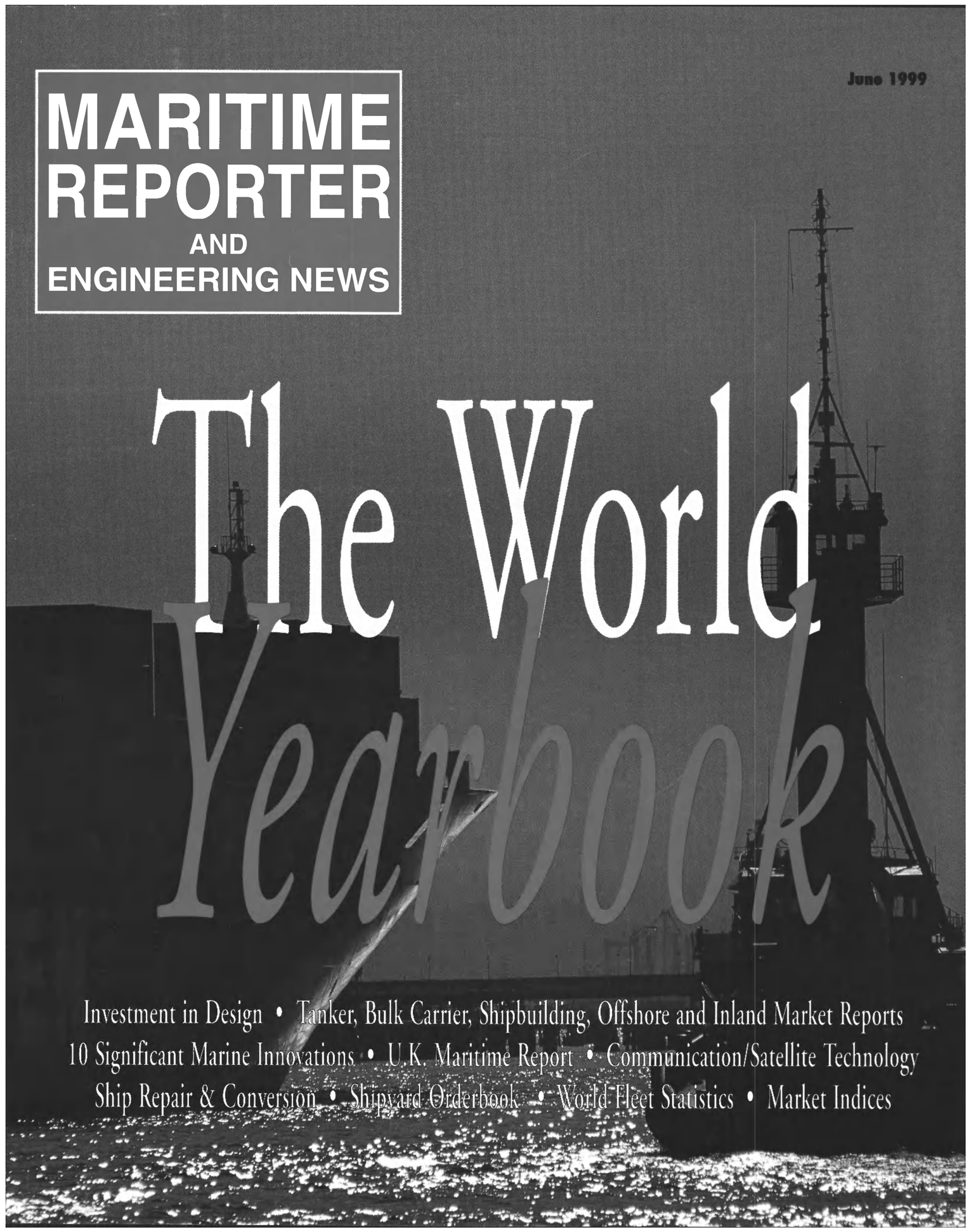
June 1999

MARITIME REPORTER
AND
ENGINEERING NEWS

The World Yearbook



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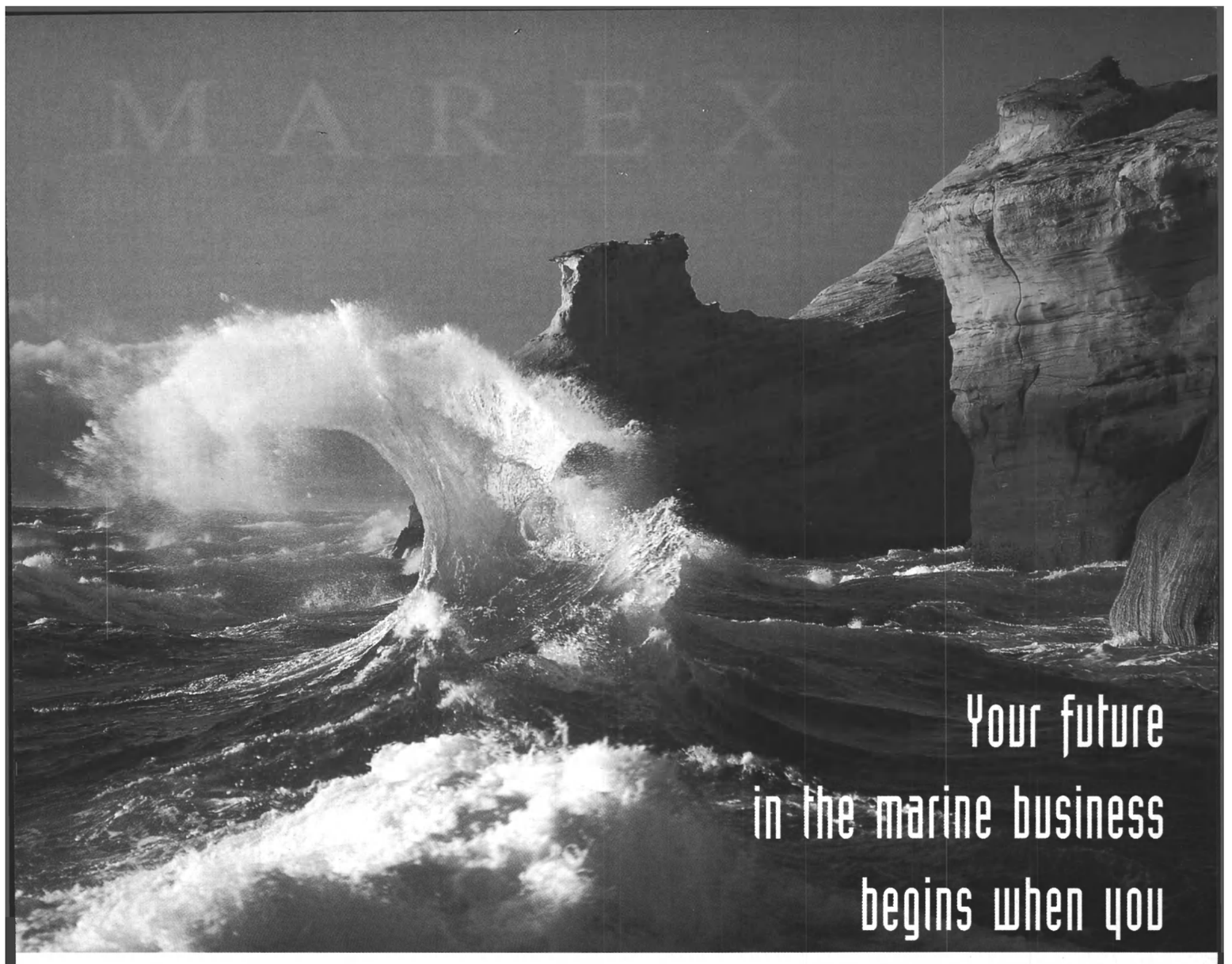

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The Yearbook

Market Reports

87 Luther's Way

Starting with the Rhodoyster in 1949, Luther Blount has served the maritime market with a unique sense of design and entrepreneurship that has left the man — some 50 years and 300 vessels later — a proven success and still driven.

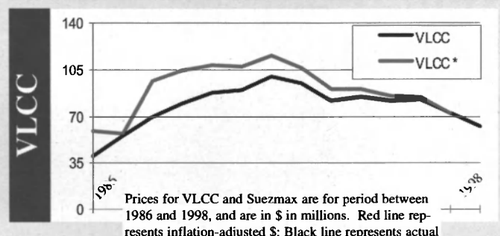
— by Regina P. Ciardiello

By The Numbers

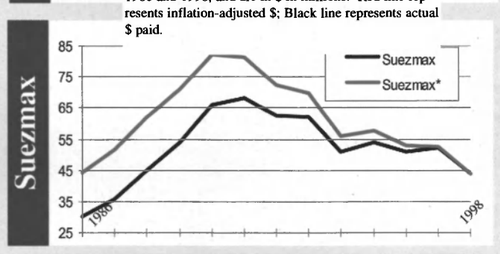
A host of unnatural market forces, including subsidies and the proliferation of a myriad of political agendas, have conspired to keep ship prices artificially low, according to shipbuilders. These claims seem to have merit, given a survey of select shipbuilders and some number crunching by the MR/EN staff. For example, the price of VLCC and Suezmax sized tankers has hardly advanced as one might expect, particularly when the numbers are adjusted to account for inflation. To make the comparisons more interesting, we have noted the price advances of a host of consumer products, from a loaf of bread to a Ferrari. Please note, however, that different timelines are utilized in several cases, due to information available.

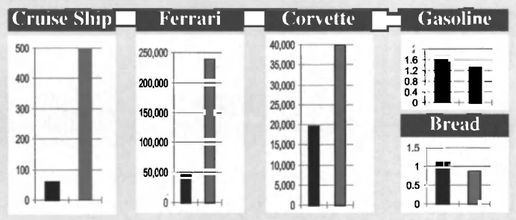
The Results
Price comparison of ships and goods, using inflation adjusted pricing.

Song of Norway (1969) v. Voyager of the Seas(1999):	Increase: 734%
1974 Ferrari v. 1999 Ferrari:	Increase 420%
1974 Corvette v. 1999 Corvette:	Increase 102%
VLCC Tanker 1986 v. VLCC Tanker 1998:	Increase 22%
Gallon of Gas (1974 v. 1999) (New York area):	Decrease 23%
Pound of White Bread (1974 v. 1999):	Decrease 21%
Suezmax Tanker 1986 v. Suezmax Tanker 1998:	Decrease 1.2%



Prices for VLCC and Suezmax are for period between 1986 and 1998, and are in $ in millions. Red line represents inflation-adjusted $; Black line represents actual $ paid.





In1969, Royal Caribbean payed $13.5 million for Song of Norway, v. $500 million for Voyager of the Seas, which is currently under construction in Finland.

1974 price was $14,000 ($46,200 in today's dollars), and was an 8-cylinder engine; versus $240,000 for a 12-cylinder model in 1999. (Source: Original Ferrari literature)

1974 price was $6,000 ($19,800 in today's dollars); versus $40,000 in 1999. Increase: 102%

The prices of both gasoline and bread, in inflation-adjusted $, has actually dropped. Gas: from $1.75 in 1974 to $1.35 in 1999; Bread from $1.12 to $.88.

ABOUT THE COVER:
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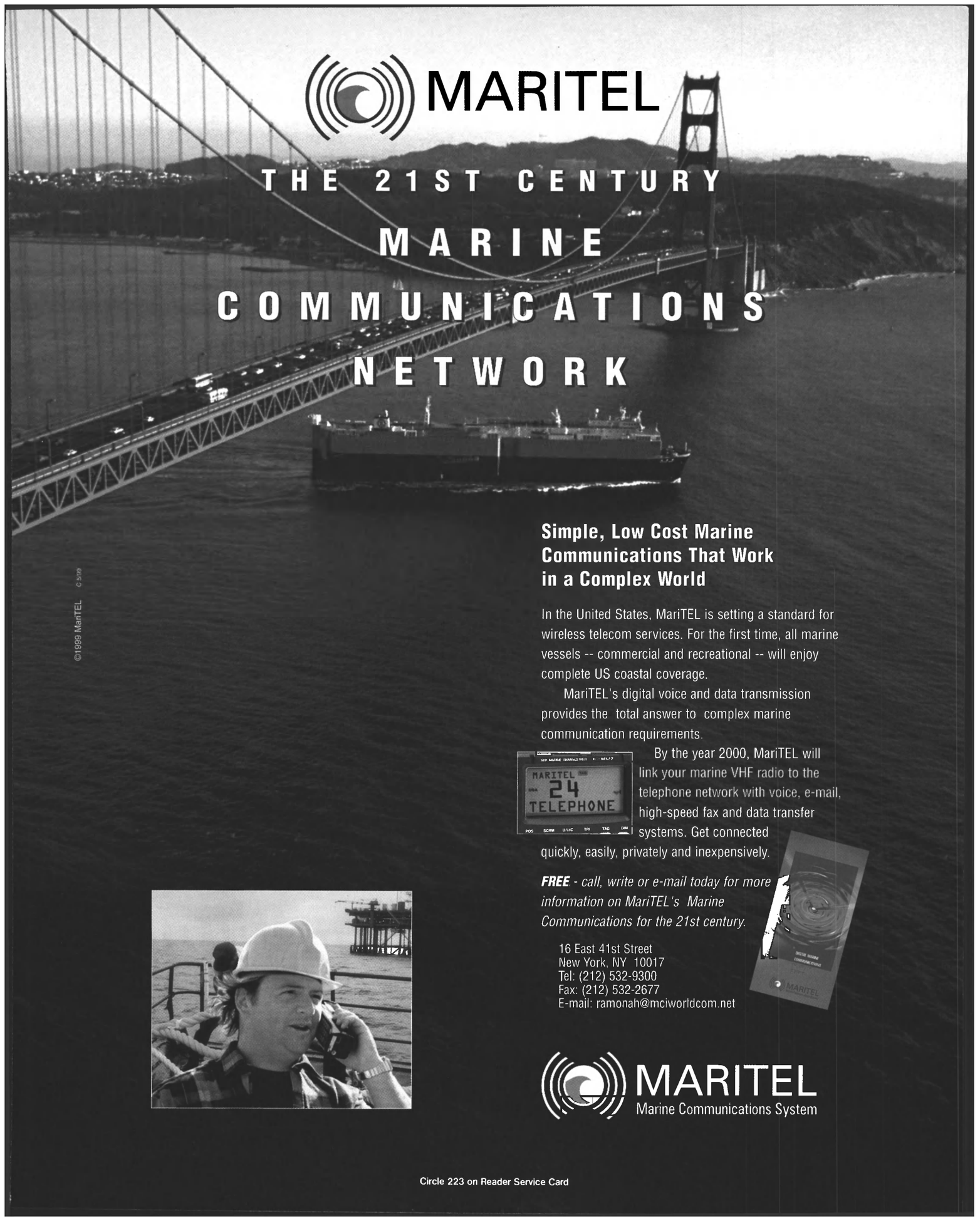
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EDITOR'S NOTE

The June Yearbook edition once again provides insights into events during the past year, while attempting to shed some light on trends and events currently unfolding. The high volume of information included in this one edition mandates that it be compiled seemingly with blinders on, with the market's trends crystallizing upon final layout. Upon giving the *Market Reports* section (starting page 22) a final read, it quickly became apparent to me that any industry neophytes giving *Maritime Reporter* a first look this month might consider changing industries ... fast. One of the world's worst kept secrets is that the maritime market endures a variety of volatile cycles, varying in severity and degree. The degree to which companies — shipowners, shipbuilders and equipment suppliers — successfully navigate the peaks and valleys largely depends on experience, quality of management, quality of products/services and preparedness.

It is also no secret that the year past was tough for the maritime industry. Since late 1997, when the Asian financial crisis threw a twist into many world markets and conspired to dampen oil demand and drive pricing to 20 year lows, shipping, shipbuilding and offshore markets have collectively endured one of the harshest stretches in recent memory. But the cyclical nature of the business means that what goes down must come up, and in the meantime, attractive buying opportunities abound.

A true beauty of the maritime industry is the mere fact that it is irreplaceable. No matter how fast computers get or how efficient information flow becomes, the need will always exist to transport large quantities of products from point A to point B, and, quite frankly, there is no more safe or cost-efficient means to do so than on the world's waterways.

The industry is undoubtedly undergoing massive restructuring, as companies in shipbuilding, shipowning and equipment supply today are fewer, but larger. Competing in the world market requires a company with deep pockets, vast resources and broad based expertise.

Competing in today's fast-changing environment also requires a constant evaluation of practices and technology. Technology has, and will, continue to have profound impacts on the way in which maritime business is conducted, both shoreside and onboard vessels. While the industry is often portrayed as conservative and slow to incorporate change, the level at which vessel owners are incorporating the latest in navigation and communication electronics, for example, is astounding. Some of the year's more notable marine innovations are highlighted in a special "10 Significant Marine Innovations" section, starting on page 54.

The Maritime Group — publishers of *Maritime Reporter & Engineering News, Marine News, Maritime Week*, and www.marinelink.com — are committed to advancing industry issues through the publication of concise, timely and interesting material. As always, I welcome comments on ways in which I and the entire editorial staff can work to serve all of your informational needs.

Gregory R. Trauthwein

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Diesel Power Annual • **Cruise Industry Report** • Safety Products Review • **CAD/CAM Systems** • SatCom Suppliers • **Deck Machinery & Cargo Handling Equip.**

August
U.S. Ship & Boatbuilding Annual • Software Solutions • **Fast Ferry Technology** • Engine Performance Equipment • **Country Focus: Germany**

September
SNAME Annual • **Marine Propulsion Technology** • Ship Maintenance/Safety Products • **Information Technology**

October
60th ANNIVERSARY EDITION • SatCom Innovations • **Vessel Overhaul & Maintenance** • Regional Focus: U.S. East Coast • **Country Focus: Sweden**

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Investment in Design

by David Tinsley,
technical editor

The cost of building for the future

A concurrence of major elements of expenditure took its toll on last year's financial results at Lloyd's Register. In the face of intensifying competition and difficult economic conditions, the very fact that the classification society continued to make heavy investments for the long-term future had a pronounced impact on the bottom line.

Research and development (R&D) endeavors were sustained, while an astonishing total of $19 million committed to staff training during 1998 reflected the earnestness of LR's Customer First training initiative, seen as essential to cultivating improved contact and faster, more efficient response to clients.

Headquarters reorganization and a policy aimed at creating greater regional focus, all part of the business-building strategy of getting closer to the customers, have imposed non-recurring costs. Interwoven with the R&D program, the process of mechanization has seen the society invest $32.4 million per annum over the past three years in information technology (IT) hardware and software.

"As well as now incorporating a number of our specialist software tools, including ClassDirect and Rulefinder, SSRS has been enhanced to allow reporting from International Safety Management (ISM) Code surveys."

— Willem de Jong

While total income was little more than one percent down at some $501 million, the big investment in outgoings coupled with the influence of price competition on newbuildings and the strength of sterling resulted in the preceding year's operating surplus of $11.2 million being turned into a deficit of $8.7 million for 1998. Net investment income ensured that LR stayed in the black overall.

The effectiveness of the Change Management Program, which draws together the various strands of the reorganizational and more customer-attuned strategy, will be pivotal to the restoration of operating results, as will the various investments in working systems.

A society wishing to retain market clout cannot afford to relax its R&D efforts, so as to meet the client industries' unerring expectations as to technological standing and capabilities. The scale of input required in this respect certainly brings into question the ability

(Continued on page 13)

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OSE on Steady Course after Rough '98

A surge in stock prices in the second half of December last year did not prevent 1998 from being the poorest of the last 16 years of the OSE All Share Index. The all-share index fell 26.7 per cent in 1998 after five consecutive years of rising share values. The OSE shipping index (which includes offshore shares) fared even worse. It plummeted 45.5 per cent after a solid gain of nearly 40 per cent in 1997.

For the Oslo Stock Exchange the financial crisis in Asia and the oil price had a disproportionate influence on the indices. It has a larger proportion of oil-related and shipping shares than the average European stock market to explain this phenomenon. Generally all shares suffered from other adverse factors such as rising interest rates and a falling krone.

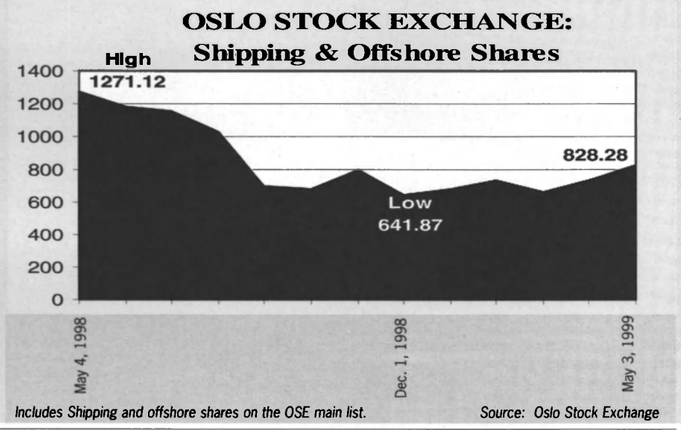
A look at the maritime sectors on other stock exchanges around the world shows that the performance of shipping shares elsewhere has not fared any better than those listed in Oslo. However, the high proportion of maritime or oil-related companies listed in Oslo, meant the OSE was hit particularly hard.

Are there any signs of recovery? Yes there are. From being one of the weakest performing European stock exchanges in 1998, the OSE so far in 1999 have turned into the second best performing stock exchange in Europe, behind Helsinki.

At the end of the first tertial this year many of the "fundamentals" seem to be back. The oil price is at USD 15; interest rates are down about 1.5 percentage points; and the krone has strengthened. The market has responded: shipping and offshore shares by + 25 per cent at the end of April; compared with + 21 per cent for the total market. Shipping shares like Bona Shipholding, Stolt Nielsen, Jinhui, Ganger Rolf, I.M. Skaugen and Odfjell, and offshore shares like Stolt Comex Seaway and Smedvig have increased their value by more than 60% so far this year.

Leaving the current market situation, I would like to focus on other fundamentals which remain unchanged despite the recent period of turbulence.

First, attracting listings from the shipping and offshore industries is still a declared priority for the OSE. This pri-



Includes Shipping and offshore shares on the OSE main list. *Source: Oslo Stock Exchange*

ority is logical given the importance of the shipping and offshore sector to the OSE and to the Norwegian economy. Secondly, the Oslo market remains a unique and attractive one for international shipping and offshore companies thanks to the expertise of the entire market environment: Oslo is alive with a community of skilled professionals ranging from investors to analysts, stockbrokers to shipbrokers, bankers to lawyers, insurance companies to ship lending institutions, shipyards to the Norwegian International Ship Registry (NIS) and even the class society Det Norske Veritas.

Oslo's many analysts and stockbrokers are very knowledgeable about the specialist maritime areas and are world renowned for this. Many brokerage firms have their own specialist shipping, cruise or offshore analysts.

The commitment to the maritime by the various participants in the financial market in Oslo was proven when the OSE, together with the Norwegian Society of Financial Analysts (NFF), arranged a one-day Tanker Market Conference in Oslo in March this year. The conference was very well attended by more than 150 analysts, investors, shipowners, bankers, journalists and others. For the Oslo Stock Exchange, playing a role in such arrangements, promoting a higher level of knowledge about OSE listed and other maritime companies, is a natural consequence of our maritime strength and priority. Moreover, at the OSE we interpret the stock exchange's role as a meeting point between companies on one side and investors on the other, to include something more than providing access to an electronic equity trading system alone.

By utilizing proactive efforts, our aim is to continuously improve the quality and liquidity of the Oslo stock market and so increasingly attract and retain companies, investors and investment banks to the market.

Another maritime product of this thinking is the Ship Finance Forum Oslo, which will take place for the first time in June this year. The Forum has been created to provide an unbiased platform for shipowners, operators, investors and financiers to discuss the most dramatic trends and issues effecting the ship finance industry. A further idea behind the Forum is to place an international focus on the unique shipping and shipping-finance infrastructure that exists in Oslo. This year's Forum will concentrate on the availability of capital and the aim in this context is to assist owners to match the right financing source with the right project.

Set against this background, at the threshold of the new millennium, the OSE is set to play an active role in the future in the Norwegian capital market in general, and the maritime sectors in particular. The technical foundations are in place with the new state-of-the-art Equity Trading System successfully introduced in February this year. The new trading system has increased market transparency and made remote memberships possible. In addition, the OSE is currently preparing to offer multi-currency trading to customers in the near future. At the OSE the emphasis on customer needs — both investors and issuers — continues to be a driving force and will lead the way in to the new millennium.

By Oddleif Hatlem, Marketing Manager, Oslo Stock Exchange

Investment in Design

(Continued from page 8)

LR's Willem de Jong

of smaller classification societies to maintain a viable market position in the future.

LR has a solid basis from which to go forward. The marine division retained its world-leading market share of classed tonnage in 1998, with an entered fleet of 104 million-gt representing 20 percent of the global fleet.

Completions to class were of a corresponding percentage, while class responsibilities were secured for 23.4 percent of all orders placed in South Korea. Its share of newbuild contracts placed in the European Union spiraled to one-third, and the level of work intake was all the more notable for the fact that LR did not have the advantage of a significant home market, as is the case with most of its competitors.

Past years' investment in fostering diversification have also been vindicated by the strong business development of the industry division, which generated an income level equivalent to that yielded by marine activities in 1998. R&D and other future-oriented initiatives are driven by market factors and by a need to continually raise efficiency and maintain an edge in a field where levels of technology and service are competitive criteria. LR chairman, Patrick O'Ferrall said, "We are streamlining our headquarters operations and, while IT will be a key element in achieving this, we are also implementing a more customer-focused approach."

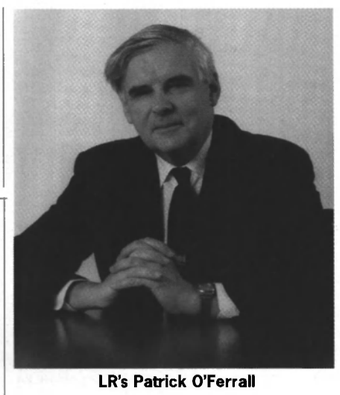
"We have undertaken a program of market research, in which we have listened carefully to the views of our customers. Through this, we will identify their needs and develop solutions to provide added value in their businesses, across all market sectors with which we are involved. Meeting the needs of customers in a cost effective and professional manner, wherever they are in the world, is the foundation on which LR's future success will be built," observed O'Ferrall. Willem de Jong, Dutch-born managing director of LR's marine division confirmed that "A radical reorganization of the structure of the division, together with relocation to new headquarters building at 71 Fenchurch Street, London, will provide each customer with a single point of contact and faster response times." As part of the process of better responding to both project and lifetime needs, he intends to create distinct departments for generic types, to better serve the differing requirements of, for instance, container vessels, tankers and passenger ships.

Improved communication through regional centers, together with investment in office and ship-based technology, is enabling the society to become more focused on the safety, business and environmental needs of its customers.

Investment in Design

Central to this was the roll-out of the new Ship Survey Reporting System (SSRS), which went live in over 150 LR offices and 44 countries. SSRS uses a laptop package with a direct link to HQ to enable surveyors around the world to send and receive survey information swiftly and accurately.

"As well as now incorporating a number of our specialist software tools, including ClassDirect and Rulefinder, SSRS has been enhanced to allow reporting from International Safety Management (ISM) Code surveys," added de Jong. SSRS is the culmination of a $37.3 million, three-year development to enhance survey reporting and provide surveyors with electronic tools and IT back-up. It is a prime example of the policy of improving internal efficiency and practices by technological means.



LR's Patrick O'Ferrall

Last year saw the development of new rules covering the redundancy of ship steering and propulsion, environmental protection, and passenger and crew accommodation comfort.

De Jong regards a sustained R&D drive as inextricably linked with the society's policy of improved contact with customer shipowners and shipbuilders and other customers.

He considers that the heightening of competition and innovation within the industry, coupled with the increasing complexity of many types of newbuild will necessitate undiminished efforts in research on the part of the society.

The first-line safety remit was expressed in new initiatives including the introduction of new rules for existing bulkers of 492 ft. (150 m) and more in length.

It was also reflected in the society's assistance with the preparation of cost-effective upgrading schemes addressing retrospective structural evaluation of the foremost hold structure of bulkers under flooding conditions.

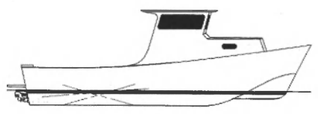
Its proactive approach to the business is also reflected in the society's innovative research into ways of accurately measuring cargo in bulker holds so as to better guard against stress and operational limits being exceeded.

The study, based on the development of a laser profile measurement technique, reflects the link between cargo loading practice and long-term hull integrity and bulker safety. A prototype is currently being laboratory-tested and full-scale ship trials will follow later this year.

