at launch. Changes in LCG are monitored, recorded, and checked to predict changes of trim at launching. The Tons per Meter immersion at various drafts is also shown. In addition, Atlas monitors differential loads between the port and starboard hoists, to measure, record and analyze differential transverse loads on docking.

In a shipyard, use of Atlas means that: (a) Vessel loads can be accurately checked for variations between docking and undocking; (b) High load concentrations can be more easily predicted to prevent hull damage during docking; (c) Damaged vessels can be recovered while the system accurately interprets how best to accommodate them; and (d) The platform can be used as a manipulator for ship conversion or modification projects.

For more information and free literature from NEI Syncrolift, Circle 56 on Reader Service Card.

**MacGregor-Navire Equipment Specified For Chiquita Reefer Series**

Six 635,000-cubic-foot reefer ships ordered by Chiquita Brands from

Danyard group in Denmark are specified with insulated weatherdeck and 'tweendeck hatch covers designed by MacGregor-Navire.

The 13,000-dwt, 24-knot series—among the world's largest and fastest reefers—will be deployed in the U.S. owner's Great White Fleet after deliveries during 1991-93. Pallet-friendly refrigerated capacity is arranged in four holds which can also accept 70 by 43-foot containers; some 95- by 43-foot containers can be stowed on deck.

The MacGregor-Navire shipsets are based on the following hydraulically operated hatch covers arranged to offer clear openings 13.70 meters by 10.50 meters (about 45 feet by 34.4 feet) in all the holds: Insulated hatch covers of the high-stowing folding Rack-Back type for the weather deck; Insulated hatch covers of the Link-Link type for No. 4 'tweendeck of Nos. 2, 3 and 4 holds; and Non-insulated hatch covers of the Link-Link type for Nos. 2, 3 and 5 'tweendecks of Nos. 2, 3 and 4 holds

and for the two 'tweendecks of No. 1 hold.

The weatherdeck sets are operated by hydraulic cylinders fitted at the sides of the covers, and the 'tweendeck covers by internally integrated cylinders. Two MacGregor-Navire hydraulic pump sets will be installed to supply power for operating the covers.

For further information and free literature from MacGregor-Navire,

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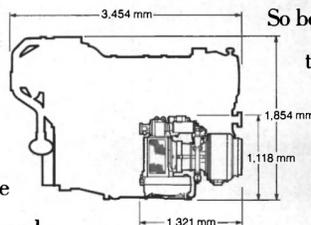
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## Boats & Barges

### Damen Delivers First Of Two Twin-Screw Multipurpose Tugs To Abu Dhabi Petroleum Ports



The superstructure of the Caterpillar-powered Hamour is placed well forward to create a large work deck aft and sufficient space for the towing/anchor handling winch.

Damen Shipyards of Gorinchem, the Netherlands, recently delivered the first of two almost identical multipurpose tugs to Abu Dhabi Petroleum Ports Operating Company (ADPPOC).

The 147.6-foot-long by 42.6-foot-beam tug, named Hamour, recently

successfully completed its sea trials. The vessel, of all welded steel construction, is suitable for the following tasks: berthing, anchor handling, firefighting, salvage, dive support, and hose flushing.

The complete design of the vessel, including the lines plan, con-

struction and engine room arrangement, was done by Damen Shipyards based on specifications received from ADPPOC.

The Hamour is powered by two eight-cylinder Caterpillar 3608 TA engines with a maximum total output of 6,658 bhp at 1,000 rpm. The engines drive Lips controllable-pitch propellers via Reintjes reduction gears. The propellers run in Van der Giessen steerable nozzles. The steering gear is by means of four Sperry hydraulic cylinders and two hydraulic pumps. For optimal maneuvering, the tug is fitted with a Caterpillar diesel-driven, Pleuger

bow thruster.

The tug, classed as a "Firefighting I" vessel, is equipped with Kvaerner Eureka fire pumps and monitors. Nautical/navigation and communication equipment includes Furuno echo sounder, radar and radio direction finder, and Sperry gyrocompass and autopilot.

The Hamour has accommodations for 17 persons. All floors, paneling and insulation are in accordance with SOLAS requirements.

For free literature detailing the facilities and capabilities of Damen Shipyards,

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### MarAd Receives Title XI Application To Refinance 2 ITBs

The Maritime Administration (Mar Ad) has received an application from the General Electric Credit Corp. of Georgia, C/O General Electric Capital Corp., Stamford, Conn., for a Title XI guarantee to aid in refinancing, at a reduced interest rate, a portion of the existing Title XI obligation issued in connection with financing of two integrated tug/barge units (ITBs).

The ITB Julius Hammer was delivered on March 18, 1981, and the ITB Frances Hammer on September 16, 1981. Both were built at Avondale Shipyards, Inc., New Orleans, La.

If approved, the 15-year guarantee would cover the following portion of the outstanding Title XI guarantee: \$15,797,257 for the Julius Hammer and \$17,605,425 for the Frances Hammer.

### Lokring Offers Free Literature On Low-Pressure Fittings

Lokring Corporation of Foster City, Calif., is offering free literature detailing its Lokring Class 200 fittings for low-pressure nonferrous pipe. The patented Lokring design employs a metal-to-metal seal and the company reports it is a cost-effective way to join thin-wall pipe onboard ship without brazing or welding.

Lokring claims it is the only mechanically attached fitting line with products approved by the U.S. Navy for use in flammable systems in fire-hazardous spaces.

The brochure also describes the portable, one-man installation tooling and power supply options. The fittings are NAVSEA and ABS approved and accepted by the U.S. Coast Guard.

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### Five Trinity Industries Subsidiaries Team To Build LPG Barges

In what may be a record in shipbuilding teamwork, five subsidiaries of Trinity Industries, Inc., are cooperating in the construction of two 260-foot liquid propane gas (LPG) barges for Harvey Gulf, Inc., Harvey, La.

The barges will be constructed, erected, and painted at Gretna Machine and Iron Works, Inc., Harvey, with components manufactured on site along with elements from the following Trinity companies: Equitable Shipyards, New Orleans, La., sandblasting and preconstruction primer; Equitable Shipyards, Madisonville, La., automated panel line fabrication; Trinity-Beaumont, Beaumont, Texas, tank placement assistance; and Beaird Industries, Shreveport, La., manufactured LPG tanks.

Each barge will be fitted with two 213-foot-long independent Beaird LPG tanks with inside diameters of 16 feet 9 inches, and a working pressure of 266 psig (pounds per square inch gauge). Each barge can carry 15,000 barrels of LPG. The tanks will be shipped by rail from Shreveport to Beaumont because they are too large to negotiate some tight turns in the Louisiana railway system.

John Dane III, president of the Trinity Marine Group which includes 10 shipyards (Beaird is part of another Trinity segment), said the team effort is a good example of Trinity's efforts to hold down company and customer costs by reducing redundancy or duplication within its plants.

Both barges are expected to be delivered in the third quarter of 1992.

For free literature on the facilities and capabilities of Trinity Marine Group,

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### L&C Associates Installs Dehumidification System Aboard USNS Mississinewa

L&C Associates of North Hampton, N.H., specialists in marine dehumidification systems, have recently completed the design and installation of a dehumidification system aboard the USNS Mississinewa in Norfolk, Va. The Mississinewa and four other Neosho Class Oilers are being placed in the Reserve Fleet as Avondale Shipyards continues the scheduled construction of 18 Kaiser Class Oilers.

Dehumidification is essential aboard the vessels of the Ready Reserve Fleet because maintaining relative humidity at or below 35 percent will inhibit moisture-induced corrosion. Dehumidification systems designed by L&C Associates utilize desiccant dehumidifiers

and a spray applied moisture barrier to maintain the integrity of the dehumidified spaces. This combination of dehumidification and sealing will maintain the ship's present condition for the duration of the layup.

L&C's dehumidification system circulates dehumidified air to both the forward and aft deckhouses, machine space, pump rooms, cargo control areas, storerooms, ship service areas, and all refrigerated storage space.

After completing the installation of the dehumidification system, L&C technicians created a vapor barrier to prevent moisture from entering the dehumidified spaces through vents, skylights or hatches. All openings leading to the dehumidified spaces were sealed with PSS, a spray applied vinyl plastic. PSS is as effective as sheet metal blanks in keeping moist air from entering the dehumidified space. But since PSS can be installed more quickly and removed without any special tools,

PSS greatly minimizes the cost of installation and subsequent reactivation.

L&C Associates is the leading provider of dehumidification and sealing systems to marine clients and has provided dehumidification systems for more than 120 clients for both military and commercial applications.

For further information and free literature from L&C Associates,

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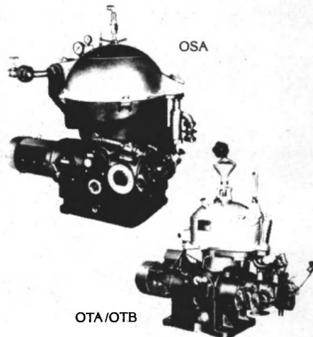
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# The Oil Pollution Act of 1990

## PRIMARY TASK OF REGULATORY ACTION FALLS TO THE COAST GUARD

By Rear Admiral Arthur E. Henn

Recent major oil spills have galvanized the 101st Congress into unanimously passing a major piece of legislation which had been under development for the previous 15 years. This legislation is the Oil Pollution Act of 1990 (OPA 90) (Public Law 101-380). Although OPA 90 will require regulatory action by several Federal agencies, its primary tasks fall to the Coast Guard. The Act's impact on both the regulated industry and on the regulating agency is going to be substantial.

The Act has numerous provisions which will profoundly change the way oil is transported in the U.S. trade. However, by far the most notable among notable provisions is the increase in liability for companies that handle, store and transport oil. Under certain circumstances, such as violation of law or gross negligence, the shipper's liability is unlimited. We have been advised that this provision can and probably will cause some shippers to abandon the U. S. trade.

In addition to increasing liability, the Act establishes the use of a Federal trust fund for financing cleanup operations; imposes response planning and execution responsibilities on government entities, as well as owners and operators of vessels and shoreside facilities; and mandates new prevention measures involving vessel construction and operation. As complex as these federal requirements are, there is the potential for even greater complications. OPA 90 does not preclude individual states from prescribing their own regulations in certain areas. In fact, various states have already enacted legislation similar to OPA 90. Because of the potential for a patchwork of nonstandard requirements among the coastal states, some of them have cooperated to form a task force to coordinate their regulatory requirements not only among themselves but with the Federal government.

For the last 25 years the Coast Guard has been actively involved

with many environmental issues regarding tanker safety and pollution prevention. Since OPA 90 enactment, the USCG has intensified action on these issues by initiating a vigorous effort to comply with the requirements in OPA 90. The Coast Guard is developing approximately 80 regulatory projects, studies and reports covering pollution prevention, response, compensation, and liability.

The Coast Guard has made several organizational and operational changes to be responsive to the Act. Two special staff elements have been established to facilitate OPA 90 implementation. A National Pollution Funds Center (NPFC) was established to develop and administer those parts of OPA 90 dealing with vessel financial responsibility and the Oil Spill Liability Trust Fund. A flag officer has been assigned as Commander. The NPFC moved from USCG Headquarters to permanent quarters in Arlington, in July 1991. A separate headquarters unit, the OPA 90 Staff, consisting of project managers, counsels, and editors, is writing regulations and overseeing and coordinating the multiple studies and reports. The Act is broadly focused and changes have also been made in the Federal oil spill response mechanism and system.

The USCG has the primary responsibility for Federal oil spill response in the coastal zone. It provides pre-designated Federal on-Scene Commanders and continually maintains manned facilities which can be used for command, control, and surveillance of oil spills. In addition, the Coast Guard now maintains two National Strike teams, one at Hamilton Air Force



Rear Adm. Arthur Eugene (Gene) Henn  
Chief Office of Marine Safety &  
Environmental Protection, U.S. Coast Guard

Base, San Francisco, Calif., and a second in Mobile, Ala. The strike teams are designed to airlift highly skilled pollution response experts and specialized oil cleanup equipment to the spill site to assist and advise Federal on-Scene Coordinators. To augment our ability to respond quickly to a spill, a third strike team is being established at Fort Dix.

With three response teams, we need a single control center to insure that they are uniformly trained and equipped. The control center will also coordinate activity among the teams. This control center is called the National Strike Force Coordination Center (NSFCC). It is being established in Elizabeth City, N.C. Both will begin operation this summer.

Not every area in the nation will have immediate access to one of the strike teams, so the USCG is also improving its ability to respond to spills by establishing District Response Groups (DRG). These will be located in the 10 Coast Guard Districts. The District Response Groups will be able to marshal all USCG resources (personnel, vessels, aircraft, etc.) within one district. The DRG will be a quick reaction, pollution response team to provide a first line of defense against spills until a major contractor can arrive on the scene. This effort may require revising USCG District Standard Operating Procedures to achieve a more coordinated USCG response and provide better access to USCG assets/resources during spill incidents.

While it is critical to have trained teams able and ready to respond immediately to a spill, it is just as essential to have response equipment stockpiled in strategic loca-

tions where it is most likely to be needed. Accordingly, the Coast Guard has identified 19 sites where equipment will be stored. The equipment includes containment booms, vessel-of-opportunity skimming systems, portable barges to hold collected oil, and associated pumps and ancillary equipment.

To make effective use of these new response capabilities requires extensive planning before a spill actually occurs. Major areas of contingency planning include prevention, cleanup, compensation, and restoration. Under OPA 90, oil spill contingency and response planning has shifted from a voluntary or limited responsibility to a major regulatory requirement for owners/operators of mobile and stationary oil-related facilities. The USCG and EPA have been cochairing monthly meetings of the National Response Team (NRT) to draft a revised National Contingency Plan by the Fall of 1991. The NRT primarily assists member agencies, coordinates their preparedness planning and response to prevent any duplication, and facilitates support of all emergency response actions.

One of the major tasks facing the Coast Guard is to write regulations necessary to implement all of the provisions of OPA. There are several extremely important regulatory projects which are high priority for rapid completion. To prevent the likelihood of an oil spill, OPA 90 requires that new tankers and tankers undergoing major modifications be fitted with double hulls versus single hulls. Right now single hull vessels constitute a majority of the ships in service. Existing tankers must be retrofitted according to a schedule that began in July 1990, and all tankers must be in compliance by 2015. However, the law does not specify the design criteria that will constitute a double hull. Details such as this will be covered by rulemaking.

The regulatory project to implement OPA 90 requirements for double hull construction on tank vessels began in August 1990. Because the public was unable to wait for completion of the rulemaking process, the USCG issued Navigation and Vessel Inspection Circular No. 2-90 on September 21, 1990, to provide industry with interim guidance on double hull standards until final regulations can be issued. A Notice of Proposed Rulemaking was published in the Federal Register on December 5, 1990. The final rulemaking will define the protective spaces that will constitute a double hull.

The Coast Guard is also working to publish final rules by August 1992 concerning response plans for both vessels and facilities. This is an important rulemaking because operators may not continue in business if they have not submitted plans to the Coast Guard for approval within six months after the rules are published.

These and more than forty other rulemakings are going to be published in the Federal Register. Many of the more important rules will be the subject of either public hearings or workshops. At the public hearings interested parties may express their views on the proposed rules. At workshops the Coast Guard will be exploring possible solutions to specific problems in a give-and-take format. All rulemakings will be available for written comment. The number of people who will want to comment on these regulations is expected to be substantial. In order to facilitate the comment process and to generally keep interested parties informed, the OPA 90 staff is developing a mailing list. When proposed rules are published in the Federal Register, they will also be sent to people on the mailing list. Anyone interested in being added to the list can write to **Bruce Novak**, U.S. Coast Guard Headquarters, room B110, 2100 Second St., SW, Washington, DC 20593-0001.

While we have been busy domestically, no effort to curb pollution can be effective without international cooperation. In fact, with so much of the tanker fleet under foreign flag, it is essential that the Coast Guard act aggressively to include the world community in the pollution prevention effort.

The USCG is working with the International Maritime Organization (IMO) to implement additional measures to minimize pollution of the oceans and rivers of the world. IMO is the arm of the United Nations which establishes rules for

vessel operation and construction worldwide.

In July 1991, the IMO Marine Environment Protection Committee (MEPC) met in London and discussed alternative tank vessel designs to double hulls. The MEPC decided to study this issue which will primarily focus on the mid-deck design. A planning meeting was recently held in London to discuss the study. The United States was a major contributor to the planning process. The study is scheduled to be completed by the end of 1991.

The National Academy of Sciences (NAS) conducted a study designed to evaluate alternative tank vessel designs and operational requirements that may provide protection equal to, or greater than, double hulls. The NAS report, titled, *Tanker Spills: Prevention by Design*, was published in February 1991, and is currently being reviewed. The NAS report and the input from IMO described above will have a significant impact on the Coast Guard's evaluation of measures which may be developed as potential equivalents to double hulls.

In addition to tanker design, the Coast Guard is studying the need for safer port operations. The Office of Navigation and Waterways Services at USCG Headquarters evaluated systems and port requirements in the Port Needs Study. The study, which will be provided to members of Congress in August 1991, focused on major ports in the United States to determine the need for Vessel Traffic Service (VTS) systems.

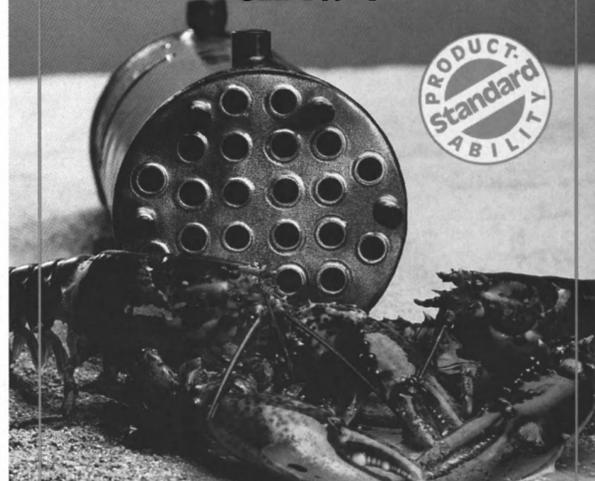
One of the concepts which appears repeatedly in OPA 90 is the need for cooperation among interested parties. The act requires cooperation among government agencies and establishes committees that involve local citizen's groups in planning and response activities. One of these cooperative requirements is for an interagency Coordinating Committee which will bring the Research and Development (R&D) resources of all the Federal agencies together. The Committee, comprising 13 government agencies, is chaired by the USCG. The initial efforts of the Committee have been to complete an implementation plan. A draft of the implementation plan is completed. Title VII authorizes funding of approximately \$27 million for regional grant programs, demonstration projects, and R&D projects. The goal is to enhance the state-of-the-art in spill prevention, spill response management, spill response, fate and effects of oil, restoration, and rehabilitation.

To date, the USCG has committed

a considerable amount of its resources, both financial and physical, to implement the requirements of OPA 90. For the future, we can expect permanent changes in the way oil industry operates and is regulated; ocean and rivers should experience environmentally beneficial impacts; creation of new technologies will help prevent and respond to oil spills.

*Editor's Note: Rear Admiral Henn was recently named Chief, Officer of Marine Safety, Security and Environmental Protection at Coast Guard Headquarters in Washington, D.C. Prior to this assignment, Admiral Henn was Commander of the Maintenance and Logistics Command, Atlantic.*

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## OPA Spawns New Opportunities To Develop Systems And Equipment For Oil Spill Control

By Theodore A. Ulrich, Partner Cadwalader, Wickersham & Taft

The Oil Pollution Act of 1990 has spawned much debate over double-hull construction and the liability of "responsible parties"; however, a large portion of the act deals with the containment and prevention of spills, primarily as a result of new equipment and manning requirements and improvements, as well as contingency planning. Thus, an opportunity exists for marine suppliers and manufacturers to provide assistance to vessel owners and operators in meeting these provisions and in developing further enhanced pollution containment and cleanup equipment.

Unfortunately, as a result of the act's preservation of the authority of the various states to enact their own statutes, additional requirements—some of which may be inconsistent—will undoubtedly be enacted by various state legislatures. broad-based contingency plan with multiple regional response centers in Texas with stored oil spill fighting equipment and an audit staff for policing private company contingency plans, which would be in addition to the Federal review.

### Drug Testing Of Crew Members

As a result of press coverage, we are all aware of the act's enhanced provisions dealing with alcohol and drug abuse, criminal records, and DWI convictions. Many of these provisions—issuance and periodic renewal of licenses and documents, accident or casualty investigation—all under its current chemical drug testing program, which requires, among other tests, the random testing of certain crew members. Although the drug testing program started some time ago, there may be an opportunity for additional contractors to be employed by the owner/operators with respect to this testing program. The drug testing program is set forth in 46 CFR Part 16 whereas the procedures of collection and testing are contained in 49 CFR Part 40.

### Manning Standards

As a result of criticism of the manning and work load level on major spills, several provisions were included in the act as to manning standards, crew size, and training. These were combined with a mandated study to evaluate navigation



equipment, electronic position-reporting and identification systems, and inspection standards (Sections 4106, 4111 and 4114 of the act). At least one computer simulator course for training has been established at CAORF at the U.S. Merchant Marine Academy regarding oil spill response and cleanup. Other training courses by simulator, videotape or other means may be needed to bridge the gap for currently licensed officers and crew as well as the establishment of such training courses for students at the U.S. Merchant Marine Academy and state maritime schools.

### Mandatory Equipment

The act has also made several specific provisions for mandatory equipment, although some vessels may already be so equipped. It provides for overflow and tank level or pressure monitoring devices on all vessels, foreign or domestic, to be installed within one year (Section 4110). It also requires that all vessels subject to the Vessel Bridge-to-Bridge Radio Telephone Act (33 USC 1203), including foreign vessels, have the capability to receive navigational safety information from the U.S. Coast Guard and others, which is apparently not now the case (Section 4118). Regulations to implement this requirement have not yet been issued; however, certain retrofitting of even existing equipment may be required in order to comply.

### Oil Spill Contingency Planning

The Oil Pollution Act of 1990 established multiple layers of contingency planning and supervision of removal or cleanup operations.

While it can be argued that the act does little to clear-up the confusion and inefficiency of such removal and cleanup operations, it is these provisions which may most affect marine suppliers and equipment manufacturers. Each of the levels of contingency planning—Federal, Area/Regional, State (coordinating with others, and as a result of the preservation of authority to the states) and owner/operator—is collecting equipment for utilization in any future spill. Their response may be exacerbated by the public criticism over the "late and inadequate" response to the Valdez oil spill. However, given the series of spills within a short period of time several months later on, as well as the potentially vast amounts of equipment which may be needed for a large spill, such stockpiling may not be unreasonable.

The act provides for the establishment of a National Contingency Plan for the effective and immediate removal of any discharge into navigable waters or an adjoining shore, the exclusive economic zone or affecting natural resources. If a substantial threat (size or character) to the public health and welfare (including natural resources) exists, then the President, through such National Contingency Plan, must direct all Federal, State or private Unit. The potential for area concerns and national concerns to be divergent is readily apparent.

In addition to the above plans, each tanker vessel trading to the U.S. must also have its own approved contingency plan for removal, "to the maximum extent practicable," of a worst case discharge or

threat thereof. This plan must be consistent with the National Contingency Plan and the Area Contingency Plan (and any state plan) and demonstrate training as well as the availability of personnel and equipment to accomplish the plan. While pending approval of a submitted plan, an owner may trade up to two years if he certifies that he has a commercial contract which will achieve the same result as his plan. The phrase "maximum extent practicable" allows for the consideration of technological limitations as well as the practical or technical limits of a particular owner/operator's response capability. However this also allows for considerable upgrading and development of suitable equipment by the manufacturers. The extent to which there will be equipment development is difficult to predict at this time.

### Onboard Removal Equipment Required

Within two years after enactment, the act provides for the additional requirement that vessels carrying oil or hazardous substances in bulk must carry onboard "appropriate removal equipment that employs the best technology economically feasible and that is compatible with the safe operation of the vessel" (Section 4202). It is not known what precisely will be required. However, booms or dispersants may be acceptable. The vessel owner/operators and equipment suppliers will need to work with the administration to reasonably define this equipment as well as provide for proper training to make it effective.

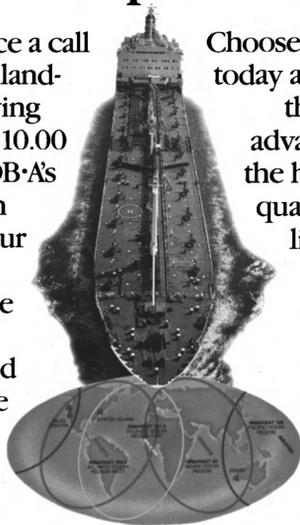
Further the above provision provides for the establishment after two years of "periodic inspections of containment booms, skimmers, vessels and other major equipment" used in oil spill removal (Section 4202). Whether this will result in the establishment of "servicing" type facilities, akin to those for life rafts, cannot be determined at this time.

As a result of the Oil Pollution Act of 1990, there are thus substantial opportunities for the marine industry's equipment and services manufacturers and suppliers to provide the additional equipment, as well as to improve upon that currently available, to help clean up oil spills.

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**ONE FROM 3.MAJ:** Jan Michalewsky (left) of the Chinese-Polish Joint Stock Co., Shanghai, China, shaking hands with Sanjin Kajba, director, 3. Maj Shipbuilding Industry, Rijeka, Yugoslavia, at a recent ceremony for the delivery of the multipurpose vessel M/S Szymanowski. Seated is Wang Chu Bin of the Chinese-Polish Joint Stock Co. The 22,000-ton Szymanowski has an overall length of 557 feet, breadth of 45 feet and design draft of 30 feet. The Polish-flag ship will be powered by a 3.Maj-built Sulzer 5RTA 62 diesel, rated at 12,739 hp at 109 rpm.

#### Dean Burch

Dean Burch, director general of the International Telecommunications Satellite Organization (INTELSAT) since 1987, recently passed away at his home in Potomac, Md., after a long illness.

Among Mr. Burch's accomplish-

ments are his liberalization of INTELSAT policies to speed the establishment of separate satellite systems in furtherance of U.S. policy goals, and arranged the organization to compete better with fiber-optic cable and to face an international market.

#### Rauma Launches 1,400-Berth Liner For Sally Line

Finnish builder Rauma Yards Oy recently christened and launched a 1,400-berth cruise liner at its Rauma yard for Sally Line.

Christened the Sally Albatross by Ms. Auli Rahkamo, wife of Helsinki city manager Kari Rahkamo, construction has moved at a quick pace due to the yard's advanced building techniques and the fact that the main engines, propulsion system and other equipment was utilized from the previous Sally Albatross. Delivery is scheduled for February 1992.

The Sally Albatross will have an overall length of 525 feet, breadth of 82 feet, draft of 18 feet and speed of 21 knots. The steel hull will be specially strengthened for ice navigation and she will comply with the regulations and classification of Det norske Veritas.

The cruise liner will have a total of 55 passenger cabins, most with a sea view and some with their own balcony, public areas covering 5,400 square meters, including four restaurants, a conference section seating 450, a night club accommodating 600, a casino, saunas and a hospital.

For free literature detailing the shipbuilding facilities of Rauma Shipyards,

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#### Free Literature Offered On Environmentally Safe All-Purpose Cleaner

Six years ago, the Electric Boat Division of General Dynamics Corporation set, as one of its goals, reduction in the use of toxic chemicals.

After receiving a sample of Simple Green, a nontoxic, nonflammable and nonabrasive cleaner, and conducting several test applications, GD began using the product for some parts cleaning and for cleaning of interior ship hull areas.

The manufacturers of Simple Green, Sunshine Makers Inc., Huntington Harbor, Calif., claim that protective clothing and additional ventilation are unnecessary when using it as a cleaning and degreasing agent.

Simple Green, according to its makers, is a nontoxic, biodegradable, phosphate-free liquid all-purpose cleaner, containing a blend of synthetic high-grade penetrants. Surfactants are added to saponify oils and grease for thorough rinsing and prevention of redeposition of contaminants. Simple Green is water-based, contains no petroleum and is nonflammable.

A free literature package on Simple Green with technical data and safety information as well as product usage is available from Sunshine Makers. For a copy,

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## HITACHI ZOSEN DELIVERS A NEW ERA IN PRODUCT OIL CARRIER DESIGN.

Announcing delivery of the first of the EPOCH MARK II series.

Hitachi Zosen has delivered the first ship in their EPOCH MARK II series, in addition to having three more ships currently under construction.

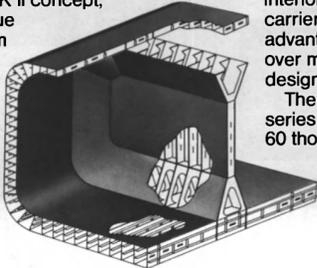
All four ships utilize Hitachi Zosen's revolutionary EPOCH MARK II concept, which incorporates a unique unidirectional girder system combined with a complete double hull structure.

While a ship's hull is customarily designed with a grillage of longitudinal and transverse members for strength, this system uses only longitudinal

members in a double hull to provide sufficient strength.

This unidirectional girder system results in unprecedented structural simplicity and completely flush surfaced cargo tank interior. MARK II product oil carriers provide unrivaled advantages in performance over more conventional designs.

The EPOCH MARK II series is available in 40 and 60 thousand dwt designs and Hitachi Zosen has obtained many patents worldwide.