In fact, LR is exploring the use of lasers to detect and analyze sub-surface defects of both marine and civil structures.

The subject of development in conjunction with Loughborough University in the U.K., the technique is known as Electronic Speckle Pattern Interferometry (ESPI).

Art Anderson Associates Designs Charter Fishing Vessel



Art Anderson Associates is designing a 36 ft. (11 m) Stolkraft fishing boat for use in Cuttyhunk, Maine. The Stolkraft hull form has been used in a variety of high-speed ferries, water taxis and workboats around the world. The vessel will be powered by twin Cummins 370 hp marine diesel engines, with Kodiak waterjets providing a service speed of 35 knots.

Circle 48 on Reader Service Card

ADI Launches Third Of Six Minehunters On Schedule

ADI Ltd. celebrated its 10th birthday with the launch of Norman, the third of the six Huon Class minehunters it is building at Newcastle, for the Royal Australian Navy. ADI, prime contractor of the $1 billion project, has already started working on the fourth and fifth ships, Gascoyne and Diamantina. The first Huon class ship, Huon, was delivered on schedule to the Australian navy in March, the second of the class, Hawkesbury has already begun sea trials and the last of the series, Yarra will hold its keel laying in June.

MES Delivers VLCC Takase To NT Maritima S.A.

Mitsui Engineering & Shipbuilding Co. Ltd. (MES) recently completed construction of a 25,000-dwt. VLCC, Takase, at its Chiba Works and delivered the ship to the owner NT Maritima S.A. of Panama.

The vessel, boasting 17 cargo tanks and 10 ballast tanks, is the second double-hull VLCC built by MES adopting advanced technology for both energy and labor saving.

The cargo tanks can load three types of crude oil simultaneously, and three cargo oil pumps facilitate cargo oil handling for each type. For safety assurance, flammable gas indicators are installed in the ballast tanks and the pump room.

Main Particulars

Classification	NK
Length, o.a.	1,043 ft. (318 m)
Breadth	197 ft. (60 m)
Depth	99 ft. (30.3 m)
Draft	61 ft. (18.8 m)
DWT	258,096
GT	160,220
Tank capacity	340,025 cu./m
Main engine	Mistui-MAN B&W
MCR	34,850 rps x 70 rpm
Complement	30

Chip Carrier Hokuetsu Endeavor Completed By Hitachi

Hitachi Zosen Corp. has built the 52,820-dwt chip carrier, Hokuetsu Endeavor, at the Maizuru Works for Milos Maritima S.A. of Panama. The ship has the Panamax size breadth with a ship length of over 656 ft. (200 m). The vessel features the Hitachi Zosen-MAN B&W 7S50MC (MKII) type diesel engine with low fuel consumption, and the Hitachi Zosen Super Stream Duct, which is equipped at the stern to increase propulsion efficiency.

Main Particulars

Classification	NK
Length, o.a.	689 ft. (210 m)
Breadth	106 ft. (32.2 m)
Depth	75 ft. (22.9 m)
Draft	37 ft. (11.2 m)
DWT	52,820 tons
GT	43,954 tons
Maine engine	Hitachi-Zosen -MAN B&W
Speed	15.7 knots

IHI Completes Capesize Bulker Shinrei

Ishikawajima-Harima Heavy Industries Co. Ltd. (IHI) has completed construction of the 170,974-dwt bulk carrier, Shinrei, for Cabot Maritime S.A., an affiliate of Shinwa Kaiun Kaisha Ltd. at the Kure Shipyard. With a capacity of 170,000-dwt, the Dunkirkmax Capezise classified vessel has flexibility for entry into various ports worldwide.

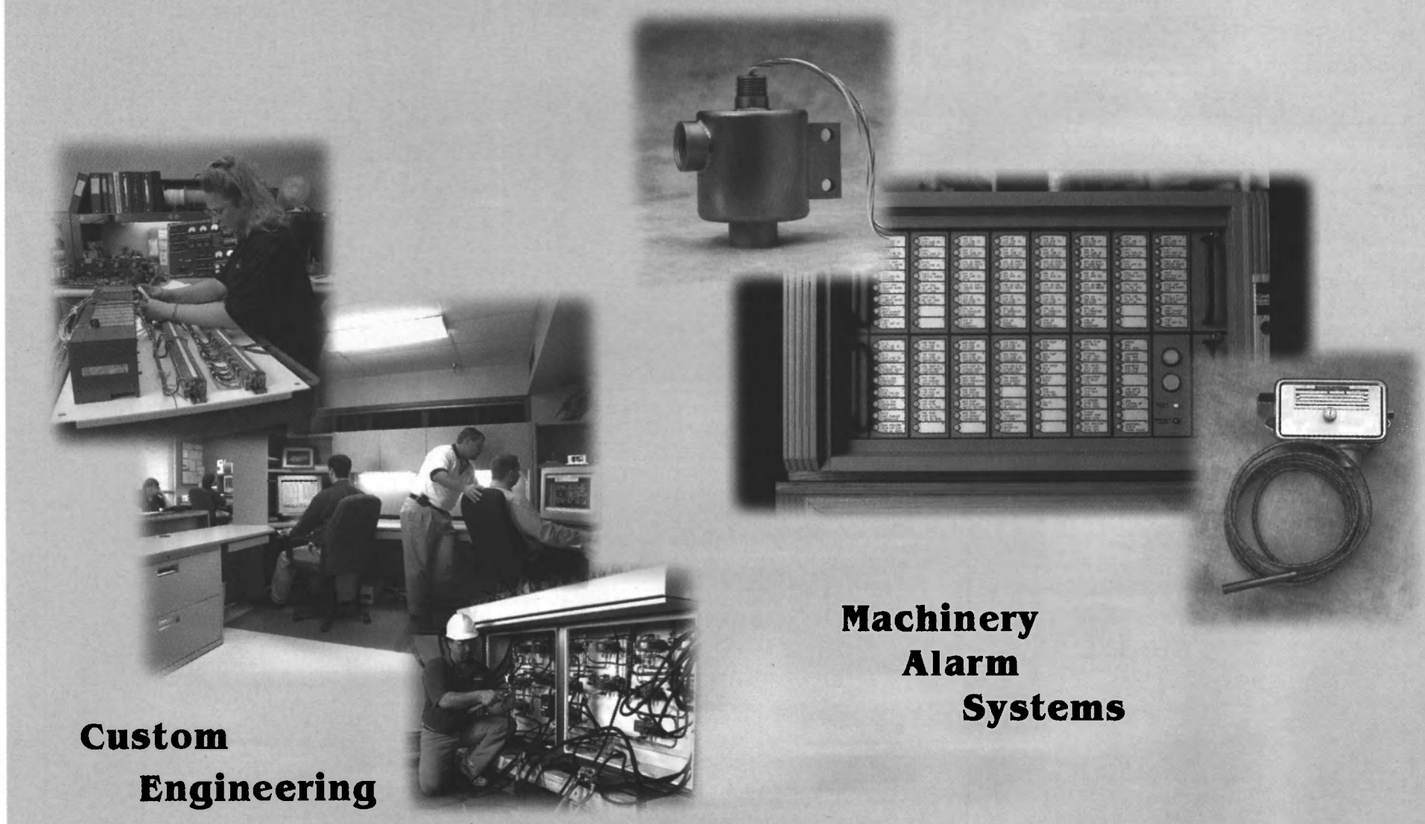
Control General

Marine Controls

Control General is an original equipment manufacturer of high quality, marine electronic and electro-hydraulic control systems.

Control General has an engineering staff experienced in designing custom steering, alarm, & control systems. Other product lines include but are not limited to control consoles and instrumentation, general alarm systems, cargo automation, engine order telegraphs, sound powered telephones, shaft tachometer systems, navigation light panels, fire detection systems, SCR System Interface, winch & davit controls and custom instrumentation.

Control General can provide practically any custom designed and manufactured electronic or electro-hydraulic marine control system. Just ask - chances are we've done it before.



Custom Engineering & Manufacturing

Machinery Alarm Systems

Austal Delivers Patrol Boats

Austal Ships has delivered the first of its eight member Bay Class Patrol Boats. Measuring 115 ft. (35 m), Roebuck Bay is ready for use by the Australian Customs National Marine Fleet.

After an extensive selection process, the Commonwealth of Australia granted Austal its contract for the vessels in May 1998.

Capable of operating around Australia's 37,000 km coastline, Roebuck Bay has a range of 1,000 nm. The patrol boat can reach a speed of 20.5 knots and has the means to maintain speeds lower than five knots for surveillance operations. For maximum comfort levels, a minimum resistance of 20 to 22 knots is employed — Roebuck's semi-displacement hullform with fine waterline entry.

Propulsion is provided by two MTU main engines rated for 1,050 kW. Each at 2,100 rpm the engines are coupled to Reintjes gearboxes and drive four bladed Veem propellers.

Circle 43 on Reader Service Card

Main Particulars

Classification	DNV
Flag	Australian
Vessel type	Medium speed Patrol Vessel
Length, o.a.	125 ft. (38.2 m)
Length, waterline	105 ft. (32.1 m)
USL measured length	115 ft. (34.95 m)
Beam (molded)	15 ft. (4.5 m)
Hull depth (molded)	15 ft. (4.5 m)
Hull draft	8 ft. (2.3 m)
DWT	28 tons
MCR	1,050 kW @ 2,100 rpm
Speed	21 knots
Range at service speed	1,000 nautical miles @ 20 knots
Engines	MTU
Gearbox	Reintjes
Propellers	Veem
Tenders	6m A1 rigid hull
	90hp Honda o/bs
Launch recovery	Vest Davit - compensated type

Superstar Virgo Departs Meyer Werft's Dock

Following extensive dock trials, the 76,880-gt cruise vessel Superstar Virgo will leave the covered building dock of Papenburg, Germany's Meyer Werft Shipyard.

Built for Asian-based shipping company Star Cruises, the ship will be towed out to a fitting-quay to complete the remainder of its interior design. Measuring, 879 ft. (268 m), with a capacity of 2,800 passengers, Virgo is sistership to Asian-operated Superstar Leo delivered in 1998.

A diesel-electric propulsion plant will enable the vessel to travel at a speed of 25 knots. The vessel is scheduled for delivery in August 1999.

The Tanker Market: Which Way Is Up?

Carried out in a vacuum, the tanker market would be an easy one to predict and analyze. As tankers get older, quality owners scrap technically inferior tonnage in favor of new ships which offer operational benefits and savings. But real world scenarios, including severe economic crisis, naturally and politically controlled oil flow and pricing, and greed all enter into the decision of when, where and why new tankers are ordered and old ones sold. In its March 1999 Bulletin (No. 63/99), Intertanko analyzes the undercurrents of tanker newbuild and scrapping practices in an article entitled "Bubbles under the surface in the tanker industry, but few eruptions." The article notes that shipowners operating 1970s built Suezmax and VLCC tankers of good quality have enjoyed good profits, in fact equating the fleet of this description as "cash cows." The organization notes that 76 different owners in all (including oil companies and state owners) have their entire fleet comprised of vessels built in the 1970s. Interestingly, 41 percent of owners in the 120,000+ dwt segment has all 1970s built vessels. Most of these owners operate small fleets, comprised of one or two ships, but cumulatively they represent quite a bit of tonnage.

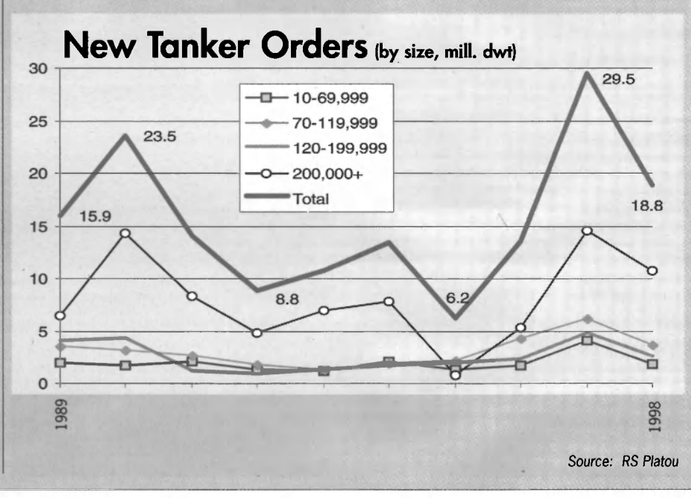
In fact, the Intertanko study found that only 10 of 198 owners in the 120,000+ dwt category operate what would be considered balanced fleets of new and older ships. Among the operators of new tonnage of this category are Frontline, with 23 ships, and many of the largest Japanese owners.

Old ships do not necessarily mean poor ships, however, as Intertanko notes that there has been a strong reduction in accidental and operational pollution from tankers. (For example: between 1970 and 1984, there was a total of 3,824,000 tons spilled; from 1984 to 1998, there was 1,535,000 tons, a 60 percent reduction). The organization in part credits mandates such as the introduction of the ISM Code, as well as revisions of STCW.

1998: Rates Well Maintained Despite The Asian Crisis

The tanker market reached the peak of the cycle in the fall of 1997 and has since been showing a declining trend. Despite the crisis in Asia, freight rates have, however, been relatively well maintained in 1998. This is quite in line with the main fundamentals: Oil pro-

(Continued on page 29)



Source: RS Platou

The Dry Bulk Market: Weakest Year Since '87

The year 1998 turned out to be the weakest one since 1987 where freight rates are concerned. The main reason behind this weaker market was the repercussions from the economic crisis in Asia including Japan, which led to reduced imports of raw materials and industrial products.

The yearly average trip charter rates for modern capesizes of 150,000-dwt fell some $4,600/day to $9,600/day in 1998. Rates for modern Panamaxes dropped about $3,600/day to $6,700/day in 1998. That is $2,100/day lower than in 1997. Freight rates for all types of bulk carriers decreased from the beginning of the year, before rebounding somewhat over a shorter period in the early fall. They did, however, fall back again towards the end of the year.

Ship's values also fell, in line with trends in the freight market. Prices for 10-year-old ships were, at the end of the year, in general 40 percent below their levels at the beginning of the year. In addition to the lower freight market there was also a considerable drop in newbuilding prices over the year.

Industrial production, the most relevant indicator for dry bulk demand, rose by 1.5 percent in the OECD countries. Both in Western Europe and in the U.S., industrial production increased by more than three percent while in Japan, it plunged by seven percent. In Asia, outside Japan, industrial activities fell considerably except in China, Taiwan and India. For the Asian region, excluding Japan, R.S. Platou estimates that industrial production increased by only two to three percent, compared with about 10 percent in the previous years. Also, the world steel production was cut back by three percent from the previous year.

Preliminary figures indicate that seaborne transports of dry bulk commodities declined by slightly more than one percent from 1997 to 1998. R.S. Platou has estimated a two percent decrease in seaborne shipments of iron ore from 1997 to 1998, and approximately a 2.5 percent drop in coking coal transports. Steam coal transports increased further all through 1998 mainly because of sharply lowered coal prices, which resulted in wider use of steam coal for electricity production. On a global scale, R.S. Platou has suggested about three percent higher steam, coal shipments in 1998 compared with 1997. Grain shipments were at significantly lower levels during most of 1998 compared with 1997 due to reduced

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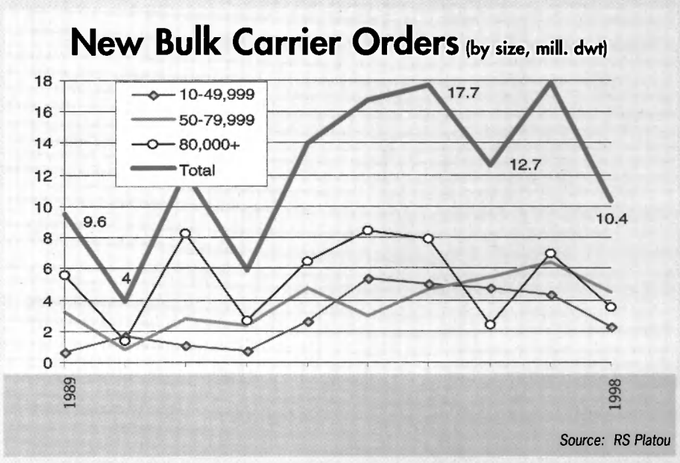


Source: RS Platou

Age Profile For Bulk Carriers

(Mill. DWT - Jan. 1, 1999)

	Year built					
	-78	79-83	84-88	89-93	94-98	Total
10-49,999	40.5	17.3	20.8	6.9	30.1	115.6
50-79,999	12.5	13.1	9.2	7.9	23.0	65.7
80,000+	5.4	10.9	13.9	17.9	29.5	77.6
Total	58.4	41.3	43.9	32.7	82.6	258.9

source: The Platou Report

imports of grains to Asia.

The dry bulk fleet increased by two percent from 1997 to 1998, calculated on a yearly average basis. A further reduction of combined carriers in dry trades resulted in 1.8 percent increase in the total active dry bulk fleet. The active Handysize fleet increased by 1.9 percent, while the operating Panamax fleet expanded by five percent. The Capesize fleet was reduced by 0.7 percent resulting from more scrapping than deliveries.

Deliveries of bulk carriers totaled 1.5 mill. dwt during 1998, while 0.5 million dwt of combined carriers were converted to pure bulk carriers. Deletions of bulk carriers amounted to 12 milion dwt. Consequently, from year-end to year-end, the fleet size remained basically unchanged.

According to R.S. Platou's preliminary assessments, the capacity utilization rate for the active dry bulk fleet fell by approximately three percent from 1997 to 1998, calculated on a yearly average basis. Seaborne transportation of steam coal is still expected to increase further in the coming years. It will be driven mainly by wider use of coal burning for energy production, particularly in Asia. The latest predictions for the grain trade indicate relatively small changes in the overall volume over the next year. Slightly lower imports are expected into Far Eastern and African countries, while higher imports are forecast into the Middle East and the CIS/Baltics.

The prevailing assumptions for economic growth indicate a further slight increase in consumption of paper during 1999. A slightly greater demand for sea transports of paper and pulp products would therefore seem realistic. In addition, in a move to protect the environment, China has initiated restrictions on wood harvesting as from late 1998.

The preceding was excerpted from The 1999 Platou Report.

Bulk Carrier Fleet

(Mill. DWT)

Year	Existing fleet	Lay-up	Bulk carriers operating	Combined in dry	Operating dry bulk fleet
89	196.9	0.5	196.4	19.7	216.1
90	202.5	0.5	202.0	22.1	224.1
91	210.8	0.7	210.1	18.2	228.3
92	214.8	1.4	213.4	16.9	230.3
93	215.0	1.6	213.4	16.1	229.5
94	219.0	1.5	217.5	13.9	231.4
95	225.5	1.3	224.2	15.2	239.4
96	237.3	1.1	236.2	14.1	250.3
97	247.7	0.9	246.8	9.5	256.3
98	258.9	1.0	257.9	7.0	264.9
99	258.9	1.5	257.4	5.3	262.7

source: The Platou Report

Bulk Carriers Sold For Scrapping

(Mill. DWT)

	10-49,999	50-79,999	80,000+	Total
89	0.4	0.1	0.0	0.5
90	0.4	0.0	0.2	0.6
91	0.4	0.5	1.4	2.2
92	1.1	0.7	1.9	3.7
93	1.2	1.0	1.5	3.7
94	1.2	0.9	1.9	4.0
95	0.6	0.4	1.3	2.3
96	2.3	2.5	3.3	8.0
97	2.8	1.5	3.2	7.5
98	3.9	3.3	4.4	11.6

source: The Platou Report

Shipbuilding: Plenty of pain, where's the gain?

The year-end turbulence of 1997 continued with even worse effect in 1998. With the exception of tankers, the overall demand for new vessels decreased sharply. Prices dropped heavily over the year, on average, by somewhere between 15 and 20 with the one exception: cruise vessels.

The Asian crisis was, of course, the main reason for the difficulties. It must be noted, however, that the difficulties in the Korean economy and the subsequent IMF intervention resulted in a sharp depreciation of the Korean Won which facilitated price reductions for the Korean shipyards. It even enabled them to show profitable figures despite the substantial fall in prices. As being shown the orderbook did not change drastically from last year. In fact, the third and fourth quarters of 1998 showed a slight increase. The reason was that the ordering activity for tankers, and in particular for VLCCs, continued to be strong throughout the year. The shipyards lead times continued to be perceived as comfortable, although quite a number of earlier deliveries which had not been available at the beginning of the year did come to the surface now and again.

Containerships: German owners in particular were still active by means of K/G system. This system is again under discussion as a result of the change of government. Orders for 157 vessels were placed representing 430,000 TEUs. This compares to 165 vessels and 321,000 TEUs placed in 1997. The orderbook now stands at 280 vessels or a total capacity of 623,880 TEUs.

Tankers: The main activity was in VLCCs and 37 vessels were ordered. Demand for Suezmaxes was stable with 17 vessels ordered, and for Aframaxes 39 vessels were ordered as opposed to 63 vessels ordered in 1997. In total, 18.84 million dwt were ordered, which constitutes a decrease of 10.66 million dwt. The orderbook of tankers above 25,000-dwt. now stands at 45.36 million dwt, which is the largest since 1976.

Bulkers: Difficult freight markets generated very little demand for this category of vessel. Only 23 capesize bulkers, 64 panamaxes and 58 handysized bulkers were ordered. The orderbook of bulk carriers above 10,000-dwt now stands at 25.52 million dwt, down 0.9 mill. dwt from the end of 1997.

Shipyard Order Book (Mill. DWT)

Yr.	Tankers	Bulk carr.	Comb. car.	Others	Total
89	16.6	12.6	0.1	7.7	37.0
90	23.3	15.3	0.7	8.7	48.0
91	39.1	9.3	2.6	9.0	60.0
92	38.4	15.3	1.9	11.4	67.0
93	29.5	16.0	0.5	13.5	59.5
94	23.6	21.0	0.2	17.3	62.1
95	24.8	27.0	0.2	14.0	66.0
96	19.1	31.8	0.7	15.3	66.9
97	20.2	27.1	0.5	18.3	66.1
98	41.7	26.4	0.4	14.5	83.0
99	45.4	25.5	0.4	13.7	85.0

source: *The Platou Report*

Market Reports

Combined Carriers: We did not register any order for this type of vessel during 1998.

Reefers: Only 2,724,000 cu. ft. were ordered.

Product/Chemical Tankers: The slowdown in the ordering activity, which commenced in 1997, developed further during 1998. This was mostly because of the high numbers of newbuildings deliveries expected in 1998/99, and less of a demand for chemical products as a result of the Asian crisis. Ordering of the MR Product Chemical tanker newbuildings amounted to 31 vessels (including stainless steel chemical tankers) which represents a 60 percent decline in the newbuilding activity in this segment compared to last year.

The coated Aframax tanker (LR-3) segment saw four new vessels ordered in 1998, compared to seven in 1998.

LNG: The LNG newbuilding market has been very quiet during 1998 with only one Letter of Intent signed, and no vessels confirmed. Many projects are still being discussed, but most have been shelved, pending the outcome of the Asian crisis.

LPG: For LPG carriers, the ordering activity of VLGCs significantly increased with 11 new vessels ordered during 1998. The orderbook for VLGCs now counts 15 vessels, representing about 17 percent of the total fleet. Other LPG segments experienced very little newbuilding activity.

Cruise Vessels: Still a very active year, 20 vessels were ordered representing 33,328 new berths. The orderbook now stands at 39 vessels, or 69,077 new berths.

Ferries/RoRos: The number of contracts concluded for RoRos and ferries for European accounts went down during 1998. There was still some activity for RoRos and Ropax, but owners, especially in Northern Europe, are reluctant to invest, bearing in mind the impact of the abolition of the duty-free sale. Asian yards, including Korea and China, have "attacked" the RoRo and Ropax market with competitive offers. This is to compensate for the lack of inquiries for conventional standard type of tonnage like tankers, bulkers and container newbuildings.

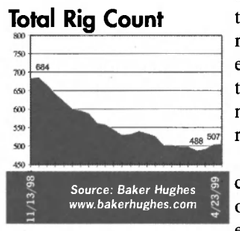
Pure Car Truck Carriers: The good freight market for Pure Car Truck Carriers (PCTCs) during recent years has awakened the interest in ordering this very specialized type of vessel. However, during 1998 deliveries of 19 vessels (86,000 cars total) exceeded new orders of 15 vessels (67,000 cars total) and reduced the orderbook to 54 units (264,000 cars total.) This is however, still 17.5 percent of the existing fleet.

The preceding was excerpted from The 1999 Platou Report.

Offshore: Gearing Up For The Rebound

While 1998 was difficult for the offshore drilling service and supply industry, but it seems 1999 will be worse. While the price of oil unquestionably maintained a lower profile throughout 1998, the massive Exploration & Production (E&P) were not fully felt until this year, and the recent release of 1Q earnings from the industry majors fully reflect this.

Total Rig Count



While the cyclical nature of industry is expected, it doesn't make it easy. Layoffs, rig cancellations, drilling postponements — all indicators of turbulent times for the oil industry, as low oil prices continue to alter business from the boardroom to the drilling rig. Utilization of the world's floating rigs has continued to decline in recent months according to Offshore Data Services, Inc.'s latest forecast released in its Offshore International newsletter. Large reductions in exploration and production spending are beginning to take effect, and even with the recent oil price increase, floating rig utilization is destined to trend downward over the coming months.

The offshore rig market continues its slide with worldwide rig demand falling by 32 units from December 1998 to March 1999, according to Offshore Data Services. In the first three months of 1999, worldwide rig demand fell from 473 rigs to 441 rigs, the lowest level of demand since August 1992.. While world-wide rig demand has bounced back to 460 in April, a one-year, 122 net decline in rig demand is staggering in its own right, as oil company cutbacks undoubtedly will push demand lower.

The U.S. Gulf of Mexico rig count is the poster child for the ravaging effects of low oil and natural gas prices. Demand in the region has steadily declined since early 1998 and currently stands at 115 rigs, a 15-rig decrease over the last four months. With a rig fleet of 180, utilization has dropped to 63.9 percent. Amazingly, floating rig day rates have held their own since Jan. 1. Fourth-generation semis continue to sign deals in the $150,000 to $160,000 range, just as they did in January. Day rates for the U.S. Gulf's third-generations semis also have held steady; these rigs continue to earn between $95,000 and $131,500 per day. Second-generation units in the U.S. Gulf are making between $35,000 and $58,000/day, compared to a day rate range of $45,000 to $50,000 in January.

In the offshore regions of Latin America, day rates for second-generation semis have fallen from a range between $121,600 and $142,200/day in December 1998 to between $70,000 and $94,000/day in March. Day rates for third-generation semis also reflect the region's tough market conditions.

When looking at day rates in the North Sea/NE Europe region, one number — $100,000 — sticks out. That is how far day rates for North Sea third-generation semis have fallen. Rigs that were garnering between $102,500 and $135,000/day in early Jan. are signing new contracts in the $30,000 to $51,000 range. The dramatic day rate drop is the result of rigs completing long-term contracts and finding new work available, but only at rock-bottom prices. Fourth-generation semis in Northwest Europe are earning between $123,000/day and $157,000/day. The European rig count has showed remarkable

June, 1999

stamina in the face of falling oil prices; utilization remains above 90 percent for the area's 46 floating rigs. Most of this staying power is attributable to the long-term nature of the region's contracts and the willingness of drilling contractors to accept the aforementioned day rate cuts. However, the number of rigs actively drilling is much lower, only 38, placing the working rig count at 83 percent. The number of rigs under contract and/or day rates could fall in coming months with seven floating rigs completing their existing contracts by the end of June.

While the picture is bleak, the keyword today is momentum, and the offshore industry has found some (of the positive nature) in recent months. Since mid-March, the oil price per barrel has steadily marched upward, buoyed by cuts from OPEC producing countries. While insiders warn that the true recovery will come only when product demand regains a healthy growth course, it seems this is inevitable given the faster than expected economic recovery in Asia.

CDI Installs Reeled Riser In The Gulf Of Mexico

Cal Dive International reported that it established another Gulf of Mexico first when it installed a reeled flowline/riser combination for Kerr-McGee in East High Island block A-379 in 350 ft. (106.6 m) of water.

Bouygues Offshore Net Sales Up 50 Percent

Bouygues Offshore S.A. announced net sales, new orders and backlog for the first quarter ended March 31, 1999. Net sales for the 1999 first quarter rose 50 percent to $265.1 million, compared to $181.4 million in the 1998 first quarter period. The backlog at the end of the first quarter was the highest in Bouygues Offshore's history, totaling $999.6 million.

PGS Expects Lower Earnings

Petroleum Geo-Services ASA said that although it expects 1999 revenues to increase above 1998 levels, the continuing weakness in oilfield activities as a result of extremely low and unstable oil prices and numerous mergers in the oil industry have delayed the start-up of several contracts, in addition to the completion of certain 3-D seismic data sales. As a result, earnings for the first quarter — and potentially the first half of 1999 — will fall below last year's results, current analysts estimate.