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Circle 267 on Reader Service Card

Maritime Reporter/Engineering News

### Saint John Shipbuilding Delivers HMCS Halifax

The first new combatant in 20 years recently joined the Canadian Navy as the Department of National Defense took delivery of the HMCS Halifax. The Halifax is also the first warship in history to use a distributed computer architecture.

Saint John Shipbuilding Ltd. in St. John, New Brunswick, built the 4,750-ton Canadian Patrol Frigate. Paramax Electronics Inc. of Montreal performed the system integration. Paramax is a subsidiary of Unisys.

A revolutionary feature of the ship is the use of a distributed computer network to control sensors, weapons, communications, navigation and machinery. Thirty computers are spread throughout the ship. If the ship takes battle damage, the network automatically reconfigures itself to avoid damaged components. Thus, one unlucky hit will not destroy the ship's electronics.

The ship carries a helicopter hangar and will initially support Sea King antisubmarine helicopters. Eventually they will be replaced by EH-101 helicopters.

The propulsion plant uses a pair of General Electric LM 2500 gas turbines, backed up by a Pielstick diesel. All are cross-connected to the reduction gears.

For free literature on the facilities and capabilities of Saint John Shipbuilding,

Circle 38 on Reader Service Card

### Hyundai Wins Contract To Build Eight 85,000-Dwt Tankers For Venezuela

The Venezuelan state-run oil company PDVSA has awarded a \$496 million contract to build eight 85,000-dwt tankers to Hyundai Heavy Industries, South Korea. This is part of an overall renovation of the company's fleet, which will cost an estimated \$1.3 billion.

Mitsubishi Corp. will provide financing of the deal, which is to be fulfilled by mid-1994.

### MHI To Build High-Speed Catamaran Hydrofoil With Diesel Engines

Mitsubishi Heavy Industries, Ltd. (MHI) has received an informal order for what is described as the world's first super high-speed catamaran hydrofoil powered by high-speed diesel engines. This informal order was made by a Japanese company which will be established jointly by local governments and the private sector soon.

This is Japan's first domestically developed super high-speed catamaran hydrofoil and marks MHI's first super high-speed passenger ship.

September, 1991

The ship will be delivered in March 1993.

The hydrofoil craft, called the Mitsubishi Super Shuttle 400, is one of the largest in the world with a capacity of 350 passengers. The 350-ton catamaran type ship, with an overall length of about 111.5 feet and a breadth of 36 feet, has a maximum speed of 40 knots per hour. An aluminum alloy is used for the hull to reduce the weight of the ship.

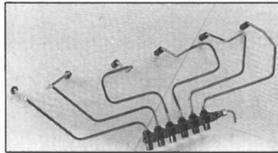
This craft will provide high-speed

transportation between Japan's mainland and the Okinoshima Island in the Japan Sea, replacing a 350-passenger, 25-knot ship currently in service.

The catamaran allows a wider hydrofoil, which provides greater lift force, and makes the use of diesel engines possible. Compared with gas turbine hydrofoils, according to MHI, diesel engines offer a considerably lower construction, maintenance and operational costs.

The Mitsubishi Super Shuttle 400 is equipped with four high-speed diesel engines. The lightweight, high-power "S16R-MTK" engine, with a power output of 2,850 hp, was developed by MHI. Two engines, installed in each hull of the catamaran, drive waterjets. The catamaran also has high stability in bad weather conditions.

For free literature detailing the facilities and capabilities of MHI, Circle 50 on Reader Service Card



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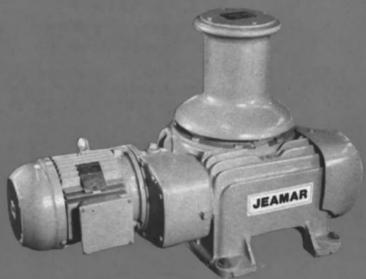
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21

### American Commercial Asks Title XI For 8 Tank Barges And 50 Hopper Barges

The Maritime Administration has received an application from American Commercial Lines, Inc., Jeffersonville, Inc., for a Title XI guarantee to aid in financing the construction of eight tank barges

and 50 hopper barges.

The vessels will operate on the inland river systems and on the Mississippi River and its tributaries and the Gulf Intracoastal Canal. The proposed builder is Jeffboat Division of American Commercial Marine Service Co. of Jeffersonville.

If approved, the guarantee, which would have a term of up to 25 years, would cover a maximum \$11.3 million of the estimated actual cost of \$15.3 million.

### Contracts To Operate Two Research Vessels Awarded By U.S. Navy

The U.S. Navy recently announced that it has chosen two oceanographic institutions to operate its next two oceanographic research ships.

The Scripps Institution of Oceanography, La Jolla, Calif., will oper-

ate one ship, called AGOR-24, for the University of California system.

Woods Hole Oceanographic Institution, Woods Hole, Mass., will operate the other, AGOR-25.

The two vessels are scheduled for full operation in late 1994 and late 1997, respectively.

AGOR-23, the first ship of a similar design, was awarded to the University of Washington in Seattle in November 1987. AGOR-24 and 25 are the second and third research ships procured under a plan to replace the aging and technologically

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### Marine Preservation Group Commits \$270 Million To Fight Oil Spills

The Marine Preservation Association, an oil industry trade group, announced that it has committed \$270 million for the purchase of equipment to fight oil spills.

The funds will cover operating and capital expenditures of the group, a nonprofit corporation based in Washington, D.C.

The \$270 million includes equipment and 16 offshore response vessels for five regional catastrophic oil spill response centers near New York, Miami, Lake Charles, La., Port Hueneme, Calif., Seattle and other staging areas.

Each regional center is designed to respond to a catastrophic spill of about 200,000 barrels. Regions will support each other to respond to larger spills.

### ASRY To Add Two New Docks En Route From US East Coast

Arab Shipbuilding and Repair Yard Co. (ASRY) recently announced an acceleration of its expansion plan by seeking a Panamax floating dock which would be commissioned well ahead of the new graving dock which had been delayed by hostilities in the Gulf.

Now ASRY has acquired not one, but two Panamax floating docks which will shortly begin their voyage from the U.S. East Coast to Bahrain in the Arabian Gulf. Arrangements to bring the new docks into service will be expedited and they are expected to be ready to receive the first vessels early in the new year, substantially improving the yard's capacity which is now based on one 500,000-dwt graving dock. This new investment will amount to about \$55 million.

Hans Frisk, who joined ASRY as general manager and chief executive for Karlskrona of Sweden late last year, is pleased with the added capacity in the yard and is looking forward to further developing ASRY to handle more and more of the large repair specifications for aging vessels which have already become a staple of the yard's work load.

For further information on facilities and capabilities of ASRY, Circle 34 on Reader Service Card.

# Sigma Coatings The Complete Choice



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The build up of marine life on a ship's hull can greatly reduce its operational efficiency. As a result of extensive research, Sigma now produces a comprehensive range of antifouling paint systems designed to prevent fouling, thereby minimising roughness and improving the hydrodynamic efficiency of the hull through the water.

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All three lines have an 'Ecol' version which complies with the latest environmental regulations.



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Boottops, topsides, superstructures and decks not only have to look good but must also withstand the rigours of impact, abrasion, weather and extremes of temperature.

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When used in conjunction with specialised coatings such as Sigma EP Multiguard and Sigma EP Glassflake, this remarkable system ensures that vessels look their best and perform to the highest possible standards.



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### Homeport Marine Converts Supply Vessel, Launches King Crab Boat

Homeport Marine Services, Inc. of Moss Point, Miss., recently completed the conversion of the 212-foot supply boat Veesea Sapphire to a standby/rescue boat with supply capabilities, and launched a 160-foot crab boat.

The Veesea Sapphire was deliv-

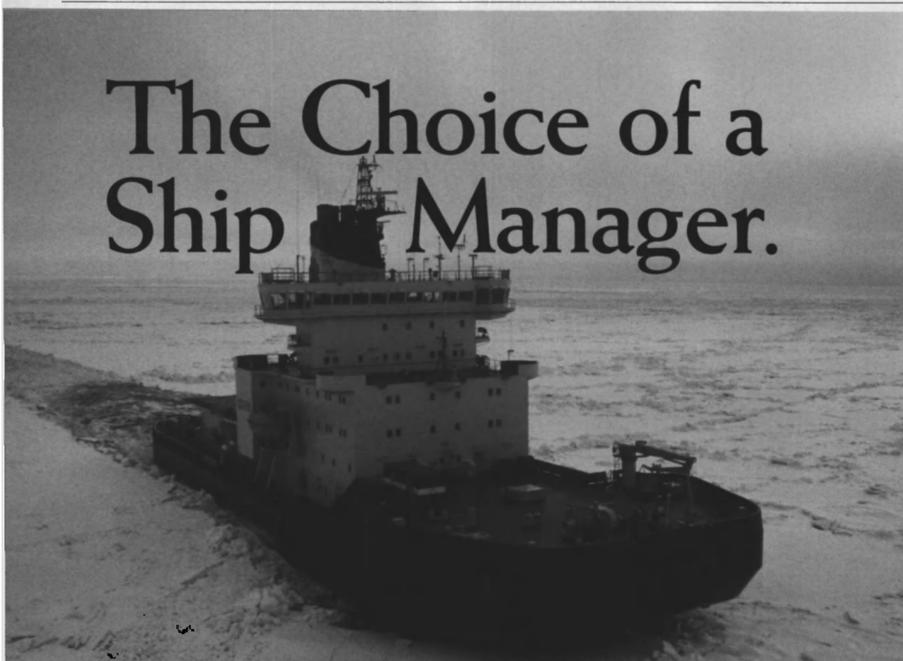
ered to Seacor Marine of Morgan City, La. This conversion work represents Seacor's intention to mobilize 10 of its vessels operating in the U.S. Gulf of Mexico and coastwide trade to the North Sea. The boats will serve under contract with Conoco UK.

Seacor president **Glen Fornell** characterized the conversion work as extensive. The vessels will comply with the latest rules applying to boats engaged in North Sea "safety" service and will be capable of meet-

ing the regulations for 250 survivor-class boats. A two-tiered extension was fitted to the deck aft of the pilothouse to accommodate survivors with bunks, treatment facilities and seating. The vessels are designed with port and starboard rescue zones to facilitate recovery from the sea. Bridge wings were extended for visibility and joystick controls installed to improve maneuverability. Where necessary to provide protection from weather, the bows have been raised and the pilot-



Seacor Marine's M/V Veesea Sapphire after being converted to a standby/rescue boat with supply capabilities by Homeport Marine Services, Moss Point, Miss.



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house lifted. Each vessel has been equipped with two British-made 15-man Fast Rescue Craft (FRCs) cradled in rapid launching davits. There were also extensive modifications to the pilothouse and the crew quarters.

In an effort to support Conoco as a leader in safety, Seacor's conversion design and vessel modifications are intended to insure seaworthiness under the harsh conditions prevailing in the North Sea, particularly during the winter, and are also intended to provide a safe and comfortable environment for survivors. These vessels meet the requirements of ABS, USCG, and the British Department of Trade and Industry.

Conversion work on two additional boats for Seacor is scheduled to begin and, in addition to this conversion work, Homeport currently has a 152-foot vessel under construction scheduled for delivery in late 1991.

The 160-foot-long by 38-foot-beam all-steel king crab boat recently launched by Homeport Marine will participate in the North Pacific and Alaska crab fisheries.

The vessel is powered by two Caterpillar 3508 diesel engines rated at 905 hp each with Twin Disc 540 reduction gears. Electrical power is furnished by three 350-kw CAT 3406TA generators. The vessel, being built in accordance with ABS loadline requirements, has quarters for 27 crewmen.

Homeport Marine is a local and privately owned company located on a 17-acre site next to the Escatawpa River in Moss Point.

For free literature giving complete details on the facilities and capabilities of Homeport Marine, Circle 51 on Reader Service Card

### Aqua-Chem Offers Brochure On Shipboard Overhaul And Repair

Aqua-Chem, with over 30 years of proven experience, is the only major U.S. desalination plant manufacturer providing shipboard overhaul and repair.

Aqua-Chem provides service from two new marine overhaul/repair centers—one located in San Diego, Calif., and the other in Norfolk, Va. Or, representatives will travel anywhere in the world to supervise repairs or prepare recommendations for your overhaul/repair work.

For more information and free literature on the full range of services provided by Aqua-Chem, Circle 29 on Reader Service Card

Maritime Reporter/Engineering News

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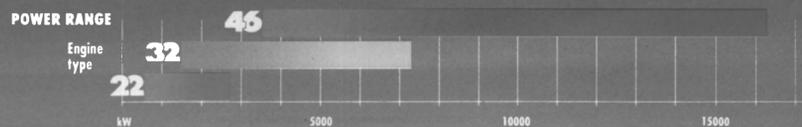
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**Textron Marine Awarded Army LACV Overhaul Pact With \$8 Million Potential**



Built by Textron Marine Systems, LACV-30s accommodate a wide variety of payloads and can be disassembled for transport by truck, rail, aircraft or ship.

A multiyear contract has been awarded to Textron Marine Systems (TMS), New Orleans, La., by the U.S. Army Troop Support Command (TROSCOM), St. Louis, Mo., to repair and overhaul the Army's fleet of LACV-30 hovercraft stationed at Fort Story, Virginia. The contract with options has a potential value of over \$8 million.

The work will primarily be performed at Ft. Story by Textron Marine Systems Virginia Beach Operations where spare parts are manufactured and other overhaul operations conducted. The company is headquartered in New Orleans, La.

Built by TMS, the 76-foot-ton LACV-30s move rapidly across water, land, snow, ice, marshes and low brush, through 8-foot surf and over 4-foot obstacles.

One of North America's largest designers and builders of air cushion vehicles, TMS, Division of Textron Inc., offers a complete support system for their products, such as the LACV-30s and the U.S. Navy's Landing Craft, Air Cushion (LCAC), which includes maintenance, technical assistance, training of operators, repairs and spares, and detailed operation and maintenance manuals.

For free literature on Textron Marine Systems,

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**Aker Omega Awarded Offshore China Project**

Aker Omega, Inc., Houston, Texas, a division of Aker Engineering a.s. of Oslo, has been awarded the next phase of development by Amoco Orient Petroleum Company and Nanhai East Oil Corporation, a subsidiary of the China National Offshore Oil Corporation, as the project management and general engineering contractor of the Liuhua 11-1 Field Development. The field is located 120 miles offshore the People's Republic of China in approximately 1,000 feet of water. The field will be developed to produce heavy crude oil with very little associated gas.

September, 1991

**MarAd Awards Contract Worth \$1.1 Million To AK Engineering**

The Maritime Administration (MarAd) recently awarded a \$1,147,095 contract to AK Engineering, Chelsea, Mass., for the drydocking and repairs to the Navy's aviation support vessel T-AVB Wright. The contractor has arranged to lease a drydock owned by the Massachu-

setts Water Resources Authority located at the Fore River Shipyard, Quincy, Mass.

The work will include painting the ship's hull, cleaning its tanks, and other repairs required by the American Bureau of Shipping and the U.S. Coast Guard.

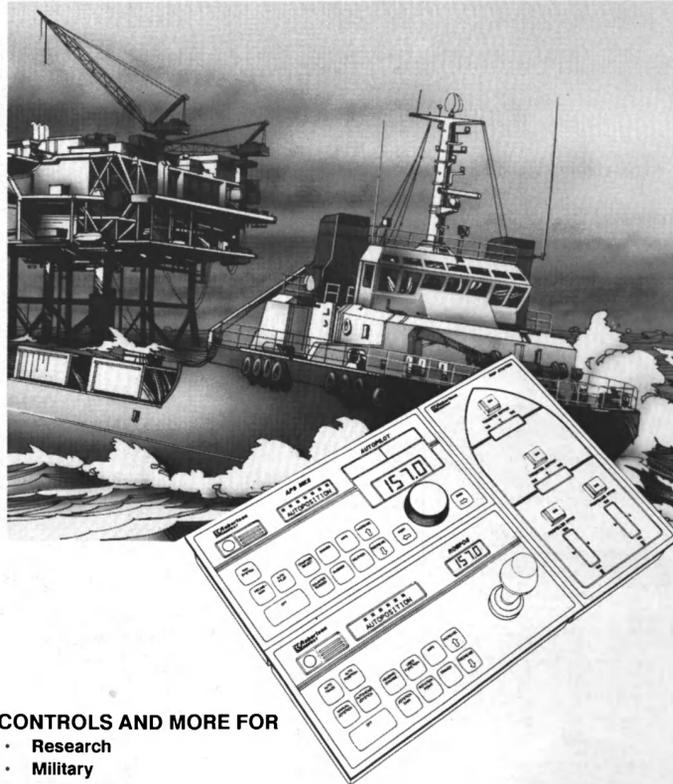
MarAd maintains a select group of cargo ships known as the Ready Reserve Force (RRF) to meet surge sealift needs in the early stages of military contingency operations. It also maintains certain Navy-owned

vessels, including the Wright, for the Navy in RRF-like status.

During Operations Desert Shield and Desert Storm, MarAd activated 78 of its 96 RRF vessels plus two Navy-owned ships, including the Wright, to support coalition operations.

The shipyard work on the Wright is expected to be completed within 21 days. American Overseas Marine, Quincy, Mass., manages the vessel for MarAd, and administers the contract on the agency's behalf.

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With its self-stripping system, the VLCC Bloom Lake also features short loading periods and manpower savings.

## Hitachi Zosen Delivers HZ-MAN B&W-Powered VLCC

The Ariake Works of Japanese shipbuilder Hitachi Zosen recently delivered the VLCC Bloom Lake to her owner, Golden Harvest Corporation. The vessel is a sister ship of the Sawako delivered earlier.

The 1,076-foot-long by 187-foot-breadth Bloom Lake is the first standard-type tanker with 280,000 dwt newly developed by Hitachi Zosen.

It is designed to carry 2 million barrels of cargo oil and cruise with minimal resistance and high fuel efficiency.

Propulsion for the tanker is provided by an HZ-MAN B&W 6S80MC-type diesel engine with a maximum continuous output of 22,900 hp x 67.3 rpm, producing a speed of 14 knots. It uses a derated,

low-speed, long-stroke, static-pressure supercharged engine, which makes significant fuel savings possible during operation. The main engine can be operated from the steering room through a microcomputer-equipped remote control system. Advanced automatic monitoring equipment is installed to permit automated cruising even when the engine room is unattended.

The vessel, which has a new, sim-

plified hull structure that eliminates the center girder, is equipped with the Super Stream Duct, a nozzle developed by Hitachi Zosen, in front of the propeller and is fitted with a large bulbous bow below the waterline for better propulsion efficiency.

The Bloom Lake has a complement of 32 persons.

For free literature detailing the facilities and capabilities of Hitachi Zosen,

Circle 43 on Reader Service Card

## Committee To Address Impact Of California Bunker Tax

A committee was recently formed to address the impact of the new California bunker fuel tax.

Called the Committee for Tax Exempt Bunkers, it will provide a forum for shipowners and bunker purchasers to air their views on the new tax, which affects all bunker deliveries in California. The Committee for Tax Exempt Bunkers will work closely with the Independent Refiners Association.

The law, which became effective July 15 of this year, will have a significant impact on several sectors of the marine community and ironically it has been the viewpoint

of many observers that the new tax will result in a net loss of revenue to the state due to the detrimental effects on so many local industries.

The new tax will pose a financial hardship on suppliers and providers of ancillary services such as barge and trucking companies, ships' agents and related services. The law also might cause a rise in global bunker prices as production and sale of bunkers in California, the world's third largest bunker supply area, declines and increased demand in alternative supply areas forces levels up.

For further information on the new committee, contact: Committee for Tax Exempt Bunkers, C/O Trans-Tec Services, Inc., 580 California Street, Suite 2020, San Francisco, Calif. 94104; or fax: (415) 421-6690.

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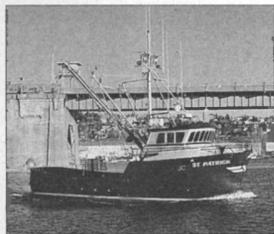
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Circle 261 on Reader Service Card

Maritime Reporter/Engineering News

### Fred Wahl Delivers Two Fishing Vessels To U.S. Owners



The Cummins-powered St. Patrick, delivered to a Seattle owner by Fred Wahl Marine Construction, was built to a Jensen Maritime Consultants, Inc. design.

Fred Wahl Marine Construction, Reedsport, Ore., has delivered two 58-foot combination fishing vessels to U.S. owners. Both vessels were built at the yard's former site in Depoe Bay, Ore.

The first boat, the St. Patrick, was delivered earlier this year to **Mark Anderson** of Seattle. She worked in the Sand Point, Alaska trawl fishery before returning to Seattle to prepare for the Southeast Alaskan salmon seine fishery this summer.

The second vessel, the Tradition, was delivered to **Doug Hoedel** of Kodiak, Alaska. She will seine for Kodiak salmon and spend the remainder of the year crabbing and longlining.

Each vessel has an overall length of 57 feet 9 inches, molded breadth of 19 feet, gross tonnage of 64 and fish hold capacity of 1,600 cubic feet.

The propulsion plant aboard each vessel consists of a Cummins KT-19 M, rated at 425 bhp at 1,800 rpm, a Twin Disc MG-516 reduction gear, with a reduction ratio of 4.5:1, Aquamet 19 shafting and 56-inch diameter four-blade bronze propeller. Generator sets consist of one 43-kw John Deere and one 12-kw Isuzu aboard the St. Patrick and two 55-kw Cummins and one 12-kw Isuzu aboard the Tradition.

Fishing equipment includes a Marco seine block and crab block aboard the Tradition and a Kolstrand seine block aboard the St. Patrick. Both are fitted with Pullmaster boom winches.

For free literature detailing Fred Wahl Marine Construction, Circle 8 on Reader Service Card

### U.S. Shipyards Receive Navy, USCG Repair, Maintenance Contracts

A number of small-, medium-, and large-sized yards around the country were recently awarded U.S. Navy, Coast Guard and Government ship repair and vessel maintenance contracts.

In the New England states, Providence, R.I.-based Promet Marine Services Corporation received a

\$116,557 contract for the technical availability on the Oliver Hazard Perry Class frigate USS Samuel B. Roberts (FFG-58).

In mid-America, National Maintenance & Repair, Inc., Hartford, Ill., will perform drydocking and repairs on the Coast Guard cutter USCG Obion (WLR-65503) under a \$256,917 contract.

In the mid-Atlantic states, M&W Marine Services, Inc., Newport News, Va., received a \$117,752 contract for vessel repairs. Also in Newport News, Davis Boat Works, received two separate contracts totaling \$527,318 for vessel repairs to two LCMs.

Norfolk, Va.-based NORSHIPCO is repairing the USS Exploit (MSO-440) under a \$1,146,182 contract.

Wilmington Shipyard, Inc., of Wilmington, N.C., received a \$247,900 vessel repair contract for the landing craft LCM-8505.

Detyens Shipyards, Inc., in Mount Pleasant, S.C., is performing repairs on the U.S. Army vessel BD-6661 under a \$180,159 contract. A separate contract worth \$584,221 was awarded to Detyens for the drydocking and repairs of the USCGC Dauntless (WMEC-624).

In Florida, Sun State Marine Inc. in Green Cove Springs, received a \$166,925 contract for drydock and repairs to the Coast Guard Primrose. The company is also performing work on the Coast Guard cutters Drummond, Key Largo and Metompkin under a \$205,780 contract.

The Bellinger Division of Jacksonville Shipyards Inc. is performing a regular overhaul of the YOGN-113 under a \$818,067 contract.

One of the Navy's hydrofoil missile ship combatants, the USS Aries (PHM-5), is undergoing work at Runyan Machine & Boiler Works, Pensacola, Fla. The contract is worth \$1,012,043.

On the West Coast, the San Pedro Division of Southwest Marine, Inc., in Terminal Island, Calif., received a \$2,887,908 contract for miscellaneous hull, mechanical and electrical repairs and ship alterations on the frigate USS George Philip (FFG-12). The yard also received a \$5,493,785 contract for similar type work aboard the amphibious transport dock USS Ogden (LPD).

Also located on Terminal Island, Al Larson Boat Shop was awarded a \$1,521,859 contract for miscellaneous hull, mechanical and electrical repairs and ship alterations on the frigate USS Jarrett (FFG-33).

Pacific Ship Repair & Fabrication of San Diego received two separate contracts for work on aircraft carriers totaling \$2,059,052. The USS Independence (CV-62) will undergo a restricted availability at the yard, while the USS Ranger (CV-61) is scheduled for a selected restricted availability. Continental Maritime has also received a \$2,684,113 contract for similar work on the Ranger. Up the coast in San Francisco, Service Engineering Co. is performing a restricted availability on the ammunition ship USS Mauna Kea (AE-22) under a \$118,504 contract. Continental Maritime of San Diego was awarded a \$2,378,348 contract for the selected restricted availability of the destroyer USS Harry W. Hill.

### NOAA Installs System To Measure Tides, Current In Tampa Bay, Fla.

Scientists with the National Oceanic and Atmospheric Administration (NOAA) recently installed the last in a series of instruments in Tampa Bay, Fla., that will provide integrated information on tides, currents and winds in the area.

The automated devices, the first of their kind anywhere in the country, are part of the NOAA's physical oceanographic real-time system, known as PORTS.

The instruments will combine current, water level and wind data and send the information by voice over the telephone or by computer modem for use by pilots, tug and towboat captains, environmental managers and recreational boaters.

According to the NOAA, the information can be especially important to pilots bringing ships into or out of the harbor. Knowing, for example, that water depths will be greater than normal can allow vessels to be loaded with more cargo.

In addition, according to Dr. **Hank Frey**, the project's director and chief of NOAA's Estuarine and Ocean Physics branch, the system can assist in search-and-rescue efforts and help predict the movement of oil spills.

"We estimate that PORTS will bring economic benefits of over \$2 million annually to Tampa Bay," Dr. Frey said. He added the system would improve safety by reducing the uncertainties of traditional tide and current predictions, which can't take weather effects into account."

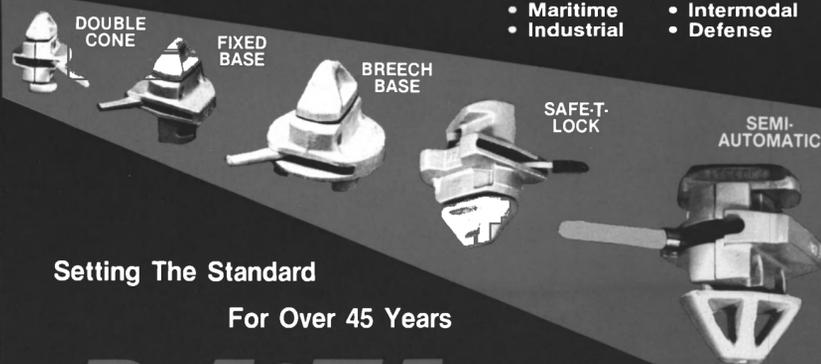
Real-time water level and wind data will be available at the Port of St. Petersburg, Port Manatee, Old Port Tampa and the Port of Tampa. Old Port Tampa will also have real-time current data. Real-time current and wind data will be available at the Sunshine Skyway Bridge.

The information will be collected centrally on a computer at the Coast Guard base at St. Petersburg, stored, and then disseminated.

NOAA's National Weather Service will also transmit the information over NOAA Weather Radio.

PORTS will undergo two months of testing before information will become generally available.

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Circle 217 on Reader Service Card

## Boats & Barges

### Winninghoff Completes Two New Deliveries—Fire/Rescue Boat And Aluminum Research Vessel



The research vessel R/V Caleta.

Winninghoff Boats, Inc., Rowley, Mass., recently announced the delivery of a 26.5-foot fire/rescue boat, and a 25.5-foot aluminum research vessel.



Fire/rescue boat Response FR-7.9.

The fire/rescue boat, Response FR-7.9, was delivered to the Hogansburg, N.Y., Fire Department to be operated on and around the Akwesasne Indian Reservation on

the St. Lawrence Seaway. The boat's 40 mph top speed and remarkable maneuverability result from a Hamilton Jet 211 drive powered by a 330-hp Volvo gasoline engine. Outfitting features include a side dive door, tow post, enlarged foredeck with integral storage, bow ladder, and the following fire system: American Godiva GP-1600 fire pump with one 2.5-inch discharge aft, two 1.5-inch discharges and an Akron Apollo monitor forward.

Such specialized outfitting and operating characteristics yield a fire/rescue response capability that was designed entirely around fire department requirements. Like the other Response-Winninghoff fire/rescue boats, this one exhibits user oriented design and construction focused specifically on fire/rescue performance.

Rutgers University Institute of Marine and Coastal Sciences recently dedicated their new Winninghoff-built aluminum research vessel, the R/V Caleta, at their Tuckerton, N.J. Research Lab. The 25.5-foot by 11-foot boat will be used for coastal and estuarine stud-

ies off the coast of New Jersey, the Hudson River and Delaware Bay.

The R/V Caleta is powered by a Volvo AD 41A/DP, a 200-hp diesel driving a duo-prop outdrive. The I/O permits operation in as little as 18 inches of water. With a normal operating load, she has a top speed of 24+ knots.

For free literature on the facilities and capabilities of Winninghoff Boats,

Circle 45 on Reader Service Card

### Bender Awarded \$4.5 Million Pact For T-AGS-40 Repair

Bender Shipbuilding & Repair Co., Inc., was recently awarded the drydocking, overhaul and repair of extensive engine room fire damage on the survey vessel USNS Tanner (T-AGS-40). The base contract amount is \$4.5 million with a potential contract value of \$5.65 million. The work is scheduled to take 120 days.

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Maritime Reporter/Engineering News

**HHI Wins Order Worth \$250 Million For LNG Carrier**



Artist's conception of the 125,000-cubic-meter-capacity Moss type LNG carrier that will be built by Hyundai Heavy Industries.

South Korean builder Hyundai Heavy Industries, Co., Ltd., (HHI) recently signed a contract with A&P Shipping S.A., Panama, worth a reported \$250 million to build the first Korean LNG ship.

This is the first of two Moss-type 125,000-cubic-meter-capacity LNG carriers awarded to Hyundai Shipyard. When delivered in March 1994, the ship will be operated by Hyundai Merchant Marine Co., Ltd. (HMM) to transport 1 million tons of Indonesian LNG per year over a period of 20 years, from 1994 to 2013.

The second ship, scheduled for delivery in March 1995, will be operated by Yukong Line Ltd. to carry 1 million tons of Malaysian LNG.

This is the first LNG carrier construction contract won by HHI and represents a major breakthrough for the company into a Japanese-dominated market.

To date, Korea has imported all its LNG—currently 2.5 million tons per year—via foreign-flag vessels on a CIF basis. The HHI deal follows a recent agreement by the Korean Government to extend its deal with Indonesia and Malaysia to double the country's import of LNG starting in 1994.

Since the 1970s, HHI has been working closely with companies such as Kvaerner Moss Technology of Norway and GAZ Transport and Techni GAZ of France in developing suitable large LNG tank designs.

HHI has already delivered a number of LPG/ethylene carriers since it first entered the LPG carrier market in 1986.

The Moss design 125,000 cubic-meter-capacity LNG ship will have an overall length of 899 feet, beam of 155 feet, depth of 87 feet and design draft of 36 feet. She will be fitted with four independent spherical tanks of nearly 131 feet in diameter.

The propulsion plant will consist of a steam turbine and two sets of Mitsubishi gas/oil dual burning marine boilers. The main turbine will be remotely controlled from the wheelhouse and centralized administration control center.

For free literature detailing the shipbuilding services of HHI,

Circle 7 on Reader Service Card

September, 1991

**Exxon Strikes Tanker Charter Deal**

Exxon Company International is near finalizing a deal to charter at least five tankers, all except one of which will be double-skinned and double-hulled.

According to reports, Exxon has struck a charter deal with Sanko Steamship of Japan and Neptune Orient Line of Singapore for three new Aframax-size tankers built at a

cost of about \$60 million apiece.

The charter plan calls for the construction of two 95,000-dwt tankers to be ordered against a charter guarantee by Sanko Steamship from Japanese shipbuilders Hitachi Zosen and Namura Shipbuilding Co., Ltd. Delivery of the vessels is expected to be in the fall of 1993.

Exxon is expected to take five-year charters on the ships, with an option for two years.

NOL is expected to order a similar size tanker for delivery in 1993

with similar charter period and rate conditions for Exxon. Another tanker will be built under the construction contract, if Exxon chooses to exercise an option.

Furthermore, another new similar size double-hull tanker owned by D'Alessia and an 86,803-dwt Yugoslav-flag single-hull tanker owned by Yugotankers will be chartered by Exxon.

According to an Exxon spokesman, the vessels would probably be used for the Atlantic Basin.

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# Industry And The Environment

## Doing The Right Thing

BY  
**JEFFERY A. SMITH**  
VICE PRESIDENT —  
PUBLIC AFFAIRS  
THE AMERICAN  
WATERWAYS  
OPERATORS



The barge and towing industry's vessels have been serving the citizens of the United States since the 1600s. As America has grown, so has the barge industry, and as America's consciousness about the environment has grown, so has the sense of responsibility this industry feels for the environment. The coastal waterways and inland river systems are some of America's greatest treasures, and this industry is totally dependent on these precious resources for its livelihood. Common sense dictates that we protect and enhance the marine environment on which our future relies.

The oil spill in Prince William Sound in 1989 struck a fundamental chord in the American people. One can argue that the interest and goals of the environmental community have been embraced by the American people. The national imperative is to achieve clean air and clean water, and protect against further environmental degradation. Across the nation, the barge and towing industry is responding responsibly to that imperative.

Americans consume 17 billion barrels of oil a day. The barge and towing industry transports nearly 30 percent of America's petroleum and petroleum products - in over 4,000 tank barges. There are inherent risks in that transportation. But according to U.S. Coast Guard statistics, waterborne commerce is the safest and most regulated form of transportation and results in fewer accidental spills or collisions than any other form of transportation. This excellent record is directly attributable to tough operational safeguards imposed by the companies

themselves, as well as strict federally mandated inspection standards.

The enactment of the Oil Pollution Act (OPA) of 1990, which combines for the first time in a comprehensive regime liability, cleanup, safety, hull configurations, penalties and other preventive measures, pushes the nation forward in the right direction of spill prevention and cleanup. The industry was involved in that process all along, guiding decision-makers to regulate and legislate sensibly and safely.

In response to OPA '90, the Towing Safety Advisory Committee formed a Subcommittee on OPA Implementation to assure a focused mechanism for providing the Coast Guard with data, information and advice on the wide range of regulatory projects the Agency is directed to pursue by OPA '90. Thus industry continues its contribution to the regulatory processes which will affect all marine transporters.

However, it is important to note that our environmental awareness predates the Valdez spill. We recognized that marine safety and environmental protection go hand in hand in 1986 when AWO established a Task Force on Vapor Emissions to intercept unguided state actions which didn't appropriately balance the two. This work resulted in safe, sensible symmetry among the provisions of the re-authorized Clean Air Act in 1991, state regulations establishing emission limitations and standards, and Coast Guard Marine Safety rules governing vapor emissions recovery.

These are all quantifiable accomplishments, but the real first step in change is a strong commitment. The

tug and barge industry adopted a guiding set of environmental principles in December 1990. These principles solidify and articulate AWO member companies' commitment to policies and practices which will maximize marine safety and environmental protection. The principles emphasize prevention, planning, responsibility, safety, training, cooperation, and environmental stewardship.

However, the industry recognizes that intentions alone are not enough. A stated commitment must be followed by action to be effective. In 1989, AWO formed a Study Group on Marine Safety Issues, and as a result of the report of that group, the AWO Board of Directors last year formed several Working Groups to further assess industry operations. These working groups were charged with reviewing the way industry does business in a broad range of areas. One working group is involved in an in-depth examination of the critical issues of licensing, manning, training, watchstanding, pilotage and other issues. Another is looking carefully at the issues of vessel construction, maintenance, and operations. Still another is examining new technology in areas of navigation and communications equipment to determine their potential to enhance marine safety on towing vessels. Another working group is ex-

amining the pollution prevention benefits of overfill devices, tank/level pressure monitoring devices, periodic gauging, and examining the thickness of tank vessel hulls.

The findings of these working groups will be a central topic of discussion at the upcoming AWO Board of Directors Fall Convention, September 12 and 13, as the industry turns its attention to this all-important examination of its own operations.

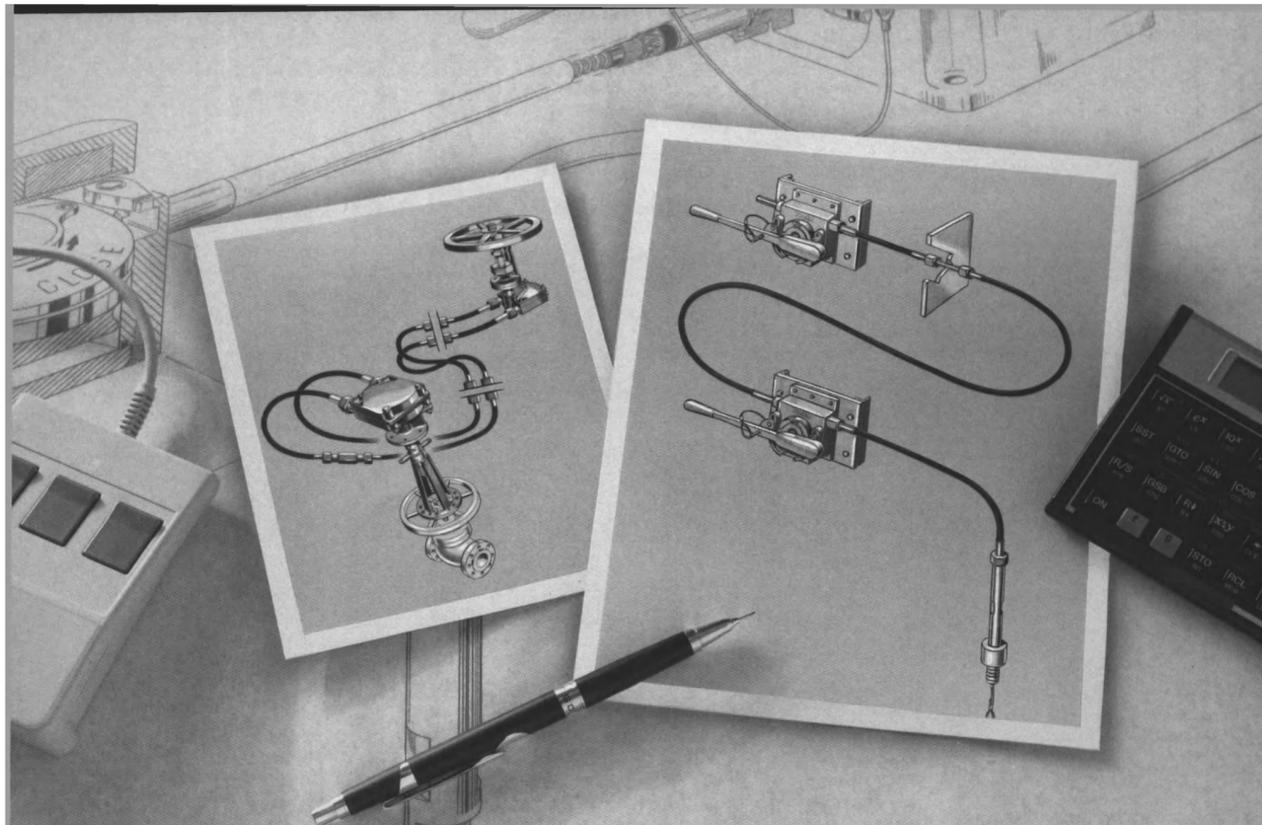
Over the last few years, the barge industry has strongly supported ratification and start-up of Annex V of the International Convention for the prevention of Pollution from Ships to put a stop to the destructive practice of dumping garbage and plastics generated by vessels at sea. On March 1, 1991, the Coast Guard published a final rule on requirements for waste disposal which requires vessels to display a placard containing detailed information on the proper discharge of waste materials. AWO responded to this need by creating a *Protect Your Waterways* placard which not only meets the requirements of the no dumping rule, but strongly asserts the industry's commitment to protecting the waterways on which their businesses rely. To date, thousands of these placards have been distributed to industry vessels. The AWO placards state that "Clean Water Is Everyone's Responsibility" — a message towing vessels carry every day.

On the midcontinent rivers, officials of the U.S. Fish and Wildlife Service, EPA and state environmental agencies have been traveling aboard industry vessels periodically for two years, at the industry's invitation. This program has resulted in enhanced mutual understanding of both towing operations and environmental protection. With the assistance of the towing industry, the EPA has produced and distributed a videotape for the use of vessel personnel on how to avoid and mini-

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Jeffery A. Smith



Left: Remote Mechanical Valve Actuator. Right: Remote Trip Valve Actuator.

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mize the environmental impact of their operations, and still operate safely. Handouts are being distributed to vessels passing through locks at particularly sensitive times for the environment — informing vessel masters of the need for special caution at selected times — and asking for input from industry concerning fish and wildlife activity in these areas of operation. This unique cooperative effort continues in 1991.

But industry commitment to the environment goes beyond stated principles, self-evaluation and cooperative exchanges of ideas. In addition to industry-wide initiatives, individual companies across the nation are demonstrating their dedication to preservation of the environment in many ways.

For example, for the last three years, through the combined efforts and resources of local towing companies, concerned citizens, representatives of the U.S. Fish and Wildlife Service and the Corps of Engineers, a project has been developed to protect the Port Aransas Refuge in Texas which is home to endangered whooping cranes. The worldwide count of these birds is under 150, and they rely exclusively on the Aransas Refuge where they return each year to spend the winter and raise their young. Industry companies provide labor, barges, cranes and boats necessary to off-load and place cement bags along various shoreline areas of the refuge where the banks are determined to be most severely threatened by erosion. In 1991, scores of volunteers worked side by side to place 11,000 bags of concrete along a 1,000 foot portion of the shoreline to form a barrier preventing contamination of fresh water into the Refuge and reducing erosion of the banks of the whooping crane nesting areas.

But it isn't only money and manpower that will make a difference, it's individual companies' commitment to high standards of environmentally responsible work practices. Through company newsletters, poster campaigns, environmental education programs and corporate policy, companies are enforcing this standard of care throughout their operations. Many companies now require biodegradable materials for cleaning, both in

their facilities and onboard their vessels, and are eliminating or substituting other products that are environmentally harmful. Industry companies across the nation are developing recycling programs and are reinforcing the concept of environmental awareness in all their employees. Most have their own corporate environmental policies.

In many companies, the push toward environmental sensitivity has resulted in voluntary modifications and changes in equipment as well, including installation of sump pumps to minimize accumulation of bilge water, providing chemical

holding tanks with secondary concrete containment, and installation of monitoring systems on vessels for greater fuel efficiency. Companies have installed water/oil separators to permit concentration of waste oil products which must be controlled, provided spill rails on tank barges, vapor flares to control volatiles brought ashore, and floating roofs on tanks that contain volatile products. Some companies that work with refrigeration units have installed freon receivers to accept the freon which would otherwise be dumped into the atmosphere. Other companies have developed volun-

tary maintenance programs designed to reduce vessel stack emissions.

This dedication has also come in the form of operational changes. Reduction of speed in narrow channels to reduce bank and bottom erosion, refraining from using single-skin tank barges in environmentally sensitive areas, additional inspections by supervisory personnel, and use of waterblasting instead of sandblasting when preparing towboat hulls for painting are just some of the many voluntary measures individual companies have adopted to protect and enhance the environment.

U.S. Coast Guard casualty data makes clear that personnel competence is statistically by far the most critical factor in accident avoidance. Many industry companies have long required training requirements above and beyond what the law requires. Increased personnel training, development of crew orientation programs, oil-spill response plans, hazardous waste handling programs and increased personnel aboard vessels when conducting potentially hazardous actions are steps companies have taken on their own to ensure safe, environmentally sensitive practices.

Across the board, barge and towing industry companies continue to refine their operations to eliminate the threat of environmental harm that could be caused by industry activity.

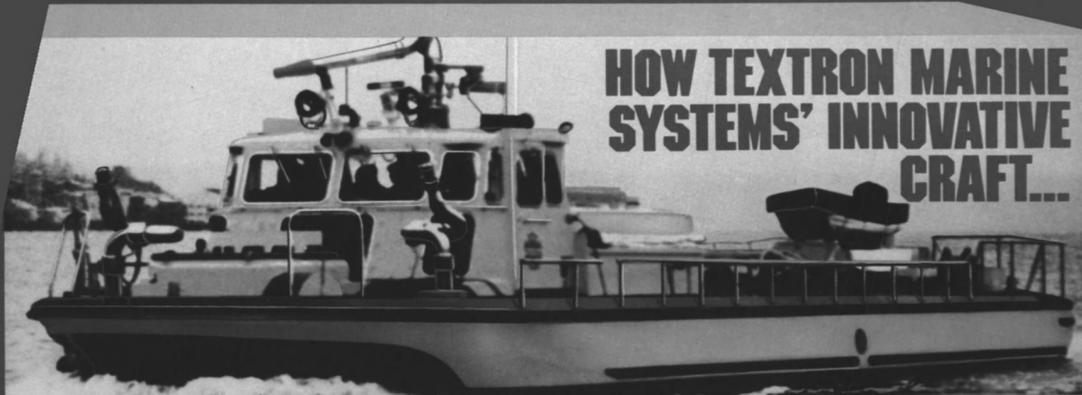
In this decade, there has emerged a wider consciousness of the need to harmonize a healthy industry with the public good, and this industry is demonstrating its desire and commitment to maintain and improve environmental conditions. The realization that more care today will result in reduced cost tomorrow, combined with the need to keep the public trust that its environment is being cared for, has led to change for this industry. We are committed to keep working to improve our performance and to safeguard our precious marine environment. This industry is changing, working harder to do better.

#### American Waterways Operators Environmental Principles

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- Make environmental protection a priority in business planning.
- Maintain active and effective environmental policies and programs designed to protect the environment.
- Conduct our business, and operate and maintain our vessels and facilities in a manner that protects the environment, as well as the safety of employees and the public.
- Develop and implement company programs that address education, training, and communication of environmental policies and procedures. Emphasis will be placed on the importance of strict compliance with federal, state and local laws and regulations regarding marine safety and the environment.
- Maintain and update emergency response plans that will allow companies to respond swiftly to environmental incidents and minimize environmental damage.
- Actively participate with government and other interested parties in creating responsible laws, regulations and programs which safeguard the environment.
- Seek out, or respond to, proposed environmental matters or concerns from either the public or private sectors.
- Strive to reduce vessel-generated waste and emissions by improving operating procedures.
- Work in partnership with manufacturers, shippers and vendors to enhance safe transportation of products and the management of cargo residues and cleaning wastes associated with the transportation of cargoes.

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### Repair Contracts Awarded By Navy To U.S. Shipyards

The U.S. Navy and Coast Guard recently awarded several repair and maintenance contracts to shipyards around the country.

On the East Coast, East Boston, Mass.-based Boston Graving Dock Corporation received \$377,968 for

the regular overhaul of the non-self-propelled covered lighter YFN-1251.

In Providence, R.I., Promet Marine Services Corporation performed regular overhauls of the patrol craft YP-696 and YP-698 under a \$279,334 contract.

Down the coast, New York Shipyard Corporation, Brooklyn, N.Y., received a \$5.1 million contract for the drydocking selected restricted fixed-price availability of the frigate USS Clifton Sprague (FFG-16).

In the mid-Atlantic states, Earl Industries, Inc., Portsmouth, Va., was awarded a \$147,000 contract for the restricted availability of the submarine tender USS L.Y. Spear (AS-36). Earl Industries was also awarded a separate contract worth \$363,700 for the technical availability of the amphibious assault ship USS Saipan (LHA-2).

The neighboring yards of Quality Boats Co. and Olympic Marine Service, Inc., received contracts for re-

stricted availabilities of landing craft (LCMs). Quality Boats received a \$111,111 contract, while Olympic Marine Service received a \$106,040 contract. Quality Boats also received a \$157,512 contract for repairs on the aircraft carrier USS John F. Kennedy (CV-67).

Also in Portsmouth, Associated Naval Architects were awarded separate contracts worth \$759,560 for work on the non-self-propelled berthing and messing barge YRBM-28 and non-self-propelled covered lighter YFN-1159, as well as \$341,859 in contracts for repairs to LCM-8604 and work on the utility landing craft LCU-1650 and LCU-1663.

In Norfolk, Dolphin Ship Repair Corp. received \$308,415 for voyage repairs on the store ship USNS Rigel (T-AF-58).

The oiler USNS Mississinewa (T-AO-144) was deactivated by Norfolk Shipbuilding & Drydock Corp. (NORSHIPCO) at its Norfolk, Va., yard under a \$1.5 million contract.

Chesapeake, Va.-based Port Allen Marine, Inc. received separate contracts worth \$384,727 for vessels repairs.

Also in Chesapeake, Creasy Electronics received \$144,839 for ship repair on the tank landing ship USS Manitowoc (LST-1180).

In Newport News, Va., Davis Boat Works, Inc. performed vessel repairs under a \$179,131 contract.

Delta Marine, Inc., Wilmington, N.C., received a \$101,400 contract for vessel repairs, while Wilmington Shipyards, Inc., also of Wilmington, received a \$222,300 contract for similar work.

Detyens Shipyards, Inc., in Mt. Pleasant, S.C., received \$138,398 for a restricted availability of the destroyer USS Mahan (DDG-42).

In Charleston, S.C., Braswell Services Group performed regular overhauls on the non-self-propelled covered lighter YFNB-42 and non-self-propelled floating crane YD-245 under a \$2.7 million contract.

Metal Trades, Inc., in Hollywood, S.C., performed a restricted availability on the large harbor tug YTB-803 under a \$552,723 contract.

In Jacksonville, Fla., Jacksonville Shipyards, Inc. received a \$1.6 million contract from the Supervisor of Shipbuilding, Conversion & Repair, for work on the cruiser USS Philippine Sea (CG-58).

Out West, Southwest Marine, Inc.'s San Pedro Division received a \$2.9 million contract for miscellaneous hull, mechanical and electrical repairs and ship alterations on the frigate USS George Philip (FFG-12). A second separate contract, valued at \$5.5 million was awarded to the San Pedro Division for similar work on the amphibious transport dock USS Ogden (LPD-5).

In National City, Calif., Bay City Marine received a \$349,990 contract for the restricted availability of the frigate USS Bagley (FF-1069).

In the Pacific, Marisco Ltd., Ewa Beach, Hawaii, performed drydocking and repairs on the U.S. Coast Guard cutter Washington (WPB-1331) under a \$124,435 contract.

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Photo: Forest Johnson Yacht: Sea Ray 630 Super Sun Sport

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Overview Of U.S. Navy Ship Repair & Modernization:

## \$13.4 Billion Earmarked For Repair Over Next 3 Fiscal Years

By James R. McCaul, President  
IMA Associates, Inc.

**M**aintenance and repair of U.S. Navy ships provides a major business base for more than 50 shipyards in this country. With only a few exceptions, Navy ship repair is the most important source of business to these firms and their network of subcontractors.

Over the next three fiscal years, FY 1991-1993, it is estimated that the total expenditure for Navy ship maintenance and modernization will be \$13.48 billion.

### Number Of Repair-Capable Yards Remains Stable

Exhibit 1 shows the trend in the number of yards capable of performing Navy ship construction and repair over the past nine years. As shown, the number of construction capable yards has fallen from 37 to 20 over this period—a decrease of 46 percent. In contrast, the number of yards with full repair capability has dropped from 49 to 44—a decrease of only 10 percent. There has been almost no decrease in the number of yards capable of performing limited repairs.

### Ship Maintenance Expenditures Triple

Exhibit 2 shows the level of expenditures for active fleet ship maintenance and modernization over the period FYs 1975-1993. As indicated, expenditures have tripled over this

**Naval Technology Cover:** For details on the Navy's new SWATHUSNS Victorious, see story on page 52.



The cable ship USNS Zeus in drydock on the BethPride dock at what was then the Bethlehem Steel Sparrows Point, Md., shipyard (Now known as BethShip Sparrows Point).

period. They peaked in 1985 at just under \$6.2 billion. This was also the high year in terms of expenditures per ship. Since then, expenditures have fallen—particularly those related to ship modernization.

However, as shown in Exhibit 2, estimates for FY 1993 indicate a rise in the amount of expenditure per ship—almost \$10.1 million per ship—the third highest level since 1975. This is due, for the most part, because estimates for FY 1993 also indicate a substantial increase in the level of expenditures per ship for maintenance, almost \$8.6 million per vessel.

Although spending is expected to remain at lower levels for ship modernization over the next few years, expenditures for ship maintenance, conversely, are projected to rise steadily from FY 1991 to 1993. Estimates for maintenance expenditures show \$3.4 billion will be spent in FY 1991, \$3.8 billion in FY 1992 and almost \$4.0 billion in FY 1993.

### Number Of Maintenance Availabilities

Exhibit 3 shows the number of overhauls and short term maintenance availabilities scheduled for active fleet ships over the past eight years and planned for the next three years. The number of overhauls has fallen dramatically during this period—reflecting the change in maintenance strategy which emphasizes frequent short duration availabilities in place of periodic lengthy overhauls.

(continued on next page)

**Exhibit 3**  
Trend in Number of Maintenance Availabilities

Fiscal Year	Overhauls	Selected Restricted Maintenance Availabilities		Total
		Availabilities	Availabilities	
1983	59	72	8	139
1984	53	88	10	151
1985	55	106	17	178
1986	33	99	31	163
1987	39	108	54	201
1988	22	87	64	173
1989	23	98	69	190
1990	19	100	55	174
1991(plnd.)	13	66	52	131
1992(plnd.)	9	81	64	154
1993(plnd.)	17	72	52	141

Source: IMA report number 7117.

**Exhibit 4 Expenditures for Maintenance and Modernization of Naval Reserve, MSC and RRF Ships (in millions of \$)**

Fiscal Year	Naval Reserve Ships	MSC Ships <sup>1</sup>	RRF Ships <sup>2</sup>
1983	100.3	240.2	n.a.
1984	97.4	179.0	n.a.
1985	123.6	319.1	n.a.
1986	127.9	164.4	n.a.
1987	148.3	221.7	n.a.
1988	157.3	205.7	75.0
1989	170.1	173.2	75.0
1990	151.8	162.7	85.0
1991(est.)	199.2	173.5	172.0
1992(plnd.)	141.9	200.7	117.0
1993(plnd.)	136.0	215.2	121.0

Notes: 1. MSC expenditure include maintenance and repair of nucleus fleet ships. Data may not be totally comparable year to year. 2. RRF expenditures included in Navy budget prior to 1989.  
Source: IMA report number 7117.

### Other Navy Ship Maintenance

The Navy has been spending between \$100 million to \$200 million annually on maintenance and modernization of naval reserve ships. The Military Sealift Command (MSC) has recently been spending about \$175 million to \$200 million annually on ship maintenance and repair of nucleus fleet ships. The Maritime Administration (MarAd) had budgeted about \$170 million in FY 1991 to maintain the Ready Reserve Fleet (RRF). Funding trends are shown in Exhibit 4.

Over the next three fiscal years, a total of about \$477 million is estimated or planned to be spent on the maintenance and modernization of naval reserve ships. During this same period, plans call for a total expenditure of \$589.4 million on MSC ship maintenance and modernization and an additional \$410 million for RRF ship programs.

### \$12.2 Billion For Electronics, Support & Other Equipment Over Next 3 Years

The Navy has been spending between \$3.3 billion and \$4.3 billion annually for ship support equipment, electronics and other equipment for replacement and ship modernization. Over the next three

years, the Navy plans to spend \$12.2 billion for such equipment. A 12-year trend in spending is shown in Exhibit 5.

The largest percentage of replacement and modernization expenditures has been for communications and electronics equipment. Expenditures in this area represent about 50 percent of the total—and are projected to increase 54 percent from

1990 to 1993.

IMA has prepared an in-depth assessment of future Navy ship repair. The 200+ page report gives details for scheduled Navy repairs over the next several years. Information includes the ship name, homeport, expected start and finish dates and type of availability. Also provided is the MSC ship maintenance plan for over the next 12

months. Historical data are provided showing work contracted to each shipyard over the past eight years. The report, Maintenance, Repair and Modernization of U.S. Navy Ships (Report No. 7117), is available for \$575. To order, contact IMA Associates, Inc., 600 New Hampshire Avenue, NW, Suite 140, Washington, D.C. 20037; telephone: (202) 333-8501; or fax: (202) 333-8504.

**Exhibit 2  
Trend in Navy Ship Maintenance & Modernization Expenditure**

Fiscal Year	Maintenance (in millions of \$)	Modernization (in millions of \$)	Total Dollars	Total Ships	Main./Ship	Modern./Ship (in 000's of \$)	Total Maint. & Mod./Ship
1975	\$1140.5	\$434.5	\$1575.0	496	\$2299	\$ 876	\$3175
1976	1490.5	569.8	2060.3	484	3080	1177	4257
1977	1903.4	669.2	2572.6	477	3990	1403	5393
1978	2563.5	545.2	3108.7	468	5478	1165	6643
1979	2508.9	772.3	3281.2	473	5304	1633	6937
1980	2642.5	763.1	3405.6	479	5517	1593	7110
1981	3195.0	952.7	4147.7	491	6507	1940	8447
1982	3632.3	932.8	4565.1	513	7081	1818	8899
1983	4201.2	896.6	5097.8	513	8189	1748	9937
1984	4214.7	2086.5	5301.2	523	8059	2077	10136
1985	4779.6	1397.7	6177.3	542	8818	2579	11397
1986	4179.7	1398.6	5578.3	555	7531	2520	10051
1987	4244.4	1344.7	5589.1	568	7473	2367	9840
1988	3551.1	959.4	4510.5	565	6285	1698	7983
1989	3454.7	1017.0	4471.7	566	6104	1797	790
1990	3654.0	1054.6	4708.6	545	6705	1935	8640
1991(est.)	3417.7	647.3	4065.0	528	6473	1226	7699
1992(est.)	3761.9	975.3	4737.2	477	7886	2045	9931
1993(est.)	3575.7	697.2	4672.9	464	8568	1503	1007

Note: Modernization costs from 1990 onward may not be completely comparable with early year figures. Source: IMA report number 7117.