New Drill Ship Enters Service

Drilling began of a wildcat offshore well to the west of the New Zealand province of Northland, Conoco said. The well, Wakanui-1, was being drilled about 144 km northwest of Auckland in 4,823 ft. (1,470 m) of water by a new ultra-deepwater drilling ship, the Deepwater Frontier, on its first assignment.

BHP Reports Successful GOM Results

The Broken Hill Proprietary Co., Ltd. (BHP), reported the results of a significant new discovery in the ultra-deep water Gulf of Mexico with the Green Canyon (GC) 826-1 well on the "Mad Dog" prospect, located in the Atwater Foldbelt. BHP also has a 44 percent interest partnership with BP Amoco (56 percent) in four and one half blocks (GC 738, 739, 781, northern half of 782 and 783) that are adjacent and contiguous with the drilled unit and into which the Mad Dog structure is believed to extend.

(Tanker Market Report continued from page 22)

ducers continued into the third quarter of the year to produce oil as if the Asian crisis did not exist, resulting in huge build-ups of oil inventories. In the last four months production cutbacks and a larger number of newbuildings depressed freight rates significantly.

Single voyage freight rates for a ULCC did actually experience a minor increase from 1997 to 1998 reaching $30,000/day. While old VLCCs maintained their 24,000 level, modern ones saw a decline of $3,000 down to $33,000/day in 1998. Freight rates for modern Suezmaxes were down $3,000/day to a level of $22,000, modern Aframaxes were more seriously hurt with tc-results falling by more than $6,000/day down to an average of $16,000 in 1998. Large clean carriers last year obtained $17,000/day, which was $2,000 below the year before. Modern MR types fell from $13,000/day to $11,000/day.

Tankers Sold For Scrapping, by Size

(Mill. DWT)

Year	10-69,999	70-119,999	120-199,999	200,000+	Total
89	0.5	0.6	0.3	0.3	1.7
90	0.4	0.5	0.2	0.0	1.1
91	0.3	0.9	0.8	0.5	2.7
92	1.4	2.5	1.4	5.1	10.4
93	0.6	2.7	1.4	6.0	10.7
94	0.6	1.3	1.3	8.6	11.8
95	0.9	0.5	1.4	7.8	10.6
96	1.0	0.6	1.1	4.1	6.8
97	0.3	0.7	0.4	2.0	3.4
98	0.5	0.7	1.6	4.2	7.0

source: The Platou Report

Tanker Fleet

(Mill. DWT)

	Existing fleet	Lay/up &storage	Tankers opeating	Comb. in oil	Oil Fleet operating
89	233.9	12.3	221.6	11.7	233.3
90	240.5	11.4	229.1	10.4	239.5
91	247.4	10.2	237.2	12.9	250.1
92	255.4	11.5	243.9	11.8	255.7
93	261.8	15.8	246.0	10.1	256.1
94	266.9	15.0	251.9	10.8	262.7
95	265.0	13.1	251.9	11.4	263.3
96	263.2	11.2	252.0	8.4	260.4
97	267.2	12.3	254.9	11.3	266.2
98	268.7	12.3	256.4	12.1	268.5
99	273.6	9.4	264.2	12.3	276.5

source: The Platou Report

An interesting feature is the reduced tc-result difference between old and modern tanker tonnage, caused by the dramatic drop in bunker prices.

Seaborne Oil Trade

After two consecutive years of four to five percent annual growth in seaborne oil trade, R.S. Platou said that a preliminary estimate, based on export data, indicates an increase in 1998 of only one percent. Exports from the Middle East rose by four percent,

Age Profile For Tankers

(Mill. DWT - Jan. 1, 1999)

	Year built					
	-78	79-83	84-88	89-93	94-98	Total
10-69,999	15.2	13.7	9.3	6.6	9.8	54.6
70-119,999	12.3	8.4	8.2	11.9	11.5	52.3
120-199,999	17.0	2.9	2.1	12.0	7.5	41.5
200,000+	56.9	6.3	7.5	29.7	24.8	125.2
Total	101.4	31.3	27.1	60.2	53.6	273.6

source: The Platou Report

Latin America's were up marginally, while other exporting areas either stagnated or declined. The unexpectedly high growth in Iraqi oil exports was definitely the most dominating factor. With the 2mbd spread close to 50/50 Gulf/East Medlate in the year these volumes generated a lot of extra employment for VLCCs and Suezmaxes. After a number of years with declining distances, our calculations indicate a marginal increase in 1998.

Once more we experienced a strong shift from refined products to crude oil. A typical illustration is the U.S., where crude imports rose four percent and product imports fell four percent.

The Fleet

The total tanker fleet increased by 1.7 percent from 1997 to 1998, calculated on an annual average basis. A small rise in the use of combined carriers in oil trades, and a modest reduction in the non-trading tanker tonnage resulted in a two percent growth in the active fleet. The active VLCC fleet rose by one percent, the rest of the tanker fleet increased by close to three percent The driving force behind the growing fleet was the increase in deliveries from 8 million dwt in 1997 to 12.7 million dwt in 1998.

Removals from the tanker fleet amounted to nearly 8 million dwt.

According to R.S. Platou's preliminary assessments, the capacity utilization rate for the active tanker fleet fell only moderately from 87.5 percent in 1997 to 86.5 percent in 1998. In the first half of the year the utilization rate stayed at the impressively high level of 88 percent, oil production cutbacks in the second half then shaved off a significant share of tonnage demand, resulting in a significant decline in the utilization rate.

According to the current order book, as much as 23 million dwt of new tankers will be delivered in 1999, which is the highest volume of deliveries since 1976! There is every reason to believe that freight rates will decline to a level which will trigger a scrapping wave.

The preceding was excerpted, in part, from The 1999 Platou Report.

N&T Argonaut: Rates Are Falling

N&T Argonaut (NTA) reported income before taxes rose to $6.3 million in the first quarter of 1999, compared with $3.1 million in the same period of 1998. While it reported that the tanker market improved in the first quarter, it noted that rates have fallen sharply in the near term, as the improvement in the first quarter was due to a decrease in the pace of oil inventory buildup and longer transport distances as Middle East oil production replaced a fall in Atlantic output.

Benor: Operating Profits Down To $3.1M

Benor Tankers reported first quarter 1999 operating profits fell to $3.1 million from $6 million in the same period of 1998. A net loss of $5.1 million, including $3.5 million lost on the sale of fixed assets, compared with a profit of $1.97 million in the first three months of 1998. The reduction in operating profit reflected weaker income levels in all sectors of the tanker market in which the company was active, Benor said. Average net time charter equivalent earnings per calendar day were $12,155 with 82 percent of the total 2,070 vessel days in the quarter covered by period employment.

Chemical Carriers: The Slump Will Continue

Drewry's latest report, "Chemical Carriers: Facing an Uncertain Future?" addresses the key market issues and examines the changes in fundamentals in the 1990's and their probable evolution into the middle of the next decade. In the run-up to the Asian crisis, the chemical carrier sector was buoyed by strong trade growth in conjunction with the rapid expansion of new plant capacities. However, all was not well even at this juncture, with a peak in freight rates in 1995 having built up increasing numbers of newbuilding orders. With newbuilding prices under pressure and many product carriers specifying the carriage of simple chemical cargoes, things were always likely to get worse.

The massive dislocation in chemical trades that has been witnessed reflects the industry's attempts to sustain competitiveness and has in turn prompted restructuring among the main players.

For owners of chemical carriers the problem of maintaining utilization rates has had to be balanced against an inevitable concession in rate levels. A considerable swathe of chemical capacity is still moving forward in spite of the upheaval in demand and general concerns that a cyclical recovery will not be initiated before 2001. Coupled with this is an exhaustive orderbook and fleet age profile that does not suggest any imminent upsurge in fleet renewal. In an environment such as this it is not so much a case of winners and losers but rather assessing the market's casualties, applying the relevant therapy and waiting to see who will survive and for how long. With demolition of the chemical tanker fleet becoming limited in recent years, the age profile of this fleet suggests that deliveries will be greater than tonnage scrapped in the near future, therefore expanding the fleet.

Whether or not the major operators can balance their schedules in some way still looks doubtful. As a result, rates and utilization are almost bound to remain low in the short term. Figure 1 shows a summary of the relationship between total chemicals trade and the consequent demand expressed in terms of deadweight — including the aggregate supply assessment and overall market balance to 2005.

The new Drewry Chemical Quarterly-First Quarter 1999 Report highlights that fears regarding the capacity of the chemical carrier market absorbing the level of newbuilding deliveries in 1988 were indeed well founded. The substantial number of newbuildings resulted from shipowners' attempts to offer more high performance vessels adapted to international regulations — combined with the expectation that demand in the Asian markets would continue to grow.

With the chemical carrier orderbook in excess of 20 percent in tonnage terms, rising to more than 30 percent in some fleet segments, the outlook remains very poor. In 1999 the fleet is likely to expand by another 10 percent annualized, while freight rates continue to remain under pressure.

In this environment it is perhaps surprising that a mere handful of vessels has been sold for demolition in the last 12 months. (Analysis shows that vessels sold for demolition in the 1990's are on average around 25 years of age). But this will not do much to counter the four million dwt of vessels (including product-chemical carriers) on order as not much more than one million-dwt is currently at this milestone.

Austal Ships Completes Latest High Speed Ferry

Located in Western Australia, Austal Ships has completed its latest Auto Express 86 high speed vehicle-passenger ferry. Named Jonathan Swift, the vessel was designed for the Irish Continental Group PLC (Irish Ferries) of Ireland.

The large, aluminum catamaran, the first fast ferry for the company, is able to hold up to 800 passengers and 200 cars. The new service will be known as Dublin Swift because of its high speed run between Dublin and Holyhead. Known as the Irish Sea crossing, the trip will run to and from the center of Dublin City at a rapid service speed of 40 knots with a total travel time of approximately one hour and 50 minutes.

Jonathan Swift is the eleventh Austal Auto Express commissioned by the company and is the first to boast Caterpillar engines. In addition to the catamaran's semi-swath hull form, Jonathan Swift features Austal's own Ocean Leveller ride control system ensuring excellent seakeeping qualities and maximum passenger comfort.

The next two Auto Express 86 ships ready to go are for Hulls 95 (handed over this May), and 96, The largest of its kind (constructed outside of Europe) to be outfitted with gas turbine propulsion, Hull 96 will arrive at Bornholms Trafikken of Denmark in November 1999.

Main Particulars

Flag	Irish
Classification	Germanischer Lloyd
Length, o.a.	284 ft. (86.6 m)
Length, waterline	243 ft. (74.2 m)
Beam (molded)	79 ft.(24 m)
Depth (molded)	24 ft. (7.3 m)
Hull draft	10 ft. (3.2 m)
DWT	400 tons
Main engines	Caterpillar
Gearboxes	Reintjes
Waterjets	Kamewa
Service speed	40 knots
Fuel consumption	5.3 tons/hr.
Fuel	162,000 liters

Avondale Industries Christened Mendonca

The fourth in a series of Seven Strategic Sealift ships constructed by the shipyards division of Avondale Industries was christened Mendonca at the company's New Orleans, La. headquarters.

The ship's namesake recognizes U.S. Army and Medal of Honor recipient Sergeant **LeRoy A. Mendonca**. A native of Hawaii, Mendonca was noted for his gallantry and heroism in going above the call of duty during enemy attack near Chich-on Korea, on July 4, 1951.

Mendonca is a welcome addition to Avondale's Bob Hope Class Sealift Ships used for the quick deployment of military equipment and supplies to U.S. troops throughout the world. Two more sealift ships, Fisher and Seay are scheduled for delivery later this year.

The 950 ft. (289.5 m), medium-speed, RoRo sealifts are among the Navy's largest. With a displacement of 62,069 tons and 65,160-shp, the vessels can cruise at speeds in excess of 24 knots.

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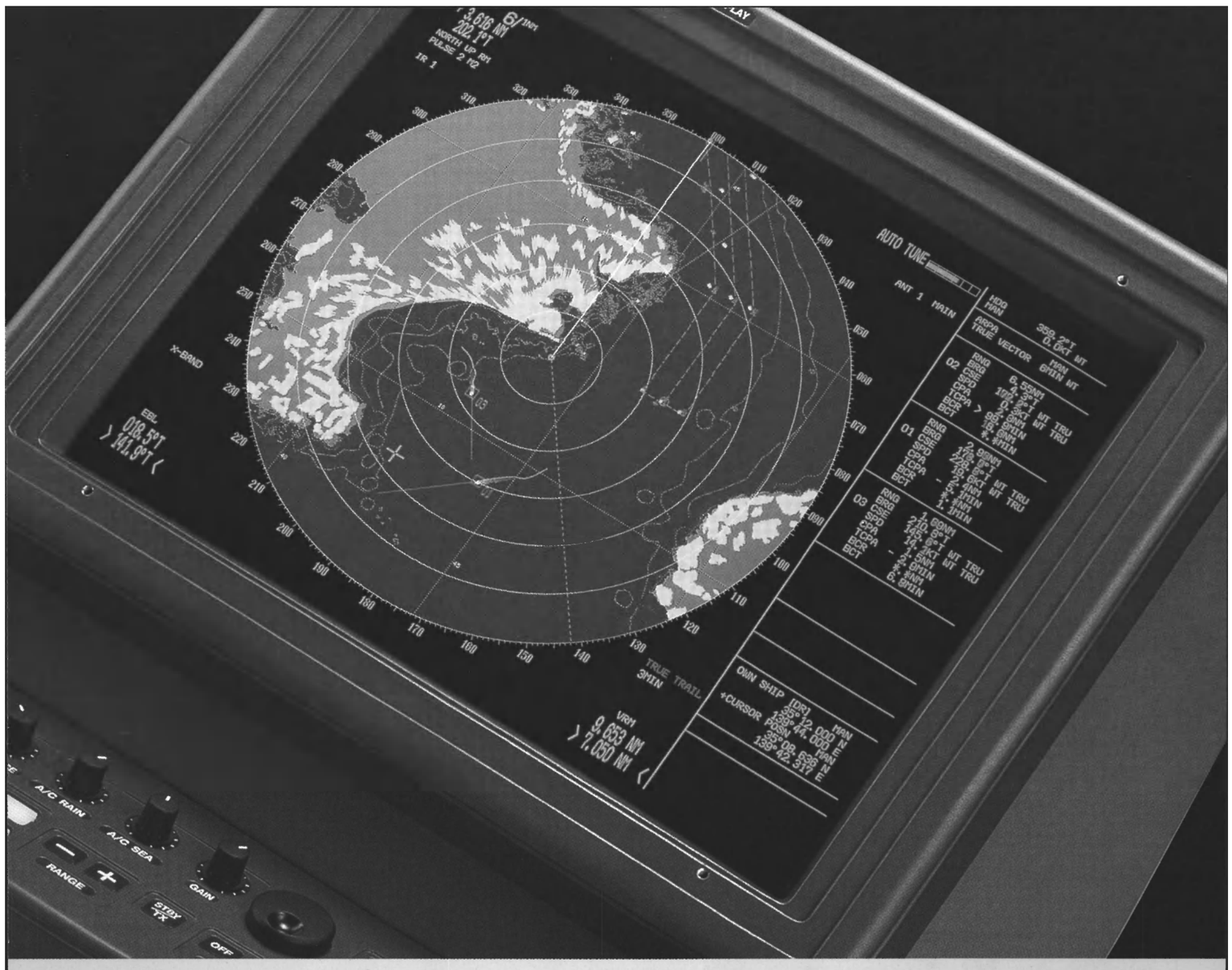
Main Particulars

Flag	U.S.
Length	950 ft. (289.5 m)
Beam	105 ft. (32 m)
Draft	34 ft. (10.3 m)
Speed	24 knots
Endurance	13,000 NM
Stowage area	Enclosed 300,000 sq./ft.



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Demand The Best!

Inland Issues: Legal matters rule the day

With a host of new and pending legislation, it seems the U.S. is preparing itself for the maritime boom anticipated to triple traffic on the waterways by the year 2020. However, a lack of funding for the USACE could result in bigger problems.

By Chris Palermo,
managing editor, Marine News

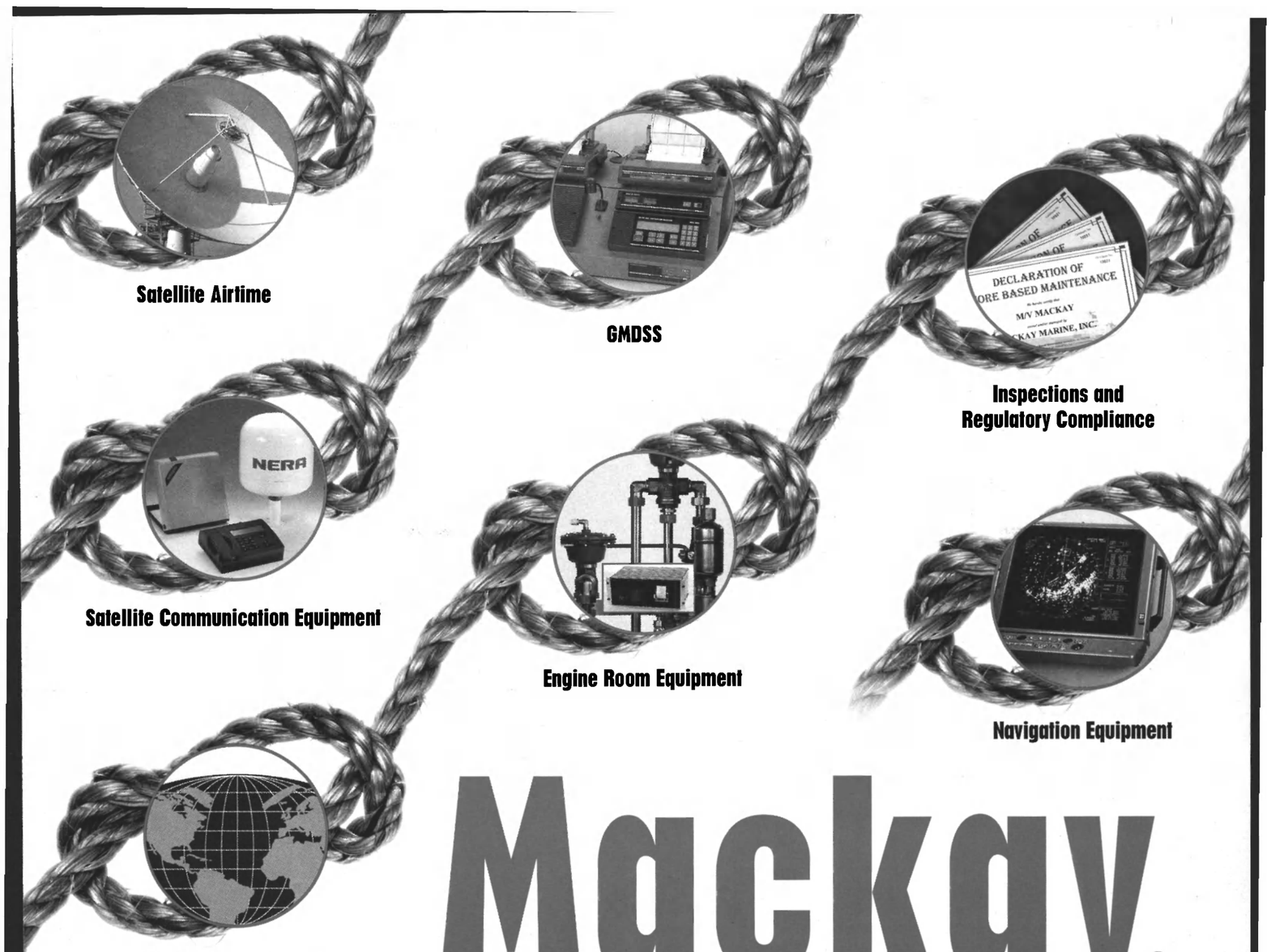
Projections for maritime traffic show the number of vessels tripling along the nation's waterways by the year 2020. With such a substantial increase expected, lawmakers and lobbyists are pushing forward with a slew of legislative measures to enhance and ensure the safe operation of vessels.

However, a shortfall of approximately $700 million in the USACE budget, as well as other agency budgets, has caused grave concern, that the infrastructure of the waterways may not be sufficiently maintained to support this increased usage. Additionally, the shortfall may be even more significant than imagined, as a percentage of the proposed budget includes a Harbor Services User Fee (HSUF); the replacement to the repealed – and rejected – Harbor Maintenance Tax from last year. Few specifics regarding the fee are contained in the budget, except it would be assessed against carriers, would be uniform nationwide, and would collect approximately $980 million annually.

What's on the table

The $3.9 billion budget request for the USACE provides a 21 percent increase over its FY 99 request, but is still below the $3.96 billion appropriated by Congress for USACE programs last year. Most of the increased spending is earmarked for deep-draft ports and channels and environmental programs, with inland waterways and flood protection projects funded at roughly the same level as in FY 99.

Under the proposal, fees would be charged to vessels transiting the harbors of the U.S. These receipts would be available for the following fiscal year for appropriation to fund construction and operation and maintenance of the nation's



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channels. The budget proposes $1.2 billion for the USACE's general construction account, $257 million of which would come from the not-yet-enacted HSUF for port improvement construction. The budget requests $1.8 billion requests for the USACE's Operation and Maintenance account, with $693 million of that figure coming from the HSUF.

For the USCG, the President requested $4.2 billion for FY 2000, as compared to a $4.1 billion request in FY 99. Surprisingly, this year's budget proposed the reintroduction of the same navigational assistance user fee proposed and rejected by Congress last year. The Administration's proposal would institute new USCG and NOAA user taxes for federal navigation safety services, such as aids to navigation and VTS systems. The USCG fee, to be collected from commercial cargo carriers, is projected to recover $41 million in FY 2000 and $165 million annually when fully implemented.

However, Senator **Olympia Snowe** (R-Maine), chairwoman of the Senate Oceans and Fisheries Subcommittee, told USCG Commandant James Loy the Administration's proposal to impose new taxes on commercial vessel operators will not be considered by Congress. Chairwoman Snowe stated the Administration is clearly violating the spirit of the law by including $41 million in user fees for FY 00 in the USCG budget.

Budget Summit

The National Waterways Conference (NWC) Budget Summitt, held in Washington D.C., brought together several key speakers from varied aspects of the budgetary process. While some good news was presented, the major-

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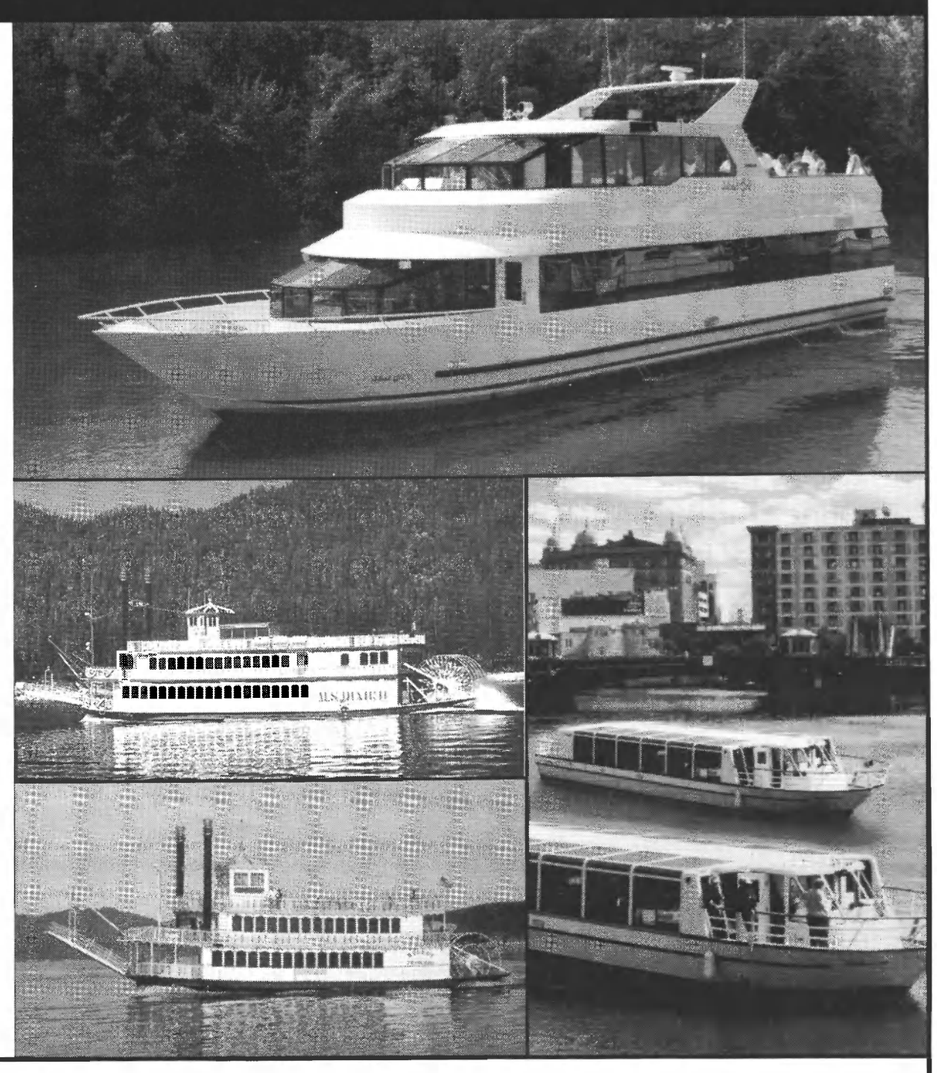

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ity of it was less positive, as the Administration's plans for the budget surplus, seemingly, didn't include the maritime industry.

T. Fred Caver, chief, Programs Management Division, USACE, began the summit by assuring the audience, "the new budget request is far better than the previous proposal." Caver pointed to the earlier request, which included the lowest construction amount in history.

"It would have resulted in the termination of ongoing construction projects," Caver said. "Fortunately, the amount was not acceptable to Congress, and we ended up with a reasonable amount.

The FY 2000 budget will allow the USACE to continue with its ongoing studies, although only one new study – flood control in California – will be started. Caver said the USACE had proposed starting 90 reconnaissance studies. The budget would also enable the USACE to not have to add to the backlog of maintenance for the first time in years. Currently, the value of the USACE's backlog is $1.6 billion worth of postponed work. The amount won't allow the USACE to start working the backlog off, but will prevent any more work being added, said Caver.

"Since we have no more budget deficits – at least, on paper – is now the time to begin making investments into the infrastructure? If not, when is?" asked Caver.

"We've reached 'zero;' we've balanced the budget," said **Rich Meade**, chief of staff to Congr. **Jim Nussle** (Iowa). "Now we need to agree on how to set up the budget. One group wants to increase spending, on education, aviation, infrastructure; one group wants tax relief; one group advocates discretionary spending; some are lobbying for a prescription drug plan for senior citizens."

Users Fee or Tax?

"The Harbor Services Users Fee would fund deepdraft navigation," said Caver. "It would replace the Harbor Maintenance Fund, which was recently declared partially unconstitutional [tax is not allowed on exports, but still is collected on imports, resulting in a total of $629 million, annually]. It changes from a 'tax' to a 'users fee.'