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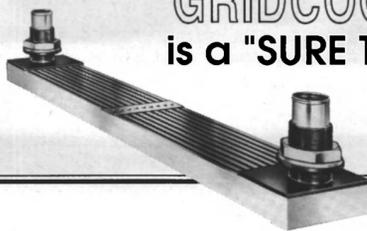
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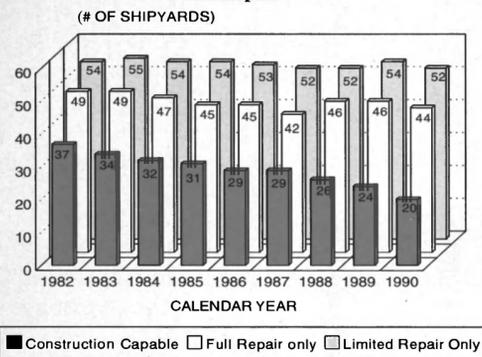


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**Exhibit 1 Shipyards Capable of Navy Construction and Repair**



Source: IMA report number 7117.

**Exhibit 5 Trend in Expenditures for Replacement and Modernization Equipment (in millions of \$)**

Fiscal Year	Ships Support Equipment	Comm. Electron. Equipment	Ordnance Support Equipment	Sales and Repair Parts	Out-fitting Spares	Total
1982	687	1,155	827	1/	2/	2,669
1983	534	1,413	695	1/	2/	2,642
1984	666	1,527	920	198	2/	3,311
1985	744	1,583	1,06	255	2/	3,643
1986	817	1,832	1,153	233	2/	4,035
1987	957	1,830	1,190	282	2/	4,259
1988	730	1,519	789	258	2/	3,296
1989	621	1,400	1,052	203	325	3,601
1990	696	1,467	696	223	186	3,268
1991	741	1,772	482	244	274	3,513
1992	777	2,444	550	296	219	4,286
1993	852	2,265	763	293	275	4,448

Notes 1. Expenditures for spares and repair parts were not separately identified prior to FY 1984.  
2. Expenditures for outfitting spares were not separately identified prior to FY 1989  
Source: IMA report number 7117, Maintenance, Repair and Modernization of U.S. Navy Ships, April 1991.

**California-Based Ship Repairers Awarded U.S. Navy Contracts**

A number of ship repairers located in or around San Diego, Calif., were recently awarded Navy ship repair, overhaul and deactivation contracts by the Supervisor of Shipbuilding, Conversion and Repair, San Diego. Additionally, a major repairer located in San Francisco was awarded a voyage repair contract by the Maritime Administration for a Navy aviation support vessel.

Southwest Marine, Inc. San Francisco, Calif., was awarded a \$3,241,145 contract for voyage re-

pairs to the T-AVB Curtiss. The work, which includes drydocking and extensive boiler repairs, was scheduled to be completed in 49 days.

San Diego-based Campbell Industries, Inc. recently received a trio of contracts totaling almost three quarters of a million dollars for the deactivation of three Navy Charles F. Adams Class (DDG-2) destroyers. The three 437-foot, 4,500-ton-displacement ships feature four boilers, two geared turbines and two shafts. The Navy's newest class of destroyer, the Arleigh Burke Class (DDG-51) features four LM2500 marine gas turbines from GE.

The first contract, worth \$247,429, was for the deactivation

of the USS Lynde McCormick (DDG-8). The second, valued at \$248,996, was for the deactivation of the USS Robison (DDG-12), while the third, worth \$248,995 was for deactivation of the USS Buchanan (DDG-14).

Al Larson Boat Shop, also located in Southern California on Terminal Island, received a contract for the regular overhaul of the self-propelled fuel lighter barge YO-203. The contract was valued at \$702,057.

The conventional powered aircraft carrier USS Ranger (CV-61), which is powered by eight boilers, four geared steam turbines and four shafts, is undergoing a selected restricted availability at Continental Maritime of San Diego under a \$3,324,427 contract.

Pacific Ship Repair & Fabrication, Inc. was also awarded a \$3,228,180 contract for a selected restricted availability on the Kitty Hawk Class Ranger.

**Boland Marine Receives \$431,793 Contract For Container Barge Repair**

Boland Marine & Manufacturing Company, Inc., New Orleans, La., recently received a \$431,793 contract for repairs to the 38,400-dwt, 1972-built container barge S.S. Cape Mendocino. The contract was awarded by the U.S. Department of Transportation, Maritime Administration.

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# Leistriz

**Thomas Marine Delivers  
Waterways Tender  
To Hempstead, N.Y.**



The 38-foot welded aluminum waterways tender CW 12, built by Thomas Marine, Inc., for the Town of Hempstead, Dept. of Conservation and Waterways, Freeport, N.Y.

Thomas Marine, Inc., Patchogue, N.Y., recently delivered a 38-foot waterways tender to the Town of Hempstead, Department of Conservation and Waterways, Freeport, N.Y.

Powered by a single 160-hp Detroit Diesel engine, the 12-ton waterways tender, called the CW 12, has a beam of 12 feet 6 inches and a draft of almost 4 feet. The rest of her propulsion plant consists of a three-blade Michigan propeller, Aquamet 22 shafting and Twin Disc reduction gear. Auxiliary power is provided by a Koehler generator set.

Other equipment on board includes Morse engine controls, Wagner hydraulic steering controls, Hale and Rule pumps.

Navigation and communication equipment includes a Whelan Siren, P/A system, ICOM VHF radio, a Ritchie compass and Raytheon autopilot and radar.

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**Management Picked For  
New Sulzer Diesel U.S.**

**Peter Sulzer**, chairman of New Sulzer Diesel Ltd. and the New Sulzer Diesel Group, headquartered in Winterthur, Switzerland, has announced the management team selected to head New Sulzer Diesel U.S. Inc., the wholly owned subsidiary charged with conducting operations from the U.S. for the New Sulzer Diesel Group.

The president and chief executive officer of New Sulzer Diesel U.S. Inc. is **Robert G. Walsh Jr.**, a graduate of Webb Institute, with graduate degrees from MIT and NYU and more than 20 years' expe-

September, 1991

rience in the maritime industry, including oversight of commercial and government ship acquisition and operations in the U.S. and overseas. Most recently he was Executive Assistant to the Deputy Commander at the Military Sealift Command in Washington, D.C.

**Ernst P. Jung**, who has been with Sulzer for over 40 years, has been promoted from general manager to vice president, technical ser-

vices for New Sulzer Diesel U.S. Inc. He has also been named to a seat on the board of directors.

Mr. **Sulzer** also announced that Adm. **James S. Gracey** (Ret.), former Commandant of the U.S. Coast Guard, has agreed to serve as adviser to the New Sulzer Diesel Group. Admiral **Gracey** sits on several boards of directors and is a consultant, with offices in Washington, D.C., and Arlington, Va.

New Sulzer Diesel is a world leader in design, manufacture, support and R&D of high-quality heavy-duty diesel engines for maritime propulsion and auxiliary, and electric power generation. New Sulzer Diesel engines propel more than one third of the world's oceangoing fleet. The 14,000 engines in service are fully supported through the New Sulzer Diesel worldwide, after-sales organization.

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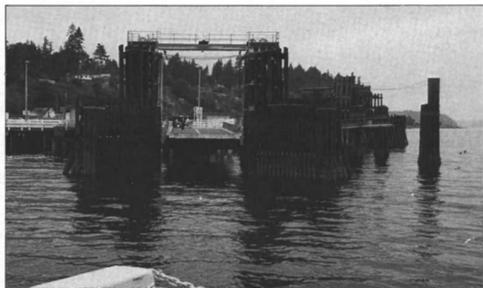
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In September, 1986 at the Clinton Terminal, a vessel rammed the wingwall, snapping the 12" x 12" timbers. The Ultra Fend faces attached to the timbers remained intact. All but two pads were reapplied to the new timbers. The two that were not reapplied had not cut nor broken on impact, but only stretched as the ferry pressed through the broken wingwall. Terminal engineers are planning to extend Ultra Fend use to the dolphins as well.



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ULTRA POLY

Circle 346 on Reader Service Card

### Gladding-Hearn Begins Construction Of Two Aluminum Pilot Boats

Gladding-Hearn Shipbuilding, Somerset, Mass., has begun construction of two new aluminum pilot boats for the Virginia Pilots Association and S.C.-based Charleston Branch Pilots.

Designed by C. Raymond Hunt

Associates of Boston, the pilot boats will function as harbor dispatch vessels, as well as transporting the pilots to ships, said shipyard officials.

The 51-foot Hampton, which offers complete liveboard accommodations for two, will replace an ashore waypoint used to dispatch the Virginia pilots to ships on the port of Hampton Roads in addition to shuttling pilots across the harbor to avoid highway traffic on the Hampton Roads Bridge/Tunnel, said

**George Duclos**, Gladding-Hearn president.

The other pilot boat, a 39-footer, will also serve as a standby boarding boat for pilots who would normally travel by car from downtown Charleston to Wando Terminal in Mt. Pleasant.

The Hampton, the Virginia pilots, fourth Gladding-Hearn launch, is powered by twin Detroit Diesel 8V-92NA engines rated for 350 hp at 2,100 rpm reaching speeds of 22

knots, while the smaller, single-screw pilot boat powered by the same engine has a top speed of 20 knots. This is the Charleston pilots, fifth pilot boat built by the yard since 1960.

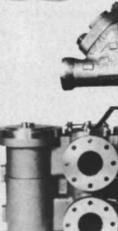
The Hampton has a beam of 17 feet, depth of 8 feet and draft of 5 feet. The as-yet-unnamed pilot boat has a beam of 14 feet, depth of 6 feet 6 inches and draft of 4 feet 6 inches. Both boats will be delivered in the third quarter of this year.

For free literature detailing the boatbuilding capabilities of Gladding-Hearn,

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Circle 255 on Reader Service Card

### Village Marine Wins U.S. Navy, Chinese Orders For Desalination Plants

Village Marine Tec., Gardena, Calif., recently received separate orders to deliver water-making plants to the People's Republic of China and the U.S. Navy.

The Chinese order is for a reverse osmosis water-making plant for an oil drilling platform off the coast of China. The watermaker is expected to produce 4,000 gallons of freshwater a day for the platform crew. Village Marine Tec. personnel are currently in China to start up the plant and train local technicians in its operation.

The U.S. Navy order is for the delivery of eight large desalination plants to make extremely pure water for use in the boilers of ships.

Each plant, which will produce 86,000 gallons per day, will deliver water from a relatively small unit—inside a container about the size and shape of a railroad boxcar. The plants will be readily portable.

The Navy will use the plants to convert industrial grade water to "boiler-quality" feed water for ships.

For free literature detailing the line of watermaker plants available from Village Marine Tec.,

Circle 92 on Reader Service Card

### Ambrose Joins Brandtship USA

Brandtship USA, Inc., Fort Lauderdale, Fla., shipbrokers and ship managers, recently announced that **Samuel L. Ambrose** has joined the company.

Mr. Ambrose will be in charge of the operation of the two LPG tankers on charter to Fertilizers of Trinidad and Tobago, Limited, and will act as owner's representative for the three Knud I. Larsen, Copenhagen Mark VI containerships on time charter to Sea-Land Service, Inc. in their Central American service.

Before joining Brandtship USA, Inc., Mr. Ambrose was president of Wisco USA, Inc., Miami for the last six years prior to which he was marine superintendent of West Indies Shipping Corporation, Port-of-Spain, Trinidad.

### Bath Iron Promotes John C. Mason To VP

**John C. Mason**, who has directed the development of the new Aegis Guided Missile Destroyer program at Bath Iron Works (BIW), has been promoted to vice president, following the commissioning of the first ship of the class into the U.S. fleet.

Mr. **Mason** began his career at BIW in 1977 as a project engineer. He was involved in research projects dealing with the Maritime Administration before becoming manager of marketing for Navy new construction in 1981. He was promoted to director of program management of the Aegis destroyer program in 1985. BIW has contracts to build eight additional destroyers and will bid on others later this year.

For free literature detailing the facilities and capabilities of Bath Iron Works,

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### Treatment/Purification System For Heavy Fuels, Lube Oils From Acomarin

When the Ultrasaff (Ultrasonic Automatic Fine Filter) was first introduced, it was originally intended only for fine filtering processes of marine heavy fuels and lube oils. Following pilot testing with different heavy fuels, however, it was discovered that with enough high ultrasonic cavitation intensity, the fuel changed towards a homogenous, stable and well-emulsified end product.

According to Finnish manufacturer Acomarin Oy, the engine room applications of Ultrasaff for fine filtering, homogenizing of wax and asphaltines into the fuel and the emulsification of water into the filtered liquid are almost unlimited. This occurs assuming the cavitation threshold is reached.

Another marine application for Ultrasaff is diesel fuel treatment for the daily service tank of a drilling rig. Ultrasaff can be used as a biocide, killing unwanted bacteria in the tank and tubing which could potentially cause fuel equipment problems.

Other similar applications include the treatment of large quantities of hydraulic oils and lube oils.

With the use of Ultrasaff, reports Acomarin, there is the potential for saving on fuel costs because of less sludge, less filter maintenance because there are no moving parts, better lubricating oil condition due to improved fuel combustion, and less nitrous oxide exhaust emissions.

Besides producing Ultrasaff systems in Naantali, Finland, Acomarin Oy plans to produce in Tampa, Fla., by Acomarin International Inc. The sales and after-sales service networks are under development.

For free literature detailing the Ultrasaff,

Circle 104 on Reader Service Card

### Bird-Johnson Appoints Ed Mullen Manager, Program Management

Bird-Johnson Company, Walpole, Mass., has appointed Edwin R. Mullen as manager, program management.

Formerly manager, marine sales, Mr. Mullen has been with Bird-Johnson for 12 years, 10 of those as a program manager. In his new position, he will be responsible for all management aspects of Bird-Johnson's government and major commercial contracts, reporting to Peter Gwyn, the company's president and chief operating officer.

Bird-Johnson Company is a leading designer and manufacturer of naval and commercial marine controllable pitch and fixed pitch propeller systems and provides castings and precision machined products.

### Merger Plan Proposed For General Ship

A former owner of General Ship Corporation, an East Boston ship repairer, is proposing to merge the yard with a local metal fabricator.

The former owner, venture capitalist **Arnold L. Mende**, is proposing a merger of General Ship and P.X. Engineering Inc. The two firms are adjacent on South Boston waterfront land owned by Boston's Economic Development and Industrialization Commission (EDIC).

Mr. **Mende** is proposing to continue Navy repair work at the yard and possibly commercial, while fabricating metal tubes at the facility that would be used for the underwater portion of the third Boston Harbor tunnel. Mr. **Mende** also wants to renovate an EDIC-owned, 1,200-foot drydock for the tunnel tube project.

The time schedule for the tunnel project is putting pressure on the proposed merger.

Private investors have already pledged \$25 million to Mr. **Mende** for the project, while EDIC has approved \$5.5 million in bonds for the project.

The Massachusetts Port Authority is offering limited loan guarantees to Mr. **Mende**.

### Avondale Industries Names Mortimer VP And Manager, Shipyards Division

**Edmund C. Mortimer** has been appointed a corporate vice president and manager, Shipyards Division at Avondale Industries Incorporated.

In his new capacity, Mr. **Mortimer** will be in charge of all shipyard operations as well as the procurement of new government work for the yard.

Mr. **Mortimer** retired after serving 30 years in the U.S. Navy, during which time he was heavily involved in the acquisition of a variety of ships.

### IPH Marine Offers Free Literature On Automation Systems For Shipbuilding

IPH Marine Automation, a division of the Danish company IPH, designs, manufactures, and carries out on-site installation of automation systems for the shipbuilding and offshore industries.

Due to the development of the revolutionary IPH Marine Automation System, MAS, IHP Marine Automation is now one of the leading ship automation suppliers to national and international owners and yards. All MAS components are type-approved by all major international classification societies.

The new diesel electrical TESOFerry Schulpengat, built on Verolme Heusden Shipyard B.V. and to be put into service between Den Helder and Texel, is equipped with a fully integrated MAS ship automation system.

For further information on automation systems for the shipbuilding

and offshore industries from IPH Marine Automation,  
Circle 30 on Reader Service Card

### Bill To Ban Drilling Off Florida Coast Meets Opposition

A bill that would permanently extend and expand a one-year-old, 10-year moratorium on oil and gas drilling off the coast of Florida encountered opposition from the Bush Administration in a recent hearing of the Senate Energy Committee.

According to David O'Neal, Interior Department Assistant Secretary for Land and Minerals Management, said the bill was unnecessary. He said the provision in the bill requiring the U.S. to buy back 221 leases for oil and gas drilling off the coast of Florida would cost \$750 million to \$1.5 billion.

The bill, which was offered by Republican Senator Bob Graham of Florida, would also ban leasing and development in a 100-mile buffer zone off the entire Florida coast.

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Circle 311 on Reader Service Card

## Modern Naval Propulsion Systems: Powering The World's Future Navies



Although the diesel engine still dominates as the main propulsion and generating plant in the commercial sector, the marine gas turbine has quickly become the preferred choice for the large modern naval combatant. First incorporated as the main propulsion power on a major warship by the Soviets in its Kashin Class destroyers, marine gas turbines offer quiet operation, excellent compactness, power-to-weight ratios and service reliability. Today they are featured on international naval ships ranging from 200-ton hydrofoil missileships to 50,000-ton naval support ships.

Marine gas turbines are typically offered in a number of propulsion arrangements with such acronyms as CODOG (Combined Diesel or Gas Turbine), CODAG (Combined Diesel and Gas Turbine), COGAG (Combined Gas Turbine and Gas Turbine) and COGOG (Combined Gas Turbine or Gas Turbine), using either one or multiple engines depending upon the cruising speed desired.

The French Navy's Georges Leygues Class destroyers are powered by two SEMT-Pielstick 16-cylinder PA6V280 diesels of 10,400 bhp and two Rolls-Royce Olympus TM3B gas turbines of 52,000 bhp in a CODOG system.

The latest classes of U.S. Navy combatants consisting of frigates, cruisers and destroyers—about 140 ships—all feature GE Marine & Industrial's LM2500 marine gas turbine as main propulsion. The Navy has even selected LM2500s for its new fast combat supply ship class. The first of the class, the 754-foot Supply (AOE-6), under construction at San Diego's NASSCO, will make her debut next year with four GE units.

This year the U.S. Navy's newest Aegis guided missile destroyer, the USS Barry (DDG-52), was christened at Ingalls Shipbuilding Inc., a division of Litton. The 504-foot Barry, like her recently delivered sister, the USS Arleigh Burke, is powered by four GE LM2500 marine gas turbine engines.

The gas turbine generator sets aboard the destroyers Barry and Arleigh Burke both use the Allison 501-K34 engines from Allison Gas Turbine, Military Industrial Engines, Indianapolis, Ind., to produce 2,500 kilowatts of shipboard electrical power.

### Diesels

Diesels engines are still very

popular for main propulsion and power generation applications in smaller naval vessels. The recently delivered 58-foot Nadon, an all-aluminum planing catamaran for the Royal Canadian Mounted Police, for example, is powered by a pair of MAN B&W 10-cylinder D2840 LXE diesels. Rated at 820 hp at 2,300 rpm each, the high-speed engines drive Arneson ASD-12 surface-piercing propellers through ZF BW-165 reverse reduction gearing.

In minehunter applications, Paxman Diesels Ltd. supplied low magnetic signature marine diesel engines for the Royal Navy's Sandown Class single-role minehunters, built by the U.K.'s Vosper Thornycroft, while Italy's

Isotta Fraschini supplied compact ID 36 diesel engines for the U.S. Navy's newest minehunter, the GRP-hulled USS Osprey (MHC-51).

The GRP-hulled Sandown vessels are each powered by two six-cylinder Paxman Valenta 6RP200E propulsion engines, which have a continuous rating of 500 kw (670 bhp) at 1,200 rpm.

MTU of North America supplied its 16V396TB94 diesel engines, rated at 3,433 bhp at 2,100 rpm, for the repowering of the SES-200, the Navy's only operational surface effect ship. The waterborne, air supported craft with catamaran-style rigid sidehulls was refurbished and converted by Textron Marine Systems, New Orleans, La. The modification calls for converting the ship's propulsion system from conventional propellers to twin KaMeWa 71S62/6-SII waterjets, and removal of existing gearboxes for replacement with two ZF BW755 gearboxes. The conversion and modification will allow the 162-foot SES-200 to achieve speeds in excess of 40 knots in calm water.

Sold by Morrison Knudsen, Power Systems Division, eight Electro-Motive Division (EMD) 2,000-kw high-shock 16-645E5N diesel engines have been supplied for use as back-up support to the nuclear power plants on two U.S. Navy aircraft carriers. EMD high shock gensets have been installed in all six of the Navy's nuclear-powered aircraft carriers.

The Fairbanks Morse Engine Division of Coltec Industries (formerly Colt Industries) has supplied the main propulsion engines and ship service engine generators for U.S. Navy LSD-41 Class ships and main propulsion engines for U.S. Navy TAO-187 Class fleet oilers.

### FOR MORE INFORMATION ON NAVAL PROPULSION SYSTEMS

Technical data, product literature and brochures are available free of charge on any of the naval propulsion systems and equipment included in this article. To receive copies of free literature, circle the appropriate Reader Service number on the postpaid card bound into the back of this issue. See the table below for the appropriate Reader Service number for each manufacturer.

Manufacturer	Reader Service#	Manufacturer	Reader Service#
Allison Gas Turbines	61	KaMeWa	76
Arneson	62	Kato	77
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Hamilton Marine	73	Sulzer-Escher Wyss	88
Hedemora Diesel	74	Westinghouse Marine	89
Isotta Fraschini	75	ZF	90

Fairbanks Morse's 10-cylinder PC 4.2 Colt-Pielstick is currently the largest U.S.-manufactured medium-speed diesel engine capable of burning DFM or heavy fuels up to 3,500 sec Redwood at 100 degrees F.

Norway's Bergen Diesel has also been very active in the U.S., supplying about 50 engines to the Navy. Bergen medium-speed diesels will power the new icebreaker/research vessel for Edison Chouest.

Serving a power range of 880 to 9,900 kw, Krupp MaK Diesel supplied the U.S. Navy oceanographic survey ships T-AGS-39 and T-AGS-40 with three Krupp MaK 6 M 332 diesel engines each as the 2,700-kw ship's services electrical plant.

The twin-hulled SWATH USNS Victorious (T-AGOS-19), which at present is on acceptance trials for the Navy, is powered by a diesel-electric propulsion system, consisting of four Caterpillar 3512 diesels with Kato generators driving two General Electric propulsion motors rated at 1,600 shp. The vessel's speed is estimated to be 10 knots.

The latest engine design from Sweden's Hedemora Diesel AB is the twin-turbocharged 18-cylinder VB 210 series, which the company has supplied as the main engines for the new Type 471 submarine for the Royal Australian Navy. The new submarines will each be equipped with three Hedemora VB 210 18-cylinder diesel generator sets with a combined output of more than 4 mw electrical power.

#### Steam Turbines & Gearing

This year, the Westinghouse Marine Division, Sunnyvale, Calif., has been awarded a \$90.8 million contract by the Naval Sea Systems Command to supply two main propulsion units, with options for up to an additional seven systems for the Navy's new Seawolf Class attack submarine. The first shipset of the third generation high power density submarine propulsion units will be delivered in June 1993.

The newest Wasp Class amphibious assault ship, the 844-foot, 40,500-ton USS Essex (LHD-2), has a power plant which uses two Westinghouse steam turbines and reduction gearing, developing a combined 70,000 shp, with two Combustion Engineering boilers, to drive the ship at speeds of more than 20 knots. Stewart & Stevenson supplied the generators for the ship.

GE's Naval & Drive Turbine Systems Department provides geared steam turbines or advanced hardened and ground gears or turbine generator sets for such U.S. Navy combatant programs as: the SSN-688 Los Angeles and SSBN-726 Ohio submarine classes; the CVN-68 Nimitz aircraft carrier; DDG-51 Arleigh Burke destroyer; and LHD-1 Wasp amphibious assault ship.

The most recent development from the Cincinnati Gear Company, which supplies gearing rated 2,500 hp and up, is the incorporation of SSS/TOSI reversing unit on a 50,000-hp gearbox in the AOE-6 program.

#### Propellers

The Bird-Johnson Company, which has supplied all of the controllable pitch (CP) propeller systems for the diesel-powered Avenger Class Mine Countermeasure (MCM) Ships, has also been popular choice with gas turbine-powered ships. Since gas turbines cannot be reversed, ships must be fitted with either a reversing gearbox or controllable-pitch propellers. The USS Barry is the latest Bird-Johnson installation to go to sea.

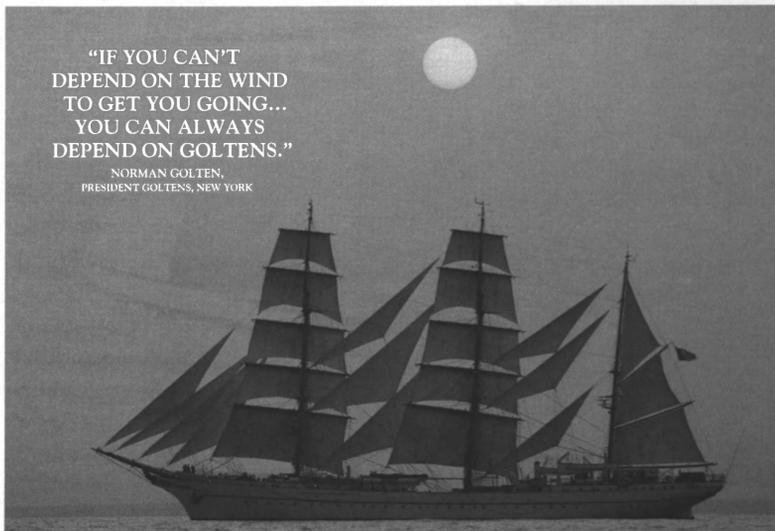
Sulzer-Escher Wyss five-bladed CP and reverse pitch propellers are featured on the FRG's Bremen Class frigates, as well as on a number of Canadian, Indonesian, Saudi Arabian and South Korean naval ships.

#### Waterjet Propulsion

Waterjet propulsion tends to be specified for high speed craft where their efficiency increases. This type of propulsion has been adopted for new patrol boats. Powerful waterjets, for example, are being

fitted aboard patrols being built for the Finnish Navy. Swedish manufacturer KaMeWa and Riva Calzoni are two of the main builders of high power waterjet units. Riva Calzoni offers waterjet units with a power range of as high as 25,000 kw.

In the lower power range, North American Marine Jet of Benton, Ark., recently supplied dual Nomer 14s, rated at 275 hp at 2,800 rpm, for a refit of a Navy 32-foot riverine patrol boat. North American Marine Jet, which in recent years has



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Whether you need repairs or maintenance for your diesel engines, Goltens offers a full range of services including: engine replacement; engine overhaul; main journal and crankpin reconditioning; centrifugal re-babbiting of any size bearing; and reconditioning of fuel injection equipment, pistons, piston skirts, cylinder heads, exhaust valves, seats, and turbochargers.

So when you need to get your diesel engine going, go with Goltens. We've got the experience and the capabilities you're looking for.



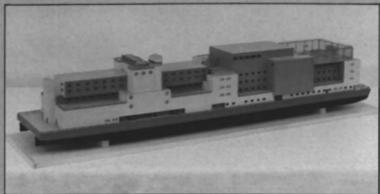
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increased its emphasis on the commercial workboat sector, is currently bidding on supplying waterjet propulsion for eight Riverine Assault Craft that will be built by SeaArk. The RACs will each be powered by dual 300-hp Cummins diesels. If all the options are exercised under the contract, as many as 50 RACs will be built for use by the Army.

New Zealand's Hamilton Jet recently supplied a pair of Hamilton model 361 waterjets for each of three Indian Coast Guard offshore patrol boats. The flush-mounted waterjets are directly driven by twin Deutz MWM TD 232 V12 diesels, producing 403 hp each at 2,300 rpm. The GRP-hulled 51-foot boats achieve a maximum speed of 24 knots.

Three McDermott-built U.S. Navy Torpedo Test Craft are equipped with Omithruster hydrojet maneuvering and propulsion systems. The YTTs, -9, -10 and -11, utilize 350-hp Omithruster Mark II hydrojet Model JT 700TDs, which offer the craft precise handling, position keeping and automatic heading.

#### Surface Piercing Propeller

One of the latest developments in the high speed boat market is the surface piercing propeller. This concept was designed for planing vessels, where only the bottom blades of the propeller do useful work at high speed.

Rolla SP Propellers of Switzerland has over 28 years' experience in the field of surface piercing technology. In recent years the number of high-speed craft propelled by surface piercing propellers has increased substantially. There are now several thousand vessels operating with these type of propellers, including sophisticated high performance naval vessels and long distance record breakers. **Philip Rolla** of Rolla SP Propellers has developed a propeller for 35 to 50 knot applications needing vertical lift at the transom.

Another concept developed is the Arneson surface drive, which has the propeller mounted on a shaft which incorporates a universal joint. The propeller end of the shaft is supported by two hydraulic rams, one vertical and one horizontal, the horizontal ram allowing the shaft to be turned in this plane to give steering using the propeller thrust, and the vertical rams allows the height of the propeller in relation to the water surface to be adjusted.

This Arneson drive concept offers benefits for vessels like landing craft which may have to beach or for craft which have to operate at widely varying draft levels.

#### Sembawang Completes TBT-Free Paint System On BP Shipping Tanker

Sembawang Shipyard Ltd. of Singapore recently completed application of an environmentally friendly self-polishing anti-fouling paint system on BP Shipping's BP

Achiever. This is reportedly the first such application in the Far East.

Called International Intersmooth BG Series and developed by the U.K.'s International Paint (Courtaulds Coatings), the TBT-free (tin-free) self-polishing coating is among the first of its type to be developed.

The 127,575-dwt tanker is among the first complete applications of this co-polymer anti-fouling.

**Geoff Sheperd**, superintendent engineer for Associated Steamships

Pte. Ltd., who was supervising the vessel's repairs in Sembawang, said that the use of this environmentally friendly application demonstrates BP's continual commitment toward environmental protection.

The BP Achiever also underwent surveys on her boiler, propellers and tailshaft during her stay in Sembawang.

For free literature detailing the ship repair capabilities of Sembawang Shipyard,

Circle 99 on Reader Service Card

#### AWO Names Whalen VP, Legislative Affairs

**Curtis E. Whalen** has been appointed vice president-legislative affairs for the American Waterways Operators (AWO), the national trade association for the inland and coastal barge and towing industry.

Mr. Whalen comes to AWO with 15 years of lobbying experience for major U.S. corporations.

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## Tanker Industry Close-Up:

# Reward Quality Tonnage, Take Realistic Approach To Regulation

By Seigo Suzuki\*, Chairman  
INTERTANKO

The world tanker fleet carries some 1.5 billion tons of oil annually, providing a reliable, indispensable and cost-effective service. However, serious problems have emerged, ranging from ill-conceived legislation to the biggest question of all—how is the aging world tanker fleet to be replaced? A solution to this problem must be found.

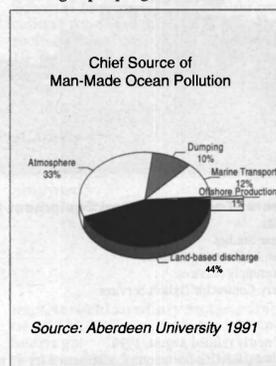
Independent tanker owners, who control about 65 percent or 190 million dwt of the world fleet, have spent billions of dollars complying with new international rules fitting new shipboard systems which improve safety and environmental levels. However, governments have failed to play their role by providing adequate shore reception facilities for cargo residues.

Furthermore, the Oil Pollution Act of 1990 (OPA) rejects international liability and compensation agreements for oil pollution damage. Instead, it opens the door to unlimited liability, which is uninsurable. Unlimited liability is also counterproductive, as it may deter high quality carriers and attract irresponsible carriers. In particular, OPA rejects shared liability on pollution damage. Cargo interests have no direct compensation sharing responsibilities under OPA. Consequently, OPA provides no incentive to select quality tonnage.

OPA, in requiring double skins on new tankers, ignores important safety concerns . . . and the fact that other design options may be more effective overall in reducing oil outflow.

Shipping activity accounts for only 12 percent of all marine pollution, while land discharges contribute 44 percent. But ships are the soft targets for regulators. Most

maritime safety experts agree that the human factor is more significant than the design issue. Oil discharges from maritime activities dropped from 1.47 million tons in 1981 to 0.57 million tons in 1989, of which the tanker share dropped from 1.12 million tons to 0.27 million tons—a 75 percent drop. In 1989, the tanker fleet delivered over 1.4 billion tons of oil. This seems to indicate that the tanker industry is making rapid progress in its efforts.



However, despite the progress made by the shipping industry, pollution of the seas must be further reduced. Pollution from coastal development is now considered as by far the most serious threat to the long-term health of the world's oceans. The point is reinforced by new statistics which reveal that ship-generated pollution is in sharp decline. In the period from 1971-80, there were 810 spills, with an average size of 3,372 barrels, while from 1981-90, there were 422 spills, with an average size of 2,555 barrels.

INTERTANKO (International Association of Independent Tanker Owners), whose 300 members control 1,800 tankers aggregating 170 million dwt, regards this as an impressive reduction—especially given the fact that the average 1990 ship is 40 percent larger than its 1970 counterpart.

Today, the tanker industry is taking new steps to introduce tougher standards of operation. However, if further significant improvements are to be made, governments, cargo interests and charterers must also play their part.

The oil industry must be induced to pay a premium for quality ton-

nage. If charterers pay a premium for quality, they also pay a premium for a better marine environment and, not least, the aging tanker fleet would be renewed on a sound financial basis.

Governments can contribute to this renewal process by resisting pressure to overregulate the industry. What regulators decide at the conference table must remain within

the bounds of enforcement capability worldwide. Overregulation detracts from existing standards and, once again, would push quality tonnage into an unfavorable market position. This, in turn, would delay much needed fleet renewal.

\*Editor's Note: This article was excerpted from a recent open letter by Mr. Suzuki to the International Maritime Organization and the oil industry.

## WATERCOM Promotes Virginia R. Lewis To Director Of Operations

WATERCOM recently announced the promotion of Virginia R. Lewis to director of operations. Ms. Lewis oversees the Operations Control Center (OCC), WATERCOM's central computer system. In this capacity, she is

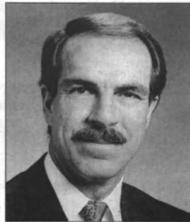


Virginia R. Lewis

responsible for monitoring 55 computerized shore stations which operate 24 hours a day along 4,000 miles of inland waterways. Additionally, she is in charge of WATERCOM's Operator Assisted Services, which provide customers with collect and credit card calling assistance and message delivery. She also supervises the operations of WFN Marine Radio, which serves the Louisville, Ky., and Madison and Jeffersonville, Ind., areas.

WATERCOM is a leader in the field of communications for vessels navigating more than 4,000 miles of American inland waterways.

## Bird-Johnson Names Andrew Barrs Manager, Seattle Operation



Andrew F. Barrs

Bird-Johnson Company, Walpole, Mass., has appointed Andrew F. Barrs to the position of general manager for their Seattle, Wash., operation.

Formerly Bird-Johnson's director, quality and program management, he has been with the company since 1974. He will be responsible for the operations of the facility, reporting to Peter Gwyn, president and chief operating officer.

Bird-Johnson's Seattle operations sells and services commercial and recreational controllable-pitch and fixed-pitch propellers, propeller shafting, and various propeller system accessories.

Bird-Johnson Company is a world leader in the design and application of naval and commercial marine controllable-pitch and fixed-pitch propeller systems and provides castings and precision-machined products to other capital goods industries.

## TOTE Adds Third Ship To U.S.-Flag Fleet

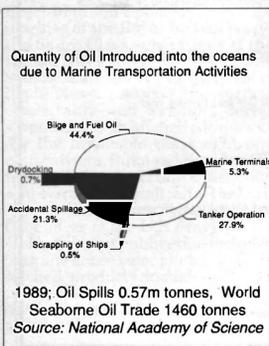
With an eye on the long-term interests of the Alaska shipping trade, Totem Ocean Trailer Express (TOTE), Inc., has purchased a third vessel to add to its U.S.-flag fleet.

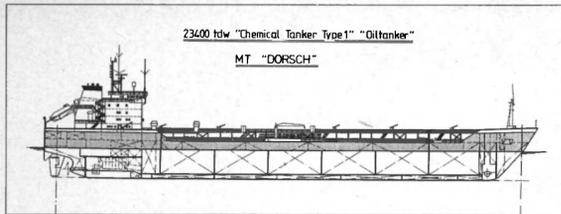
TOTE, which currently operates two Roll-On/Roll-Off trailerships between Tacoma, Wash., and Anchorage, Alaska, purchased the 700-foot S/S Puerto Rico from Puerto Rico's government-owned shipping company, Puerto Rico Marine Management, Inc. TOTE plans to lengthen the vessel by 90 feet at a yet undetermined U.S. shipyard. The total investment in the vessel, including purchase and conversion is expected to be \$50 million, according to , company vice president of operations.

According to Robert B. McMillen, TOTE president and chief executive officer, the additional ship would provide backup capability to assure a steady shipping schedule for its customers and would also be available to handle the anticipated increase in Alaska trade into the next century.

To be renamed the Northern Lights, the ship is currently at Jacksonville Shipyards, Inc., Jacksonville, Fla., where she will undergo work to bring her up to U.S. Coast Guard and ABS classification standards. Mr. McMillen said the ship would be available for charter by the end of this year.

TOTE is a privately owned Alaska corporation which began operations in 1975. It is headquartered in Seattle and is a subsidiary of Totem Resources Corporation, which also owns Foss Maritime Company and InterOcean Management Corporation.





Outboard profile drawing of the Lindenau-designed double-hull chemical/oil tanker "Dorsch." She is equipped with 17 cargo tanks—12 side tanks and 5 center tanks—with a total capacity of 27,740 cubic meters.

## Lindenau Shipyard Launches Largest Double-Hull German-Flag Oil Tanker

Lindenau GmbH Schiffswerft & Maschinenfabrik, Kiel-Friedrichsort, Germany, recently launched and christened its 15th double-hull tanker since 1976.

Christened the "Dorsch" by Mrs. Inge-Maj Denisoff, the 23,000-dwt tanker is the sister ship of the M/T Conger, delivered by the yard to shipping company Carl Buttner of Bremen in the first quarter of this year. The Conger is reportedly the largest double-hull oil tanker sailing under the German flag.

The aim of this new type of tanker

developed by Lindenau is to transport oil and chemicals as environmentally safe and economically as possible.

The Dorsch, like the Conger, has a double side shell which, according to Lindenau, offers a three-fold higher collision resistance than a comparable single shell tanker. She has been classed by Germanischer Lloyd, +100 A4 E3 "Chemical tanker Type 1" "Oil Tanker" COLL 5 (center cargo tanks) COLL 2 (Wing Cargo Tanks) +MC E3 AUT INERT.

Built for worldwide trade of

chemical and crude oil products, her overall length is 557 feet, with a molded breadth of 81 feet, summerfreeboard draft of 34 feet gross tonnage of 12,299 and deadweight of 23,400 tons.

Main propulsion is provided by a MAN B&W 6L 58/64 diesel, rated at 9,977 hp at 400 rpm, with Renke-Tacke reduction gearing and a four-blade variable pitch propeller plant.

Navigation equipment includes a Krupp Atlas Elektronik 5600 radar and 8600 ARPA and an Anschutz Standard 14 gyrocompass and autopilot.

The Dorsch is expected to be delivered in the first quarter of 1992.

For free literature detailing the shipbuilding capabilities of Lindenau Shipyard, Circle 95 on Reader Service Card

## Aker Omega Plans Joint Industry Project With 8 Oil Companies

Aker Omega, Inc. of Houston, Texas, is planning to start a Joint Industry Project (JIP) on October 1, 1991, with eight major oil company participants. The project is aimed specifically at investigating an alternative concept for producing oil in the 3,000-6,000-foot water depths in the Gulf of Mexico but has potential applications in much shallower waters and around the world.

The concept to be studied will be a particular type of free-standing buoyant riser system which Aker Omega refers to as a Subsea Completed Buoyant Riser (SCBR) system. Spread wells similar to that used with the Shell Auger TLP are located at the mudline with shutoff valves in simple trees, and from them dual tubings encased in rigid riser sections extend to a "crown"

location approximately 400 feet below the water surface. Upward from the "crown" the dual tubing is extended by flexible risers sections which first droop downward and then rise to the interior of the lower hull of the FPV. From that position the flexibles rise to the deck where they are attached to manifolds. This concept could provide an economic and reliable means of developing future deepwater fields, possibly more economic than TLP and TLWP concepts now being considered.

The Joint Industry Project is planned in three phases. Phase 1, which will start October 1, 1991, is scheduled to complete in mid-February of 1992. Phase 2, now planned for the summer of 1992, will be a model test which will be subcontracted to Marintek in Trondheim. Phase 3 will be a detailed design phase, and it is now scheduled for 1993.

For additional information,

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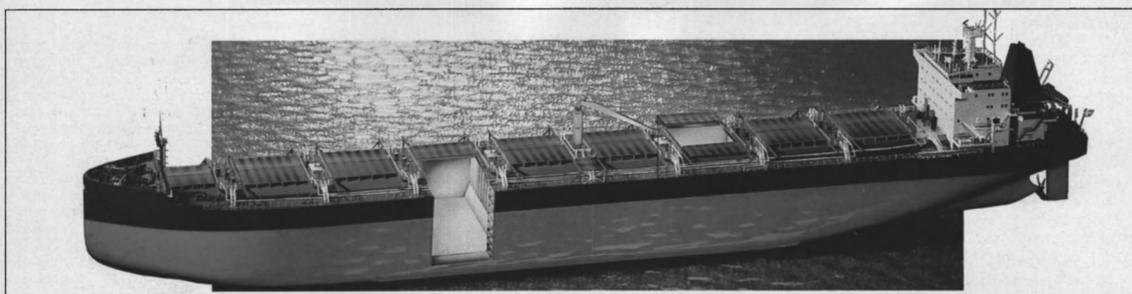
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## —THE PANAMAX CARRIER—

### New Generation Of Vessels From Burmeister & Wain Shipyard



#### *BCT85 Designed To Meet U.S. Oil Pollution Act Of 1990 Can Be Delivered As Either Product Carrier Or OBO Carrier*

SHIPOWNERS who want an effective carrier with the highest possible flexibility, will find the answer in the new generation of Panamax vessels from Burmeister & Wain Shipyard (B&W). This latest Panamax-beam ship design from B&W takes the concept of fully double-skinned construction yet a stage further.

The new design, the BCT85, incorporates 2-meter spacing between shells and can be delivered as either a product carrier or an OBO carrier.

In both versions, the vessel is more effective than conventional Panamax-sized carriers, and due to higher cargo capacity and lower operating costs, the BCT85 has a higher earning potential.

The new 80,500-dwt class is designed with double hulls, as required by the U.S. Oil Pollution Act 90, and conforms with U.S. Coast Guard Regulations relating to new, oil-carrying vessels entering U.S. waters.

The wheelhouse is equipped with all the electronic communications, navigation and weather-reporting facilities of a modern navigation bridge. Maneuvering of the vessel is divided in practical main functions and grouped in the work stations:

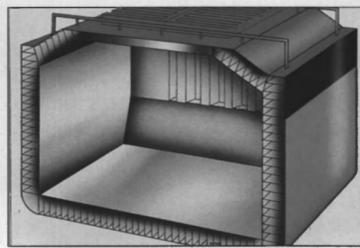
- Route Planning Station
- Navigation Work Station
- Traffic Surveillance and Maneuvering Station
- Instrument and Alarm Panel

Maneuvering consoles are placed on each bridge wing.

The purpose of the double hull is to increase safety. But the double hull also has an important function as ballast tanks, as well as an effective insulating effect, thus reducing the costs of heating cargoes such as crude oil.

Another advantage of the double hull is that all structural reinforcement is located between the hulls. Therefore, the sides of the tanks or the holds are smooth and entirely free of sharp edges. This ensures easy and effective maintenance — and high cargo flexibility, due to the easy-to-clean tanks.

Burmeister & Wain Shipyard has been building double hull vessels since 1984. This experience ensures the highest possible utilization of the double-hull concept.



*All structural reinforcement is located between the hulls. Therefore, the sides of the tanks or the holds are smooth and entirely free of sharp edges.*

Deep-well pumps for handling of liquid cargoes are placed in the bulkheads between the cargo holds.

The vessel is designed and constructed as a single-screw OBO carrier or product carrier to the rules of Detnorsko Veritos, or other classification societies to an equivalent notation.

The OBO version will, in a combination trade, Atlantic and the PT-version in product trade, A.G.-Japan, show an improved earning power.

The hull derives from the shipyard's successful Panamax carriers which have proved in practice to be among the most fuel-efficient of their type. The fuel consumption at CSR is as low as 30 tons/dny.

The BCT85 is built to minimize the crew costs, without compromising the safety of the vessel, or the standard of the accommodation facilities.

Propulsion is provided by one MANB&W cross-head diesel engine, type 5S60 MC or equivalent, direct reversible, single-acting, two-stroke, constant pressure turbo-charged, delivering 10,900 bhp at 95 rev/min.

Auxiliary machinery consists of two MAN B&W diesel engines, type 5L23/30 or equivalent, each directly coupled to an alternator, 640-kw, 720-rpm, 3 by 440-VAC, 60-Hz; two MAN B&W diesel engines, type 6L 28/32 or equivalent, 1,500-kw at 775-rpm, one directly coupled to an alternator, 1,200-kw, 3 by 440 VAC, 60-Hz; both engines with power take-off for hydraulic power-pack gear box; and one emergency generator at approximately 150-kw, 3 by 440-VAC, 60-Hz.

Other than an exceptionally bluff bow developed for the latest design, the hull form derives largely from the preceding classes of Panamax carriers.

In the face of increasingly tough competition from Far Eastern yards, Burmeister & Wain is one of the few European shipbuilders to have maintained a presence in the Panamax sector. For nearly 20 years, B&W has been turning out economical classes of Panamax carriers from its Refshaleoen yard in Copenhagen, Denmark.

*For more details, contact:  
Burmeister & Wain Shipyard A/S, P.O. Box 2122,  
DK-1015, Copenhagen K., fax 45 3157 11 19.*

**Marco Christens Third Freezer Longliner For Alaska Frontier**



The Frontier Explorer, shown undergoing sea trials in Puget Sound following completion by her designers and builders, is based on Marco's successful MarcoMatic automatic longline system and a vessel with the proven ability to meet the needs of North Pacific longlining.

Marco Shipyard has continued its leadership in the development of the automated North Pacific longliner with the delivery of the Frontier Explorer to Alaska Frontier Company. It is the third such vessel for AFCO built by Marco, and comes just two years after the first was christened.

Marco introduced the freezer longliner concept to the Alaska fisheries with the conversion of an offshore supply vessel into the very successful Deep Pacific. Her experience formed the basis for the current design.

The Frontier Explorer is 135 feet 4 inches long, with a beam of 30 feet 10 inches and a depth of 14 feet 11 inches. She will carry approximately 590,000 pounds of headed-and-gutted fish in her 14,800-cubic-foot refrigerated hold.

The new vessel is powered by a Caterpillar 3512 diesel, rated at 1,175 hp at 1,600 rpm, driving a three-blade Berg controllable-pitch propeller through a Reintjes 4.94:1 reduction gear. Auxiliary power is provided by two CAT 3406T diesels coupled to 250-kw generators.

For free literature on the facilities and capabilities of Marco Shipyard,

Circle 24 on Reader Service Card

**Vulkan Group Signs Contract To Build Two Chiquita Reefers**

German shipbuilders Bremer Vulkan AG and Schichau Seebeckwerft AG of the Vulkan Group recently signed a contract with United Brands/Chiquita, represented by the Great White Fleet Ltd., for the construction of two refrigerated cargo vessels.

The order for the reefers is a repeat of a 565,000 cubic foot capacity design. Bremer Vulkan has delivered four of these ships to date.

The new ships are scheduled for delivery at the end of 1992 and the early part of 1993 and will join the Chiquita fleet.

The ships will be built by Schichau Seebeckwerft.

Financing for the ships was arranged by a German bank consortium.

September, 1991

**Leevac Shipyards Converts Two Vessels**

On April 3, 1991, Leevac Shipyards, Inc., Jennings, La., signed a contract with the OMI Ship Management, Inc. as ship managers for U.S. Department of Transportation, Maritime Administration (MarAd) for the conversion of two 180-foot offshore supply vessels to torpedo retrieving vessels. The contract price

for the two vessels was \$2,291,000 with a total of 84 calendar days to complete the project.

Leevac completed and redelivered the vessels on July 3, 1991.

The two supply boats (Nola Pelham built in 1981 and Crystal Pelham built in 1982) were sold by MarAd from the Reserve Fleet in Orange, Texas, to the U.S. Navy.

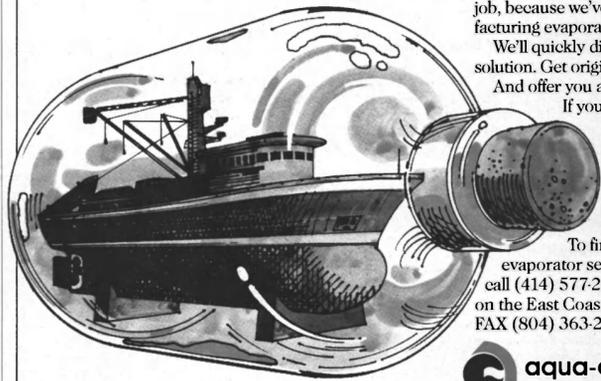
Now named Hugo and Hunter, the two vessels will operate out of Roosevelt Roads, Puerto Rico. Each

vessel replaces vessels that were destroyed in Hurricane Hugo in 1989. The vessels will be assigned by the Navy to the Atlantic Fleet Weapon Training Facility and operated by General Electric.

For free literature detailing the facilities and capabilities of Leevac Shipyards,

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## Progress Report On Development Of Europe's E-3 Tanker Design

The U.S. Congress adopted the Oil Pollution Act of 1990 in August of last year, which includes technical requirements of full double hulls in tankers to reduce accidental oil pollution risks. The International Maritime Organization is now working to develop international regulations. In principal, various alternatives backed by other countries are being studied in addition to the American proposals. It is likely that new MARPOL 73/78 amendments will be in force in 1993 or 1994.

### Owners Opposed To Double Hulls

Many shipowners are opposed to mandatory double hulls for oil tankers, and favor instead the approval of equally effective alternatives to deal with oil spills. However, even before approval of OPA 90 (since early 1990, nearly all contracts for large tankers have been placed for

double-hull designs or have an option to convert to one). Many of these options are being exercised. According to the latest figures, orders for 87 double-hulled tankers, including 10 on option, have been placed worldwide by shipowners to date.

This might be due to the fact that double hulls will be the only new tanker type allowed in U.S. waters after 1994, pending adoption of new IMO regulations and possible related amendments to OPA 90.

### New Double-Hull Tanker Designs

Due to this commercial pressure, and with great technological effort, shipyards are redesigning their standard tankers to include double hulls. The first new double hull designs appeared in the market in 1990, and by now few single skin ships are being commercialized by yards, including IMO III type chemi-

cal tankers.

For example, Astilleros Espanoles S.A. (AESAs) has redesigned, or is redesigning, all its standard tankers to comply with OPA 90 requirements; chemical tankers from 8,000 dwt to 46,000 dwt, shuttle tankers of 125,000 dwt and Suezmax tankers of 145,000 dwt.

### New From Europe, The E-3 Tanker

The renewed interest in reducing accidental oil pollution from tankers, coupled with the age of the existing tanker fleet, has created a concern among European shipping and shipbuilding interests regarding the Far East domination in this market segment and made desirable a European reentry in this market. Meetings have been held between five leading European shipyards since the fall of 1990. As a result of these meetings, the five yards—AESAs of Spain, Bremer Vulkan and Howaldtswerke Deutsche Werft, both of Germany, Fincantieri SpA of Italy and GEC-Alsthom Chantiers de l'Atlantique

of France—have decided to develop a new generation of supertankers that would reflect the new market character around the year 2000. The three basic aspects of the project are:

Ecological—providing far greater protection against accidental pollution of the seas than previous designs;

Economical—providing competitive running costs in comparison with other alternative designs in the market; and

European—featuring European industrial products; being technologically advanced and suitable for competitive production.

In the E-3 Project technical work, the prevention of accidental pollution has given the same importance, in terms of time and resources, as other traditional aspects of the project, such as naval architecture, structures or machinery and equipment. The basic principle is to reduce accidental pollution by all means available, with an objective of "zero pollution."

The E-3 concept is based on the analysis of the chain of events needed to go from a vessel sailing without

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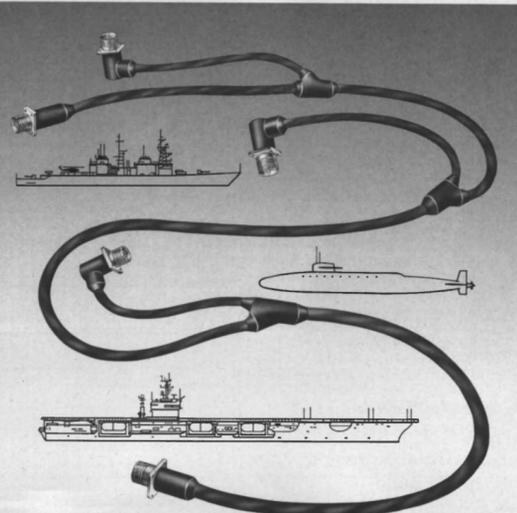
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Maritime Reporter/Engineering News

problems, to a harmful pollution of the marine environment. The chain of events begins with an incident or hazardous situation which results in an accident involving the cargo tanks. Cargo oil escapes from the tanks and the vessel, causing an uncontrollable spill and resulting in oil pollution.

Therefore, when fighting against accidental pollution, there is the chance of intervention at each link of this fateful chain. Severing any one of the links is sufficient to avert

pollution. Most groups working on this problem, including owners, the Congress and IMO, have concentrated on the central links of the chain on protection of cargo tanks by means of a double hull, and the containment of cargo on board by the action of hydrostatic pressure, vacuum and overflow to other intact tanks.

The E-3 Project goes even further and tackles the problem along its entire range. Means are being analyzed to:

- Improve navigation systems to prevent hazardous situations;
- Improve safety systems to prevent hazardous situations degenerating into accidents;
- Protect cargo tanks against internal and external damage in the event of explosions, collisions and groundings;
- Adopt measures and systems to keep the cargo within the vessel in the event of the tanks rupturing;
- Have equipment on board for

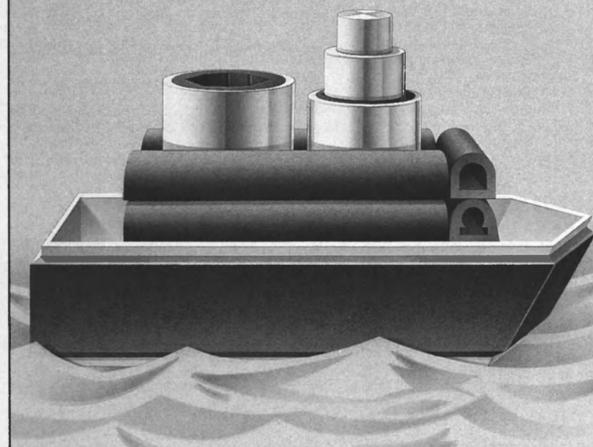
cargo containment operations and cleanup in the event of a spill.

According to research by the E-3 Project, 80 percent of accidental spills into the sea are caused by human error. Therefore, the E-3 tanker will feature what it calls "fail-safe" characteristics in her design that will contribute to control the consequences of such errors.

The E-3 Project is developing an open design whose leading features can be incorporated in tankers of any size designed to meet the specific requirements of each customer. However, initial work has centered around a VLCC size vessel of two million barrels capacity, with a deadweight tonnage of 280,000 tons and equipped with special collision avoidance systems. The service speed takes into account current trends towards relatively fast ships, and may be adjusted up or down, according to customer specifications. The specific technical details of the E-3 Project are still confidential and will not be published until later this year.

Editor's Note: This article is excerpted from a recent speech by **Rafael G. Fraile**, the head technical manager at Spanish shipbuilder Astilleros Espanoles S.A. and the lead manager of the team of five European shipyards working on the technical and marketing matters of the "E-3 Tanker Project," a new double-hull, two-million-barrel-capacity VLCC design.

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### Conrad Industries Delivers Drydock, Three Deck Barges



The steel floating drydock Terminales, built by Conrad Industries, Inc., Morgan City, La., for foreign owner Terminales Maracaibo, C.A. of Maracaibo, Venezuela.

The Morgan City, La., shipyard of Conrad Industries, Inc., recently delivered a floating drydock and three deck barges to separate domestic and international owners.

The steel floating drydock, with a length of 120 feet overall and a width of 52 feet, was delivered to Terminales Maracaibo, C.A., of Maracaibo, Venezuela.

Two of the deck barges were delivered to Cashman Brothers Marine Contracting Co., Inc., Quincy, Mass. The oceangoing deck barges are ABS classed and have an overall length of 220 feet and breadth of 54 feet, with deck, side and bottom plating of 1/2-inch steel.

A smaller deck barge, with an overall length of 120 feet and 45-foot beam, was delivered to Moter S.A. of Fort-de-France, Martinique, French West Indies. She is Bureau Veritas classed.

For free literature detailing the vessel construction capabilities of Conrad Industries,

Circle 3 on Reader Service Card

**Tin-Free Self-Polishing Antifouling Introduced By Hempel's Marine Paints**

Hempel's Marine Paints A/S has announced the introduction of their second generation of tin-free self-polishing antifouling: Hempel's Nautic Tin-Free 7190.

The product is based on extensive research carried out at Hempel's research centers in Copenhagen and Barcelona, and is the result of a total commitment by Hempel's to the development of environmental-friendly antifouling—a culmination of carefully planned and targeted research programs started in 1976.

According to the Hempel Group's technical director, **Niels Conradsen**, Hempel has invested heavily in antifouling research and the new product, which will be followed by further developments based on even more advanced technology within the next few years.

Hempel's Nautic Tin-Free 7190 is based on extensive practical testing of similar compositions which have provided satisfactory performance under various conditions for periods approaching four years.