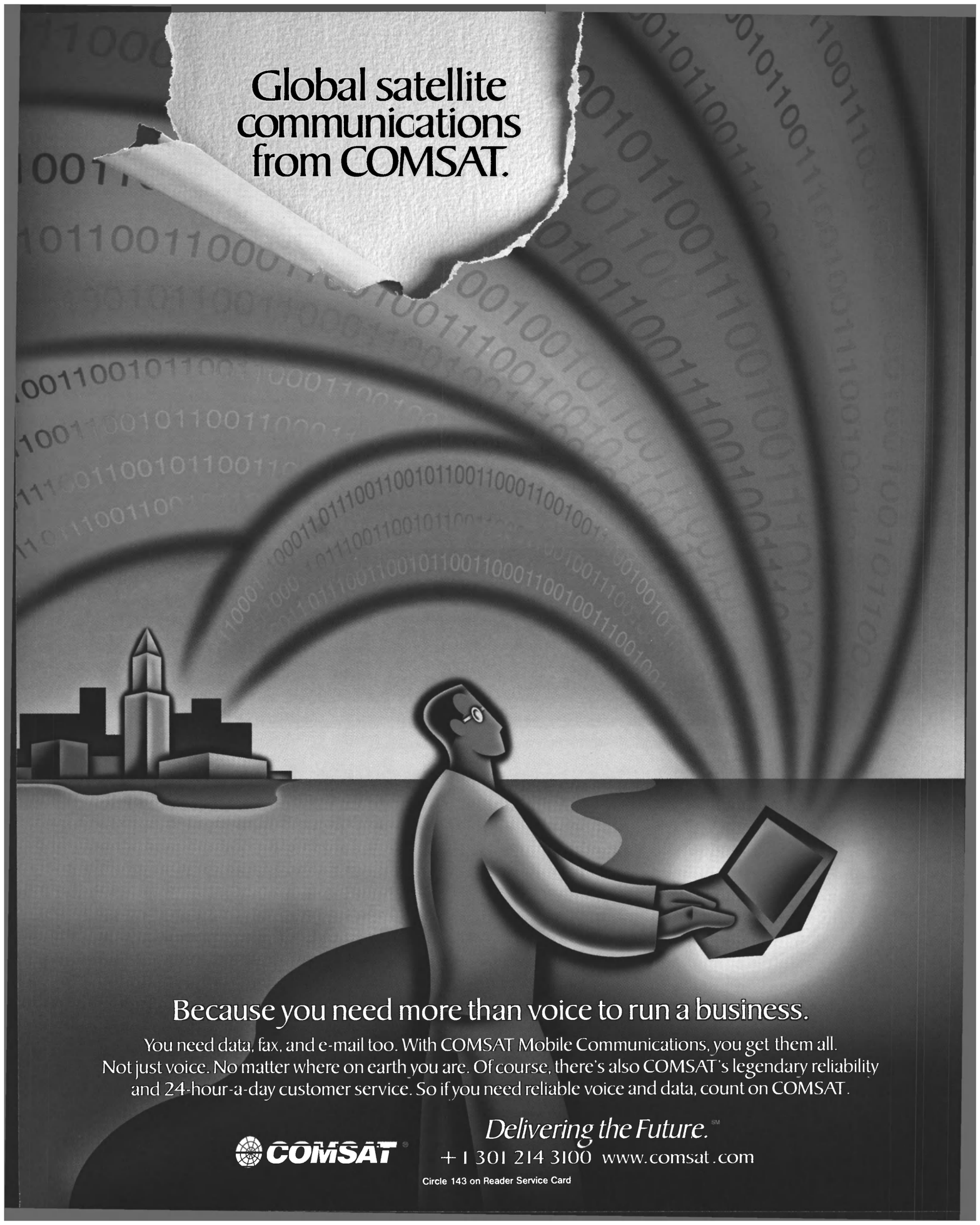
"The fee would fund operation and maintenance (O&M) requirements and would fund capital improvements in deepdraft water. The President estimates $951 million can be raised from the new users fee being included into the FY 2000 budget, of which $258 million would go to capital improvements, and $693 million would fund O&M activities."

The anticipated total is $322 million more than the Harbor Maintenance Fund already collects, Caver said, meaning if the new user's fee is not passed, approximately $330 million would need to be "found."

"There's nearly one billion dollars in new taxes in that budget proposal – they call it 'fees,' but it's taxes – and we don't even need it yet," said **Jean C. Godwin**, senior vice president, American Association of Port Authorities (AAPA).

"There's no connection between the value of a cargo and the cost of dredging," Godwin continued. "So why should a vessel carrying a shipment of computers pay more than a vessel carrying a shipment of wastepaper?

(Continued on page 43)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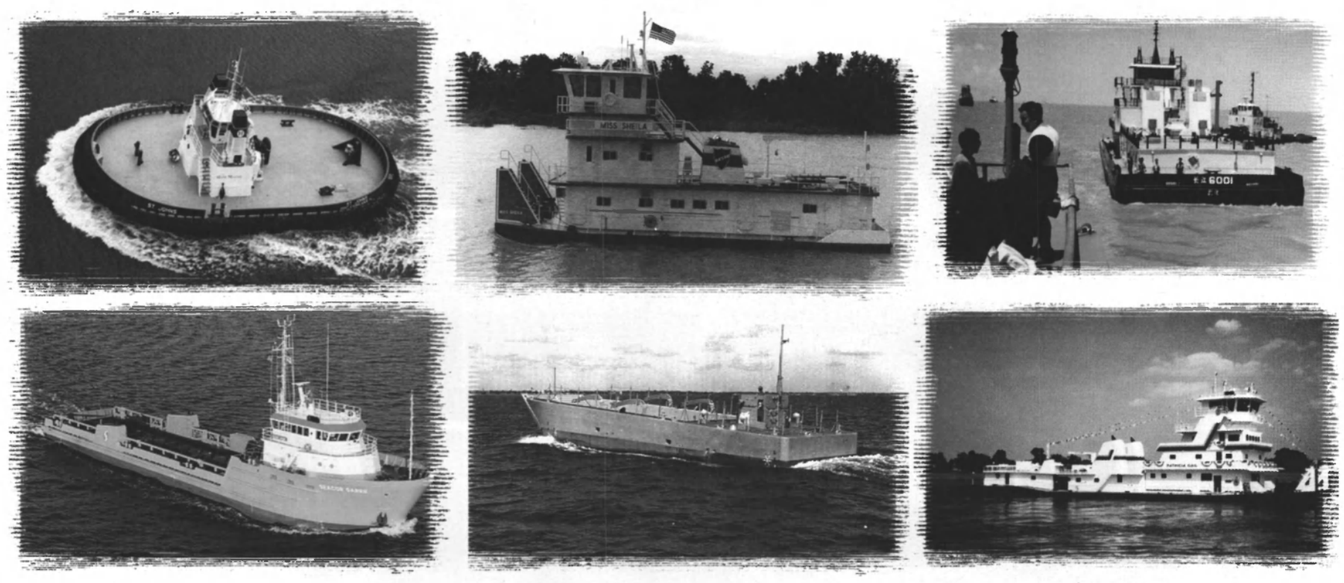

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Mr. Mel: Taking Care of Business Powered By "Cats"

Mr. Mel was recently repowered with Caterpillar diesel engines.

(photo: Skeets Photo-Service, Patterson, La.)

Diamond Services Corp. knows the importance of staying competitive in the oilfield service industry, which is why the Morgan City, La., company broke the conventional rules of "propping" and built Mr. Mel, the first water jet-powered crew/supply boat to work in the Gulf of Mexico. Considered an innovative propulsion system for a crewboat, the diesel engine/water jet combination offers advantages of increased speed, maneuverability and flexibility over propellers.

The 145 ft. (44 m) aluminum monohull, built at Swiftships, Inc., was delivered in February 1995. At that time, Mr. Mel was powered by four 815 bhp (611 bkW) diesels driving four Hamilton HM-571 water jets through a Twin Disc MG-5202 gear with a 2:1 reduction ratio. Mr. Mel is capable of carrying 79 passengers with a full load of fuel and 30 tons of deck cargo at 24 knots, and can achieve 28 knots light.

Since 1995, Mr. Mel has worked continuously in the Gulf of Mexico, running supplies and crewmen to deep water oil rigs. The water jets, as expected, have performed flawlessly, making them a worthwhile investment in the eyes of Diamond Services. But there was a second factor to the equation.

"We began experiencing engine problems," says **Mike Swiber**, the company's purchasing manager. "What began as piston ring wear turned into larger, more frequent problems." Swiber adds that for the first three years, the engines went through several repairs and overhauls in an attempt to alleviate the problems. While much was covered under warranty, it was downtime that the company could not afford.

"It got to the point where enough was enough," he says. "We continued to successfully serve our customers during these times, but the original engines weren't durable enough to meet our standards. It's no secret that in this industry, engines take a beating, and these simply weren't cut out to be crewboat engines."

With business potentially at stake, Diamond Services decided to pull Mr. Mel's original diesel power plants. The company looked to its fleet, powered by various engine manufacturers, for clues as to which type of engine would meet the company's requirements.

The answer was found with Diamond Services' Lisa Ann and Mr. D. Lisa Ann was built in 1997 to the same specifications as Mr. Mel, but powered by Cat 3412 engines. The same year, the 17-year-old Mr. D, equipped with conventional props, was repowered with the same model engines. The propulsion history was good and performance results were strong for both vessels, so Diamond Services ordered four Cat 3412 engines, each rated 825 bhp (619

bkW) @ 2,100 rpm, from the local Cat dealer Louisiana Machinery Power Systems.

The repower was completed in May 1998. After passing all the necessary performance tests, Mr. Mel was back to work in the Gulf the following month.

"The Cat engines have been performing very well, and they work well in tandem with the jets," Swiber states. "Most importantly, there's a sense of security that they will help us serve our customers' needs. The engines are still pretty new, but if they have a track record like the ones in Lisa Ann and Mr. D, I expect they'll perform reliably."

Durability, comparable horsepower ratings and competitive pricing were the top reasons Diamond Services selected Cat engines for the repower, Swiber says. He adds that the availability of parts and service from Caterpillar was also an important factor for a boat that operates continuously.

"There's even a Cat dealer located in Del Cormen, Mexico, which is in the region where Mr. Mel operates," adds Swiber. More shipbuilding activity is on the horizon for Diamond Services. The company built the world's largest jet-drive crewboat at Swiftships Inc. Kristin Grace measures 185 ft. (55.5 m) long and 30 ft. (9 m) wide, and is capable of carrying cargo up to 330 long tons on deck, nearly twice the amount of Mr. Mel. She will be designed to transport 64 passengers and five crewmen. The quad-screw vessel will be powered by Cat 3508 Series B electronically controlled engines, each rated 1,300 bhp (975 bkW) @ 1,835 rpm, driving Hamilton water jets.

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TDI-Halter Delivers Pride Texas

Gulfport, Miss.-based TDI-Halter, a Halter Marine Group company completed its conversions and upgrades of Pride Texas and Pride Kansas from mat slot to mat cantilevered jackup drilling rigs.

Designed to handle a 1,400 kip hook load at 45 ft. (13.7 m) cantilevered position, Texas is able to move up to 12 ft. (3.6 m) off centerline to port to starboard — in depths of as much as 300 ft. (91 m). To accommodate the new cantilever system, as well as enabling the rig to work against fixed platforms in deepwater, the mat was increased in size and modified. Texas is the second of the conversions to be performed by Halter. The first conversion was Kansas, which underwent alterations in January 1999.

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Crowley Marine Services Receives Papu Sur

Crowley Marine Services Paraguay has accepted delivery of the Papu Sur, the second of two new Papu-Class river push boats to be deployed in its Mercosur barge feeder service. With a fleet that includes two additional ocean tugs, Papu Viento and Papu Mar, the Papu Sur will broaden the feeder service's daily sailings between Montevideo, Buenos Aires, Asuncion and other ports situated along the Parana, Paraguay and Uruguay river system. Four flat-deck ocean and river barges are also part of the new group of Sur vessels. Measuring 112 ft. (34 m), Papu Sur, along with its sister vessel Papu Norte, were designed and constructed for Crowley Marine's subsidiary, Vessel Management Services.

(Continued from page 38)

"We're not recovering what we need for maritime dredging – with what's left of the Harbor Maintenance Trust Fund, we still collect $629 million, which is more than enough. This plan means the money collected will cover the federal government's contribution, as well. So even though military ships use the channel as well, maintenance dredging costs will be borne entirely by commercial shippers…a very narrow universe.

"We cannot let budget 'sleight-of-hand' create new policy," Godwin said.

Regional Concerns

R. Barry Palmer, executive director, DINAMO, said his region is currently being funded for construction of locks and dams and new projects at approximately $75 million. This is in comparison to FY 96's budget of $225 million.

"We have new authorized projects valued at three billion dollars," Palmer said. "If we could get to a level of approximately $250 million by 2002 or 2003, that would mean there would be substantial completion of many unfinished locks and dams by 2010.

"Even now, we'd still need another $75 million to get to a reasonable level of construction, as it is, some projects have been delayed by as much as six years. Reaching a level of adequate funding would help us speed up the completion dates of projects by three to nine years."

"Eight years ago, the Upper Mississippi Region began a reconnaissance study to determine the need for lock and dam modernization," said **Christopher Brescia**, president, Midwest Area River Coalition 2000 (MARC 2000). "Four years ago, the railroad in the same area was determined to need trackage – a $1.4 billion investment. The railroad will start construction in one year. There are no plans to begin construction on the waterways project, yet, the feasibility study was begun six years ago.

"We have lost faith in the feasibility

process," Brescia concluded. "We have lost faith in a system where our region contributes 40 percent to a trust fund and receives 15 percent back. We have lost faith in the USACE."

Fuel Tax Repeal and WRDA

One of the major issues lobbied for by the American Waterways Operators, was a repeal of the 4.3 cent "deficit reduction" fuel tax paid by railroads and inland waterways carriers. The Transportation Tax Equity and Fairness Act was introduced in the House of Representatives by Rep. Kenny Hulshof (R-Mo.), along with 22 co-sponsors, as H.R.1001; and was introduced in the Senate by **John Chafee** (R-R.I.), **John Breaux** (D-La.) and **Jim Jeffords** (R-Vt.) as S.820. Additionally, the Senate passed S. 507, the Water Resources Development Act, which authorizes USACE's navigation, flood control and dredging projects. The bill was held up in the House of Representatives last year in a dispute over the Auburn Dam on the American River near Sacramento. The Senate moved swiftly in 1999 to reconsider and pass the legislation.

As introduced, WRDA 99 retains its predecessor's "Challenge 21" program, which encourages the agency to pursue "'non-structural' flood control and riverine ecosystem restoration projects, taking a watershed-based approach to flood prevention," according to a bill summary. Such projects could include estuary and wetlands restoration, voluntary removal of structures in floodplains and improved flood warning systems. The bill would also authorize the initial design work for several lock extension and rehabilitation projects on the Upper Mississippi and Illinois Rivers.

In the House, Congressmen **John Doolitle** (R-Calif.) and **Bob Matsui** (D-Calif.), representing two sides of the Auburn Dam issue, reached a compromise, and the bill was scheduled for consideration by the House Transportation and Infrastructure Committee. The compromise created a new dispute over American River water rights, and ultimately led to subcommittee passage of the bill on a party line vote. The final vote in committee to report the bill out was not a party line vote, but several Democrats on the committee voted against the bill to show their dissatisfaction with the resolution of the Auburn Dam issue. The bill will now proceed to the floor for consideration, and, if passed, to a conference with the Senate to work out differences in the two bills. The House bill authorizes approximately three million dollars in USACE projects, while the Senate's bill authorizes a level of approximately $2.25 million.

Safety Legislation

Despite the concerns of infrastructure funding, lawmakers are still endeavoring to ensure the safety of the expected increase in maritime traffic, since it seems nearly inevitable. For example, one of the requirements of OPA 90 was a phase-out schedule for single-hull tank vessels with double sides or a double-bottom. The schedule will grant these vessels an additional five years operation, but no single-hull tank vessels carrying oil in bulk will be permitted to operate in the U.S. after Jan. 1, 2015.

The USCG announced it will grant no extensions of OPA 90 phase-out dates for single-hull tank vessels converted to vessels with a double bottom or double sides unless the conversion was completed before Aug. 18, 1990.

In addition, the USCG has agreed to take a second look at developing a Streamlined Inspection Program (SIP) for tank barges. The program has been

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Up & Down: Sweet Music To MacGregor's Ears

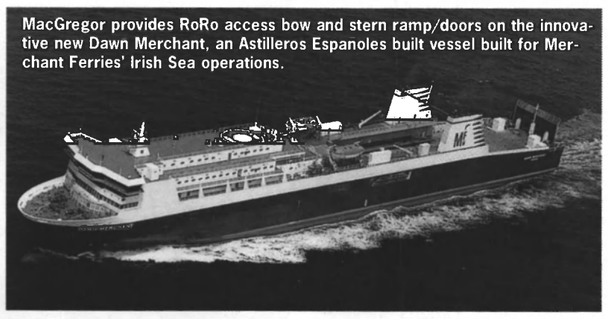
While market undulations cause tensions to rise and profits to waver, the movement has special meaning to Sweden's MacGregor Group AB. Not that MacGregor likes market instability anymore than the next company, mind you, rather that the company is one of the world's premiere suppliers of cargo care products — including ship's elevators, hatch covers, cranes, RoRo equipment, escalators and air conditioning chillers — and the ability to get "up and down" onboard a ship means more business for the group.

Founded in 1929 with a patented steel hatch cover design, the MacGregor Group has nearly tripled in size during the past few years, fueled by merger, acquisitions and growth from within. Along the way, the company formed by the brothers **Robert** and **Joseph MacGregor** have merged with or acquired equipment supplier leaders such as Finland's Navire, Dan-Elevator, and Conver-OSR. In 1993, Swedish industrial group Incentive acquired MacGregor-Navire's shares, and combined it with its own subsidiary, Hägglunds marine, which was a world leader in shipboard cargo cranes, to form the organization known today as the MacGregor Group.

Although rapid, the growth has actually occurred in a systematic and designed approach, positioning the company as a formidable global provider of equipment and services, positioned to meet the high demands of a market in transition.

According to **John Albino**, president of MacGregor USA Inc. in Pine Brook, N.J., part of the company's overall success is its partnering mentality: "In today's market, it is essential to provide life-cycle solutions instead of one-off product sales."

The company's overall growth can be seen as reflecting this trend, and in a microcosm, its growth in the U.S. is a prime example. Realizing that service after the sale is similarly critical, MacGregor USA has steadily increased its presence. For example, growing its Miami office from a one-person operation in 1993 to a full service organization today, and relied on skilled craftsman to meet customers repair and maintenance needs. "We have no trainees, only workers with 9+ years of experience," Albino said. Apart from its strong hold on U.S. cruise operator customers, MacGregor has enjoyed good success with U.S. military projects helping to outfit the recent round of new Sealift ships



MacGregor provides RoRo access bow and stern ramp/doors on the innovative new Dawn Merchant, an Astilleros Espanoles built vessel built for Merchant Ferries' Irish Sea operations.

Tech Behind The Talk

The marine industry, with its unique and demanding operational parameters, is particularly brutal on purveyors of new technology. Salesmanship and style only go so far, as those products which do not support claims of performance are quickly dismissed. The MacGregor Group is highly regarded among shipyards and shipowners for supplying the systems, products and supports which withstand the rigors of operating at sea. Shipowners today, particularly on the high-value cruise ship side, are far more proactive and sophisticated in choosing major equipment suppliers, said **Bjorn Stenwall,** MacGregor's technical manager, Passenger Ship Div. "Owners are consulting with suppliers such as MacGregor to dictate the number and speed, for example, of a ship's movement systems." This trend

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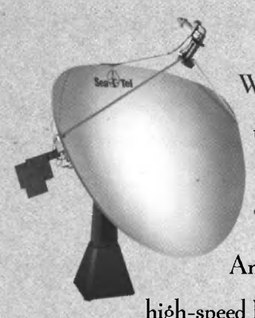

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has also been spurred by the growing size of ships, as owners must adjust accordingly to accommodate more passengers on larger ships. The task of moving 3,000 people, for example, to the exits when leaving for ashore excursions can create tremendous bottlenecks and delays, unless the people moving systems have been provided for accordingly. MacGregor's Passenger Ship Division has enjoyed a steep rise in escalator orders, as it has secured orders for 42 escalators for installation in ferries and cruise ships during 1999 and 2000. The company said that escalators are being specified in increasing numbers as operators of cruise ships and ferries are recognizing that escalators are significantly more efficient than elevators between two or three decks. Typically, passenger movement rates of up to 9,000 passengers an hour are possible with escalators using 1,000 mm (two-passenger) step widths. MacGregor's escalators are a product of its partnership with Kone's wholly-owned subsidiary in Germany, O&K Rolltreppen GmbH. As with its elevator partnership with Kone, MacGregor provides its maritime expertise to develop escalator technology and market the products in the marine sector.

Key applications of escalators are in the quick movement of passengers to and from bottleneck areas or for speeding crew movements between galley/service centers and the restaurant areas.

For large passenger ferries, owners are recognizing the benefits of faster turnaround times by using escalators to move passengers between car decks and public areas, as well as to and from passenger loading points and the main entrance lobby.

Basically, the escalators utilize the same control technology and main components as Kone uses in its elevators. They can therefore be linked to a ship's central elevator control and monitoring computers to provide for optimum shipboard passenger transport solutions. The marine units are based on O&K's exterior grade escalator units and are fully weatherproofed and ruggedized.

On the elevator side, MacGregor has won elevator orders for all seven of Royal Caribbean Cruises' latest newbuildings, the Millennium-class cruise ships. For each of the four Millennium ships, MacGregor will provide 17 elevators as well as eight service escalators. The 10 passenger elevators will be arranged in three groups: one set of four panoramic elevators and two groups of three conventional units. The panoramic elevators will be quite unusual in that all will face outboard through an external atrium positioned on the starboard side of the ship. The other seven elevators are service units.

In an example of continuing innovation, Monarch of the Seas — which recently underwent extensive repair work at the Atlantic Marine yard in Mobile, Ala., feature the first marine application of MacGregor-Kone MiniSpace elevator. The new shipboard elevator offers space and weight savings compared with existing elevator mechanisms.

MiniSpace is a new concept which uses a new compact drive motor, eliminating the requirement for large machinery rooms associated with conventional traction wire pull and balance-weight elevators.

MacGregor will supply 22 MiniSpace elevators, two conventional elevators and eight escalators for each of two vessels in a new class of cruise ships ordered by the Carnival Corporation from Kvaerner Masa-Yards. Carnival has ordered the first two 84,000-gt vessels for Italian-based Costa Crociere and Carnival Cruise Lines.

Circle 98 on Reader Service Card

Hyundai Heavy Industries Delivers Tarquin Loch

Hyundai Heavy Industries has delivered its newest to L.G.S., U.K. — a 6,300 cu./m LPG carrier with a semi-pressurized/fully refrigerated type with cargo space split into two independent holds. With an overall length of 354 x 52 ft. (107.9 x 15.7 m), including a depth of 27 ft. (8.2 m), the vessel is powered by a B&W main engine with an MCR output of 4,750 bhp at 170 rpm. Electrical supply is derived from three diesel driven alternators and a shaft generator of 400 kW, in addition to an emergency unit of 96 kW. Capable of carrying two cargoes simultaneously, such as anhydrous ammonia and butane mixtures, the ship is able to travel at a service speed up to 15 knots.

Circle 47 on Reader Service Card

Main Particulars

Flag	U.K.
Length, o.a.	354 ft. (107.9 m)
Length, b.p.	323 ft. (98.4 m)
Breadth (molded)	52 ft. (15.7 m)
Depth (molded)	27 ft. (8.2 m)
Draught designed	20 ft. (6 m)
Main engine	Hyundai - B&W
Manufacturer	Hyundai Shipyard
Output MCR	4,750 bhp x 170 rpm
Main engine - driven alternator	Nico
Output	400 kW
Diesel driven alternators	
Engine make	Commins
Alternator make	Stamford
Output	472 kW
Cargo tanks	IGC
Cargo pumps	Svanehøj
Radars	Furuno

Ysselwerf Delivers Vessel To Simon Møkster Rederi

YVC Ysselwerf delivered the platform supply vessel, Stril Supplier, to owners Simon Møkster Rederi AS of Stavanger, Norway.

Stril Supplier was the first YVC newbuilding delivered at the former Wilton Fijenoord Schiedam.

The final outfitting was carried out in the graving dock at Schiedam, which has recently been renamed "Rotterdam United."

Circle 49 on Reader Service Card

Main Particulars

Classification	DNV
Flag	Norwegian
Length, o.a.	275 ft. (83.7 m)
Length, b.p.	250 ft. (76.2 m)
Breadth (molded)	65 ft. (19.7 m)
Depth (molded)	24 ft. (7.4 m)
Depth (shelter deck)	34 ft. (10.4 m)
Draft (max)	20 ft. (6.1 m)
Corresponding DWT	4,300 tons
Speed	15.5 knots
Main engines	Caterpillar
Power	1,900 kW @ 1,800 rpm
Propellers	Aquamaster
Power	2,200 kW @ 1,200 rpm
Fuel oil, cargo capacity	1,167 cu.m
Fresh water	1,068 cu.m
Ballast/drill water	1,222 cu.m
Dry bulk	400 cu.m
Liquid mud	643 cu.m
Brine	635 cu.m
Base oil/methanol	222 cu.m
Passengers	4

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FDS: A unique answer to the deepwater projects needs

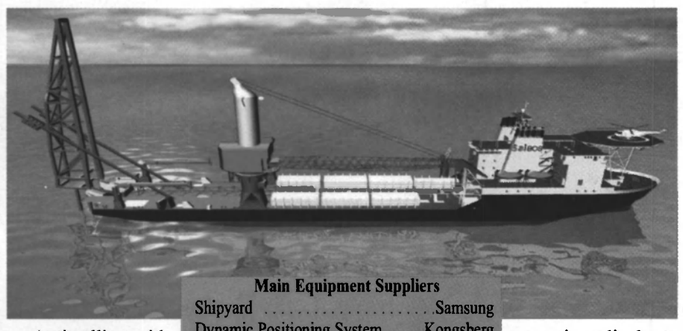
A thorough analysis of the offshore projects in development in West Africa and South America showed the evolution from the traditional water depths to deep waters. Bourgues Offshore and Saipem, through their common subsidiary SAIPOS (50/50) decided to invest in a vessel designed for this new challenge. As soon as the agreement between Bourgues Offshore and Saipem was finalized and the cost determined, $150 million each, the engineering subcontract was placed with SHIFFKO Gmbh. The project schedule began with the basic engineering in 1997; the engineering subcontract was placed in March 1998. All the main equipment orders were issued at the end of 1998, including the shipyard order in December 1998. The vessel will be available in September 2000.

The FDS is a multipurpose crane and pipelaying DP construction vessel; the three main criteria, which have driven the development of this project, are as follows:

- Capability to develop offshore oil and gas fields in depths to 3,000 msw.
- Capability to lift and transport on deck heavy subsea and surface modules and equipment.
- Capability to transit between the construction sites at a cruising speed of 14 knots.

The ship is being built according to codes SOLAS / ILO / MARPOL with a DNV classification +1A1 (EO - DYNPOS - AUTRO - DSV II / III SF - HLDK SH - ICE C) and is compliant with Norwegian, U.K. and USCG for foreign flag vessel regulations.

The FDS has been designed for particular sea conditions in the South Atlantic. The tests carried out are very promising and confirmed the good behavior of the vessel. The natural period of the ship is 15 seconds in pipelaying mode, which is above the swell period encountered in the areas where the vessel will be mostly working. The J-lay operation roll has single maximum amplitude of five degree and the main crane operation angle is two degree. All the operations and characteristics are possible thanks to the following systems ensuring the stability:



Main Equipment Suppliers

Shipyard	Samsung
Dynamic Positioning System	Kongsberg
Diesel Engines	Wartsila
Thrusters	Lips
Main Crane, J-Lay Tower	Amclyde
Auxiliary Cranes	Liebherr
Winches	Imeca
Firing Line Conveyors	Remacut

- Anti-rolling with two span Bilge keels of 1.24 m.
- Ballast system installed with two 300 CM/hr. electric pumps.
- Crane compensation by utilization of eight 1,500 CM/hr. Electric pumps.

The total sea water ballast capacity is 11,539 CM including the 2 x 1,276 CM (on each side) for the crane ballast itself.

The vessel is 516.7 ft. (157.5 m) long and 98.4 ft. (30 m) wide and has an operating displacement of 25,300 tons and a payload capacity of 4,300 tons. The operating draft is 24.2 ft. (7.4 m) with a depth of 40.7 ft. (12.4 m).

A total installed power of 25 MW produced by diesel driven generators in 6.6 KV is distributed to all user motors in the vessel; in particular to the six thrusters: two stern thrusters for DP and sailing; two fore thrusters azimuth and

retractable for DP; two bowthrusters in tunnel for DP.

The vessel is designed to accommodate an optional thruster in order to increase the operational bollard pull from 50 MT to 80 MT, if it appears to become necessary in the future. State of the art equipment has been chosen and installed based on proven technology. The DP capacities are:

- In pipelaying mode DYNPOS AUTR, DNV DP II, with 50T bollard pull at sea state 5 and a current of 1.5 knots all acting abeam
- In subsea mode DYNPOS AUTRO, DNV III, without bollard pull with the same other conditions.

The capacities are such that the vessel has autonomy well above 30 days; this characteristic is important considering the sites of operation and the opportunities to work on both sides of the Atlantic Ocean. The cruising speed of 14 knots allows the vessel to move rapidly from one site to another.

Quad joint strings prepared on the firing line (52 m length maximum) will be installed through the J-lay tower in friction or collar mode, with a hang off clamp at the bottom and a traveling clamp to allow the transit of the string in the tower. The tower is designed for 400 MT tension with a tilting angle of 45 to 96 degrees; however, this maximum tension capacity is expected to be used only in emergency case (for recovery of flooded pipes for instance), limiting the required tension to 320 MT in normal use. Preliminary calculations show that such tension allows the laying up to 2,000 msw for pipes in the range of 14 to 16-in. The tower itself is designed for pipes up to 24-in. outside diameter.