According to Hempel's worldwide marketing manager, **Svend Johnsen**, Hempel will continue to market antifouling according to the "tailor-making" philosophy, which means that the new product will be specified according to the vessel's operating conditions. We are confi-

dent that the new product will be able to provide drydocking intervals up to five years, Mr. **Johnsen** said, but until we have sufficient practical results to prove that we shall only specify it up to 48 months.

Provided that the existing primer and antifouling system is sound, the new antifouling can be applied directly on top of tin containing self-polishing antifouling, ablative antifouling and the Classic types.

For further information and free literature on Hempel's Nautic Tin-Free 7190,

Circle 42 on Reader Service Card

**Westmont Industries Delivers Third Navy Barge Crane**

Westmont Industries, Santa Fe Springs, Calif., recently delivered the third of a series of five 100-long ton barge cranes, YD-248, to the U.S. Navy.

The floating cranes, engineered fabricated, assembled, tested and delivered by Westmont, are to be used at various naval activities, with four cranes to be located on the East Coast and the other on the West Coast. The single-deck barge has a reinforced cargo deck area, boom rest, crew spaces, auxiliary and diesel engine generator, shoe power back-up, capstans and other accessories.

The fully revolving diesel-powered crane has a luffing boom and

three independent hook hoists. The main hoist has a rated main hoist capacity of 100 long tons at an 80-foot radius, an auxiliary hoist capacity of 38,000 pounds and a whip hoist capacity of 10,000 pounds.

For free literature detailing the capabilities of Westmont Industries,

Circle 93 on Reader Service Card

**Viking Fender Appointed Goodyear 'Ship-Side' Marine Fender Distributor**

Viking Fender Company of Sea Bright, N.J., was recently appointed by Goodyear Tire & Rubber Company as a distributor of "Ship-Side" Marine Fendering.

Viking will distribute both molded and extruded rubber in rectangular, D-Shape, and wing-type fenders for tugs, barges, workboats, ferries and similar hard-working vessels.

Viking Fender manufactures laminated marine fendering.

The 1991 edition of Viking Fender Company's catalogue is now available. For a free copy,

Circle 21 on Reader Service Card

**New Asmar Floating Dock To Become Operational In October**

The new 1,200-ton-lifting-capacity floating dock, which Asmar Shipbuilding and Docking Company of

Chile is building as part of its modernization program for its Talcahuano shipyard will be launched this month and become operational in October.

Developed by Asmar itself, the new dock has been specifically designed to carry out the repair of fishing vessels and other types of smaller vessels.

The dock, which is about 262.4 feet long by 59 feet wide, is of box type with lateral rectangular walls. The lifting time for a 1,200-ton vessel will be one hour 15 minutes.

For free literature on the facilities and capabilities of Asmar Shipbuilding and Docking Company,

Circle 54 on Reader Service Card

**Argo Marine Opens New Spare Parts Procurement Office In Largs, Scotland**

Argo Marine recently announced the opening of a new spare parts procurement office in Largs, Scotland.

The new office will be managed by **Alistair McGowan**, formerly purchasing manager of Kvaerner-Kincaid Shipyards.

Mr. McGowan's primary responsibility will be to source European marine spares for Argo Marine's locations at New York, N.Y., Virginia Beach, Va., New Orleans, La., and San Francisco, Calif.

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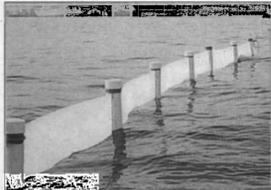
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**Oil Containment Systems Use High-Performance Spectra Fibers From Allied Signal**



Spectra fabrics can play a significant role in helping to contain mammoth oil spills, such as the one in the Persian Gulf.

Environmental cleanup and pollution control are on nearly everyone's list of critical problems. In light of the enormous spill in the Persian Gulf, immediate action is required.

Spectra fabrics are part of the solution. A Spectra fabric is today being used in the first workable oil containment system employing high-performance fibers. The system, called Oscar Boom for spill control, is produced by Oscar International, of Winston-Salem, N.C. (Oscar is an acronym for Offshore Surface Cleanup and Recovery.) It uses a vertical floating containment fence employing a specially treated woven Spectra fabric supported by patented flotation spars. The fabric is treated so that water can flow through but oil and other floating pollution cannot.

Here, Spectra's great strength-to-weight ratio, low specific gravity and chemical resistance are key to its superiority. Spectra's strength and low specific gravity allow it to stand upright in the water, while other fabrics previously used in this application were weaker and tended to drape, said **Paul Weber**, president of Integrated Textile Systems, Inc., Monroe, N.C.

"It is the perfect material for the application," said **James Neal**, president of Oscar International, who invented the Oscar Boom. "Its great strength allows it to take all the strains involved in the recovery process. And Spectra's inert quality resists oil, saltwater, salt water, saline, ultraviolet rays and acids."

The Spectra fabrics create an additional environmental advantage," **Mr. Weber** stated. "The fabric-and-oil combination doesn't have to be buried, as with previous containment systems. It can be incinerated or burned as a fuel when it is no longer needed."

"The Oscar System using Spectra is being commercialized in the first half of 1991," said **Mr. Weber**. "Integrated Textile Systems is working with a major U.S. oil company and a European government to develop this technology."

For free literature detailing Spectra fibers,  
Circle 59 on Reader Service Card

**Premiere Introduces New Cost-Cutting Welding Module**

Premiere, Inc., Broussard, La., recently unveiled a new unitized welding module that replaces up to seven individual welding units. The module, designed to reduce costs while improving efficiency, is the first of its kind manufactured spe-

cifically for the oil industry.

In the process of looking for a more dependable and efficient method of providing the customer with the required welding equipment, Premiere developed the unitized welding module. At its heart are two diesel-engine-driven generators. Each is capable of powering seven welding machines. Premiere recommends using a maximum of six welding machines and one generator while retaining the seventh

welding machine as a standby. The second generator provides 100 percent backup electrical power.

**Lee Matherne**, president of Premiere, explained that "With this module, only one unit is required, rather than seven boxed welders. It can be operational less than 15 minutes after it is on board."

For more information and free literature on the new cost-cutting welding module from Premiere,  
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**Viking Introduces  
New 35-Person Davit  
Launched Life Raft**

A new davit launched life raft is now available for emergency evacuation of passengers from large ships. The system was developed with ultimate concern for passenger safety and comfort by Viking Life Saving

Equipment, a Danish manufacturer of lifesaving products for the marine industry.

The raft accommodates 35 people. Its large-capacity significantly reduces the need for a greater number of smaller rafts and davits. Equipped with an emergency pack and all other equipment required by SOLAS, it also meets IMO regulations for lifesaving equipment. It has also passed severe wind tunnel and sea trial

wind force tests.

A great advantage of the davit launched raft is that it allows boarding on deck, after which the raft is lowered to the water and released from the ship. The dangers of jumping from deck to the raft or entering from the water are eliminated.

For further information from Viking Life Saving Equipment,

Circle 58 on Reader Service Card

**Centerline Power Offers  
Brochure On Products  
And Services**

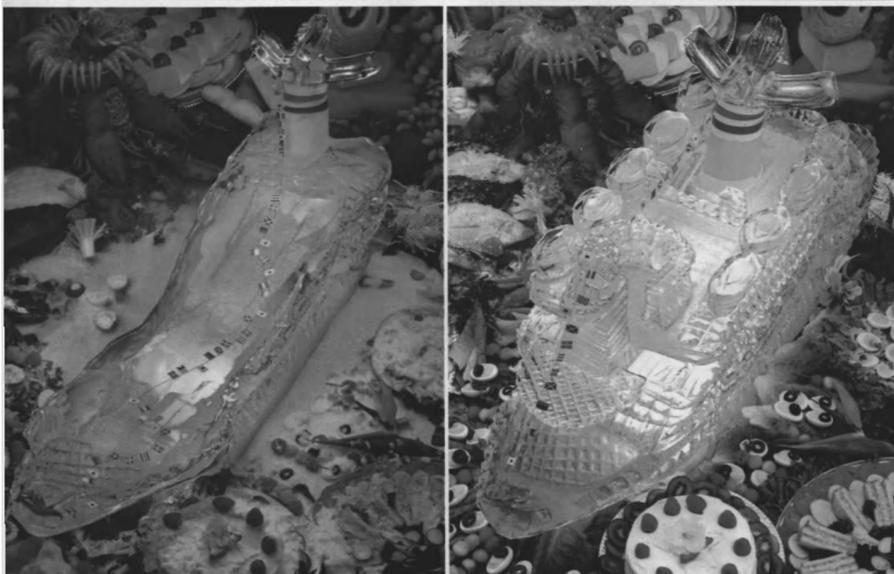
Centerline Power, Inc. of Longmont, Colo., has successfully completed pilot production of the first Sulzer RND fuel injection nozzles manufactured in the U.S. The run includes large nozzles for 90-cm bore engines.

This achievement marks the culmination of over nine months of intensive design, engineering and research effort by Centerline. Regular production of nozzles for two-stroke engines began in July and includes Sulzer RTA needle and guides and circulating valves.

Centerline, established in 1986, specializes in the manufacture and repair of fuel system components for two- and four-stroke marine diesels.

For complete details on Centerline products and services,

Circle 20 on Reader Service Card



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**Oil Spill Control Video  
Offered By Breg-Oil  
Sponge International**

A video presentation has been produced by Breg-Oil Sponge International, Inc. describing the company numerous sorbent products. The video shows various sorbent applications and explains how the sorbents work, as well as showing the latest technology for controlling spills.

The company manufactures sorbents for most every need. Oil spills on water—toxic liquids and aggressive chemicals—nonaggressive chemicals and common industrial fluids.

For more information,  
Circle 16 on Reader Service Card

**Didier Keller Named  
President Of IMODCO**

IMODCO Inc. recently announced the appointment of **Didier Keller** as president of the company to replace **Robert C. Byrd** who resigned to pursue other interests in the offshore oil and gas industry as a private consultant.

Mr. Keller, formerly executive vice president of IMODCO Inc., also served with IMODCO Inc.'s sister company SBM Inc., and has over 15 years of experience in the single-point mooring industry, holding positions of increasing responsibility in project management, operations, engineering and marketing.

IMODCO Inc. is a member of the IHC/Caland Group of international marine technology oriented companies, whose business is to serve the offshore oil industry and the dredging/mining industry.

For free literature on the products and services offered by IMODCO Inc.,

Circle 27 on Reader Service Card

**HMVG Delivers New Interdictor Patrol Boats To Taiwan Customs**



The Interdictor is available in lengths between 32 and 40 feet. Designed for launching at sea from a larger ship, the boats cruise at 30 knots with a maximum speed in excess of 35 knots. Beam is 11 feet 8 inches and draft is only 23 inches.

The Hood Military Vessel Group (HMVG) of Hood Enterprises, Inc. has completed delivery on a three-million-dollar contract for eight custom, deep-V hull patrol boats to the Taiwan Customs Service. Used to patrol and combat smuggling in the Formosa Strait between Taiwan and the Republic of China, the patrol boats are one of nine "Interdictor" designs available from HMVG.

HMVG markets military and municipal patrol boats to governments, port authorities and agencies worldwide.

The HMVG Interdictor is able to self-right, restart and run all systems after a 360-degree rollover. The 40-foot offshore Interdictor designed for the Taiwan Customs Service carries a crew of six in a watertight, fully air-conditioned pilothouse with reinforced Lexan windows.

Developed by boat designer Ted Hood, the Interdictor hull and superstructure construction consists of fiber reinforced plastic with unidirectional S- and E-glass, Kevlar, aircraft grade balsa core and vinyl ester resin to achieve maximum strength with minimum weight. The deep-V planing hull provides excellent handling in heavy seas.

The boats are powered by twin Cummins 300 engines and Arneson drives and feature dual lever engine controls and trolling valves for low-speed maneuverability.

For more information on boats marketed by Hood Military Vessel Group,

Circle 44 on Reader Service Card

**NASSCO Names Grothen Director Of Repair**

National Steel and Shipbuilding Company (NASSCO) has announced that **Richard Grothen** has been named director of repair.

Mr. Grothen will have overall responsibility for the repair and conversion of U.S. Navy and commercial ships at NASSCO. He will also direct maintenance operations for the shipyard.

He joined NASSCO in 1981 as manager of support services and later served as director of new construction outfitting.

Circle 310 on Reader Service Card →

**Soviet Icebreaker Traverses North Pole, Arctic Ocean During 21-Day Expedition**

The Soviet nuclear-powered icebreaker *Sovetskiy Soyuz* recently arrived at the Bering Sea Port of Provideniya in the Soviet Far East, completing what is called the first-ever crossing of the North Pole and

Arctic Ocean by a surface vessel.

The vessel carried 54 Americans among its 90 passengers, according to Stamford-based Salen Lindblad Cruising and Quark Expeditions.

On July 26, the icebreaker sailed from Murmansk in the western Soviet Union and reached the North Pole on the morning of August 5, according to Salen Lindblad. Passengers paid up to \$25,000 each to join the 21-day expedition, which is

also the first to carry so many Westerners and paying passengers aboard a member of the Soviet Arctic fleet.

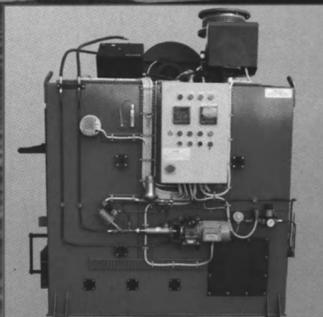
The *Sovetskiy Soyuz's* 75,000-shp drives her through pack ice 5 feet thick at speeds up to 10 knots.

The nuclear-powered vessel has a cruising speed of 18.8 knots when not cutting through the ice. She weighs 21,000 tons, is 500 feet long and has 2-inch-thick steel at bow.

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The Cummins-powered Miss Ellis Island, built by Blount Marine, is certified to carry 775 passengers on excursion trips between the island and New York City's Battery Park.

## Cummins-Powered Passenger Vessel 'Miss Ellis Island' Delivered To Circle Line By Blount Marine

Blount Marine Corporation, Warren, R.I., recently delivered the passenger vessel Miss Ellis Island to Circle Line Statue of Liberty Ferry, Inc. The vessel was designed by naval architect **Robert A. Simons**,

and is certified to carry 775 passengers on excursion trips to Ellis Island.

The Immigration Center on the island has recently been refurbished. Ellis Island itself has been made part of the National Park System.

The vessel contains several unusual features due to its dockage and route. One of these features is the watertight bumper pipe with a solidly welded insert plate. The bumper is built for protection from the heavy surge at the Battery pier in lower Manhattan. Also unusual is the oil-lubricated shaft bearing, made by the Golten Group of Norway, which lubricates and protects the shafts. The design also features a profile with rounded stern and capped pilothouse in keeping with the look of the famous Circle Line fleet.

The Miss Ellis Island brings the total of Blount-built vessels in the Circle Line Statue of Liberty Ferry fleet to five.

For free literature on the facilities and capabilities of Blount Marine,

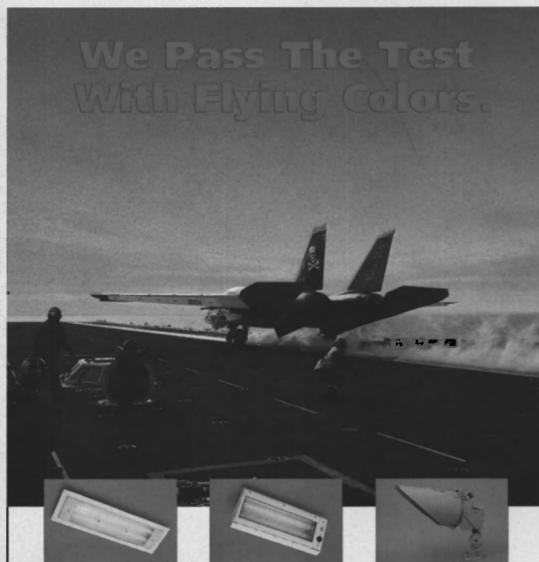
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Bearing .....	Golten Group
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Ventilation .....	Aerovent

### Correction

An article in the April issue recently omitted the fact that Raytheon Marine Company manufactures advanced high seas commercial radar in the U.S. Raytheon has produced commercial marine radar for over 40 years. The firm currently manufactures radar, including its Pathfinder/ST, at its Hudson, N.H., facility.



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Maritime Reporter/Engineering News

**Centofanti Purchases  
Schrader Bellows Product  
Line Of Parker-Hannifin**

Centofanti Marine Service, Inc., West Elizabeth, Pa., recently announced completion of the purchase of the Schrader Bellows Marine Controls product line of Parker-Hannifin Corporation, Akron, Ohio. Included in the sale are all existing inventory, tooling, test fixtures, engineering documentation and trade names Gear-Mate II, Mariner Mark IV System and Commandair Valves.

Schrader Bellows has been a leader in the manufacturing of gear and engine control systems with both fully pneumatic and electric over pneumatic systems. These systems are compatible with either hydraulic or air-flex clutches.

**Gabe Centofanti**, president, said the name will change to Centofanti Marine Systems, Inc. due to legal requirements, but that the address is all that will change. We remain dedicated to the quality product and designs as well as first class service to our distributors and customers, he added.

For further information on Centofanti Marine Systems,

Circle 49 on Reader Service Card

**Shell Offshore Teams  
With Houston Marine  
For Stability Training**

Shell Offshore Inc. (SOI) has commissioned Houston Marine Training Services to develop a 10-day stability training program. SOI will use the completed package to train selected drilling foremen and marine personnel assigned to the company's tension leg platform.

Forty percent of the training will be oriented toward tension leg platforms, and the remainder to standard surface drilling units.

The course will be submitted for Coast Guard approval so that attendees can meet the training requirements for licenses as ballast control operator, barge supervisor, and offshore installation manager.

**Corps Of Engineers Says  
Missouri River Season  
Will Not Be Extended**

The U.S. Army Corps of Engineers in Omaha, Neb., has announced that the 1991 commercial navigation season on the Missouri River will not be extended beyond November 1 because storage in the reservoirs has not recovered sufficiently.

Col. **Donald E. Hazen**, Corps of Engineers Missouri River Division engineer, said, "While the Missouri River basin has received much im-

proved snowmelt and rainfall runoff in May and June, storage is inadequate to trigger an extension to November 15."

The opening of the 1991 navigation season was delayed one week in April, and the season length will be shortened by advancing the closing date from December 1 to November 1. In addition, minimum service flows are limiting barges to 7-1/2-foot drafts rather than 8-1/2-foot drafts throughout the five-week shortened season.

**Ronald Swart Joins  
Willard Marine, Inc.**

**Ronald L. Swart** has joined Willard Marine, Inc. of Anaheim, Calif., as manager, R.I.B. Division. Mr. Swart has over 10 years' experience in the R.I.B. and inflatable boat business, and over 20 years in the marine industry. He has been active in the Southern California Marine Association, recently serv-

ing as chairman of the 1991 Los Angeles Boat Show Committee. One of the first orders of business for Mr. Swart will be to set up a national sales representative program to market Willard's Sea Force R.I.B. line.

In business for over 30 years, Willard Marine is a designer and builder of fiberglass Rigid Inflatable Boats (R.I.B.) and other boats from 18 to over 60 feet in size, principally for commercial and military markets.

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The exploration of new geometries sometimes leads to the discovery of new techniques and applications. Talent then becomes the important factor so that innovation is given direction to result in usefulness, not triviality. In surface piercing propellers, for example, advanced duplex stainless steels benefited from unique production expertise in large investment castings making the REXP90/91 the world's largest investment cast propeller series possible. At the forefront of such achievements you find a Swiss new technology firm. Its name stands for innovation you can depend on.

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Circle 254 on Reader Service Card

## Meyer Werft Delivers Fifth In Series Of Six Gas Tankers To AKP 'Sovcomflot' In Moscow



The cargo tanks on the Saulkrasti are designed for maximum pressure of 5.4 bar and 30 percent vacuum, and for a lowest transport temperature of -48 degrees C. The gas plant enables the ship to cool down, warm up or maintain all cargoes at any requested working temperature. With a total pump capacity of 1,500 cubic meters an hour, time of discharge is about 10 hours.

Meyer Werft of Papenburg, Germany, recently delivered the fifth ship of a series of six LPG/Ammونيا/VCN carriers to AKP "Sovcomflot," Moscow. Some days before delivery, the 16,250-dwt tanker was named Saulkrasti, from a place in the Gulf of Riga.

The yard had already delivered one gas tanker in January this year, and in autumn the last unit of the series of six vessels will be handed over. Upon completion of the series, the yard will have built a total of 45 liquefied gas tankers.

Like all the other ships of the series, the 518-foot-long by 69.8-foot-wide Saulkrasti is owned by "Sovcomflot" and will be operated

on their behalf by Acomarit (UK) Ltd., Glasgow.

The vessel is propelled by one MAN B&W two-stroke main engine, type 6L50MCE, developing 5,820 kw (7,920 hp) at 141 rpm; the propeller speed is 141 rpm. The main engine is capable of burning heavy fuel oil up to IF 380 (3,500 sec. Redwood I).

Electrical power is supplied by three MAN-B&W generating sets with A. van Kaick generators.

Unattended operation of the machinery space is possible in compliance with the regulations.

For free literature on the facilities and capabilities of Meyer Werft, Circle 25 on Reader Service Card

## NKK Breaks Into LNG Carrier Market

The recent award of a 19,000-cubic-meter-capacity LNG carrier to Japan's Nippon Kokan K.K. (NKK) marked a significant breakthrough for the company into this highly technological construction market.

Ordered by a Japanese company, the LNG carrier will feature a new NKK membrane design and will be used to supply medium-sized cities in Japan. Construction is expected to start later this year with delivery scheduled for the latter half of 1993.

NKK has had recent success, posting orders for seven ships during 1990-91.

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Circle 292 on Reader Service Card

Maritime Reporter/Engineering News

**Ohmec International  
Introduces New  
Diesel Fuel Monitor**

Ohmec International Corp., manufacturers of Ohmec onboard contaminant monitors for aircraft, has recently introduced the "Water Witch."

The Water Witch is a solid-state, portable instrument designed to detect water in marine diesel fuel. An audible alarm alerts the operator whenever the 28-inch-long sensing rod comes in contact with water, thereby reducing possible costly water damage to engines and fuel systems.

The Water Witch is a hand-held instrument powered by a 9-volt transistor battery that, when inserted into diesel fuel, sounds an audible alarm if water contact is made. A storage tank unit is also available.

For further information and free literature on the Water Witch from Ohmec International,

Circle 19 on Reader Service Card

**Oceaneering To Work  
On Three Platforms  
Offshore California**

Oceaneering International, Inc., Houston, Texas, has been awarded a contract to provide diving, atmospheric diving system (ADS), and remotely operated vehicle (ROV) services on Exxon's Harmony, Heritage, and Hondo platforms offshore California. The work will be performed by Oceaneering's Santa Barbara office.

Work is scheduled to begin this month on the Harmony and Heritage platforms, with the first phase of operations involving structural modifications in water depths up to 960 feet seawater.

Work on the Hondo platform includes installation of clamps and risers and preparations for the pipeline tie-ins, which Oceaneering will perform in the spring of 1992. A team of over 50 divers, welders, ROV personnel, and ADS operators will be mobilized for the project, which is scheduled for completion by summer 1992.

**New Japanese Report  
Warns Shipyards Not  
To Expand Capacity**

A new report recently published by a Japanese research institute states that adequate worldwide shipyard capacity exists to handle the projected orders for VLCCs during the 1990s. The report can be seen as a warning to yards which have plans to expand their present capacity by upgrading present facilities or building new ones.

The report, "Changes in the

September, 1991

World's Shipbuilding Facilities for Large Size Vessels," published by the Japan Maritime Research Institute, says that 27 likely VLCC building facilities which exist at present are sufficient to handle the demand for 350 VLCCs during the 1990s.

JMRI maintains that it is in the best interests of Japan, South Korea, and Western Europe to closely coordinate the supply and demand conditions which exist at present in order to maintain profitable shipbuilding prices.

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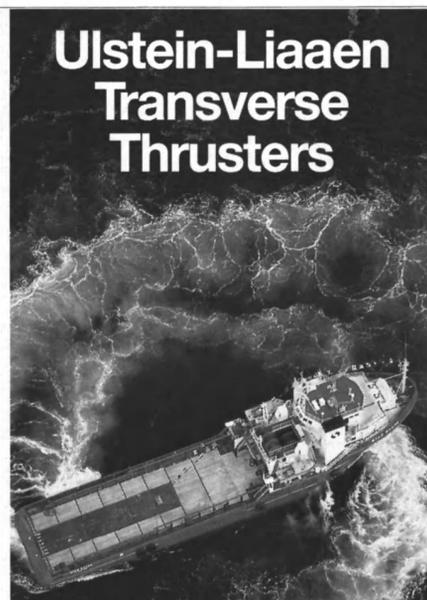
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For further information and free literature on Miba bearings,  
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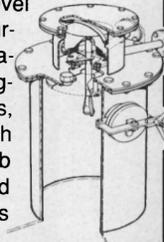
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**Infinite Offers  
Free Literature On  
Diesel Engine Parts**

Infinite, Inc., a producer of diesel engine components, plans to manufacture and distribute Detroit Diesel 53, 71 and 92 Series cylinder kits with 100 percent U.S. content. Pistons, liners and piston pins will be produced at Infinite's Germantown, Wis., facility and

packaged with U.S.-made piston rings in an effort to supply the Detroit Diesel aftermarket with a cost competitive cylinder kit.

Infinite anticipates having this program fully implemented by the December 1991. This program is part of a long-range objective for Infinite to establish its position as a quality OEM alternative.

For free literature detailing Infinite's aftermarket Detroit Diesel cylinder kits,

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Circle 217 on Reader Service Card

**Single-Hull VLCC Price  
Will Reach \$128 Million  
By Year 2005**

*Study Released By  
Ocean Shipping Consultants - U.K.*

Prices for very large crude carriers (VLCCs) with single hulls (SH) will reach \$128 million by 2005, predicts Great Britain's Ocean Shipping Consultants (OSC) in a recently-released study. The report, which builds on OSC's 1989 study, continues to maintain that ordering levels will drop over the 1991-1993 timeframe, and prices will follow suit. However, although orders definitely fell during the last quarter of 1990 through the first quarter of 1991, tanker prices have remained relatively steady.

OSC's price predictions tend to be on the conservative side. Furthermore, international prices for tankers with double hulls (DH) will be significantly higher. After accounting for these factors as well as figuring in inflationary increases, it is safe to say that the era of cheap ships is definitely drawing to a close.

The following table shows prices for recent tanker orders in three categories: VLCCs (250,000-280,000 dwt), Suezmax tankers (130,000-150,000 dwt), and product tankers of shuttle-ship size (80,000-100,000 dwt):

**Recent Prices For New-Construction Oil Tankers**

Dwt/Hull	No./Type	Customer	Yard	Date	Del.	Price
280,000 dwt SH w/DH option	3 VLCCs	Saudi Aramco	Mitsubishi, Japan	4/91	1993/94	\$107.9m ea. <sup>1</sup> (¥15b ea.)
280,000 dwt SH w/DH option	3 VLCCs	Saudi Aramco	NKK, Japan	4/91	1993/94	\$107.9m ea. <sup>1</sup> (¥15b ea.)
280,000 dwt DH	1 VLCC	Amoco, U.S.	Mitsubishi, Japan	3/91	1993	\$100m +
280,000 dwt DH	1 VLCC	Onassis, Greece	Sumitomo, Japan	2/91	1993	\$125m <sup>2</sup>
Unknown dwt SH w/DH option	2 VLCCs	Worldwide Shipping, Hong Kong	Hyundai, Korea	5/91	1993/94	\$90m ea., SH \$108m ea. w/DH option
148,800 dwt Both DH	2 tankers	Mitsui-Chevron Japan-U.S.	IHI, Ishibras, Japan, Brazil	4/91	1993	\$162.5m for both \$81.25 ea. (estimate) <sup>3</sup>
95,000 dwt SH	2 tankers, shuttle ship size	Leif Hoegh, Norway	Mitsui, Japan	6/91	93	\$122.3m for both (¥17b), \$61m ea.
86,000 dwt DH	8 product tankers	Petroleos de Venezuela	Hyundai, Korea	Unofficial 7/91	Unknown	\$65m ea. (Japanese bid: \$71.5m)

<sup>1</sup> Saudi Aramco ship price originally quoted at \$115 million (¥16 billion) per ship.

<sup>2</sup> Price for the Onassis ship, first ordered in July 1990, was changed to reflect the double hull option, thereby increasing the original price of ¥13.5 billion.

<sup>3</sup> The price was not revealed. However, Brazil's government bank BNDES approved a \$130 million loan to have the ships built. Presuming it was an 80 percent loan, the contract price for the two ships would be \$162.5 million.

**Liebherr Reports  
Brisk Demand  
For Deck Cranes**



The vessel Erikson Crystal, showing high-speed Liebherr cranes of type CBW 5/19 Litronic, capable of working under offshore conditions.

Liebherr's leading position for deck cranes on reefer vessels continues to be confirmed by the rising number of orders placed with the manufacturer during recent months.

Among the orders presently being fabricated by Liebherr-Werk in Nenzing, Austria, and other Liebherr factories and by licensees are a total of 18 deck cranes to be delivered to Danyard A/S in Frederishavn, Denmark, and to be installed on six reefer vessels for Chiquita United Brands of Cincinnati.

Each ship will be equipped with Liebherr's new low height, slim line CBW Litronic® container handling crane. The two single cranes on each vessel have 36 tons capacity at 20 meters radius, the twin crane comes with 2 x 20 tons, also at 20 meters outreach.

This order comes directly in line with an order for 32 reefer cargo-handling cranes for eight newbuildings under construction at four Norwegian shipyards (Kleven, Aukra, Langsten) for a Danish/Finnish group of owners (Lauritzen, Erikson, Holming). In this case, each vessel will have two CBW 8/20 Litronic and two CBW 36(20)/21/22.5 Litronic (the latter means 36 tons to 21 meters radius and 20 tons to 22.5 meters).

Still under delivery is a contract for 48 high-speed CBW 5/19 Litronic cranes, capable of working under offshore conditions, for 12 vessels. Electronic control of motions and fairleaders allow work in Union Purchase mode.

For free literature on cranes from Liebherr,

Circle 26 on Reader Service Card

**Hamilton Waterjets  
Power Fast Ferry**

Narvik Mek. Industri A/S (NAMEK), located in Narvik in northern Norway, recently delivered the Inpesca 10, a 90-passenger, 53-foot fast ferry powered by Hamilton waterjets.

September, 1991

The innovatively designed boat is propelled by a Hamilton waterjet propulsion system, consisting of Hamilton 362 waterjets coupled to Volvo TAMD 122D engines, each rated at 444 hp. The waterjets propel the 16-ton vessel up to 31 knots in lightship conditions. With its load of 90 passengers, an extra 6 tons, a cruising speed of 24 knots is maintained.

The hull form incorporates deep pontoon chines on each side of the center section. This configuration

gives high lift and significantly reduces wave generation giving a low friction hull which is easily driven by the low drag Hamilton system. The net result is a high-speed vessel, still capable of planing even at low speeds, with relatively small engines.

The high-speed ferry is destined for operation in Nicaragua.

For free literature detailing Hamilton waterjets,

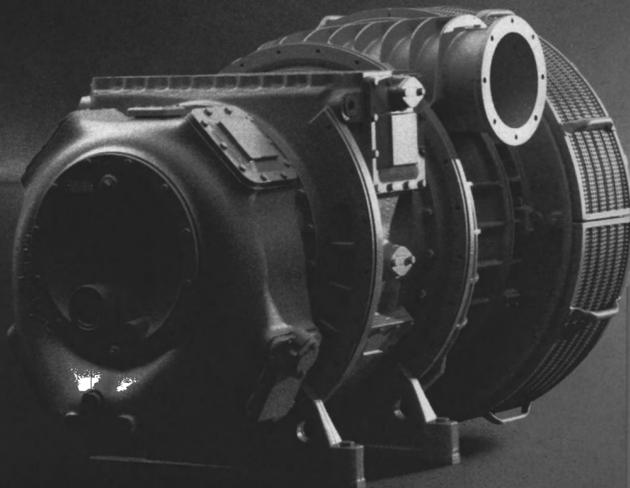
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### Magnavox Installs New Differential GPS System In Scandinavia

Ships maneuvering through the narrow twisting channels leading into Stockholm and Helsinki can now navigate with greater accuracy and confidence, thanks to an innovative new differential GPS system which has recently been installed by Magnavox.

The system was developed by Magnavox under contract with the Swedish Maritime Administration and the Finnish Board of Navigation.

The differential navigation system uses land-based reference stations to monitor the signals broadcast from the satellites in the Global Positioning System (GPS). Each reference station computes corrections for the satellite ranges. These correction factors are then transmitted to ships, vehicles or aircraft

fitted with GPS receivers, thereby providing a substantial improvement in position-fixing accuracy.

The systems in Sweden and Finland are the first operational systems to use marine radio beacons to transmit the differential GPS correction factors.

Several large passenger ferries are already using the system with excellent results. The differential GPS data is being integrated with the ships' radars and enhanced electronic chart systems, providing

highly accurate navigation through channels that are at times no more than twice the width of the ship, even during restricted visibility.

For further information and free literature from Magnavox,  
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### Bender To Lengthen, Overhaul Research Vessel

Bender Shipbuilding & Repair Co., Inc., Mobile, Ala., recently received a contract worth \$4 million to lengthen, overhaul and reactivate the research vessel Western Strait.

The Western Strait will be renamed Ka'imikai-O-Kanaloa and will be operated by the University of Hawaii for the Hawaii Undersea Research Laboratory Program in Honolulu, Hawaii.

Under the contract, Bender will extend her present length of 185 feet to 222 feet by adding a mid-body. Other work under the contract will include the addition of quarters, laboratories, scientific equipment and submarine handling gear with various auxiliary equipment, storage and public spaces to support a total of 36 personnel.

### Bridon To Provide Aircraft Carrier Purchase Cables To U.S. Navy

The U.S. Navy has awarded a million dollar contract to Bridon American Corp for 220,000 feet of high-strength purchase cables for aircraft carriers, according to an announcement by William B.R. Hobbs, Bridon president.

The steel cables will be part of the aircraft arresting gear used to stop high-speed jet aircraft landing on carrier decks. Purchase cables are attached to the cross deck pendants that engage a hook on the underside of the landing aircraft.

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### Electric Boat Names Roger E. Tetrault General Manager

Roger E. Tetrault was appointed corporate vice president and general manager of General Dynamics' Electric Boat, effective August 1.

Mr. Tetrault comes to Electric Boat from Babcock and Wilcox, where he spent 20 years in various positions of the Nuclear Fuel Division, including division vice president and general manager. In 1990, he was named vice president and group executive of the company's Government Group.

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### Magnavox Installs New Differential GPS System In Scandinavia

Ships maneuvering through the narrow twisting channels leading into Stockholm and Helsinki can now navigate with greater accuracy and confidence, thanks to an innovative new differential GPS system which has recently been installed by Magnavox.

The system was developed by Magnavox under contract with the Swedish Maritime Administration and the Finnish Board of Navigation.

The differential navigation system uses land-based reference stations to monitor the signals broadcast from the satellites in the Global Positioning System (GPS). Each reference station computes corrections for the satellite ranges. These correction factors are then transmitted to ships, vehicles or aircraft

fitted with GPS receivers, thereby providing a substantial improvement in position-fixing accuracy.

The systems in Sweden and Finland are the first operational systems to use marine radio beacons to transmit the differential GPS correction factors.

Several large passenger ferries are already using the system with excellent results. The differential GPS data is being integrated with the ships' radars and enhanced electronic chart systems, providing

highly accurate navigation through channels that are at times no more than twice the width of the ship, even during restricted visibility.

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## Upcoming Events

**Transshipment Conference** in Quebec City, Quebec, Canada, September 10-12. Run by Mariport Group Ltd., the event is on cargo shipment and handling concepts for the 1990s. Held at the Loews le Concorde Hotel Grande Allee. Phone: (416) 333-8171; fax: (416) 333-1162.

**American Waterways Operators (AWO) Fall Convention** in Washington, D.C., September 12-13. Will offer a forum to members to be brought up to date on pertinent issues confronting the tug and barge industry and the association. To be held at the Washington Court on Capitol Hill. Contact **Lori Swenningson** for further information at (703) 841-9300.

**The Oil Pollution Act of 1990: An Assessment One Year Later** in Oslo, Norway, September 17-18. Conference will provide a forum for both government and industry executives to conduct a comprehensive examination of OPA's impact both at the national and local level in the U.S. One of the guest speakers will be Vice Adm. **John Costello**, USCG (Ret.), who is president of the

Marine Spill Response Corporation. For registration information, contact: Conference Coordinator, Marine Marketing International, c/o Kotorfelleskap a/s, Hjalmar Brantingsvei 8, 0581 Oslo 5, Norway.

**National Waterways Conference (NWC) Annual Meeting & Exhibition** in Houston, Texas, September 18-20. On the agenda will be such issues as addressing navigation infrastructure, higher waterways user taxes and environmental challenges facing the inland waterways industry. Event will take place at the Doubletree Hotel. For further information contact NWC at 1130 Seventeenth Street, Washington, D.C. 20036; telephone: (202) 296-4415; fax: (202) 835-3861.

**Baltic & International Maritime Council (BIMCO)** in Venice, Italy, September 20-24. The conference program of this general meeting will feature sessions on quality assurance and life extension of ships, Europe after 1992, and dialogue between owners and charterers. Held at the Hotel Excelsior, 161 Bagsvaerdvej, DK-2880 Bagsvaerd, Denmark, Phone: (+45) 444-44500.

**Petroleum Tankship Operations Course** in Houston, Texas, September 30-October 3. Course for shoreside personnel taught by **Arthur McKenzie**, New York Trade Center Institute. Phone: (212) 466-4044.

**Admiral of the Ocean Seas (AOTOS)** in New York, N.Y., October 11. Annual awards dinner for AOTOS. This year award presentations will be made to **Warren Leback**, U.S. Maritime Administrator, and **Charles I. Hiltzheimer**, president and chief executive officer of Puerto Rico Marine Management Inc. Held at the New York Hilton. Phone: **Barbara Spector Yeninas**, AOTOS coordinator (201) 226-6260; or United Seamen's Service (212) 775-1262.

**West Coast Tanker Operations Symposium** in La Jolla, Calif., October 11-12. Sponsored by the Los Angeles Metropolitan Section of The Society of Naval Architects and Marine Engineers. Will be held at the Sheraton Grande, Torrey Pines Resort. The symposium will discuss technical issues relating to tanker operations on the U.S. West Coast. Operating experience and the impact of new legislation on the

tanker fleet will be among the topics discussed. Contact **Harold D. Ramsden**, MCA Engineers, Inc., at (714) 662-0500.

**65th Annual Convention of Propeller Club of the U.S.** in Brownsville, Texas, October 14-18. Panel sessions will cover Gulf of Mexico fisheries, Shipping Act review, foreign trade market assessment, pollution issues, and lessons of the Persian Gulf War. Held at Fort Brown Hotel & Resort. Contact Propeller Club of the U.S., 3927 Old Lee Highway, #101A, Fairfax, Va. 22030; phone: (703) 691-2777. (continued on page 75)



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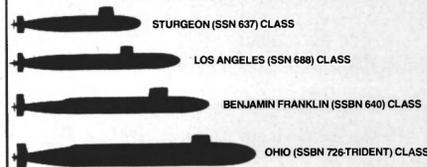
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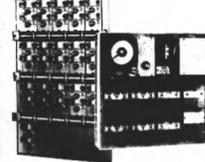
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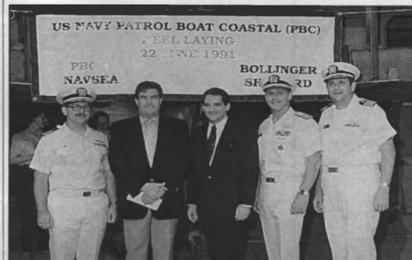
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## Keel Laid For New Navy Patrol Boat At Bollinger Shipyard



Pictured, left to right, at the recent keel laying ceremony held at Bollinger Machine Shop & Shipyard, are: Capt. **Rich Havel**, Project Manager, PMS 300, U.S. Navy; **Boysie Bollinger**, chairman and CEO of Bollinger; Congressman **Billy Tauzin**, Third Congressional District of Louisiana; Adm. **George Worthington**, Commander, Naval Special Warfare Command; and Capt. **John Donahue**, Supervisor of Shipbuilding, Conversion and Repair, U.S. Navy.

A keel laying ceremony was recently held at Bollinger Machine Shop & Shipyard, Inc., Lockport, La., for the new class of U.S. Navy coastal patrol boats (PBC). The PBC is 170 feet in length and will be used by the Special Operations Force (SOF) for coastal interdiction and special warfare.

The basic contract for eight boats was competitively procured and awarded to Bollinger in August of last year.

A contract modification to exercise an option for the construction of five more PBCs was awarded for \$48,729,397 in July 1991. Work will be performed at the Lockport, La., yard and is expected to be completed March 1, 1994.

For free literature detailing the boatbuilding capabilities of Bollinger Machine Shop,

Circle 102 on Reader Service Card

## New Sulzer Diesel Expects To Report Good Profit In '91

New Sulzer Diesel Ltd., Winterthur, Switzerland, formed when Sulzer spun off its diesel engine business into a new company in July 1989, reported that last year the diesel business broke even for the first time in a decade as orders rose 28 percent over 1989, and orders so far this year are well above budget.

A resurgence in the shipbuilding industry has benefited New Sulzer Diesel. The last three years have seen a very healthy newbuilding market around the world.

**Peter G. Sulzer**, New Sulzer's chairman, said most of the new orders have come from Japanese shipbuilders. The company itself does relatively little manufacturing, but has 25 licensees around the world who do, with the largest concentration in Japan and South Korea.

New Sulzer's principal shareholders now are the Italian shipyard Fincantieri, along with two German shipbuilders, Bremer Vulkan and Deutsche Maschinen- und Schiffbau. Sulzer Brothers also retains a small interest.

**Robert G. Walsh Jr.** was recently appointed president of the new company's U.S. subsidiary, New York-based New Sulzer Diesel US Inc. Mr. Walsh most recently served as executive assistant to **Wallace T. Sansone**, deputy commander of the U.S. Military Sealift Command.

For free literature detailing New Sulzer Diesel,

Circle 106 on Reader Service Card

### Upcoming Events

(continued from page 73)

**Fish Expo '91** in Seattle, Wash., October 17-20. Exhibition and seminars, at the Seattle Center. Features one of the largest exhibitions in the world on the commercial fishing industry. For further details call (207) 772-3005.

**Seatrade Expoship Riomar 91** in Rio de Janeiro, Brazil, October 21-25. Conference and exhibition organized by Seatrade. Held at Centro de Convenções do Hotel Nacional. Contact **Michael Kazakoff**, phone: (609) 452-9414 or fax: (609) 452-9374.

**Fleet Maintenance in the 21st Century** in Virginia Beach, Va., October 22-23. Joint symposium sponsored by the Commander in Chief, Atlantic Fleet and American Society of Naval Engineers, at the Pavilion Convention Center. Technical papers regarding fleet maintenance management, engineering, logistics and training within aviation, surface and submarine fields will be presented. Contact **Lewis J. Friedrichsen**, M. Rosenblatt & Son, Inc., 5700 Thurston Avenue, Suite 204, Virginia Beach, Va. 23455; phone: (804) 460-4449; or fax: (804) 464-2801.

**Europort '91** in Amsterdam, The Netherlands, November 12-16. Exhibition will focus on shipping and shipbuilding, port and dock equipment, communication and navigation equipment, etc. Will be held in the RAI Exhibition and Conference Center. For further information, contact RAI Exhibitions in Amsterdam at +31 20 549 1212.

**SNAME Annual Meeting & 11th International Maritime Exposition** in New York City, November 13-15. Marine industry trade show sponsored by The Society of Naval Architects and Marine Engineers. Technical papers will be presented on industry issues. Exhibits will include ship design, propulsion machinery, navigation and communications equipment, etc. Will be held at the New York Hilton. For further information, contact SNAME at 601 Pavonia Avenue, Jersey City, N.J. 07036; or phone: (201) 798-4800.

**The Work Boat Show** in New Orleans, La., December 5-7. Annual exhibition focusing on offshore supply boats, inland tugs, barges, commercial fishing boats and excursion/passenger vessels will be held at the Louisiana Superdome. For information, contact National Fisherman Expositions, 5 Milk Street, P.O. Box 7437, Portland, Maine 04112-7437; phone: (207) 772-3005; or fax: (207) 772-5059.

**AAPA 1992 Annual Meeting** in Anchorage, Alaska, September 21-25, 1992. Annual meeting of the American Association of Port Authorities. An attendance of 800 is anticipated for this event. For further information, call (703) 684-7300.

September, 1991

## TANKER REGULATIONS

Implications for the Market

International shipping safety and antipollution regulations look set to undergo a major upheaval in the 1990s according to a new report. The introduction of the 1990 US Oil Pollution Act by the Bush Administration in August 1990 threatens to shatter the international alliance that has been built up over the course of the last three decades.

The guidelines on which most international legislation is now based are provided by conventions held by the International Maritime Organization (IMO). The study, by tracing the history of the international community's response to the dual problems of maritime safety and pollution, concludes that adoption of the IMO's two major policy weapons—SOLAS (concerned with marine pollution) and KV (concerned with safety of life)—by maritime nations increased significantly during the 1980s.

The report has found that allegiance to international legislation is high. More than 95% of the world tanker fleet, for instance, is registered under a flag state that has adopted KV. While in practice such affiliation is somewhat lower, it nonetheless shows that the trad-

ing opportunities for substandard ships are limited. Despite these successes, however, the maritime environment has continued to be blighted by major oil spills resulting in disillusionment in certain quarters with the achievements of the IMO.

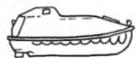
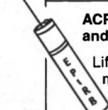
In the meantime the 1990 US Oil Pollution Act, already termed the most radical response yet by a single nation to the problem of marine pollution, threatens to have devastating impact on both tanker costs and operating practices. With research by Drewry suggesting that the fitting of a double hull will add an extra 20-25% to the cost of a newbuilding, the scale of the legislation is likely to be harshly felt. Supplementing this is the prospect of unlimited damage liability for the owners of vessels deemed responsible for oil spills. This has already forced some "majors" to suspend operations to the United States. While most P&I Clubs—for the moment at least—offer coverage of up to \$1 billion, owner/operators are having to pay a price for it. The renewal of P&I cover in February 1991 left some companies facing a three-fold increase in premiums. In short, this could represent the beginning of a two-tier market,

in which oil trades to the USA are distinct from the oil trades to the rest of the world.

The effects of this single piece of legislation, however, threaten to have a far wider effect on the world of shipping. It seems likely that, as a result, the international regulations to which tanker owners must adhere may be subject to wholesale change. Reports suggest a growing lobby to be in favor of large-scale amendments in IMO legislation following the decision by the world's leading importer of crude to introduce its own answers to the problem of marine pollution. Although details are at present vague, recent meetings have seen a number of radical topics discussed, including the mandatory introduction of double-hulled tankers. The cohesion of the international community under the banner of the IMO is undoubtedly threatened by the emergence of unilateralism on a grander scale and the study seeks to assess the likely future moves by regulators—which in some cases may be significant.

For further information, contact Drewry Shipping Consultants Ltd., 11 Heron Quay, London E14 4JF.

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The report is available for \$575.00 per copy. To order, please contact IMA Associates, Inc. - 600 New Hampshire Ave., NW - Suite 140 - Washington, DC 20037 - Telephone 202-333-8501 - Fax 202-333-8504. Telephone or fax orders will be accepted

### JBF Offers New Wave Of Multipurpose Oil Recovery Vessels

JBF Scientific Company, Inc. of Southwest Harbor, Maine, is introducing three new models to its current line of successful oil spill recovery vessels. This new generation of fast response, multi-use oil and debris recovery boats are available in 25-, 30-, and 42-foot lengths. The vessels consist of a catamaran-hull with twin engines and onboard collected oil storage tanks, and have response speeds in excess of 20 knots.

Advantages of the new design include incorporation of a proven oil-spill recovery concept, multi-use workboat, fast response, shallow draft, and competitive pricing through extensive use of computer enhanced design and construction.

For more information and free literature from JFB Scientific, Circle 46 on Reader Service Card

### Ferrostaal Takes Over All Services Of Affiliate MAN GHH Floating Docks

Ferrostaal AG, Essen, Germany, announced that it has taken over all the activities of its affiliate company MAN GHH in the field of the engineering and marketing of floating docks.

With a background of over 30 years' worldwide experience in the field of shipbuilding and marine engineering, Ferrostaal, with its specialized FN Division, offers the same range of professional technical and commercial services to existing customers of GHH Floating Docks as they have received in the past, and will offer these services to new customers.

For further information and free literature from Ferrostaal AG, Circle 52 on Reader Service Card

### RCI Delivers Oil-Spill Containment Boats To U.S. Navy

River City Industries, Inc. (RCI) of Moss Point, Miss., recently delivered two 33-foot pontoon platform workboats to the U.S. Naval Facilities Engineering Command, Port Hueneme, Calif. The boats are designed to deploy oil containment booms in the event of an oil spill. The catamaran pontoons are fabricated of fiberglass and are fitted with all-aluminum decks.

RCI currently is performing a contract for the U.S. Navy for the construction of 30 each fiberglass trimaran towed targets. RCI has already delivered 40 such craft under two previous contracts.

For additional information regarding the products and services of RCI,

Circle 53 on Reader Service Card

### French Named VP, New Construction Production At National Steel

National Steel and Shipbuilding Company (NASSCO) has announced that **Spencer L. French** has been named vice president, new construction production.

Mr. French will have overall responsibility for the construction of new ships at NASSCO. He will

direct line operations for the steel and outfitting trades, planning and scheduling for U.S. Navy and commercial ship construction, and ship management and testing.

Mr. French has over 22 years of experience in shipyard operations, engineering, program management and support functions. Prior to joining NASSCO as a vice president in 1987, he was a vice president with General Ship Corporation in Boston, Mass.

### U.S. Offshore Firm Seeks MarAd Approval To Sell Bulk Barge

Gulf Fleet Supply Vessels, Inc., Houston, Texas, has received approval from the Maritime Administration to sell to J.P. Knight (Offshore) the 5,061-dwt barge Hercules Del Golfo, a British corporation.

Built in 1982, the vessel will be registered in St. Vincent and the Grenadines.

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Dimensions: 154.7' X 38.5' X 12.5'  
Gross Tonnage: 286  
Net Tonnage: 194  
Horsepower: 1700 @ 1225 RPM  
Fuel Capacity: 60,000 Gallons  
Fresh Water Capacity: 27,000 Gallons

#### Engine Compartment:

- 2 - Mo. D-398, Twelve cylinder, Caterpillar diesel engines keel cooled, air start, with LO and Water Temp alarms
- 2 - Mo. 3198, Caterpillar hydraulic clutches with 3.95:1 gear ratio driving four blade propellers
- 2 - 300 KW, 110/408 V AC generators driven by keel cooled, Mo. 353 Caterpillar diesel engines
- 2 - Two stage, Gardner-Denver, air compressors and tanks
- 1 - 3" Aurora bilge pump, 3" Aurora fire pump, 3" FO transfer pump
- 2 - 1" Deming FW pumps and system
- 1 - 4" Ammonia compressor cooling water pump
- 1 - 1-1/4" SW wash down pump

There are approximately 1400 wood lath traps on the vessel with 30 miles of 9/16" polypropylene rope with floats, etc. necessary for the operation of the traps.

There is a material lift from the ice hold to the processing room that is electrical operated.

There is a hydraulic crane on the second deck for lifting stores, catch boats, etc.

There are ten (10) hydraulic fishing reels on the main deck.

On the second deck of the vessel there is a processing room certified by the U.S.D.A. (composition covering).

The vessel is renovated with a total of 11,000 cu. ft. of below freezing, cargo hold with a plate freezer that has an estimated capacity of 1500# of frozen product per three (3) hours of operation

There are ammonia compressors on the vessel with 100% redundancy for the protection of the frozen product, and 6" of insulation through out the refrigerated spaces.

There are packaging machines, conveyors, stainless steel work tables, sinks, etc. for processing the product.

On the second deck port side there is a laboratory, to be used in the quality control of the product.

This vessel has an appraised value of \$2,450,000.



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**Halter International's  
Spill Response Answer:  
Multipurpose Combo-60**

In 1990, the Congressional Office of Technology Assessment released a report on the current equipment available for cleanup operations including skimmers, chemical dispersants, burning and bioremediation. The OTA report, "Coping with an Oiled Sea: An Analysis of Oil Spill

Response Technologies," provided builders with the challenge to design a vessel that would exceed modern technology.

"We cannot always prevent an oil spill from happening," said **Harold P. Halter**, president of Halter International, Inc., "but we can control it once it has occurred."

As founder of Halter Marine Inc. until its sale to Trinity Industries in 1983, Mr. Halter was one of the premier boatbuilders during the oil boom.

Now Mr. Halter has teamed with **John R. Glas**, a senior officer and investment banker, and formed New Orleans-based Halter International. The firm just introduced the first of a series of multipurpose emergency response vessels, the Halter Combo-60. She is equipped with a computer-based system for rapid deployment and a training program for vessel operators. The RREDI Corp., a Halter International subsidiary, manages an oil spill training program for personnel who will operate



The Halter International Combo-60 is ballasted down as crew put out the Halter International Sea Sled for improved recovery effectiveness.

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You may need assistance applying high-performance plastics, rubber compounds, ceramics or fiber glass to piping and venting, structural supports, or any number of new designs that protect equipment and personnel.

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\*A trademark of International Nickel Company.

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Marine Products from **TRINOVIA**

the Combo vessels. The training is offered as part of a comprehensive service contract. Other vessels in the series will vary in size and may be modified to meet specific customer requirements.

According to Halter International, each vessel in the Combo Series employs six different pumping modes of operation, which enables each vessel the capacity of adapting to the type and consistency of spill material and existing sea conditions. In following the flow of oil in the vessel, the Combo sucks oil through a unique collection device, called the Halter Sea Sled, at hovering flow rates of 4 knots and skimming flow rates of 4 knots. The oil moves across flexible bellows, which affords continuous sled contact with oil in seas up to 6 feet, and through the bow, and into the separation chamber, where a modified floating weir is located. The separated oil is heated as it is drawn by a Lawrence centrifugal screw pump during light spills. The oil is then pumped into and temporarily stored in 20,000 gallon polyurethane-coated nylon "bladders," or into nearby barges or ships. The company reports that for heavier spills, oil greater than 1-1/2 feet thick, two Nomera 20, North American Marine jet pumps operate simultaneously with the Lawrence pump producing a recovery capacity up to 20,000 barrels per hour. In its maximum pumping mode, Halter International claims the Combo-60 is capable of recovering up to 32,000 barrels per hour by utilizing all four of its jet pumps.

The jet pumps are driven by four Caterpillar 3208TA diesel engines, rated at 425 hp at 2,800 rpm.

With the Combo's multipurpose capability, much of the vessel's time will be dedicated to activities other than oil recovery. In addition to collecting oil, Halter International reports the Combo-60's function include fighting fires, aerating chemical spills, patching damaged vessels, backwashing shorelines, clearing debris from waterways, draining flooded areas, servicing land-based fire engines, and dredging shallow water areas.