The firing line is organized on the deck to assemble the quad-joints strings in five working stations for welding, NDT and coating. The large space on deck (3,000 sq. m.) is available for storage of standard pipe joints (12 m) or onshore-prepared quad-joints for pipe-in-pipe flowlines or special steel. Large capacity and heavy racks are loaded without any external help thanks to the main crane capacity.

Installation of flexible pipes (up to 17-in. ID) is executed through the J-lay tower or a chute with the use of four pad tensioners (maximum of three).

Combined installation of several pipes or pipes and umbilicals in parallel is one of the characteristics of the vessel, as it can be deducted from the description here above the design of the vessel for the pipelaying has been developed in order to install every type of pipe and umbilical, commonly used in deep water fields; the number of vessels on site being therefore limited to the FDS itself.

Keeping in mind this criteria and in order to have the possibility to work in autonomous mode the lifting capability of the FDS is very interesting:

- One main crane of 600 MT at 30 m and 300 MT at 55 m;
- Two 30 MT auxiliary cranes;
- Two 20 MT auxiliary cranes.

With such characteristics, handling and lifting of pipes and racks on board, modules installation on FPSO or on any floating units (SPAR, TLP etc...), temporary decks or module support frames as well as installation of mooring systems can be executed.

The lifting and handling capabilities are increased by the utilization of the A&R winches (400 MT to 3,000 m WD or 600 MT to 1,500 m WD) and an auxiliary winch (100 MT) associated with a specific portside modules handling tower to allow for safe transfer and installation of modules from deck to sea.

10 Significant Marine Innovations

The Use Of Standard Low Voltage Motors In New Dutch Frigates

With defense budgets under increasing pressure, the Royal Netherlands Navy is using many standard commercial components in its new Air Defence (and Command) Frigates, the largest fighting ships in the Dutch armed forces and an advanced area air defence force. The first ship of four is currently under construction at Schelde Shipbuilding in Vlissingen, Holland, due for delivery in 2002. One of the more interesting developments is the use of standard ABB aluminium motors to drive many essential functions onboard. This includes pumps for the delivery of fuel and chilled water for water-cooled equipment, crucial for the ship's survival. After stringent tests, the shipyard

and the Navy have concluded the ABB motors are adequate for the duty.

"We work to military standards but use commercial standards whenever we can. Sometimes we take test certificates at face value; sometimes we perform our own test. At the end of the day, it is down to what level of risk we can accept," says **Michel Janssen**, Head of Design Group II at the Royal Netherlands Navy.

A major concern during procurement was to find motors able to withstand vibration and shock, which may come about as a result of enemy fire.

The shock resistance will also serve to

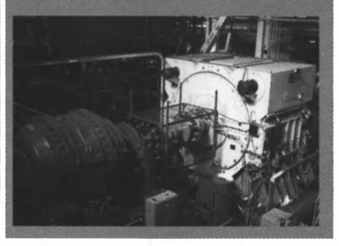
(Continued on page 114)

Integrated Power System Dubbed Technical Revolution

The U.S. Navy has introduced a new ship's propulsion project which promises to offer new insights to innovative power solutions well into the next century. Dubbed Integrated Power System (IPS), it was introduced last month at the Carderock Division's Ship Systems Engineering System (SSES) in Philadelphia.

Benefiting the Navy, as well as the marine industry, the resourceful invention will work as a developmental test bed for the electric ships of the new Millennium. The new architecture of the IPS encompasses electric power generation, distribution, con-

(Continued on page 116)



Cargo Handling:

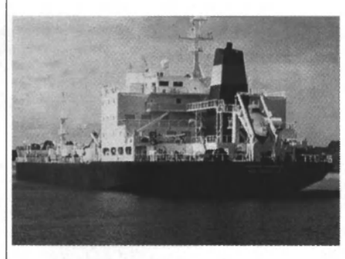
Molten Sulphur Tanker Sails Four Years Sans Freeze-Ups

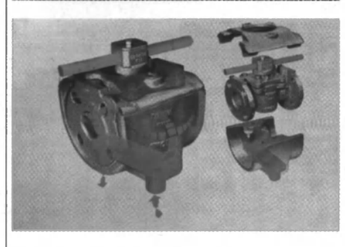
The operator of the world's largest and most modern molten sulphur tanker has enjoyed four years of near-continuous service thanks in part to the ship's innovative thermal maintenance system. Sulphur Carriers, Inc., a subsidiary of International Shipholding Corporation, keeps M/V Sulphur Enterprise at sea hauling around 24,000 long tons of molten sulphur per trip. "We've had zero freeze-ups and zero maintenance associated with the bolt-on piping and valve heating system," says **Peter Johnston**, Sulphur Carriers' VP of operations.

For reportedly the first time on any sulphur transport ship, a bolt-on heating system keeps the molten cargo flowing and the ship on schedule by preventing costly delays due to frozen pipes and valves. The innovative thermal maintenance system was engineered and built by Controls Southeast Inc., of Charlotte, N.C. Frozen lines and the resulting delays in loading and unloading can be very costly in lost transit time and additional port charges.

All the cargo-carrying pipes and valves aboard Sulphur Enterprise are surrounded by bolt-on oil-circulating ControTrace pipe heating elements and ControHeat valve jackets from CSI. Yet despite a harsh marine environment and a non-stop schedule, the bolt-on system has required neither repair nor replacement since the ship was launched. More important, it has eliminated the constant maintenance and frequent freeze-

(Continued on page 130)





TOP: The M/V Sulphur Enterprise carries about 24,000 tons of molten sulphur from Louisiana and Texas to Florida. A sophisticated thermal maintenance system with bolt-on heating elements from Controls Southeast Inc. keeps the molten cargo flowing for loading and discharge.

BOTTOM: ControHeat(thermal maintenance modules from Controls Southeast Inc. keep valves open aboard the M/V Sulphur Enterprise. The maintenance-free bolt-on modules keep molten sulfur at 278°F.

Innovative Longliner Helps Redefine Market

The Innaves designed longliner features many advanced, cost saving features.

Under the auspices of the European Eureka Program, under the Halios Project name, Spain's Innaves has designed and built a new longliner design which reportedly offers many innovative technological advantages.

The Halios longliner has now been in successful operation for about a year. Innaves designed the ship top to bottom, including hull forms, the automated longlining system, the modified atmosphere in the holds for improved catch preservation, and the diesel-electric propulsion.

From the initial shipshape, it's easy to see that this ship is different.

As opposed to the traditional U forms incorporated for fishing ship designs in recent years, the Halios ship features a V form, giving it advantages in seakeeping and speed. It's bulbous stern optimizes wake distribution.

For smooth vessel operations, the task of longline stowage, replacement of damaged branch lines and baiting operations have been automated.

The Innaves system also is designed to automate bottom longlining with a monofilament main line, long monofilament branch lines and precision hook-baiting. The automatic system not only aids safety goals, but effectively eliminates six crew members.

Based on its shape and demanding operational requirements, the vessel demanded a rugged propulsion solution. Once in the fishery, the ship runs at high speeds while paying out longline.

While hauling in, the vessel advances at between one and two knots, normally upwind, with often a need for greater power to retrieve broken tackle.

The Innaves designed solution includes a power system that during longline inhauling operations (approx. 18 hours per day) employs diesel-electric propulsion obtained from one genset. The genset powers a 110 kW alternate current motor through a frequency converter by vectorial control of the armature, which drives a PTO from the reduction gear.

Starting in March, Innaves began conducting extensive demonstrations of the system, with the financial backing of the FEDER funds and the European R&D Framework Plan (FAIR Program). A professional ship will be commissioned and the needed equipment installed to compare the improved effectiveness of the new systems and the traditional methods.

Circle 38 on Reader Service Card

Medium Speed RoRo Passenger Catamarans

Over the last decade, while the marine industry has been focusing totally on the fast ferry scene, one Australian company has been developing a full range of medium speed RoRo passenger catamarans from a 30-car capacity to 1,500-car capacity, including truck capacity, and speeds of 15 to 20 knots.

These designs come from the Sea Transport Corporation, whose Naval Architecture division, Sea Transport Solutions (STS), totally focused on an economic alternative right between the choice of fast and conventional ferries. They became aware that a stated deadweight of RoPax vessels, when under closer scrutiny of the Stability book, particularly the limiting criteria of the arrival port condition, highlighted a maximum Revenue Deadweight (or payload) considerably less, sometimes down as far as 50 percent of the total stated deadweight.

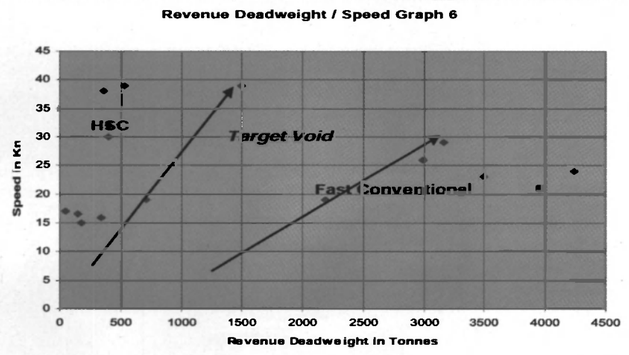
Group CEO, **Stuart Ballantyne**, said that after extensive investigations of the Revenue Deadweight of existing fast and conventional designs, most conventional and fast ferries have a revenue deadweight or payload of approximately 25 to 35 percent of the vessel's lightship weight. When plotting revenue deadweight against service speed, there appeared to be an interesting "target void" between the high speed and conventional vessels.

While *Maritime Reporter* covered the developments in lightweight materials and improvements in vessel deadweights in the May 1999 edition, STS have investigated the aspect of revenue deadweights and speed and plotted the graph.

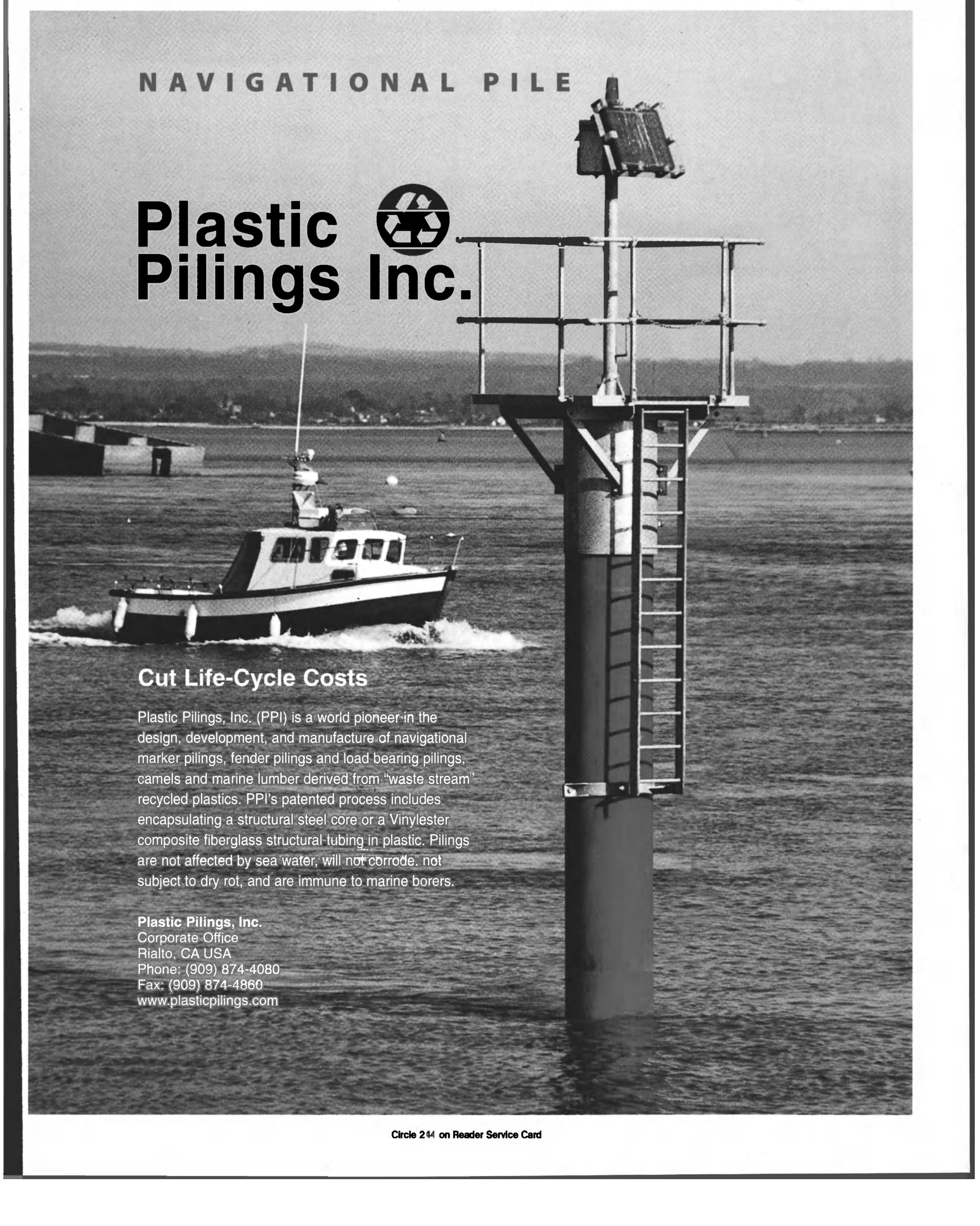
As can be seen, the high speed craft designers are attempting to get more Rdwt and the conventional designers are focusing on getting more speed. highlighted during last month's Cruise and Ferry Conference in London, Kvaerner Masa's design chief, Kai Levander, highlighted this incremental push for speed by conventional RoPax vessel owners.

Ballantyne's STS team focused on the "target void" and a solution to fill the

Plot the Rdwts and service speeds of current Ropax designs



In examining the speed and capacity characteristics of the existing ferry fleet, Stuart Ballantyne found a "target void" which he seeks to fill with his innovative RoPax design.



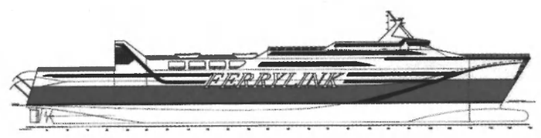
Circle 244 on Reader Service Card

125S Medium Speed Cat

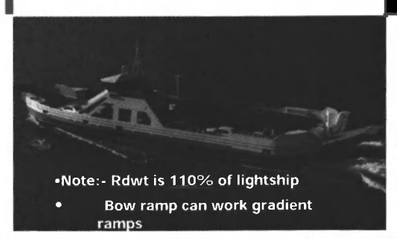
STS design 22knots with 3300 Rdwt

•125 x 35 x 4.8draft, 4 x 3500kW

•3673m2 main deck (truck axle) •5300m2 car decks



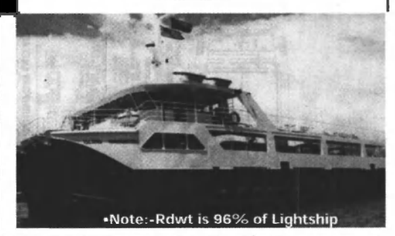
"M.V. Seaway" - 41m Roro/Pax Catamaran
•Rdwt 173 tonnes, service speed 15 kn



•Note:- Rdwt is 110% of lightship

• Bow ramp can work gradient ramps

"M.V. Island Navigator" - 39m Roro/Pax Catamaran



•Note:-Rdwt is 96% of Lightship

gap. Its obvious basic design ingredients had to be:

- Eliminating salt water ballast totally;
- Lightweight (aluminum and GRP composite) superstructures;
- Sticking to a steel/high tensile steel hull, for less capital cost and ease of repair and maintenance in outlying regions;
- Good seakeeping, particularly in head seas;
- Alternative speed range for low and high season market demands; and
- A better Rdwt as a percentage of lightship.

The STS design result was a catamaran hull which achieved Rdwts of 85 to 110 percent of lightship. These craft are designed with almost a SWATH forebody, a catamaran afterbody, quadruple screws, aluminum superstructure, aluminum ramps, watertight doors and engine hatches. For rough water areas, there is a high bow arrangement and forward accommodation, and for inshore areas the superstructures are generally positioned off center on one side of the vessel.

The center lanes were designed for truck axle loadings and the side lanes only for car axle load. Sea Transport Solutions point out that there are so many RoPax vessels around the world with full truck axle loads throughout their vehicle decks, without the available stability to use it, so in effect the operator is just carrying weight for no good reason.

The following is the profile of the 200 x 63 ft. (60 x 19 m) STS cat and with a draft of 8 ft. (2.5 m) can carry 450 tons of vehicles at speeds up to 20 knots.

Inshore Waterways Solutions

For the demands of partially sheltered waters and areas with little or no facilities, a shallow draft (4.5 ft. [1.4 m]) design range was developed. These craft had scarphed bulbs and incorporated a two piece aluminum bow ramp which could beach directly on to shallow gradient boat ramps — a big plus for start-up ferry operations which do not have the capital required for shore linkspans. The vessel shown below operates from Brisbane to North Stradbroke Island at an impressive speed of 17.5 knots maximum, and 15 knots service. A sister vessel is operating in New Zealand from Auckland to Waiheke Island. They can

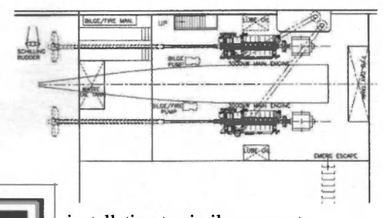
carry 42 cars or a combination of cars and trucks.

Propulsion

The quadruple screw arrangement gives a total redundancy package where a master is usually happy to take a ferry into operation with three out of four engines available. This, of course, cannot happen when the vessel loses one out of two engines. The four small engines also make the machinery replacement easy, and a fifth engine for rotational maintenance makes sense.

As pointed out by STS, while the cost of four small engines is actually cheaper than two larger units of the same aggregate power, the extra cost of the stern gear, engine mounts, exhausts, etc., actually brings the cost of a quadruple installation to similar amounts.

125S Port Engine Room



The rapid acceleration and deceleration in a four propeller configuration also gives added incentive to operators who are chasing tight schedules. For night freight runs and low season operation, two engines can be shut down. CP props are designed for the larger versions with alternator close coupled to the main engines for powering bowthrusters.

Access to the machinery spaces on the STS designs is by spiral staircases on each quarter of the vessel, utilizing the dead space that vehicles cannot maneuver into. This configuration results in an easy access to a spacious engine room which also houses the steering gear and auxiliaries. A one stop shop for the duty engineer. The centerline girder also incorporates an escape access from one engine room to the other, well above the cross flooding level. Fuel tanks are incorporated in the centerline structure in saddle tank arrangements and incorporated into the higher axle loading areas. Forward fuel tanks in the lower part of the hulls also give the designs some trim capability.

The STS range of catamaran designs incorporates full compliance to the latest RoPax stability rules, including compliance to the Stockholm rules.

Remote Island Service

South Australia has had two of STS' 120 ft. (37 m) designs operating across the very rough patch of water between the mainland and Kangaroo Island since 1984, with an impressive weather downtime of less than one percent. These vessels, the Philanderer 3 and Island Navigator, had a very positive impact on the local economy since starting in 1984, creating a reliable daily link and establishing a healthy commuter and tourist trade. During this time, several high speed ferries have started in competition and all reportedly have failed.

The STS philosophy of designing around regional and outlying economic parameters has resulted in a very interesting range of designs, which now have been sold to 21 countries. Many organizations are now realizing that fast ferries — with higher R&M costs — may not have necessarily been the right solution for a given route. The STS range offers an interesting alternative.

Circle 99 on Reader Service Card

Design Modification Could Save RoRos

As the debate regarding the survivability [illegible] es on. two researches last [illegible] claimed that curved car decks [illegible] mprove safety. The researcher[illegible] n the University of Strathclyd[illegible] a Royal Institution of Nav[illegible]ects competition to make shi[illegible] said curved decks could m[illegible]o ferries more stable. The r[illegible] have reportedly produced two designs which they claim would prevent water from getting onto the car deck and capsizing the ship as it did in the Zeebrugge and Estonia disasters.

Earlier studies have shown that the decisive factor affecting RoRo damage survivability is the water accumulated on the main deck.

The first design is a Roro deck with a positive sheer and a positive camber, calling for the deck at the bow and the stern to be three ft. (1 m) higher than in the middle of the ship. The cross section is convex with the center about 7.8 in. (20 cm) higher than the sides. If the ship was holed the design would limit the amount of water coming in and maintain the list of the ship, the researchers reason. In the case of damage forward or aft, the increased freeboard resulting from the deck sheer would ensure that less water reaches the RoRo deck.

The alternate proposal — a RoRo deck with negative sheer and negative camber together with intelligent wash ports — has a deck that is higher in the middle than at the bow and stern with a convex cross section. Intelligent Wash Ports (IWP) are freeing ports with flaps, which passively allow only water outflow, their opening or closing depending on the pressure difference on either side of the flap. The use of IWP has been considered and abandoned on the basis of inconclusive research showing that the overall area of the freeing ports necessary to ensure effective outflow would be too large to offer an attractive solution. The idea is to minimize the area of opening of the IWP by utilizing again a curved RoRo deck. Negative deck camber assists in water accumulating near the ship's centerline, helping to reduce the ship heeling and increasing chance of survivability.

The Ship Stability Research Center was established in January 1997 at the University of Strathclyde in response to concerted efforts by the international maritime industry to adopt scientific approaches in dealing with ship safety. The center is part of the Department of Ship and Marine Technology, and comprises 30 researchers. The center has forged long term partnerships with a number of key industry players, including Color Line, P&O Ferries, Caledonian MacBrayne, Stena Line, P&O Stena, DFDS, Irish Ferries, TT Line, Viking Line and Silja Line.

Ulstein develops pulling propeller

A new propulsion concept using pulling propeller technology is under development at Ulstein Propeller, and units of up to 6 MW are intended for applications including offshore and merchant tonnage

Ulstein Propeller has begun a project to develop a pulling propeller design for use with azimuthing and tractor drive units. The maximum rating of the new pulling propeller will be 6 MW and it will utilize a traditional gear wheel transmission. Although this is recognized as a significant development in the industry it is not a new concept to Ulstein Propeller. Previously, the company successfully developed and marketed its Speed-Z design of high-speed pulling propeller unit. This latest project builds on the company's experience in developing the Speed-Z and extends its application to larger commercial tonnage, including cruise ships and offshore vessels. The new pulling propeller is also expected to generate interest in naval markets where its inherent low noise characteristics should offer notable advantages.

Ulstein Propeller's target is to fully exploit the advantages of the pulling propeller working in association with a vertical drive strut aft of the propeller. There are a number of advantages in having a propeller in pulling mode rather than the conventional pushing mode.

By removing the gear drive or shaft supports from in front of the propeller, the pulling propeller is able to operate in a optimum and near homogeneous water flow. Efficiency is thereby increased significantly.

Locating the propeller forward of the support strut will also contribute to reduced wear and tear, because the dynamic thrust and torque is of a completely different magnitude to the conventional pushing propeller's imperfect wake created by the forward support strut. Propeller efficiency is still affected by the strut aft of the propeller. But its effect on total propulsion efficiency can be reduced by taking full advantage of the aft strut by designing its profile to counter rotational losses induced by the propeller. This will utilize the energy in the swirl aft in the propeller slipstream to create thrust in the same direction as the propeller thrust.

By adopting the pulling propeller concept, **Rune Garen**, research and development manager at Ulstein Propeller, believes that efficiencies can be increased by as much as 10 per cent. "Such an improvement is considerable by any modern day standard," says Mr Garen. "Already, evidence suggests an eight percent improvement is attainable but, by optimizing the hydrodynamic interactive package of propeller design and aft support strut, close to 10 percent must be a realistic target".

Speed-Z provided Ulstein Propeller with valuable experience in the design of pulling propellers. Ulstein learned that there is a very interesting interaction between the slipstream and the vertical strut, and that when the propeller is working in an almost homogeneous inflow; noise, vibration and dynamic torque are very low.

Ulstein has already commenced preliminary design of the new propulsion system and has begun analyzing the flow around the strut and the pod. Viscous CFD calculations will then be carried out and verified by model tests. The next phase will be to build and test a full-scale prototype by the end of next year.

10 Significant Marine Innovations

Building It Up & Tearing It Down

Master Maritime AS has developed a new type of offshore construction and decommissioning vessel. The concept is based on a column of a stabilized heavy lift vessel (HLV) which is able to handle topsides of up to 20,000 tons in one piece.

The vessel, which is currently in the design stage with negotiation for construction underway, is designed to be self-propelled and outfitted with a dynamic positioning system.

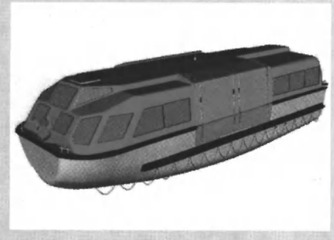
The HLV is moored vertically to suction anchors, deployed by the vessel, and the tie-down system is pre-tensioned in order to eliminate roll, pitch and heave motions during load transfer operations offshore. Load transfer of topsides are performed by ballasting, alternatively de-ballasting of the HLV.

Two 1,200-ton capacity cranes are employed for offshore construction and dismantling work. In addition to its primary tasks, the vessel could also be employed for pipe laying from reel (10,000-ton capacity), installation of cables and umbilicals, subsea installations and removal of templates and manifolds, well intervention and salvage operations.

Circle 39 on Reader Service Card

Space Saving Cruise Tender Introduced

Umoe Schat-Harding launched its new compact, high-capacity cruise tender which reportedly offers cruise ship operators a cost- and space-saving alternative. The CTL1200 cruise tender can accommodate 100 passengers when used as a tender, or 150 when used as a lifeboat. Meanwhile, the boat measures just 39 ft. (12 m) long and 14.7 ft. (4.5 m) wide. According to **Arne Dybvik**, the company's marketing director, Umoe Schat-Harding has already received four orders for the CTL1200.

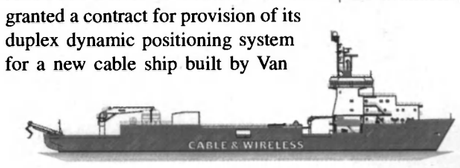


The CTL1200 can be boarded in the stowed position, and has the standard Schat-Harding comfortable, functional and high standard interior. Installed as a package with Schat-Harding's UNIC rolling pivot davit system, it will reportedly meet all Panama Canal requirements. The company stressed that the new unit will not replace the very successful CTL38 model.

Circle 35 on Reader Service Card

ALSTOM Awarded Contract By Van der Giessen de Noord

The marine and offshore division of ALSTOM Drives & Controls has been granted a contract for provision of its duplex dynamic positioning system for a new cable ship built by Van der Giessen de Noord.Chosen for its higher levels of reliability and efficiency, the system will allow for a supplementary level of redundancy and higher DP availability. If one system falls short, an alternate will automatically take over so that the vessel may continue to operate. The newbuild Bold Endeavour will be operated by Cable & Wireless Global Marine worldwide.



Circle 32 on Reader Service Card

STN ATLAS Nabs Orders For Ship Control Centres

Based in Hamburg, Germany, STN ATLAS Marine Electronics has received orders for eight more of its Ship Control Centres (SCC's) from shipyards in China, Finland and South Korea.

The most recent order to date covers systems for three 65,000-gt container vessels being constructed by Samsung for delivery later this year. STN is also working on a project for Orient Overseas Container Line, with an additional two SCC's slated for installation aboard chemical tankers built by Hanjin Heavy Industries for Bakri Navigation.

Circle 4 on Reader Service Card

Trio Of Subsidiaries Complete Repair And Maintenance

Three subsidiaries of United States Marine Repair (USMR) — Southwest Marine (SWM), San Francisco Drydock (SFD) and NORSHIPCO have concluded repair and maintenance projects on three of the cruise ship industry's forefront vessels.

Refurbishment began with Royal Caribbean's M.V. Viking Serenade. Drydocked at SWM's San Diego location from April 12 to 18, work included rudder repair, sea valve and shaft inspection, and repainting of the ship's bottom.

San Francisco Drydock, USMR's Bay Area shipyard, revamped Carnival Cruise Lines' Elation from April 11 to the 23rd. A member of Carnival's Fantasy class, the 70,390-grt vessel is one of the largest in the world with a length of 855 x 118 ft. (260 x 35.9 m).

In addition to routine drydocking, Elation underwent standard inspection and warranty repairs on its fin stabilizers and Azipod propulsion units.

Recently acquired by USMR, Norfolk, Va.-based NORSHIPCO concluded its routine overhaul and reinstallation of three generator engines on Royal Caribbean's Enchantment of the Seas. From March 2, - April 27, the vessel received structural work in its chain lockers, inspection of sea valves and piping modification, as well as hull cleaning and repainting.

Circle 3 on Reader Service Card

Seay Corporation Garners Tractor Tug Deal

Seattle-based marine management company, Seay Corporation was granted a contract to supply two tractor tugs for the U.S. Navy operation in Diego Garcia, Indian Ocean. Built in 1998, the vessels measure 95 ft. (28.9 m) and are powered by Niigata engines with ZP-21 Kaplan steerable propeller nozzles allowing for 45 metric tons of bollard pull.

CDI Submits Letter Of Intent For Marine Support Services

CDI, a Gulf of Mexico Subsea Contractor has issued a Letter of Intent to U.K.-based C-Mar Services for the stipulation of Marine Support Services for the company's fleet of vessels.

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- 23% fuel savings
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- 10.68% more bollard pull
- 7.69% more bollard pull astern

COMPARE TO KORT Type 19A NOZZLES:
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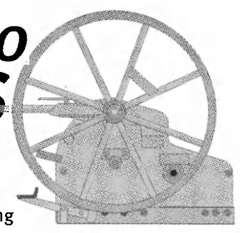
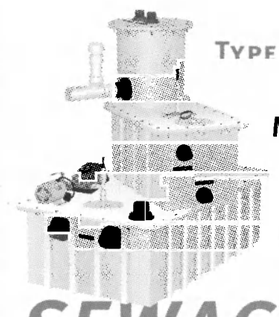


THE HUMPHREY

TYPE II



- low maintenance
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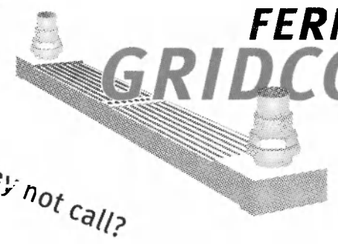
- significant weight savings

FERNSTRUM GRIDCOOLERS



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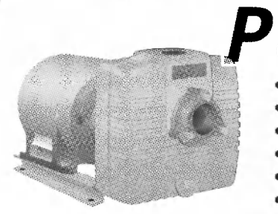
75 man	11,160 gpd	**MODEL 10D**	I.M.O. / USCG certified

SEWAGE TREATMENT

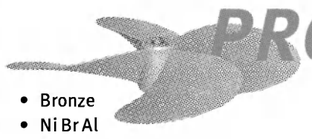
PUMPS



- straight centrifugal
- self-priming centrifugal
- electrical drive
- hydraulic drive
- mechanical drive
- close-coupled
- long-coupled
- constant-pressure
- cast iron
- bronze
- stainless steel
- aluminum
- plastic
- custom pump packages

- fire
- bilge
- ballast
- trash
- waste
- sewage
- oil/fuel transfer

PROPELLERS



Why not call?

- Bronze
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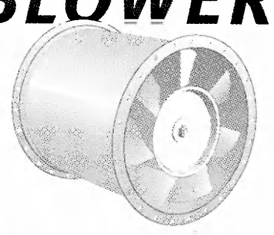
- Stainless Steel

BLOWERS

Why not call?



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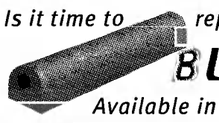

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Circle 341 on Reader Service Card

Hakodate Completes Log/Bulk Carrier For Diamond Camellia

The Hakodate Dock Co. Ltd. completed construction of the 31,762-dwt log/bulk carrier, Century Forest, for Diamond Camellia S.A. The vessel is a new handy-size bulk carrier, exceeding the capacity of the previous handy size of 28,000-dwt.

The ship was designed with a shallow draft in comparison to other ships with similar cargo loading capacity. The Century Forest can maintain sufficient stable condition without any ballast water in tanks during full load conditions of 6,041,931 S.C.R. logs in holds and on decks.

Liberian Government, Affiliates Settle Registry Disputes

The Government of Liberia (GOL), IRI and its Affiliates and Liberia International Ship & Corporate Registry (LISCR) signed a settlement in May resolving all outstanding disputes between LISCR, IRI and GOL subject to the performance of specific terms and conditions.

New M D Takes Over At Permea

Per Svein Flø has joined Norway's Permea Maritime Protection, a division of Air Products A/S as its managing director. Flø replaces **George E. Lewis** who has departed to assume a position at Allentown, Pa.-based Air Products & Chemicals.

CMS Accepts Delivery of Tan'Erliq

Crowley Marine Services received delivery of Tan'erliq — the second of two new 10,192 hp tractor tugs from Crowley Maritime Corporation subsidiary, Vessel Management Services. Measuring 155 ft. (47.2 m), Tan'erliq and her sister vessel Nanuq are the largest and strongest of the cycloidal tugs. The tugs, which together form the Prince William Sound Class, have specifically designed and developed form CMS under contract with Alyeska Pipeline Service Company for tanker escort and spill response operations in Valdez Harbor and Prince William Sound, Alaska.

Designers & Planners Opens New Office

Designers & Planners, Inc. (D&P), a wholly-owned subsidiary of British Maritime Technology Limited, has opened a divisional office in Houston, Texas. Specializing in naval architecture, marine engineering and environmental consulting, the Arlington, Va.-based firm hopes to expand into the commercial shipbuilding, and offshore oil and gas markets. **Eric Powell**, a naval architect who was previously a supervisory engineer for a new dredge construction project in Southeast Asia, will serve as manager of the new office.

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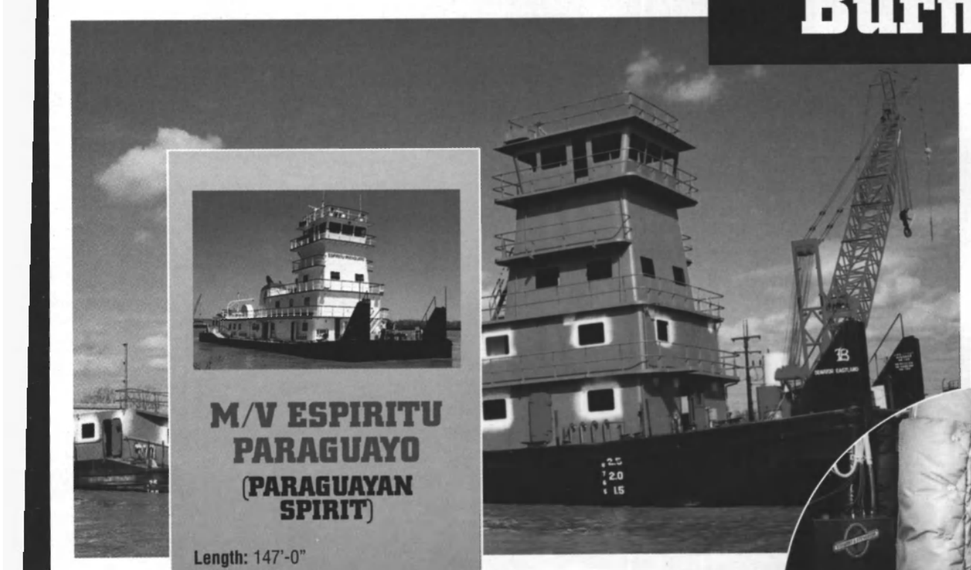
PRS Relocates Office

The Piraeus Branch Office of Polski Rejestr Statkow (PRS) has moved to:Aghiou Nikolau 5-7, Piraeus effective this May. New telephone and fax numbers are: +30 1 45 28 320 and +30 1 45 85 845, respectively.

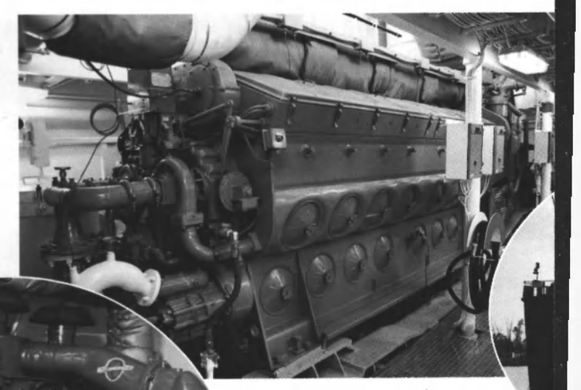
Out of the Ashes

Burned out hull gets

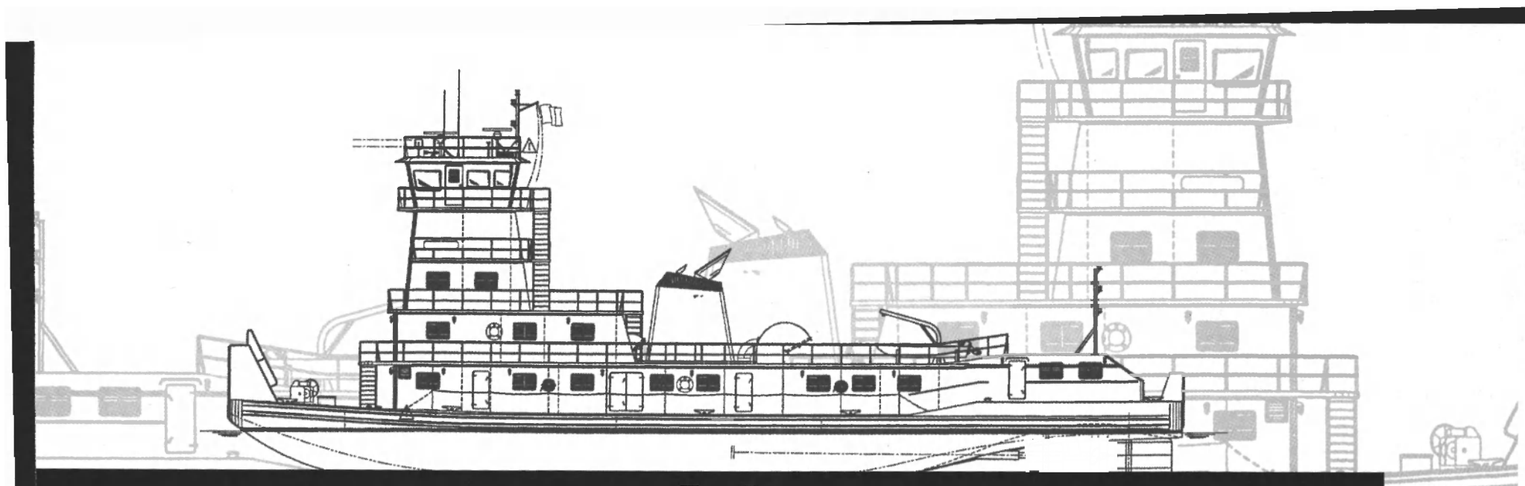


M/V ESPIRITU PARAGUAYO
(PARAGUAYAN SPIRIT)

Length: 147'-0"
Beam: 38'-6"
Depth: 10'-6"
Draft (full load): 8'-6"
Fuel Capacity (approx): 120,000 gallons
Main Engines: Two (2) EMD 16-645E4C 2720bhp@800rpm
Total hp: 5,440
Marine Gears: Two (2) Lufkin RHS 3020 Ratio 3.75 to 1
Generators: Two (2) Detroit Diesel 8V71 99KW
Standby Generator: Detroit Diesel 4-71 50KW
Propellers: Two (2) 102" Bollinger 4 Blade SS
Steering Rudders: Two (2)
Flanking Rudders: Four (4)
Quarters: Officer (4); Crew (12); Guest (2)
Home Port: Asuncion, Paraguay
Built: Halter Marine—Lockport, LA



ARTIST'S RENDITION



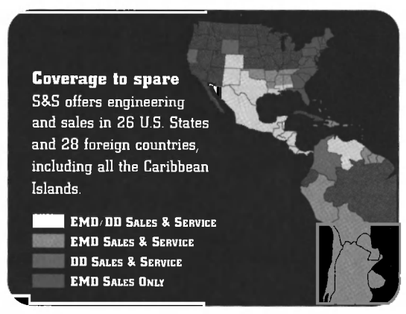
new power, new life, new mission

Ten Years Ago, the towboat **Senator Eastland** burned on the Arkansas River. After the fire, the hulk was towed away, the deckhouse and machinery were removed, and the hull was painted and stored.

Flash forward to 1997. Stewart & Stevenson purchased the old hull, together with new rudders and propeller shafts, and the old propellers. S&S concluded it could rebuild and repower the vessel as a 5400 H.P. towboat.

S&S subcontracted with Halter Marine, Inc. to do a detailed design and to repair the hull, then complete the boat like an all new boat. The hull was towed to Halter Gulf Repair in New Orleans, a Halter repair yard, where it was dry-docked. Audio gauge readings of the hull showed the hull to be in like new condition.

So work began. The gridcooler boxes were changed or added, and the generator channel coolers were lengthened. New bearings, sea chests, a water maker and strut barrels were installed. The propeller shafts were installed and a new pair of stainless steel, four-blade propellers with 90% developed area ratio were installed. New rudders and new Fernstrum gridcoolers were installed, and the hull was sandblasted and painted. The hull was re-floated and towed to Halter Marine, Inc. in Lockport, Louisiana.



While the hull was at Halter Gulf Repair for three months, work was proceeding on the deckhouses at Lockport. When the hull arrived, the interior was prepared for some changes and the machinery was installed. A pair of Lufkin Model RHS 3020 reverse-reduction gears in ratio of 3.75 to 1 were installed, then a pair of remanufactured EMD 1 6-645EC turbocharged engines were installed to produce 2720 hp each at 800rpm. Two Detroit Diesel 8V71N, 115 KW generator sets were installed.

Renamed **Espiritu Paraguayo** (Paraguayan Spirit), this new vessel has high horsepower and generous crew capacity. It will operate on unmarked river sections with no shore electricity available, where it must lay over at night. The deckhouse is unusually tall (49 feet eye level) to provide the greatest viewing advantage. This is possible because there are no low bridges where the boat will be in operation. As might be expected, redundant fire control features are in place as well.

Following sea trials in March, 1999, the vessel was loaded onto a semisubmersible boat for transportation to Paraguay. Stewart & Stevenson is delivering it to Navegacion Paraguaya Americana, S.A., a company affiliated with the South American barge line ventures of Allen Mott. This is the third towboat purchased by Mott from S&S, and the fourth towboat powered by Electro-Motive Division of General Motors (EMD) engines by S&S for Mott and Associates.

Stewart & Stevenson engines were chosen to power these new vessels because our DDC and EMD engines have given many years of reliable service at home and abroad. Let us show you how S&S can provide economical and reliable power to bring new life to your vessel.

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Circle 278 on Reader Service Card

KHI Finishes Handymax Bulker Tanghai For COSCO

Kawasaki Heavy Industries Ltd. (KHI) has completed the Handymax size bulk carrier, Tonghai for COSCO Bulk Carrier Co. of China. The ship is the flat deck type with a forecastle and has five cargo holds, and four 25-long -ton deck cranes installed between hatches along the center line, which allow cargo handling at ports with poor cargo handling facilities. Tonghai will be transporting mainly cereals, coal, ore, packaged lumbers and steel products.

Main Particulars

Classification	ABS
Length, o.a.	615 ft. (187.5 m)
Breadth	101 ft. (31 m)
Draft	38 ft. (11.7 m)
DWT	47,980
GT	27,176
Main engine	Kawasaki-MAN B&W

NKK Delivers Bulker Stellar Navigator

NKK Corp. has delivered the 172,000-dwt type bulk carrier, Stellar Navigator, to Karakoram Maritima S.A. of Panama at the Tsu Works. The carrier is the 10th of the 170,000-dwt type built by NKK. Stellar Navigator has nine cargo holds and hatches of the Dunkirkmax type Capesize bulk carrier developed by NKK, and the vessel provides maximum hold capacity and deadweight within the limitations of the Port of Dunkirk. The carrier is now in service for coal and iron ore transport worldwide.

Main Particulars

Classification	NK
Length, o.a.	948 ft. (289 m)
Breadth	148 ft. (45 m)
Depth	79 ft. (24.1 m)
Draft	58 ft. (17.7 m)
DWT	172,940
GT	87,417
Main engine	MAN-B&W
Speed	15 knots

MES Completes Glory Ace For Blue Valley Shipholding

Mitsui Engineering & Shipbuilding Co. Ltd. (MES) has constructed the 46,620-dwt bulk carrier, Glory Ace, for Blue Valley Shipholding S.A. of Panama at Chiba Works. The Glory Ace is the 18th 46,000-dwt type bulk carrier developed by MES. The ship has five cargo holds and four cranes, which were arranged for efficient cargo handling.

Main Particulars

Classification	NK
Length, o.a.	623 ft. (189.8 m)
Breadth	102 ft. (31 m)
Depth	54 ft. (16.5 m)
Draft	38 ft. (11.6 m)
Main engine	Mitsui-MAN B&W
MCR	10,100 ps x 111 rpm
Speed	16.6 knots

Two IHI Subsidiaries Merge

IHI Marine Co. Ltd. (IMC) and IHI Marine International Inc. (IMI), which are subsidiaries of Ishikawajima-Harima Heavy Industries Co. Ltd. (IHI), merged in early 1999, with IMC continuing to cover business operations for both companies. The former business covered sales of parts, offshore repair, and repair supervision of deck cranes and engines, while the latter provided ship design and shipbuilding materials on the package deal basis in addition to offering technical consulting for ship production systems and production facility supply.

Through the merger, IHI intends to establish equipment supply and consulting services to meet user's needs in shipyard construction, shipbuilding facilities, ship drawings, shipbuilding materials, offshore repair and machinery parts.

Northrop Grumman Granted Contract From U.S. Navy

Northrop Grumman Corporation's Oceanic & Naval Systems unit has agreed to a $3.2 million pact with the U.S. Navy to implement laser line scanning technology into the AN/AQS-14A towed array minehunting sonar system — the only one of its kind currently deployed in the U.S. Navy's inventory.

When in Hawaiian Waters

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New Orleans	(504) 733-4024	Seattle	(206) 768-1603

Circle 332 on Reader Service Card

P and H Marine Appoints New Associates

Located in Portsmouth, N.H., P and H Marine has appointed Dr. **Lee Alexander** to senior technical associate and Captain **Richard J. Cobanli** to senior associate. Alexander, formerly the technical advisor for Offshore Systems, has been actively involved in electronic chart-related technologies for more than 15 years and serves on a number of IMO, IHO and IEC committees dealing with electronic standards. Cobanli has more than 15 years experience with vessel operations and management consulting in the maritime industry, most recently as a senior auditor with Det Norske Veritas.

Global Industries Concludes Two Significant Extensions

Global Industries has completed two major extensions to the Destin Pipeline system by way of automatic welding on the system's second extension in the Gulf of Mexico — a first for the Houston-based company. The second of a two-part series of extensions was installed separately to a maximum water depth of 770 ft. (234.6 m). Supporting two natural gas developments in the eastern Gulf of Mexico, the project was accomplished during the fourth quarter of 1998 and the first quarter of 1999.

Kongsberg Simrad Reaches Agreement With R&B Falcon

Kongsberg Simrad, based in Houston, Texas, will supply R&B Falcon Drilling with a Total Integrated Vessel Control System for R&B's new building RBS8D Ultra Deepwater Class III Semi.

The order follows the deliveries of the systems for the Pathfinder Class Drillship and for RBS8M Drilling Rig to R&B Falcon.

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MacGregor To Supply New RoRo Equipment

German yard HDW has placed contracts worth $8 million with MacGregor for new RoRo equipment on two of its SuperFast Ferries. Greek owner Attica Enterprises has ordered four of the MacGregor outfitted ferries from HDW and has recently exercised its option for two additional vessels — bringing HDW's orders for RoRo equipment to a total of $24 million.

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Keppel Shipyard Awarded Two Projects from SBM

Keppel Shipyards was awarded two conversion projects by Single Buoy Moorings (SBM). The first contract is to convert the 87,811-dwt tanker MT Metsoven to a Floating Storage and Offloading (FSO) facility with storage capacity for up to 500,000 barrels of condensate. The second contract was granted for the conversion of an existing Floating Production Storage and Offloading (FPSO) vessel named FPSO VI. Upon completion in the year 2000, SBM will lease the FSO to PPML who will operate the vessel for 15 years.

Caterpillar Diesel Engines To Supply Power For Sedco Rigs

Six diesel-fueled Caterpillar 3616 engines will supply more than 26 MW of electricity to power three technology-advanced deepwater semi-submersible drilling rigs from Schlumberger Sedco Forex. Two of the dynamically positioned rigs are under construction at the DCN Brest shipyard in France, with a third rig is being built by PPL in Singapore. The first of these rigs is scheduled to begin operation in the Gulf of Mexico in December 1999 as part of a five-year contract with Texaco Inc. Compared to conventional semis, the Sedco Express rig is designed with a lower center of gravity, a feature that offers greater stability, increased deck load capacity and reduced noise.

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U.K. Maritime Report

Expansion Via Acquisition

by David Tinsley, technical editor

In a remarkable series of moves, U.K. engineering groups have considerably increased their international market influence by absorbing prominent, North European-based players in key sectors of the marine business. The momentum started to build when the TI Group purchased the 70 percent balance of shares in the Dutch-based propeller and waterjet specialist Lips, and was carried forward by Vickers' agreement to buy the non-shipbuilding interests of Norway's similarly acquisitive Ulster organization. A new confidence in maritime-related activities was also expressed by Powell Duffryn's takeover of Kvaerner Ships Equipment.

Each transaction has been characterized by the complementarity of the acquired product range, by purchasers' investment in niche market potential, and by the added scope created for offering integrated equipment and engineering 'packages'.

With its marine propulsion systems know-how, Lips represents a good strategic fit for TI, having been combined with the latter's seals and bearings specialist John Crane Marine. The group's ability to better serve Asian shipbuilding, which commands some 70-75 percent of the market, has also been strengthened by TI's increased shareholding from 50 to nearly 90 percent in seals and bearings maker Japan Marine Technologies, with which Lips has a close working relationship.

Nearly 98 percent of shareholders in both Vickers and the diversified manufacturer and technology firm Ulstein gave the green light for the transaction whereby the U.K. specialist engineering concern bought all the Norwegian group's operations bar the shipbuilding division.

Apart from motion control specialist Brown Brothers in Edinburgh and Michell Bearings on Tyneside, Vickers' marine market standing has hitherto been attributable to its ownership of Swedish-based Kamewa, as a leading designer and supplier of propellers, thrusters, waterjets and winches. The Norwegian deal adds considerably to its stake in the business, through Ulstein's position as a producer and technology driver in medium-speed diesels, reduction gears, deck machinery, all types of thrusters, controllable pitch propellers, steering gear, high-performance rudders, marine automation and ship design.

It also substantially extends Vickers' international dimension as a result of the energetic acquisition program pursued by Ulstein since flotation in the fall of 1997, a process which has included the purchase of U.S. firm Bird-Johnson, with its important position in the fixed pitch propeller and waterjet sectors.

As Vickers-Ulstein Marine, the new force in marine equipment, engineering and design technology, with a heightened capability for complete shipboard solutions, will be based at Ulsteinvik under **Baard Mikkelsen,** who had steered the Ulstein Group as its chief executive.

Fred Olsen Cruise Lines Black Prince

Similarly shaping a course for expansion in the marine business by taking over an established Scandinavian, Powell Duffryn purchased Kvaerner Ships Equipment for £34 million ($55 million) cash. By incorporating the previously Norwegian-owned group of companies within its subsidiary Hamworthy Marine, an influential new entity has been created, generating an annual turnover of around £120 million ($192 million) from both volume and high-technology products.

The move confirmed the publicly-quoted parent group's perception of Hamworthy Marine as a long-term, core business. Hamworthy has proved both commercially and technologically adept, and has shown a propensity for developing profitable niches and for acquiring complementary marine equipment firms. Its earlier purchases included Danish cargo pump maker Svanehoj and the U.K. firm Industramar, which it had earlier bought the rights to the Schilling rudder design.

Registered as Hamworthy KSE, the latest Anglo-Scandinavian union draws together the Hamworthy business in shipboard waste treatment systems, high-performance rudders, deepwell cargo pumps, engine room pumps, and compressors, and KSE's comprehensive involvement in cargo access equipment, plus its stake in higher added value sectors such as gas cargo plants, inert gas systems, and VOC (volatile organic compound) recovery systems.

The combined portfolio has enhanced the possibilities for supplying equipment packages to the more capital-intensive fleet sectors such as cruise ships, ferries and specialized tankers. The link-up promises benefits as regards R&D and the service network, ever-more pressing considerations for modest-sized engineering

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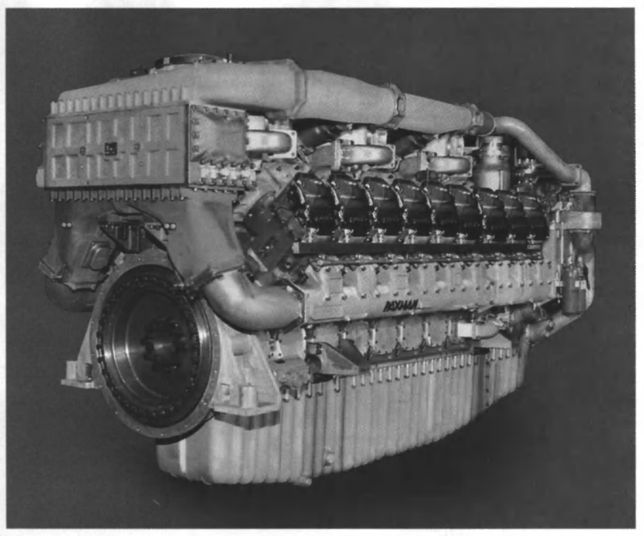
companies today. To better manage the new structure and ensure responsiveness to the various generic fields, three divisions have been created, all of which report to group managing director **Kelvyn Derrick,** based in the U.K. at Poole.

Compressors, Schilling rudders, shipboard waste management systems and condition monitoring equipment are now under the ambit of the marine and offshore division, domiciled at Poole. From Gothenburg, the dry cargo handling division will oversee the design and supply of cargo access gear such as hatch covers, and ramps, doors and decks for RoRo vessels. Hamworthy KSE's liquid cargo handling business has twin locations, in Tranby, Norway, and Aalborg, Denmark, in deference to the influence of the KSE and Svanehoj legacy companies.

In an important new initiative, the liquid cargo division has recently supplied a Norwegian shuttle tanker with a complete plant assembly for the recovery, storage and compression of cargo-borne volatile organic compounds (VOC) for use as fuel in the vessel's propulsion machinery.

The Kvaerner group's dramatic April announcement of its decision to entirely withdraw from shipbuilding, denoting a complete turnabout in policy, cast uncertainty over the future of one of the remaining cornerstones of U.K. merchant shipbuilding, Kvaerner Govan.

At the time of writing, the Tyneside firm Swan Hunter had expressed interest in the Govan yard, giving rise to hopes that the Clyde's last remaining deepsea vessel shipbuilder would stay in business. The yard has achieved substantial productivity improvements over the years, has been extensively modernized, and has a high-technology track record



Paxman 18VP185 high speed diesel

in recent years in tonnage such as stainless steel chemtankers and sophisticated offshore vessels.

Govan is one of four European yards which Kvaerner has identified within its so-called "exit strategy" for immediate downscaling leading to ultimate closure if a buyer cannot be found. By contrast, most Kvaerner shipyards are the subject of plans for spin-off through an issue to shareholders, or through joint ventures with other shipbuilders whereby Kvaerner's investment would be reduced over time.

Commercial newbuilding construction now is on a very modest scale in the U.K., albeit with resilient and dependable names such as Appledore Shipbuilders in Devon, and Ferguson Shipbuilders at Port Glasgow continuing to make their mark in fields of specialized small-ship production.

A Scottish success story of recent years has been the re-emergence of the west coast yard Ailsa-Troon under the ownership of the Derbyshire cathodic engineering specialist Cathelco. It has pursued business across a broad front, with a measured return to newbuilding complementing activities in shiprepair, craft refurbishment and steel fabrication. Milestone events in 1998 included the delivery of a 131 ft. (40 m) fishing vessel, the largest trawler built in Britain for two decades, and a £20 million ($32 million) landing craft deal, its biggest contract for 25 years or more. It can build ships up to 374 ft. (114 m) length wholly under cover.

In southern England, FBM Marine continues to exert its influence not only in the construction of fast, lightweight vessels, but also in its prolific output of high-speed ferry designs, including those licensed to Pequot River Shipworks in the U.S. by and FBM Aboitiz in the Philippines. The company has been investigating possibilities for raising the scale of its shipbuilding operations beyond those permitted by its riverside yard on the Isle of Wight.

In the meantime, profitable Harland and Wolff has made further advances in its transition from traditional shipbuilding to technology-intensive construction and conversion projects for the offshore and other sectors. Underscoring its new business orientation, the combined value of the two deepwater drillships ordered last year by Houston-based Global Marine constituted the largest

UiE Scotland Heightens Reputation With Delivery

UiE Scotland passed delivery of the Bleo Holm FPSO to Bluewater, producing the first oil from the Ross Field in the UKCS for Talisman Energy.