For free literature detailing the Combo-60 from Halter International,

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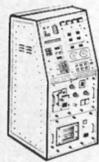
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StanBlast Abrasives, P.O. Box 968, 3300 River Road, Hawley, LA 70059

## AIR CONDITIONING AND REFRIGERATION—Repair & Installation

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Bailey Group, 2323 Randolph Ave., Avenel, NJ 07001  
Carner Transcold, P.O. Box 4805, Syracuse, NY 13221  
Stal Refrigeration AB, Butangsgatan 16, S-601 87 Norrköping, SWEDEN  
York Int'l, P.O. Box 1592083G, York, PA 17405

## BALLAST

Chesapeake Specialty Products, 5055 Northpoint Blvd., Baltimore, MD 21219  
Genstar Stone Products, Executive Plaza IV, Hunt Valley, MD 21031  
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Jack Faulkner, 2419 Caddy Lane, P.O. Box 371, Flossmoor IL 60422  
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Lyngso-Valmet Marine A/S, P.O. Box 130, N-3430 Spikkestad, NORWAY  
MMC International, 60 Inp Dr., Inwood NY 11696  
Marine Electric RPD, Inc., 50 Carol St., P.O. Box 1135, Clifton, NJ 07014-1135  
Norcontrol A/S, P.O. Box 1024, N-3191 Horten, NORWAY  
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Cummins Engine Company, Mail Code 60011, Box 3005, Columbus, IN 47202-3005  
Global Maritime Services, 247 SW 33 Court, Ft. Lauderdale, FL 33315  
Göthen Marine Company Inc., 160 Van Brunt Street, Brooklyn, NY 11231  
Hatch & Kirk, 5111 Leary Avenue NW, Seattle, WA 98107  
KHD Canada, Inc., 4420 Garand, Ville St-Laurent, Quebec, CANADA H8R 2A3  
Kim Hotstar Mfg Co., E 5724 Broadway Ave, P.O. Box 42, Spokane WA 99210  
MAN B&W Diesel GmbH, Stadtbachstrasse 1, D-8900 Augsburg 1, GERMANY  
MAN B&W Diesel, 17 State Street, New York, NY 10004  
MTU of North America, 10450 Corporate Drive, Houston, TX 77478  
Markisches Werk GmbH, P.O. Box 1442, D-5884 Halver 1, GERMANY  
Pacific Rim Diesel, 3842 W. Marginal Way SW, Seattle, WA 98106  
Paxman Diesels, P.O. Box 8, Paxman Works, Colchester, Essex, CO1 2HW, ENGLAND;  
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## ENGINES

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Litton Special Devices, 750 W. Sprout Road, Springfield, MA 19064  
Koden International, 77 Accord Park, Norwell, MA 02061

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Birnie, Rice & Arner, Inc., 1172 Camp St., New Orleans, LA 70130  
Gladys Marine, Garves Point Rd., Glen Cove, NY 11542  
Maritime Power Corp., 200 Henderson Street, Jersey City, NJ 07302  
Okavo Steel Inc., P.O. Box 745, Avon, CT 06001

## EVAPORATORS

AlfaLaval, Desal A/S, Stamholmen 93, DK-2650 Hvidovre, Copenhagen, DENMARK  
Aqua-Chem, Water Technologies Div., P.O. Box 421, Milwaukee, WI 53201  
Beard Industries Inc., P.O. Box 31115, Shreveport, LA 71130

## FANS-VENTILATORS-BLOWERS

Caring Turbine Blower Co., 10 Nebraska St., P.O. Box 88, Worcester, MA 01613  
Jon M. Liss Associates, Inc., 411 Borel Ave., San Mateo, CA 94402

## FASTENERS

Jameson Distributors, 28 Narragansett Ave., P.O. Box 348, Jamestown, RI 02635  
Non-Ferrous Bolt & Mfg. Co., 4085 Nevso Dr., Suite C, Las Vegas, NV 89103

## FENDERING SYSTEMS/BUOYS-Dock & Vessel

Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241  
Miligan Marine Supply Inc., 5832 Harvey Wilson, Houston, TX 77020  
Rowe Bumpers, Conveyors & Caster Corp., 3501 Detroit Ave., Cleveland, OH 44113  
Seward International, Inc., Clearbrook Industrial Park, P.O. Box 98, Clearbrook, VA 22624  
Soldur Plastics Co., 200 Industrial Dr., Delmont, PA 15626  
Standard Refrigeration Co., 2050 N. Ruby, Melrose Park, IL 60160  
Ultra Poly Inc., 2926 South Steele, Tacoma, WA 98409  
Wiking Fender Co., 50 Church Street, Sea Bright, NJ 07786

## FIBER OPTIC SYSTEMS

AT & T, Cables System/Fiber Optic Div., 111 Madison Avenue, Morristown, NJ 07962

## FUEL ADDITIVES, CONDITIONING

U.S. Borax/Industrial Chemicals, 3075 Wisher Boulevard, Los Angeles, CA 90010

## GALLEY EQUIPMENT

Cosulich Refrigerator Co., 949 Industry Rd., Kenner LA 70062  
Gaylord Industries, 10900 S W Avery St., P.O. Box 1149, Tualatin, OR 97062  
McEroy Machine & Mfg Co., Inc., P.O. Box 4454, Biloxi MS 39535-4454

## GANGWAYS, LADDERS

Coast Marine & Industrial Supply Inc., 398 Jefferson St., San Francisco, CA 94133  
Rampmaster Inc., 9825 Oceola Blvd., Vero Beach, FL 32966  
Westmont Industries, 10805 Painter Ave., Santa Fe Springs, CA 90670  
Wooster Products Inc., 1000 Spruce St., P.O. Box 896, Wooster, OH 44691

## HEAT EXCHANGERS

AlfaLaval, Desal A/S, Stamholmen 93, DK-2650 Hvidovre, Copenhagen, DENMARK  
AlfaLaval Separation Inc., 2115 Linwood Avenue, Fort Lee, NJ 07024  
Beard Industries Inc., P.O. Box 31115, Shreveport LA 71130

## HORNS/WHISTLES

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

## HOSE

HBD Industries, Inc., 1801 S. Railroad Street, Salisbury, NC 28145-0948

## HYDRAULICS

Aeroquip Corporation, 3000 Strayer, P.O. Box 631, Maumee, OH 43537-0631  
Cunningham Marine Hydraulics Co., 201 Harrison St., Hoboken NJ 07030  
Del Gavo Marine Hydraulics Inc., 619 Industrial Rd., Carlstadt, NJ 07072

## INCINERATORS

Teamtac A/S, P.O. Box 100, N-4912 Gjevning, NORWAY  
A/S Vesta, 27 Skudehavsvej, DK-2100 Copenhagen DENMARK US Agent: American United Marine, 5 Broadway, Rte 1, Saugus, MA 01906

## INSULATION

Soundcoat Company, 1 Burt Drive, Deer Park, NY 11729

## JOINER—Watertight Door—Paneling—Ceiling System—Decking

Cupples Products, 2650 S. Hanley Rd., St. Louis, MO 63144  
GE/Carcon Electronic Systems Corp., 550 S. Fulton Ave., Mt. Vernon, NY 10550  
IMAC AB, Berga Alle 1, S-252 55 Helsingborg, SWEDEN  
U.S. Rep. Hopeman Brothers, Inc., P.O. Box 820, Waynesboro, VA 22980  
Maritime Services Corp., 3457 Gaillard Drive, Hood River, OR 97031  
Walt & Krenzer Inc., 1390 M. Read Blvd., Rochester NY 14606

## KEEL COOLERS

R.W. Fernstrum & Co., 1716 Eleventh Ave., Menominee, MI 49858  
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241

The Walker Machine Co., Inc., 84-98 Cambridge Avenue, Jersey City, NJ 07307

## LEGAL SERVICES

John Jozwick, c/o Bryan, Schiffrin & McMonagle, First & Cedar Bldg., Ste 350, 2701 First Ave., Seattle, WA 98121

## LIFEBOATS/RAFTS

Zodiac of North America, P.O. Box 400, Stevensville, MD 21666  
Willard Marine Co., Inc., 1250 N. Grove St., Anaheim, CA 92805

## LIGHTING EQUIPMENT—Lamps, Fixtures, Searchlights

ACR Electronics, Inc., 5757 Ravenswood Rd., P.O. Box 5247, Ft. Lauderdale, FL 33310-5247  
Archway Marine Lighting, 4501 Swan Ave., St. Louis, MO 63110  
Carlisle & Finch, 4562 W. Mitchell Ave., Cincinnati OH 45232  
The L.C. Doane Co., P.O. Box 975, Essex, CT 06426  
Nautilus Equipment Ltd., P.O. Box 66, Station M, Halifax, Nova Scotia B3J 2L4, CANADA  
Phoenix Products, 6161 N 64th St., Milwaukee WI 53218

## LINE BLINDS

Stacey/Fetteroff, P.O. Box 103, Skippack, PA 19474

## LOGISTICS

V. Logistics Consultants, Inc., 3420 Bienville Blvd., Ocean Springs MS 39564  
QED, 4646 N. Witchduck Road, Virginia Beach, VA 23455

## MACHINERY MAINTENANCE, REPAIR, OVERHAUL, AND TESTING

Del Gavo, 619 Industrial Rd., Carlstadt, NJ 07072  
Global Maritime Services, 247 SW 33 Court, Ft. Lauderdale, FL 33315  
Göthen Marine Company Inc., 160 Van Brunt Street, Brooklyn, NY 11231

## MACHINING—On Site Repair

Global Maritime Services, 247 SW 33 Court, Ft. Lauderdale, FL 33315

## MARINE ACCOMMODATIONS

Hopeman Brothers, P.O. Box 820, 435 Essex Ave., Waynesboro, VA 22980

## MARINE FURNITURE

Wilson & Hayes, 1601 Eastlake Avenue, East, Seattle, WA 98102

## METAL PRODUCTS

Williams & Co., Inc., 901 Pennsylvania Avenue, Pittsburgh, PA 15233-1495  
Jamestown Metal Marine Sales, Inc., 4710 N.W. Second Ave., Boca Raton, FL 33431

## 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  
Artec Offshore Corp., 578 Enterprise St., Escondido, CA 92025  
B.C. Research, 3650 Westbrook Mall, Vancouver, B.C. CANADA V6S 2L2  
CDI Marine Co., 9487 Regency Square Blvd., Suite 500, Jacksonville, FL 32225  
CT 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, 3200 Ridgeway Dr., Suite 403, Metairie LA 70002  
Design Associates Inc., 14360 Chef Menteur Highway, New Orleans, LA 70129  
Designers & Planners, 2611 Jefferson Davis Hwy, Ste. 3000, Arlington, VA 22202  
Diversified Technologies, 812 Live Oak Dr., Chesapeake VA 23320  
Encon Management & Engineering Consultant Services, P.O. Box 7760, Beaumont, TX 77706  
GHM Inc. (Industrial Measurement Consultants), P.O. Box 1836, Newport News, VA 23601  
Gibbs & Cox, Inc., 50 West 23rd Street, New York, NY 10010  
The Glosten Associates Inc., 600 Mutual Life Bldg., 605 First Ave., Seattle, WA 98104  
Morris Guralnick Associates, Inc., 130 Sutter Street, Suite 400, San Francisco, CA 94104  
C. Raymond Hunt Associates, 69 Long Wharf, Boston MA 02110  
Hydrocomp, Inc., 45 James Farm Lee, P.O. Box 865, Durham, NH 03824  
JH Inc., No. 4 Executive Campus, Cluett 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  
Alan C. McCure Associates, Inc., 2600 South Gassner, Houston, TX 77063  
John V. McCollum, Inc., 1199 Long Point Road, Mt. Pleasant, SC 29464  
McEroy Machine & Mfg Co., Inc., P.O. Box 4454, Biloxi, MS 39535-4454  
John J. McMullen Associates, Inc., 1 World Trade Center, Suite 3000, New York, NY 10048  
MacPherson Maritime Services, 141 Jefferson Ave., Westfield NJ 07090  
Fendall Marbury, 9 Neal Street, Annapolis MD 21401  
Marine Design & Operations, Inc., 226 Chestnut St., Roselle Park, NJ 07024  
Marine Management Systems Inc., 102 Hamilton Ave., Stamford CT 06902  
Marine Power Associates, 1010 Turquois St., Ste 217, San Diego, CA 92109  
ManTech, Seacoff, Bay Road, Newmarket, NH 03857  
Maritime Design, Inc., 3020 Hartley Rd., Jacksonville, FL 32225

R.J. Mellis & Co., 71 Hudson St., New York, NY 10013  
Nautical Designs, Inc., 2101 S Andrews Ave., Suite 202, Ft Lauderdale FL 33316  
Nelson & Associates, Inc., 610 Northwest 183rd St., Miami, FL 33169  
Northern Marine, P.O. Box 1169, Traverse City, MI 49685  
Ocean Oil International Engineering Corp., 3019 Mercedes Blvd., New Orleans LA 70114  
Olsen Marine Surveyors Co., P.O. Box 283, Port Jefferson, NY 11777  
Omega Marine Engineering Systems, Inc., 11757 Katy Freeway, Ste 1100, Houston TX 77079  
QED Systems Inc., 4646 Witchduck Rd., Virginia Beach, VA 23455  
Donald J. Quigley, Inc., P.O. Box 515 Richboro, PA 18954  
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  
Sea School, 10812 Gandy Boulevard, St. Petersburg, FL 33702  
Seaworthy Systems Inc., P.O. Box 965, Essex, CT 06426; 17 Battery Pl., New York, NY 10004; P.O. Box 205, Solomons MD 20688; 2 Skyline Pl., 5203 Leesburg Pike, Suite 700, Falls Church VA 22041; 1305 Franklin St., Suite 210, Oakland, CA 94612.  
Seaworthy Electrical Systems, 17 Battery Pl. N.Y. N.Y. 10004  
George G. Sharp, Inc., 100 Church St., New York, NY 10007  
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

#### NAVIGATION & COMMUNICATIONS EQUIPMENT

Anschutz & Company, P.O. Box 3748, Teaneck, NJ 07666  
AT&T, High Seas Dept., 412 Kemble Ave., Room C380, Morristown, NJ 07960  
Comsat Maritime Services, 950 L'Enfant Plaza SW, Washington DC 20024  
Furuno U.S.A., 271 Harbor Way, S. San Francisco, CA 94080  
Henschel, Inc., 9 Hoyt Drive, Newburyport MA 01950  
Hose McCann, 9 Smith Street, Englewood, NJ 07631  
IDB AeroNautical Communications, 15245 Shady Grove Road, Rockville, MD 20850  
Kelvin Hughes Ltd., New North Rd., Hainault, Ilford, Essex IG6 2UR ENGLAND  
Kenwood USA Corp., Marine Products Div., 2201 E. Dominguez St., Long Beach, CA 90810  
Mackay Communications, 441 US Highway #1, P.O. Box 331, Elizabeth NJ 07207  
Marine Electric RFD, Inc., 50 Carol St., P.O. Box 1135, Clifton, NJ 07014-1135  
Mobile Telesystems, Inc., 300 Professional Drive, Gaithersburg, MD 20879  
Naval Electronics, 5417 Jetview Circle, Tampa FL 33634  
Norwegian Telecom, P.O. Box 6701, Oslo 1, NORWAY  
Novatech, 820 Cormorant St., Victoria, BC V8W 1R1, CANADA  
Robertson Marine Systems, 3000 Kingman Street, Suite 207, Metairie, LA 70006  
SPD Technologies, 13500 Roosevelt Blvd., Philadelphia, PA 19116  
Simrad, 19210 33rd Avenue West, Lynnwood, WA 98036  
Singapore Telecom, Orchard Point Post Office, P.O. Box 38, SINGAPORE 9123  
Sperry Marine Inc., 1070 Seneca Trail, Chantottesville VA 22901  
Standard Communications, P.O. Box 92151, Los Angeles, CA 90009  
Summer Equipment Ltd., 24 West 4th Ave., Vancouver V5Y 1G3, CANADA  
Trimble Navigation, 585 North Mary Avenue, P.O. Box 3642, Sunnyvale, CA 94086  
Waterway Communications System, Inc. 453 E. Park Pl., Jeffersonville, IN 47130

#### NOZZLES

Nautican Enterprises Ltd., 407 Mountain Highway, North Vancouver, B.C. V7J 2L1

#### OIL—Marine—Additives

Exxon Company International, 200 Park Ave., Bldg 222, Room A279, Florham Park, NJ 07932, P.O. Box 4706, Houston, TX 77210-4706  
Mobil Oil Corporation, 3225 Gallows Road, Fairfax, VA 22037-0001  
Shell Oil, P.O. Box 2463, Houston, TX 77252  
Texaco, International, 2000 Westchester Avenue, White Plains NY 10650

#### OIL/WATER SEPARATORS

AlfaLaval Separation, Inc., 955 Mearns Rd., Warminster, PA 18974-0556  
Centrico, Inc. (Westfala Separators), 100 Fairway Court, Northvale NJ 07647  
FAST Systems, Inc., 3240 N. Broadway, St. Louis, MO 63147  
NIMO International, 60 Inp Dr., Inwood NY 11696

#### PAINT—COATING—CORROSION CONTROL

Ameron, 201 N. Berry St., Brea, CA 92622  
Enviro Coatings, Inc., 4560 Belt Line Rd., Suite 300, Dallas, TX 75244  
Esgard, Inc., P.O. Drawer 2698, Lafayette, LA 70502  
Globaltech, 9801 Westheimer St., Ste. 202, Houston, TX 77042  
Jamestown Distributors, 28 Narragansett Ave., P.O. Box 348, Jamestown, RI 02635  
Hempel Coatings, Foot of Curie Avenue, Wallington, NJ 07057  
Melvin Pierce Marine Coating, Inc., P.O. Box 93, Semmes, AL 36575  
Microphor, Inc., Marine Division, 452 E. Hill Rd., P.O. Box 1460, Willets, CA 95490  
Sigma Coatings, 8979 Market St., Houston, TX 77029, 330 Rover Road, Harvey, LA 70059, 1100 Adams St., Hoboken, NJ 07030  
Unitor Ships Service, Unitor Marine Chemicals Division, 3 High St., Rickmansworth, Herts, WD3 1SW UNITED KINGDOM

#### PIPE FITTINGS/CONNECTING SYSTEMS

Aerocap Corporation, 3000 Strayer, P.O. Box 631, Maumee, OH 43537-0631  
Deutch Metal Components, 14800 S. Figueroa, Gardena, CA 90248  
Stanley G. Flagg Co., 1020 W. High St., Stowe, PA 19464  
Thaxton, Inc., 25 Leonburg Rd., Mars, PA 16406-8401

#### PORTR SERVICES

Port of Brea, P.O. Box 897, New Iberia LA 70561  
Port of Portland, 5555 N. Channel Ave., Portland, OR 97217

#### PROPULSION EQUIPMENT—Bowthrusters, Diesel Engines, Gears, Propellers, Shafts, Turbines

Avondale Industries, Harvey Quick Repair, P.O. Box 116, Harvey, LA 70058  
American Air Filter, P.O. Box 35690, Louisville, KY 40432  
ASEA Brown Boveri, 1460 Livingston Ave., North Brunswick NJ 08902  
ASEA Brown Boveri (Stromberg), P.O. Box 185, 00381 Helsinki, FINLAND  
Argo International, 140 Franklin Street, New York, NY 10013  
Aquamaster-Rauma Ltd., Box 220, SF-26101, Rauma, FINLAND  
Bergen Diesel A/S, P.O. Box 924, N-5002, Bergen, NORWAY  
Bird Johnson Company, 110 Norfolk St., Walpole, MA 02081  
CWF Hamilton & Co., Ltd., P.O. Box 709, Christchurch, NEW ZEALAND  
Caterpillar, 100 NE Adams Street, Peoria, IL 61629-2320  
Cincinnati Gear Co., 5657 Wooster Pike, Cincinnati, OH 45227  
Concals Industries (Fairbanks Morse Engine Div.), 701 Lawton Avenue, Beloit, WI 53511  
Cummins Engine Company, Mail Code 60011, Box 3005, Columbus, IN 47202-3005  
Electro-Motive Division of GM, 9301 W 59th St., LaGrange, IL 60525  
Fincantieri, Diesel Engines Division—GMT, Bagnoli della Rosandra 334, Trieste, ITALY  
GE Marine & Industrial, 1 Neumann Way N-158, Cincinnati OH 45215  
GE Naval & Drive Turbine Systems, 166 Boulder Dr., Fitchburg MA 01420  
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241  
Krapp MaK, 7555 Danbro Crescent, Mississauga, Ontario, CANADA L5N 6P9

Mapeco Products Inc., P.O. Box 6, 725 Glen Cove Ave., Glen Head NY 11545  
Marine Gears, Inc., P.O. Box 689, Greenville MS 38707  
Marine Systems Inc., 2032 Atlantic Ave., Chesapeake VA 23324  
Markisches Werk, P.O. Box 1442, D-5884 Halver GERMANY  
MAN B&W Diesel, 17 State St., New York, NY 10004  
MAN B&W Diesel A/S, Ostervej 2, DK-4960 Høylej, DENMARK  
MAN B&W Diesel A/S, Alpha Diesel, Niels Juel Vej 15, DK-9900 Frederikshavn DENMARK  
MAN B&W Diesel GmbH, Stadtachtrasse 1, D-8900 Augsburg 1 GERMANY  
MKW Power Systems, 301 S. Church St., Rocky Mount, NC 27801  
MTK Magnetek Inc., 11150 Santa Monica Blvd., Los Angeles CA 90025  
New Sulzer Diesel Ltd., CH8401, Winterthur, SWITZERLAND  
Northwest Marine Services Corp., 6452 So. 144th St., Tukwila WA 98168  
Nylands Marine Service A/S, P.O. Box 130, N-4818 Faerik, NORWAY  
Omnitruster Inc., 9515 Sorenson Ave., P.O. Box 2144, Santa Fe Springs, CA 90670  
Ovako Steel Couplings AB Sweden, S813 00 Høtors SWEDEN  
Propulsion Systems, 1441 N Northlake Way, Seattle WA 98103  
Rolla SP Propellers SA, Via Silva 5, P.O. Box 251, 6828 Balerna SWITZERLAND  
Rolla SP Propellers USA, 4030 Mustang Road, Melbourne, FL 32934, USA  
Karl Senner Inc., 25 W Third, Kenner LA 70062  
Schottel-Werft, D-5401 Spay, GERMANY  
Stewart & Stevenson, 1400 Destrehan, P.O. Box 8, Harvey LA 70059-0008  
Sulzer/Escher Wyss, Ravensburg GERMANY  
Textron Lycoming, 450 Main St., Stratford, CT 06497  
Ulstein International, A/S, N-6065 Ulsteinvik, NORWAY  
J. M. Voith GmbH, Marine Division, Postfach 1940, D-7920, Heidenheim/Brenz, GERMANY U.S. Rep: Voith Schneider America Inc., 121 Susquehanna Ave., Great Neck, NY 11021  
Oy Wartsila Ab, Vasa and Absa Divisions, P.O. Box 244, SF-65100 Vasa, FINLAND  
Oy Wartsila, Stork Division, P.O. Box 244, SF-65100 Vasa, FINLAND  
Westech Gear Corp., 2600 E. Imperial Highway, Lynwood, CA 90262  
ZF of North America, Marine Sales, 500 Barclay Blvd., Lincolnshire IL 60069

#### PROTECTIVE WRAPS

FAM (Fam Applicators of North America), 1260 E Woodland Ave., Springfield PA 19064

#### PUMP—Repair—Drives

Coffin Turbo Pump, Inc., 326 S. Dean Street, Englewood, NJ 07631  
Del Gaudio, 619 Industrial Rd., Carlstadt, NJ 07072  
Gossen Marine Company Inc., 160 Van Brunt Street, Brooklyn, NY 11231  
Hulter Marine, Lario Division, 1713 S McKenzie St., Foley AL 36535  
Jim's Pump Repair, 48-55 36th St., Long Island City NY 11101  
Leistritz Corporation, 165 Chestnut Street, Allendale, NJ 97401  
Megator Corporation, 562 Alpha Drive, Pittsburgh, PA 15238  
Vita Motivator, 99 W Hawthorne Ave., Suite 622, Valley Stream NY 11580  
Widpen Pump & Engineering Co., 22069 Van Buren St., P.O. Box 845, Colton, CA 92324

#### REMOTE VALVE OPERATORS

S. S. White Technologies, Inc., 151 Old New Brunswick Rd., Piscataway, NJ 08854  
Teleflex, Inc., 771 First Ave., King of Prussia, PA 19406

#### ROPE—Manila—Nylon—Hawsers—Fibers

Allied Signal Inc., Fibers Division, 1411 Broadway, New York, NY 10018  
Columbian Rope Corp., P.O. Box 270, Guntown, MS 38849  
DuPont, Montgomery 403, 1011 Centre Road, Wilmington, DE 19805

#### SANITATION DEVICE—Pollution Control

Jered Brown Brothers, 56 South Squirrel Rd., Auburn Hills, MI 48326  
Byrne, Rice & Turner, Inc., 1172 Camp Street, New Orleans, LA 70130  
Envirovac Inc., 1260 Turret Dr., Rockford, IL 61111  
FAST Systems, Inc., 3240 N. Broadway, St. Louis MO 63147  
Microphor, Inc., 452 E. Hill Rd., P.O. Box 1460, Willets, CA 95490  
Novatech, 820 Cormorant St., Victoria BC V8W 1R1, CANADA  
Red Fox Environmental Services, Inc., P.O. Box 53809, Lafayette, LA 70505-3809  
Research Products/Blankenship (Pincinet), 2639 Arndon, Dallas, TX 75220

#### SCALE MODELS

Scalestest Ray Model Shop, 187 N Ninth Ave., Sturgeon Bay WI 54235

#### SCUTTLES/MANHOLE

L.S. Baier & Assoc., 7527 NE 33rd Dr., Portland OR 97211

#### SHIPBUILDING EQUIPMENT

MAN—GHH, Sterkrade Werfstrabe 112 D-4100 Duisburg 18, GERMANY  
MAN—GHH, P.O. Box 110240, D-4200 Oberhausen 11, GERMANY  
NEI Sincrofil, Inc., 4970 S W 87th Ct., Miami FL 33176  
Offshore Industries, Inc., 144 Railroad Ave., Suite 206, Edmonds WA 98020

#### SHIPBUILDING—Repairs, Maintenance, Drydocking

Atilleros Espanoles S.A., Padilla 17, 28006 Madrid, SPAIN  
Atlantic Marine, Inc., 8500 Hecksher Dr., Jacksonville, FL 32226  
Avondale Industries Inc., P.O. Box 50280, New Orleans LA 70150  
Bender Shipbuilding & Repair, P.O. Box 42, Mobile AL 36601  
Bethlehem Steel, Martin Tower, Bethlehem PA 18106  
Bethlehem Steel, Baltimore Marine Div., Sparrows Point Yard, Sparrows Point MD 21219  
Blount Marine, Box 368, Warren RI 02885  
Bollinger Lockport & Laroze, P.O. Box 250, Lockport LA 70374-0250  
Chris-Marine AB, P.O. Box 9025, S-2000 39, Malmö, SWEDEN  
Conrad Industries, 1501 Front Street, P.O. Box 790, Morgan City, LA 70381  
Curacao Drydock (USA), Inc., P.O. Box 3012, Curacao, Netherlands Antilles  
Equitable Shipyards Inc., Trinity Marine Group, Box 29266, New Orleans LA 70189  
Fincantieri SpA Cantieri Navali Italiani, Via Cipro 11, 16129 Genoa ITALY  
Freeport Shipbuilding, P.O. Box 417, Freeport, FL 32439  
Galveston Shipbuilding, 6800 Port Industrial Boulevard, P.O. Box 2660, Galveston, TX 77553  
Gulf Craft, Inc., 3904 Highway 182, Patterson, LA 70392  
Halter International, 7412 Lakeshore Drive, New Orleans, LA 70124  
Hitachi Zosen, Hitachi Shipbuilding & Engineering Co., 1-1-1 Hkotsubashi, Chiyodaku Tokyo 100, JAPAN  
Houston Ship Repair, 1621 Woods Dr., P.O. Box 489, Channelview, TX 77530  
InPlace Machining Co., 1929 N. Butlum Street, Milwaukee, WI 53212-3793  
Jacksonville, Shipyards, 750 E. Bay St., Jacksonville, FL 32202  
Jeffboat, Inc., P.O. Box 610, Jeffersonville IN 47130  
Kvaerner Fjellstrand, N-5532 Ornastrand, NORWAY  
Lindena Werft, Postfach 9060, D-2300 Kiel-Friedrichsort, GERMANY  
Lisnave, Apartado 2138, 1103 Lisbon, Codex PORTUGAL  
MAN GHH Sterkrade, P.O.B. 110240, D-4200 Oberhausen 11, GERMANY  
Mil. Dave, Inc., P.O. Box 130, Lewis, Quebec, CANADA  
Marco, Inc., 2300 W Commodore Way, Seattle, WA 98199  
T. Marotti, Calata Chioarella, 16126 Genoa (Port) ITALY  
Munson Manufacturing, 150 Dayton, Edmonds WA 98020  
Newport News Shipbuilding, 4101 Washington Ave., Newport News, VA 23607  
New York Shipyard Corp., One Beard St., Brooklyn NY 11231  
Norconsult Engineering Co., Inc., P.O. Box 529, 5785 Plantation Rd., Theodore, AL 36582

Protecno, Ltd., Rua Eugenio Castro, 13A/r/c, 2800 Almada, PORTUGAL, U.S. Rep: Walter Thorsen, Inc., 79 Oweno Rd., P.O. Box 755, Mahwah, NJ 07430-0755  
Quality Shipyards, Inc. (Zapata), 3201 Earhart Dr., P.O. Box 1817, Houma, LA 70361  
Thomas Marine, 37 Bransford Street, Patchogue, NY 11772  
SeaArk, P.O. Box 210, Monticello AR 71655  
Service Marine Industries, P.O. Box 3606, Morgan City LA 70381  
Skipperliner Shipyards, 621 Park Plaza Dr. Dept 21, LaCrosse WI 54601  
Steiner Shipyard, Inc., P.O. Box 742, Bayou la Batre, AL 36509  
Swath Ocean, 979 G Street, Chula Vista, CA 92011  
3 Mai Associates Shipbuilding Industry, P.O. Box 117, 51001 Rjeika YUGOSLAVIA  
Textron Marine Systems, 6600 Plaza Drive, New Orleans, LA 70127-2584  
Trinity Marine Group, Box 3029, Gulfport, MS 39055-3029  
Union Dry Dock & Repair, P.O. Box M1539, Hoboken, NJ 07030  
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 21166

#### SIMULATOR TRAINING

Houston Marine Training Services, 1600 20th Street, Kenner, LA 70062  
Marine Safety International, Marine Air Terminal, LaGuardia Airport, NY 11371

#### SILENCERS

Beard Industries Inc., P.O. Box 31115, Shreveport LA 71130

#### SMOKE CURTAINS

HMS Marine Hardware, 333 W. Merrick Road, Valley Stream, NY 11580

#### STABILIZERS

Naia Stabilizers, Van Dusen & Meyer Inc., P.O. Box 558, Shelton, CT 06484

#### STAINLESS PLATE

Eastern Stainless Division, Cyclops Corporation, P.O. Box 1975, Baltimore MD 21203

#### STUFFING BOXES

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

#### SURVIVAL EQUIPMENT

Schat Watercraft, P.O. Box 465, Ft. Industrial Rd., Farmingdale NY 07727  
Stearns Manufacturing, P.O. Box 1498, St. Cloud MN 56302  
Viking Life Saving Equipment, 1625 N Miami Ave., Miami FL 33136

#### TANK CLEANING

Houston Ship Repair, 1621 Woods Dr., P.O. Box 489, Channelview, TX 77530

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IMO Industries, Gems Sensors Division, One Cowles Rd, Plainville CT 06062  
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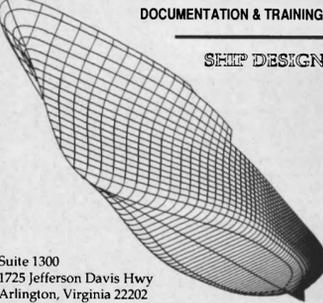
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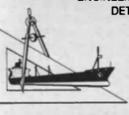
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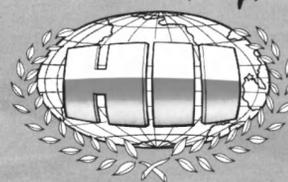
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