The vessel, completed by its agreed delivery date was handed over 100 percent mechanically complete.

Upon completion of the 22 month project that encompassed engineering, procurement, fabrication and installation, the commissioning of about 9,000 tons of topsides and equipment were also performed.

In August 1997, the vessel's bare hull was towed from Japan to UIE's Clydebank yard. The company had previously invested more than $2.45 million to extend and deepen berthing facilities in order to accommodate the 106,000-ton, 794 x 138 ft. (242 x 42 m) vessel.

Commencement of the FPSO's construction began with the installation of foundation steel work on the vessel's hull — providing support for the topsides packages.

U.K. Maritime Report

order ever won by the Belfast yard, part of the Norwegian company Fred Olsen Energy.

Each vessel, based on the dynamically-positioning, Glomar 456-class monohull design, is valued at around $300 million, of which more than 75 percent is the responsibility of Harland and Wolff. Glomar C R Luigs, the first of the pair, is destined for initial charter to BHP Petroleum following scheduled handover in October 1999, while the sister vessel, Glomar Jack Ryan, has been committed to the Exxon group, once ready for service in the opening quarter of 2000.

As it had done in earlier years with the seminal Sea Quest and Seillean projects, the Ulster firm showed its mettle in the offshore domain with the delivery at the beginning of last year of the Schiehallion FPSO (floating production, storage and offloading) unit, the world's largest purpose-built vessel of its type. Harland & Wolff has since further demonstrated its capabilities as one of the few truly integrated design, engineering and fabrication complexes in Europe through the major conversions of two semi-submersible rigs as fifth-generation units for drilling, testing and workover operations.

ICON Research Advances With On-Board Monitoring; Doctor System

Icon Research has developed a fully featured system for onboard monitoring of rotating plant and machinery — as well as the measurements of temperatures and pressures. Comprised of an industrial network for data gathering, the system also has the capabilities to store results and display plant conditions.

The program compliments planned maintenance and allows for plant maintenance on the basis of its condition — rather than age.

Operation is simple. The regular view of the system will be shownin a schematic of the ship presenting its various levels.

A green or clear appearance on each deck of the ship ensures that everything is status quo — along with "traffic light" type boxes appearing at the bottom of the screen indicating the amount of points that are okay.

If problems arise, a yellow or red traffic light is displayed showing which points have reached alarm status and by clicking the mouse pointer on the affected ship, all areas with sensors, as well as their status are shown.

Many points may have two or even three measurements that can be accomplished by using only one transducer. The software can decipher the problem that the equipment is experiencing by breaking down the vibration into its component frequencies — and by knowing which frequencies are related to which problem.

By clicking the mouse once more on any given measurement, two trend graphs are displayed — one for the condition of bearing (gbearing), the other for mechanical type problems such as unbalance or looseness — both of which are measured using the vibration velocity.

ICON has also come upon much success with its easy-to-use Doctor system. Designed initially as a portable instrument, the system is able to take fuel pressure readings on 2 stroke engines in addition to cylinder pressure. Performance can be measured on 4 stroke engines as well.

Circle 18 on Reader Service Card

A proactive approach to the business is expressed in its development of a new-generation vessel, the Fobox, combining drilling, production, storage and offloading capabilities. With the current paucity of new projects arising from the offshore sector, a situation which will surely not persist, the Northern Ireland company can be expected to pursue opportunities in other high-value areas where it has proven expertise, not least the naval field.

In addition to the drillship contracts with Global Marine, the 1998 business inflow included an order for over 5,600-tons of weldments for two auxiliary oilers under construction at VSEL's Barrow premises for the U.K. Ministry of Defence, and a project to convert the derrick lay barge Polaris to a full dynamically-positioning vessel on behalf of the French offshore company ETPM.

The diversity of the current orderbook for the Paxman VP185 at Alstom Engines' Colchester works underlines its broad market reach, vindicating the designers' endeavors in developing a unit equally suited to all the established, core sectors for the Paxman range, and with an eye also to the fast ferry business. The addition of an 18-cylinder version, complementing the original 12-cylinder model, has strengthened the company's commercial hand, boosting its offering of truly compact, high-speed diesels in spheres of the business where the MTU and Caterpillar reputations are firmly entrenched. The potency of the type is such that the 18VP185 offers an unrestricted output of 4,021-bhp (3,000-kW) at 1,770-rpm for marine propulsion duties, with a limited-period rating as great as 5,362-bhp (4,000-kW) at 1,950-rpm.

Deliveries of the first examples of the beefy, 18-cylinder unit from the extensively modernized Colchester factory are imminent, a total of six such engines at around 4,000-bhp having been specified as emergency genset prime movers for the Royal Caribbean group's cruiseship newbuild program in France and Germany.

Power: Alstom Engines Leads With Its Multidivisional Units

Comprised of the Paxman and Ruston Divisions, Mirrlees Blackstone and Regulateurs Europa, Alstom Engines is known for its manufacturing of high- and medium-speed engines. In addition to the production of heavy fuel, dual fuel and gas engines, the U.K.-based company constructs an assortment of engine control and monitoring equipment.

Alstom's Paxman Division is responsible for high speed diesel engines for marine propulsion and auxiliary applications with a power range of 610-4,000 kWb. The division also focuses on provisions for the commercial fast ferry and super yacht markets.

Medium speed diesel, heavy fuel and dual engines for marine propulsion and auxiliary duties in the power range of 780-7,550 kWb are furnished by the Ruston Division — one of the foremost leaders in fast ferry propulsive power.

Single or multi-unit installations in specific vessels such as conventional ferries, tankers and bulk carriers are provided by the Mirrlees Blackstone sector, with Regulateurs Europa performing the design and production of electronic and mechanical governors and actuators.

Circle 17 on Reader Service Card

U.K. Maritime Report

Repair: Cammell Laird Diversity An Asset

Cammell Laird has quickly gained a foothold among the world's shiprepair as providing technologically complex solutions as well as cost effective and quality routine maintenance. Its capabilities to handle a diversity of jobs, large and small, is evident by the recent influx of work.

Cammell Laird Merseyside has drydocked its semi-submersible offshore structure, Iolair — a first for the U.K.-based shipyard. Operated by R&B Falcon, the vessel, which is used for emergency response, was drydocked at the Cammell Laird yard for general repair before returning to its operations out of the North Sea.

The 37,584-grt cruise ship, Song of America was recently at the yard's number five drydock for an eight week track refit. Acquired by Airtours' Sun Cruises, the vessel will be renamed Sunbird, as well as undergo a livery change before commencing its new cruise schedule comprised of weekly voyages to Palma, Majorca.

Four P&O Ferries, St. Ola, St. Sunniva, St. Clair and St. Rognvald underwent their annual drydocking and refit the end of this past year at Cammell Laird Teeside. Procedures included were: general maintenance, repairs, and safety, and LSA and fire fighting equipment work for each vessel's renewal of passenger certificates before sailing to their usual venues around the Scottish Islands.

The privilege of having the largest drydock on the U.K.'s East coast allowed Cammell Laird to dock the 137 ft. (42 m) beam of North Sea shuttle tanker Berge Hugin. Owned by Bergesen, d.y. ASA, the vessel was converted to an FPSO and is now operated by the joint venture company Advanced Production Systems.

MOD Royal Fleet Auxiliary vessel, Fort George was upgraded during its drydocking and refit with Phalanx, CIWS (close in weapons systems) and UAG radar systems. The 28,821-grt vessel was the first of its kind to receive this type of work outside at a non-naval dockyard.

Atlantic Horizon, Labrador Horizon and Austral Horizon were converted to seismic vessels for Horizon Exploration. Involving large scale steelwork fabrication, the projects were carried out at Cammell Laird's Merseyside and Tyneside yards. Complete fit-outs, including machinery, pipework and electrical services were also incorporated, as was instalation of each vessel's specialist seismic survey equipment. Refurbishment also included newly designed layouts and renewal of cabin and service spaces to each ship's crew accommodations.

Cammell Laird's ongoing projects include the upgrade and removal of the existing engine room and surrounding hull structure on the Icelandic purse/trawler Borkur. The fitting of a new pre-fabricated 200-ton engine room section, incorporating new machinery and systems is also slated for completion. Other efforts include the removal of the existing diesel engine driven bowthruster for replacement with a larger, electric driven unit.

Currently being converted from a salvage vessel to a deepwater dynamically positioned drillship, Peregrine VII is drydocked at Cammell Laird's Meyerside yard. The ship now boasts over 7,000 tons of steelwork with a 98 ft. (30 m) midship section lengthening its pontoons. Installation and commissioning of the drilling and ship systems, incorporating machinery, pipework and electrical services was also performed. Conversions to an ROV vessel were also completed on DSND Oceantech operated Atlantic Challenger —in addition to general repairs and new equipment installation...The 38,406-grt shuttle tanker Petrotoll was drydocked at the Merseyside yard for emergency repairs.

U.K. Maritime Report

Four of the 18VP185 diesels have been specified for an equivalent number of 85,000-gt Millennium-class vessels ordered from Chantiers de l'Atlantique for operation with Celebrity Cruises. The Paxman-driven auxiliary generators will in each case be located inside the funnel casing and will run on the same fuel as the turbines, a coges (combined gas turbine and steam turbine electric drive system) plant having been selected for the program. As an important reference in the German shipbuilding market, 18VP185 engines will perform a similar back-up role in the two Vantage-class cruise ships entrusted by Royal Caribbean to Meyer Werft.

A major export deal involving the 12-cylinder model has underscored Paxman's strengths in the naval and defense agency sectors. Each of four LCF anti-aircraft frigates to be built for the Dutch navy by Royal Schelde at Vlissingen will be supplied with four 12VP185-engined genset modules, delivering 1,650-kW at 1,800-rpm for all onboard electrical and weapon system requirements. The same type of machinery is to be fitted in the Royal Navy's trimaran frigate demonstrator, ordered from Vosper Thornycroft.

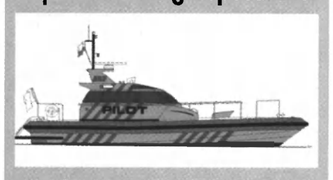
In the non-military propulsion stakes, the VP185 has a number of references now in eastern Asian high-speed ferry applications, and has also found favor at the top end of the leisure marine market as propulsion for luxury yachts. A newly-secured contract for a very high power density, twin 18-cylinder installation in a U.S. newbuild yacht emphasizes the design's potential.

Alstom Engines' position in the fast commercial vessel stakes owes much to the success of the RK270 medium-speed diesel, manufactured on Merseyside at Newton-le-Willows. Ruston-powered fast ferries in service and under construction at the time of writing numbered 26, and the design's attraction to RoRo equipped lightweight vessels of the largest types has been increased through progressive uprating of the RK270 range to 9,490-bhp (7,080-kW).

In a prestigious new reference for the 270 mm-bore class in the most environmentally-sensitive Scandinavian regime, a multi-engine plant based on four 20-cylinder engines developing a combined 37,960-bhp (28,320-kW) has been adopted in the recently-commissioned fast monohull RoRo ferry Destination Gotland.

Plying between the island of Gotland and the Swedish mainland at around 35 knots, the 367 ft. (112 m), stern-ramped

Associated British Ports Request New High Speed Pilot



Humber Marine Services, the marine operating division of Associated British Ports, North East Region at Hull, have placed an order for a new high-speed pilot boat in conjunction with Souter Marine Limited in Isle of Wight.

Designed by Camarc Ltd the new-build is a smaller version of the Camarc designed pilot boats currently operating in Holland.

A DSI manufactured triple engine configuration and Hamilton waterjet propulsion will provide the vessel with a speed of 32 knots. With construction expected to commence during the first quarter of this year, the vessel is slated for a December 1999 completion.

Swedish vessel has the distinction of being the first high-speed ferry to be installed with a Siemens exhaust treatment plant. This keeps harmful nitrogen oxide (NOx) emissions well below the 2-g/kWh level sought by the Swedish authorities. Each of the Ruston engines has a Siemens selective catalytic reduction (SCR) unit as does each auxiliary MTU diesel. Having taken over U.K. medium-speed engine builder Mirrlees Blackstone a couple of years ago, Alstom has substantially extended its scope of supply and power range coverage. While the progressive development of the MB430, in particular, has strengthened the Stockport firm's hand in marine applications, Mirrlees' production profile remains land-based power plant-oriented, reflecting the successful switch of business emphasis of some years ago. As an indicator of the power concentrations available from the U.K. factory, the newly-uprated 18MB430M has been introduced with ratings in excess of 15,000-kW (some 21,000-bhp) at 600-rpm.

Dag Pike Associates Aims To Service Marine Industry

Dag Pike Associates has been formed as the newest consultancy company offering an array of services to the marine industry.

The U.K.-based firm, led by marine specialist, Dag Pike will assist ship and boat builders, operators and maritime lawyers in a variety of areas — mainly product development, market information and analysis, and training and boat handling in equipment use.

Circle 1 on Reader Service Card

Cory Towage Granted Contract For Oil Recovery Vessel

Cory Towage has been awarded the contract by the Mersey Docks and Harbor Company to supply and operate an Oil Recovery Vessel (ORV) for operation on the River Mersey, the Manchester Ship Canal and in and around various Mersey ports and terminals.

The vessel was put on order by Ro-Clean Desmi Limited for construction in the U.K. by OMI Limited. Dubbed Pollgarth, the catamaran will measure 60 ft. (18.5 m).

Vikoma International Aids With Oil Spill Response Catamaran

Vikoma International has introduced the Spillcat — its newest muliti-purpose oil spill response craft.

Providing 140 sq./ft. (42.6 sq./m) of clear deck space, carrying payloads of up to 1,500 kgs, the Spillcat is ideal for shoreline cleaning due to its extremely shallow draft.

Circle 20 on Reader Service Card

Fleet Support Limited Finishes Upgrade

After many years following acceptance by the Royal Navy of the aircraft carrier HMS Illustrious, Fleet Support Limited recently completed a refurbishment project at is Portsmouth yard.

Encompassing eight months of maintenance and upgrade work, the project included an additional section to Illustrious' flight deck and a variety of Combat System revisions.

Measuring 75 x 59 ft. (23 x 18 m), the deck features various new compartments and associated handling equipment.

The addition of the 160-ton deck has the capability of providing Illustrious to efficiently operate RAF jump jets alongside RN Sea Harriers.

Overhaul of all sewage treatment plants, fitting of two new propellers and maintenance of the diesel generators were also part of the renovation plan.

Luther Blount — A man with vision and drive

By Regina P. Ciardiello, assistant editor

At 82, Luther Blount is a man of dedication and engineering intelligence within the maritime industry — and he's not ready to quit anytime in the near future. Last year, his company, Blount Industries located in Warren, R.I., commemorated yet another milestone with the celebration of its 50th anniversary in April 1998. Most recently, Blount held the launching of his 300th vessel — Harold E. Bickings, this past March.

Whether we "live to work or "work to live," many of us just take our profession simply for what it is — work. Luther Blount, though is the exception — for he doesn't view what he does as "work." He merely goes about his day as he has for the last 82 years of his life — living each day to the fullest and working to expand his already established Blount Industries in Warren, R.I.

"I never saw shipbuilding as work, it was something that I enjoyed and found I could always make money by doing it." said Blount.

A well-known figure within the maritime industry, Blount isn't planning on living a retiree's life anytime soon. He admits that as a self-proclaimed workaholic, he would rather concentrate on inventing new patents and creating his vessels to further his business than play a round of golf or relax in the sun.

"I plan to keep going," Blount emphatically said. "I've got all kinds of new things, my people (engineers and builders) work hard and stay up-to-date with the industry."

Upholding his reputation as a skilled craftsman and entrepreneur, Blount's motto is not foreign and fairly simple — customer satisfaction.

"Whether you win or lose, you must always be able to come through for the customer," he said.

Boasting about 90 employees, the Blount Shipyard houses the current new-build combination dinner/casino boat that Blount's engineers and builders are working on for a November 1999 delivery. The 161 x 40 ft. (49 x 12 m) 600-passenger vessel will operate out of New York Harbor. Four decks, complete with elevator and promenade will add to the glitzy atmosphere of this entertainment boat — a significant difference from his first vessel — a kayak he constructed as a young boy of 17 living in Barrington, R.I.

Birth of an Inventor

Willis and Ruth Blount became the parents of Luther Blount in 1916. A son Nelson was born two years later. At Willis' urging, Luther began working at his father's ice plant from the time he was 13. While other young boys his age were playing sports, Blount awoke at the crack of dawn every Saturday so that he could assist his father at 7 a.m. at the plant. It was here that Blount developed his solid and driven work ethic.

Ancon launched on August 17, 1957 Pictured(L to R): unidentified, Luther Blount, Warren Sherburne, Mrs. Warren Sherburne, unidentified, Margaret (last name unavailable, she was the lab tech for Belding Hemingway Certicelli), Mary Ellen Blount, Marcia Blount, unidentified, Rev. Warren Roberts, unidentified. Children, front (L to R) Julie Blount, Joanne Blount and Nancy Blount.

Upon his retirement in 1944, the elder Blount sold the ice plant and generously distributed each of his employees with their own truck and route. Interestingly, the grandsons of many of these men now work at Blount Industries.

Growing up in the seafaring town of Warren, R.I., Blount became accustomed to the bay and the vessels that supported the area. He reminisced of excursions on Narragansett Bay on his grandfather Eddie's boat. It was through him that Blount would get his first taste of the marine world. In 1903, after Eddie purchased his father-in-law's company, Buckingham Oysters, located in West Barrington, R.I., he moved the business to Warren, R.I. — renaming it E.B. Blount Sons which would eventually become the capital of the New England's oyster industry. Unfortunately, the Hurricane of 1938 damaged E.B. Blount Sons as well as most of the area's oyster businesses. Even though recovery seemed a long process, Nelson Blount managed to salvage what was left of his grandfather's hard work and continued the Blount tradition with the start of Blount Seafood a few years later. By then the oyster business had been rejuvenated into clams and Blount Seafood landed its largest and still most prominent client — Campbell's Soups. The company is the largest supplier of clams for Campbell's famed clam chowder.

While his brother Nelson managed Blount Seafood, Luther, who had recently completed his degree in engineering from Boston's Wentworth Institute, utilized his skills within the operation. Using his keen sense of design and engineering skills, Luther was able to construct most of the company's clam machinery. His first working vessel, a catamaran named the Rhodoyster, Jr. debuted on April 20, 1949 for the purpose of transporting the company's clam shells out of odor range. Stored on Blount Seafood's dock, the decaying shells were causing an offensive smell. Luther would take his new boat out to Narragansett Bay and dump the pungent-smelling shells from Rhodoyster, Jr.'s cargo bins.

Dubbed a "freak" by area residents, because of its unconventional appearance (the pontoons were constructed by the welding together of 55-gallon oil drums), the vessel took a little over a week to construct. Inhabitants of the area were quick in taking back their insults of Luther's inventive craft when they realized its purpose. Blount responded with the 73 ft. (22.2 m) Rhodoyster to be used for oyster planting, cultivating and harvesting.

Following the success of the Rhodoyster pair, Blount set his sites on higher endeavors — a tanker/cargo vessel. Interestingly enough, he ran an advertisement in *Maritime Reporter* in 1949. Charles H. La Duca, then president of West Shore Fuel, in Buffalo, N.Y. contacted Blount with the notion that his

Launched in 1953, the Blount Industries constructed Miss Liberty had been dubbed as the largest excursion passenger ship of its kind since World War II, measuring 133 x 33 ft. (40.5 x 10 m).

Lifetime Achievement

TOP: Autocisco II, which is the Indian translation of "Resting Place" was one of Blount's earlier passenger ferries built for operation out Casco Bay, Maine.

LEFT: The first "unofficial" Blount vessel that spawned a successful business venture — the Rhodoyster, Jr. — launched in 1949.

RIGHT: Luther Blount in a recent photo.

tanker could be used to supply oil for his bunkering operation.

"I remember when Charles (La Duca) came out to Rhode Island, it was a beautiful, clear day — January 10, 1949 to be exact," Blount reminisced. "I took he and his wife out on the Rhodoyster."

After demonstrating his feel for tank construction and design (the Rhodoyster was built using 7-diameter tanks), La Duca expressed that he would need a much larger vessel to put his ideas the use — the fueling of oil burning Great Lakes steamers. Blount's response: "If you can pay me, I'll do it."

Before the ink on his agreement with La Duca was dry, Blount began construction of his first contracted vessel — the 95 ft. (28.9 m) William H. Bennett. Carrying 50,000 gallons of oil, the tanker was then followed by three additional newbuilds delivered to La Duca by Luther Blount. Thus began the inauguration of Blount Industries.

Teaming up with his brother, Nelson, Luther designed and engineered the vessels on grandfather Eddie's oyster property, while Nelson ran the Blount Seafood plant one

block away. The original shipyard still sits in the same location where the Blount family planted its roots in 1951.

There have been many changes and expansions to Blount's company since that fateful day in 1949 when he met Charles La Duca. Blount went on to construct a variety of vessels that included tugs, tankers and workboats. More notably the fast ferry Autocisco II; Queen of France, used by the University of Rhode Island Marine Laboratories for study of the fishing industry and Blount's own patented Hustad Controllable Pitch Propeller which activated its blades to any pitch by moving the handle forward allowing for electric, hydraulic or pneumatic operation. Blount received $50,000 for his invention — money he would later use to start-up an eventual subsidiary, American Canadian Caribbean Cruise Line (ACCL), which he formed in 1966.

While he enjoyed taking his ideas from paper to reality, Blount thought about dabbling on the other side of the table — the ship operating business. For years, he had been creating vessels for other people, so he thought why not run them as well. Blount responded with the purchase of Prudence Island Ferry Company in 1960. Building two to three passenger ferries a year, Blount's company provided transport to and from the Island. After 10 years, he sold off the company to concentrate his efforts on ACCL. In conjunction with the line's developments, the "father of adventure cruising" implemented his patented bow ramp to each vessel. The invention provided passengers to disembark directly onto the beach.

Known as the only ships of their kind to run excursions out of Chicago through the inland Great Lakes and along the Mighty Mississippi. The liners also offer overnight itineraries in the Bahaman Islands and along the South and Central American coasts via the locks of the Panama Canal

And the Blount tradition continues on with three of Luther's five children, Julie, Nancy and Joanne working for their father. Julie assists him as office manager of Blount Industries; Nancy is vice president of ACCL and Joanne and her husband Bob Dahmer operate Blount's Bay Queen Ferry Route. His son, Willis, though not directly involved with Blount's companies, holds a place in the marine industry with a fishing trawler that he runs out of Nantucket Island. Another daughter, Marcia, is an elementary school teacher.

Though actively involved within all of his holdings, Blount cannot get out to as many functions as would like to — a task that his children now fulfill for him.

And so enters the next generation of Blounts, with Luther's children carrying on their namesake while their cousins still run Nelson Blount's company, Blount Seafood. Still remaining where it has stood since 1951, (one block away from Blount Industries), Nelson's children took over the business after their father died in a plane crash in 1967.

With obvious sadness in his voice, Blount remembered how his brother was an instrumental force in the establishment of Blount Industries. Nelson provided Blount with the financial backing that he needed to start off — a favor that he will always remember and contributed to his becoming a success in the marine industry.

"I started my business with next to nothing," he reflected. "That's something that can rarely be done today."

MarineSafety Rotterdam Holds Electronic Charts Conference

A conference and exhibit regarding "Safe, Efficient Navigation Using Electronic Charts" was held at MarineSafety Rotterdam. Sponsored by Safety At Sea International, the discussion featured a panel of industry experts including **Pieter Struijis**, director of shipping, The Port of Rotterdam who stressed the importance of VTS and ECDIS tools in the maritime industry. Captain **G. Singhota** of IMO's Marine Safety Division and the conference's keynote speaker observed that IMO is committed to the use of electronic charts due to their potential to lower risks.

Aalborg Industries Appoints New Director

Sven Hvilborg has been appointed director of global after sales service - marine at Denmark-headquartered Aalborg Industries.

Previously, Hvilborg, who is a marine engineer, served as president of the company's Japan office where he has been succeeded by **Katsuhiko Ishiwata**.

Cummins-Case Credit Expands

Since entering the commercial marine market last year, Cummins-Case Credit Financial Services has extended its operation within that division with the opening of an office in Seattle this May

specifically servicing the Gulf and Pacific regions. **Dean Chinnery** will serve as the office's marine-sales finance manager and **Robert F. Lowe** was appointed new business manager.

Circle 29 on Reader Service Card

Superior-Lidgerwood-Mundy Introduces New Capstans

Superior-Lidgerwood-Mundy Corp. has released it newest product, the Millennium-2000 Capstans featuring the latest in high-performance right angle drives. Unlike most conventional worm gear Capstans, the Millennium-2000 is able to maintain a significantly high efficiency over a wide range of ratios, for the ability to reflect a greater pull for equal or less hp.

Circle 50 on Reader Service Card

Tesoro Set To Acquire BP's West Coast Marine Fuel Operations

Tesoro Marine Services, the Houston-based subsidiary of Tesoro Petroleum Corporation has agreed to purchase the U.S. West Coast marine fuels operations of BP Marine, a division of BP Amoco.

The acquisition includes facilities in Port Angeles, Seattle, Portland and Los Angeles with total terminalling capacity figures at 605,000 barrels.

C-Seal Simulators Initiates Unique Device

The C-Seal Simulators company has developed a device designed to change a typical P.C. monitor, keyboard and mouse into one multi-function display unit. Named the OSIR (One Stroke: Immediate Result), the product is currently producing radar/ARPA simulators — the precise duplications of the bridge equipment. OSIR upgrades simulation performance, while concurrently lowering costs at an advantageous price. Other products offered by C-Seal consist of full-scale radar/Arpa consoles for IBS simulation, desk-top radar/ARPA consoles for classroom simulation and the SMART simulator complete with built-in instructive program for total self-learning.

Circle 30 on Reader Service Card

Kockums Computers Systems Is Sold

The Sixth Fund Board, an independent manager of general pension funds in Sweden has acquired a member of the Celsius Group — Kockums Computer Systems. With an asset portfolio comprised of stocks, bonds and derivatives listed on the Swedish Stock Exchange, including significant holding in heavy-hitting Swedish companies, the Fund's capital amounts to an estimated $1.6 billion.

Kockums currently deploys design and information systems at more than 280 shipbuilders and design engineering offices worldwide. More notably is its Tribon 4 system — an integrated design and information system developed specifically for the shipbuilding and offshore industries.

Royal Caribbean Restructures

Royal Caribbean Cruises Ltd., operator of Royal Caribbean International and Celebrity Cruises has named **Bonnie S. Biumi** vice president and treasurer, and **Daniel J. Hanrahan** has been designated as senior vice president of marketing for Royal Caribbean International.

Biumi comes to Royal Caribbean from Nee Corporation where she served as CFO of the Miami-based NYSE equipment rental company. Hanrahan had previously been with Polaroid Corporation as vice president and general manager.

Ready for the year 2000?

Computer date problems are going to affect GPS users as early as this August. But Inmarsat is preparing for the millennium bug, having set up a task force to deal with it as far back as 1996, writes Ruth Ling.

Anyone working in industry or commerce who doesn't yet know how the Year 2000 problem could affect them is painfully unaware of the world around them. Originally seen as just an IT problem, the millennium bug is now recognized as a business issue with much wider implications, the greatest one being business survival. Potentially, the problems associated with the use of two-digit year fields — 00 appearing as 1900 rather than 2000, and 2000 being a leap year — will affect all software and embedded micro-processor chips which have any awareness of or dependency on dates. A whole new Year 2000 industry has sprung up in the past year or so. Those companies which are taking the problem seriously are investing enormous sums of money in IT expertise to take precautionary measures. SingTel, Singapore's signatory to Inmarsat, for example, is spending a total of $100 million to beat the bug. The brain-drain of the 50s, when British skills and intellect were lured overseas, is being repeated as British programmers are offered salaries of $8,000 a day and free flights home on the Concorde every weekend by American companies determined to be Year 2000-compliant. But the maritime industry has not woken up to the threat of the millennium bug and Lloyd's Register of Shipping has warned of the potential seriousness of complacency: "The shipping industry is making a late start. There could be problems with embedded chips in navigational, propulsion and safety equipment such as fire detectors and alarms," said **Tim Jones,** chief executive of Lloyd's Register.

Consequently, Lloyd's and insurers Thomas Miller have developed an Internet web site (at www.lr.org/links/index.html) to alert both equipment suppliers and ship-owners of the need to check all their systems. And union leaders have voiced their concerns, saying the industry has a history of reacting only after a tragedy.

But steering a passage through these choppy waters is Inmarsat, which is preparing itself for whatever the turn of the century might do to the world's clock-based computer systems. The organization set up its Year 2000 task force in November 1996, and within two years the vast majority of its mission-critical systems have been tested for year 2000 compliance.

The task force is headed by **Gill Govier**, manager of the programs management group, part of the product development and engineering division at Inmarsat, and a member of the ITU's prestigious Year 2000 task force. The team includes people working across all divisions — from technical and satellite control to financial and administrative, including health and safety and payroll — to ensure service and business continuity.

Key objectives of Year 2000 task force

In 1996 Inmarsat carried out an inventory and risk assessment of all its systems. Its aim was to ensure all its key systems are compliant with the year 2000 date change so that they will be able to:

- handle date information before, during and after January 1, 2000, including, but not limited to, accepting date input and performing calculations on dates or portions of dates;
- function accurately and without interruption before, during and after January 1, 2000 without changes in operation associated with the advent of the new century; respond to two-digit year date input in a way that resolves the ambiguity as to the century in a disclosed, defined and pre-determined manner; store and provide output of date information in ways that are unambiguous as to century; manage the leap year occurring in the year 2000 following the quad-centennial rule. In

addition, Inmarsat has had to ensure that all GPS receivers are able to manage the rollover that will occur in the system at midnight on August 21/22, 1999.

Following this extensive inventory and risk assessment, a short list was drawn up of priority systems which would be vulnerable to the year 2000 date change.

The key systems to be investigated included the satellites, LESs, network co-ordination stations, mobile earth stations (MESs), the service activation system, mobility management, telemetry, tracking and command (TT&C) services, satellite and network control and monitoring systems including GPS receivers.

During 1997 most of the priority systems had been tested to see how they would react to the date change and plans were drawn up which detailed how to solve the various problems.

Rollover and reboot tests were run to check calendar transitions on the following dates:

- **December 31, 1999 - January 1, 2000 (the transition to the new century);**
- **February 28 - 29, 2000 and February 29 - March 1, 2000 (checks for the Leap Year);**
- **December 30 - 31, 2000 and December 31, 2000 - January 1, 2001 (checking for any problems caused by there being 366 days in 2000).**

A check and resolution of records was also made of possible default end/retention dates such as 9.9.99.

"We did find some funny things happening when we ran these tests," said Govier. "The date that a system transitions to could be just about anything; one system went from 1999 to 19100, another to February 16, 1936 — it just totally flipped because it didn't recognize the '00'."

"Having assessed the impact of the tests, we planned to complete the solutions and changes on the priority systems by December 1998 to give us one year of contingency before the rollover to the year 2000," she explained. "We've also had to continually re-evaluate the priority of all other systems to escalate those whose business drivers may have changed. And, during 1999, we will investigate and implement solutions where necessary on all other non-priority systems."

The team also thoroughly tested all the satellite control center (SCC) equipment and software at Inmarsat's hot redundant back-up control center, which can be made ready at a second's notice if there is a failure at Inmarsat's London headquarters or if its building is in any danger. "We were able to provide a testing environment exactly the same as the operational environment," said Govier. "It includes a simulation of the TT&C network so that we can pretend the SCC is linked to TT&C sites."

By the end of 1998, the impact analysis phase had progressed according to plan, the project was ahead of schedule and 50 percent of all priority systems identified had been through compliance testing, while several other key systems were undergoing final checks.

Help on the web

A number of maritime authorities have gotten together to help the shipping world by posting "help pages" on Internet sites. These include:

http://www.inmarsat.org/year2000 (Inmarsat website with Year 2000 page)

http://www.itu.int/y2k (ITU webpage)

http://www.lr.org/links/index.html (Lloyds Register and Thomas Miller insurers)

http://www.microsoft.com/technet/year2k/ (Microsoft)

http://www.bug2000.co.uk (Action 2000, the UK government's Y2k task force)

Formal confirmation had been received from the Inmarsat-2 and Inmarsat-3 satellite manufacturers that Inmarsat's fleet has no on-board knowledge of dates and will not be affected by the rollover to the millennium. All TT&C sites were completing their tests, with no major problems identified to date, although in some cases the GPS receivers needed to be upgraded.

In order to ensure product compliance by MESs, LESs and network co-ordination stations (NCSs), Inmarsat ensured that the relevant System Definition Manuals (SDMs) reflected Year 2000 requirements and the organization kept in regular contact with manufacturers to progress compliance tests.

The target for manufacturer completion was set at December 31, 1998 so as to be consistent with Inmarsat's overall program.

Details of the status of specific MES models are available from the manufacturers concerned, or on the Inmarsat website.

Year 2000 rears its head in August

But while the world gears itself up for those few days at the turn of the century when devastating chaos could be wreaked, at a cost of billions of dollars, in those industries and service sectors that have not checked their systems, GPS users — most of whom are in the maritime industry — have even more to be worried about. They have to be ready four months before everyone else — because August 21 is when the GPS rollover will occur.

Some receivers of time signals from the GPS satellite fleet will hit problems at midnight on August 21/22, 1999 when the 'week number' field cycles from 1023 to zero. Unless they have been correctly programmed to handle this event, the receivers may well think themselves back in 1980.

Inmarsat's ground segment uses 16 of these vulnerable time receivers to keep its satellite control system in synch with its TT&C stations around the globe. "We have been pressing the receivers' manu-

facturer to come up with a fix for this problem and this has now been achieved," explains **Justin Lewis,** leader of Inmarsat's satellite operations support group. In November, his colleague **Aldo Novelli,** supervisor of ground operations, began organizing a 'new boards for old' program to install the upgraded hardware in all the affected sites. The work will be completed in plenty of time to beat this particular pre-millennium deadline. "Although the GPS rollover date is not a year 2000 problem as such, it does give a foretaste of the sort of problems which will occur at the century's end as the clocks in computer equipment jump backwards in time rather than smoothly going forwards," said Lewis. "In the case of GPS, systems might jump from August 21, 1999 to January 6, 1980 (the start of GPS 'week zero'). In the year 2000 case, systems could jump from December 31, 1999 to January 1, 1900.

Inmarsat and the ITU

Another area in which Inmarsat has been busy is raising awareness of the millennium bug problem among the telecoms communities through the ITU.

Last March, Govier was invited to take up a place on the ITU's Year 2000 task force — the only satellite carrier repre-

sentative on the 20-strong team — and shortly afterwards was made chair of the Information Management sub-group.

To illustrate the enormity of the task ahead for the ITU project team, BT recently carried out a study showing that the majority of the world's telecoms will not be functional. It is predicted, for example, that only 11 percent of Africa's telecoms industry will be operational in the year 2000.

A major success for the task force has been the first round of inter-carrier connectivity tests whereby Telia (of Sweden), Deutsche Telekom (Germany) and Hong Kong Telecom connected their captive environments and rolled them forward to the millennium. Voice traffic was successfully exchanged including backwards and forwards between 1999 and 2000 with the seven-hour time difference.

There has been teamwork since last June when the world's three major satellite carriers — Inmarsat, Eutelsat and Intelsat — started a series of regular meetings to share Year 2000 information and experiences.

"The most exciting thing is seeing all normal competitive and political barriers completely broken down by the need to work together to tackle the job in front of us," added Govier.

Arguably, the greatest of her problems has been to find a hotel in London which had rooms to accommodate 30 staff for the three nights of the transition period. (She's leaving nothing to chance: even though all Inmarsat systems should have been cleared as Year 2000-compliant long before then; there's no guarantee that external systems such as London's transport network or the national grid will be operating smoothly.) As far back as October 1998, every hotel room in central London was fully booked. Perhaps you are better off at sea.

"But what we've demonstrated at Inmarsat," Govier said, "is that if you've fully verified each of your systems — everything from satellite control to the staff payroll system — by December 31, 1999, you should be able to wake up on New Year's Day in the year 2000 and find that life as you knew it has not come to a crashing end."

Thrane & Thrane Signs Contract with ICO

Thrane & Thrane A/S, Danish manufacturer of satellite communication equipment, signed a contract with ICO Global Communications, for the development and supply of terminals for remote businesses and residential housing. The remote business terminal will include the display and keyboard, DC supplies, and an antenna located up to 262 ft. (80 m) away. Thrane & Thrane plans to develop and market a maritime terminal for merchant ships, yachts and fishing boats.

Globe Wireless, Marinet Meld

Marinet Systems and Globe Wireless have combined to form a full service marine communications company offering service in the satellite and high frequency radio industry including a cost effective routing e-mail and data transfer capability.

Together, the new venture will provide international services in 16 countries to the more than 2,000 vessels already contracted by each respective company.

Veripos Institutes DGPS Network In The Gulf

Veripos, which keeps a high-accuracy Differential GPS (DGPS) network across northern Europe has established a comparable service in the Gulf of Mexico based on both HF and Inmarsat-delivered signal correction facilities.

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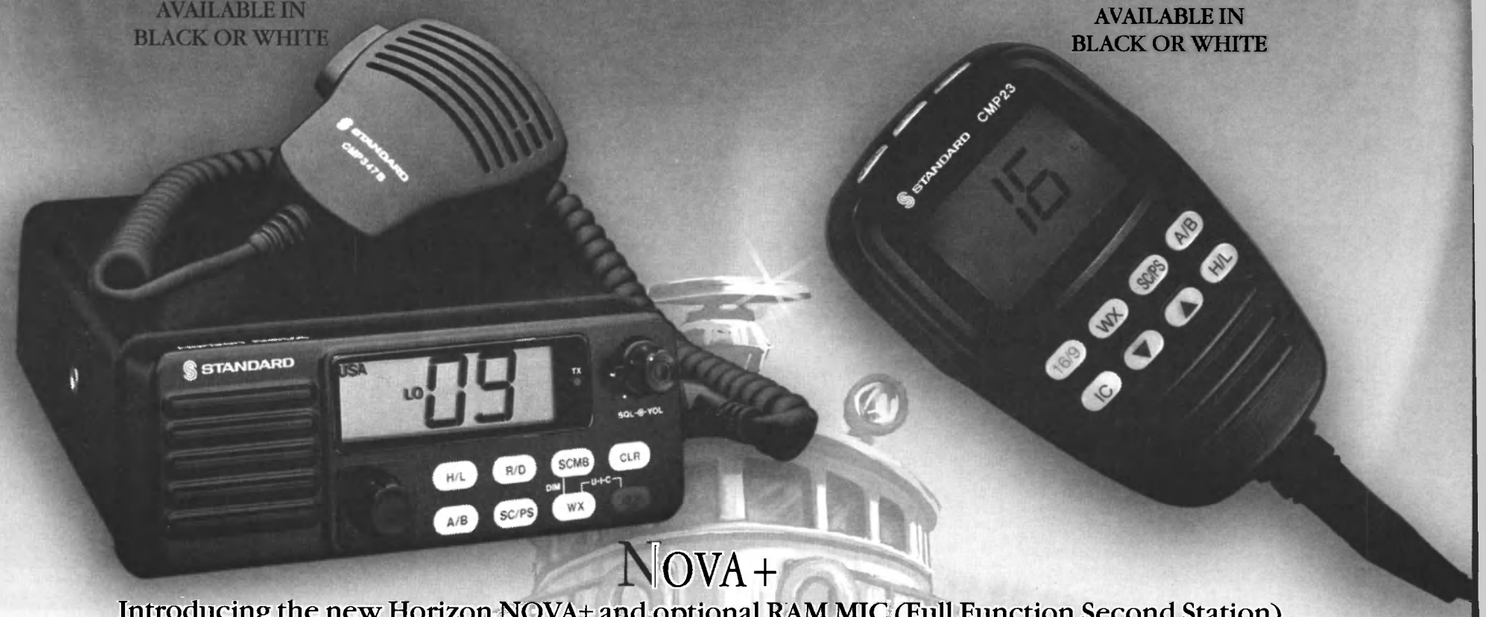

NOVA+

Introducing the new Horizon NOVA+ and optional RAM MIC (Full Function Second Station) which allows you to have a 25 watt VHF radio where you need it most. The simple one cable installation allows you to achieve this without additional antennas or power connections.

Of course, the NOVA+ has all of the features you've come to expect from Horizon VHF; features too numerous to list.

Find out how simple and economical it can be to have a waterproof 25-Watt VHF in the palm of your hand.

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HORIZON
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Shipyard Orders

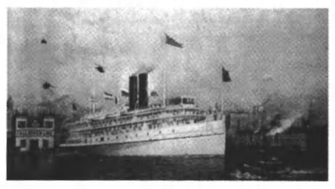
Ferlship is a strategic consultancy highly specialized in market researchs guided to the shipping industry. For additional information, please contact Ferlship @: Pza. Sta. Mª Soledad Torres Acosta, 2. 2º C, 28004 Madrid, Spain, Tel. : +34 91 531 01 78 , 689 01 45 66; Fax: +34 91 531 01 78' e-mail: ferlship@iies.es (Prices are in U.S. Dollars)

Owner/Operators	Country (SO)	Shipbuilder	Type	No.	DWT	GT	Deliv.	$
TAUBATKOMPANIET	NORWAY	DALIAN SHIPYARD	AHTS	2	3,000		2000	39
MAERSK LINE	DENMARK	VOLKSWERFT STRALSUND	AHTS	2			1999/2000	
PRESIDENT MARINE	SINGAPORE	DALIAN SHIPYARD	BARGE	1	5,000		1999	
HIKARI SANGYO	JAPAN	JIANGYANG	BARGE	1	52,000		1999	12.1
EUROPEAN INTERESTS	-	HALLA	BULK CARRIER	1	170,000			32
D'AMATO	ITALY	HUDONG SHIPYARD	BULK CARRIER	2	74,500		2000/2001	41
DIANA SHIPPING	LEBANON	HALLA	BULK CARRIER	2	74,000		2000	38
BRAVE MARITIME	GREECE	HALLA	BULK CARRIER	2	74,000		2000	38
NISSHEN KAIUN	JAPAN	SASEBO	BULK CARRIER	1	74,000		1999	19.5
LEVANT SHIPPING	GREECE	SANOYAS	BULK CARRIER	3	52,000		2001	59
GREEK INTEREST	GREECE	SASEBO	BULK CARRIER	3	50,000		2000	55
GERMAN INTERESTS	GERMANY	BOHAI SHIPYARD	BULK CARRIER	2	28,200		2000	28
FAR EASTERN SILO	TAIWAN	IMABARI SHIPBUILDING	BULK CARRIER	2	73,900		2000	40
ANGELICOUSSIS	GREECE	SASEBO	BULK CARRIER	1	172,000		2001	34.5
FILBERG SHPG	-	OSHIMA SHIPBUILDING	BULK CARRIER	1	90,000	50,600	2000	
LAODEMEIA SHPG	-	OSHIMA SHIPBUILDING	BULK CARRIER	1	90,000	50,600	2000	
TRINITY SHPG	GREECE	OSHIMA SHIPBUILDING	BULK CARRIER	1	90,000	50,600	2000	
COSCO	CHINA	OSHIMA SHIPBUILDING	BULK CARRIER	2	75,000		2000	42
ZODIAC MARITIME	UK	DAEDONG SHIPBUILDING	BULK CARRIER	3	75,000		2000	55.5
ZODIAC MARITIME	UK	DAEWOO	BULK CARRIER	1	75,000		2000	18.5
JIN LU NAVIGATION	PANAMA	OSHIMA SHIPBUILDING	BULK CARRIER	1	74,200	38,800	2000	
JIN QUE NAVIGATION	PANAMA	OSHIMA SHIPBUILDING	BULK CARRIER	1	74,200	38,800	2000	
D'AMATO	ITALY	HUDONG SHIPYARD	BULK CARRIER	3	74,000		2000	61.5
CHINA SHIPPING	CHINA	OSHIMA SHIPBUILDING	BULK CARRIER	2	73,600		2001	39.6
MITSUBISHI CORP.	JAPAN	SUMITOMO	BULK CARRIER	3	73,500		1999/2000	69.84
DIAMOND ARROW	JAPAN	HASHIHAMA	BULK CARRIER	1	73,475	38,700	2000	
DIA MARINE CORP	JAPAN	TSUNEISHI	BULK CARRIER	2	73,441		2001/2002	45.6
UNKNOWN	-	OKEAN SHIPYARD	BULK CARRIER	4	73,000		2000	124
JAVA MARINE	SINGAPORE	DAEDONG SHIPBUILDING	BULK CARRIER	1	72,800	38,500	-2000	
NEW POINT SHIPPING	MONACO	DAEDONG SHIPBUILDING	BULK CARRIER	1	72,800	38,500	02000	
SAMRAAN NAV.	MONACO	DAEDONG SHIPBUILDING	BULK CARRIER	1	72,800	38,500	2000	
GOLDBEAM	HONG KONG	OSHIMA SHIPBUILDING	BULK CARRIER	1	50,800		2000	24.4
NORDEN	DENMARK	OSHIMA SHIPBUILDING	BULK CARRIER	2	50,800		2000	38
OSHIMA SHIPPING	JAPAN	ONOMICHI	BULK CARRIER	5	50,700		2000	112.5
MITSUI & CO.	JAPAN	MITSUI	BULK CARRIER	1	50,000		1999	
SANZO ENTERPRISES	DENMARK	TAMANO SHIPYARD	BULK CARRIER	1	50,000		1999	
COSCO	CHINA	NANTONG	BULK CARRIER	1	48,000		2000	

OWNER OPERATOR	COUNTRY SO	SHIPYARD	TYPE	No	DWT	GT	DELIVM	US$
MITSUBISHI/ NISSHIN	JAPAN	SANOYAS	BULK CARRIER	1	48,000		2000	20.2
MITSUBISHI CORP.	JAPAN	OSHIMA SHIPBUILDING	BULK CARRIER	1	48,000		2000	
NISSHIN KAIUN	JAPAN	OSHIMA SHIPBUILDING	BULK CARRIER	1	48,000		2000	
GREAT LAKES MARINE	CANADA	HALTER GULF REPAIR	BULK CARRIER	1	38,200		2000	
MITSUBISHI/NISSHIN	JAPAN	HAKODATE DOCK	BULK CARRIER	2	32,000		2000	
UNKNOWN	-	KANDA SHIPBUILDING CO.	BULK CARRIER	2	32,000		1999/2000	
TANKERSKA PLOV.	CROATIA	CEBU SHIPYARD	BULK CARRIER	2	28,500		2000/2001	34
TANKERSKA PLOV.	CROATIA	TSUNEISHI	BULK CARRIER	2	28,000		2000	34
UNKNOWN	-	IMABARI SHIPBUILDING	BULK CARRIER	2	28,000		1999/2000	
UNKNOWN	-	IMABARI SHIPBUILDING	BULK CARRIER	1	24,000		2000	
MARUBENI CORP	JAPAN	KANDA SHIPBUILDING CO.	BULK CARRIER	2	23,500		2000	
BOCKSTIEGEL REED.	GERMANY	GDANSK	BULK CARRIER	4	7,000		2000	40
BRIESE SCHIFFAHRT	GERMANY	GDANSK	BULK CARRIER	4	7,000		2000	40
KREY SCHIFFAHRT	GERMANY	GDANSK	BULK CARRIER	4	7,000		2000	40
FORMOSA PLASTICS	TAIWAN	HHI	BULK CARRIER	2				66
FORMOSA PLASTICS	TAIWAN	IHI	BULK CARRIER	2	170,000		2001	72.68
			ORE STRENGTHENED					
UNKNOWN	-	HASHIHAMA	BULK CARRIER	1	170,000		2000	
			ORE STRENGTHENED					
GOLDEN OCEAN	HONG KONG	HITACHI SINGAPORE	BULK CARRIER					
			ORE STRENGTHENED					
CSAV	CHILE	TSUNEISHI	BULK CARRIER	2	74,000		2001/2002	40
			ORE STRENGTHENED					
WORLDER SHIPPING	HONG KONG	SUMITOMO	BULK CARRIER	1		73,500	2000	
			ORE STRENGTHENED					
TORVALD KLAVENESS	NORWAY	OSHIMA SHIPBUILDING	BULK CARRIER	2	71,700		2001/2002	59
			ORE STRENGTHENED					
SAMAMA	MICRONESIA	DAEDONG SHIPBUILDING	BULK CARRIER	3	72,800		1999/2000	57
			ORE STRENGTHENED					
NORTHERN LIGH.	UK	FERGUSON SHIPBUILDERS	BUOY TENDER	1	225		2000	11.5
US COAST GUARD	US	MARINETTE MARINE CORP.	BUOY TENDER	2			2000/2001	60
CABLE & WIRELESS	UK	VAN DER GIESSEN	CABLE SHIP	1	8,000	7,900	1999	49
CTR GROUP								
(PROYECT OZONE)	BERMUDA	HYUNDAI MIPO DOCKYARD	CABLE SHIP	13	8,000		2000/2003	485
A. P. MOLLER	DENMARK	VOLKSWERFT STRALSUND	CABLE SHIP	2	7,000		2000	82
TALCAR	ISRAEL	GDYNIA	CAR CARRIER	2	20,600	53,500	2000	96
NIPPON YUSEN KAISA	JAPAN	SUMITOMO	CAR CARRIER	2	13,000		2000	90
U. EURO. CAR CARR.	NORWAY	TSUNEISHI	CAR CARRIER	2	8,000		2000	38
HARM/A-LINE	GERMANY	ROLANDWERFT	CAR CARRIER	2	2,500		2001	41.63
BUQUEBUS	ARGENTINA	DERECKTOR SY.	FAST FERRY	1				
IVER SHIPS	NORWAY	HALLA	CHEM.TANKER	2	46,000		2000	60
ACHILLEION SHIPPING	GREECE	DAEDONG SHIPBUILDING	CHEM.TANKER	1	45,800	30,000	2001	
ELBA NAVIGATION	MONACO	DAEDONG SHIPBUILDING	CHEM.TANKER	1	45,800	30,000	1000	
GALLIPOLI SHIPPING	GREECE	DAEDONG SHIPBUILDING	CHEM.TANKER	1	45,800	30,000	2001	
MESSINA NAV	ITALY	DAEDONG SHIPBUILDING	CHEM.TANKER	2	45,800	30,000	2001	
PACIFICO SA	GREECE	DAEDONG SHIPBUILDING	CHEM.TANKER	1	45,800	30,000	1000	
POMPEI SHIPPING	GREECE	DAEDONG SHIPBUILDING	CHEM.TANKER	1	45,800	30,000	2001	
STROMBOLI SHIPPING	GREECE	DAEDONG SHIPBUILDING	CHEM.TANKER	1	45,800	30,000	1200	
BROSTROMS GROUP	FRANCE	3 MAJ	CHEM.TANKER	2	35,000		2000/2001	58
NOVELLA OITAVIA	ITALY	3 MAJ	CHEM.TANKER	1	35,000		2000	29
NOVELLAS / MONTA-								
NARI / CAGNONI	ITALY	3 MAJ	CHEM.TANKER	3	35,000		2000	54
IINO KAIUN	JAPAN	SHIN KURUSHIMA	CHEM.TANKER	1	19,000		2000	
DONSOTANK	SWEDEN	SHANGAI EDWARD	CHEM.TANKER	1	16,000		2000	18
OLYMPIC INTER.	JAPAN	USUKI	CHEM.TANKER	1	16,000		2000	25
UNKNOWN	-	FUKUOKA SHIPBUILDING	CHEM.TANKER	2	11,200	5,999	1999	
TOKYO MARINE	JAPAN	SHIN KURUSHIMA	CHEM.TANKER	2	8,500		1999	
ASAHI TANKER	JAPAN	FUKUOKA SHIPBUILDING	CHEM.TANKER	1	7,700		2002	16.23
MARNAVI	ITALY	AARHUS FLYDEDOCK	CHEM.TANKER	1	4,400		1999	
MITSUI O.S.K. LINES	JAPAN	MINAMI NIPPON	CHEM.TANKER	2	45,000		2000/2001	72
TARBIT SHIPPING	SWEDEN	DE BIESBOSCH	CHEM.TANKER	1	6,400		2000	
TRANSOCEAN	GERMANY	J.J. SIETAS	CHEM.TANKER	2	5,000			32
CONTI REEDEREI	GERMANY	HANJIN	CONTAINER	4	79,000		2000/2001	240
VINASHIN	VIETNAM	GDYNIA	CONTAINER	2				25
VINASHIN	VIETNAM	SZCZECIN SHIPYARD	CONTAINER	2				25
P&O NEDLLOYD	U K.	HHI	CONTAINER	4			2000/2001	320
BERTRAN RICKMERS	GERMANY	HANJIN	CONTAINER	4			2000	
YANG MING MARINE	TAIWAN	CHINA SHIPBUILDING CORP.	CONTAINER	2	68,280	64,000	2000	
NORD CAPITAL	GERMANY	SAMSUNG	CONTAINER	1	67,500	65,900	2000	60
HAPAG LLOYD	GERMANY	HHI	CONTAINER	1	67,000	53,000	2000	
HAPAG LLOYD	GERMANY	HHI	CONTAINER	2	54,766	53,000	2000	
FRIEDRICH A DETJEN	GERMANY	HALLA	CONTAINER	2	45,000		2000	76
CLAUS-PETER OFFEN	GERMANY	SAMSUNG	CONTAINER	5	40,000		2000	165
GEBAB	GERMANY	THYSSEN NORDSEEWERKE	CONTAINER	2	34,600		2000	80
CLAUS-PETER OFFEN	GERMANY	SAMSUNG	CONTAINER	1	32,100		2001	35
SPLIETHOFF'S	NETHERLANDS	SZCZECIN SHIPYARD	CONTAINER	4	19,000		2000	80
POLISH INTEREST	POLAND	GDANSK	CONTAINER	1	18,400		1999	17
SHANDONG INTER.	CHINA	KYOKUYO ZOSEN	CONTAINER	2	10,000		1999	33
UNKNOWN	-	GISA	CONTAINER	1	6,500		2000	
GERMAN INTERESTS	GERMANY	JIANGYANG	CONTAINER	1	5,350		1999	
TRANSINSULAR	PORTUGAL	VIANA DO CASTELO	CONTAINER	1	5,050		1999	11
PACIFIC CARRIERS	SINGAPORE	JIANGZHOU	CONTAINER	1	3,500		2000	5.75
CHENG LIE NAV.	TAIWAN	YANTAI RAFFLES SHIPYARD	CONTAINER	1			2000	
COSCO	CHINA	NANTONG	CONTAINER	5			2000/2001	
ITC	CHINA	KYOKUYO ZOSEN	CONTAINER	2			1999	33
NATIONAL NAV.	EGYPT	DAEWOO	CONTAINER	2			2000	80
UNKNOWN	-	SHIN KOCHI JUKO	CONTAINER	2			2000	
UNKNOWN	-	SHIN KURUSHIMA	CONTAINER	2			2000	
INDIGA	-	HDW	CRUISE SHIP	1			2000	
ROYAL CARIBBEAN	US	MEYER WERFT	CRUISE SHIP	1	8,900	85,000	2001	350
ROYAL CARIBBEAN	US	CHANTIERS DE L'ATLAN.	CRUISE SHIP	2		85,000	2001/2002	700
AM. CLASSIC VOYAGES	US	INGALLS SHIPBUILDING	CRUISE SHIP	2		72,000	2003/2004	880
P&O N.SEA FERRIES	UK	FINCANTIERI	CRUISE SHIP	2		60,600	2001	300
FESTIVAL CRUISES	GREECE	CHANTIERS DE L'ATLAN.	CRUISE SHIP	2		48,000	2001/2002	451
RENAISSANCE CRUISE	FRANCE	CHANTIERS DE L'ATLAN.	CRUISE SHIP	2		32,000	2001	337
READING & BATES	US	HHI	DRILLSHIP	1		23,000	2000	300
SAIBOS CML	MADEIRA	SAMSUNG	DRILLSHIP	1			2000	150
AMCO	EGYPT	KVAERNER FJELLSTRAND	FAST FERRY	1		500	1999	24
STRINTZIS	GREECE	DAEWOO	FAST FERRY	1			1999	26
TIRRENIA SOC. NAV.	ITALY	FINCANTIERI	FAST FERRY	1			2000	60
TURKISH SHG. INDUS.	TURKEY	KVAERNER FJELLSTRAND	FAST FERRY	2			1999	16
P&O	UK	MITSUBISHI H.I.	FERRY	1		19,000	2000	50
UNKNOWN	-	HALTER MARINE INC.	FERRY	1		7,900	2000	
ATTICA ENTERPRISES	GREECE	HDW	FAST FERRY	2	6,420	28,200	2001	220
ANEK LINES	GREECE	SOC. ESERCIZIO CANTIERI	FERRY	1		32,000	2001	110
ANEK LINES	GREECE	HDW	FERRY	1		32,000	2001	110
CORSICA FERRIES	FRANCE	CANTIERE NAVALE	FERRY	2	5,000		2000	140
DUTCH INTERESTS	NETHERLANDS	NQEA AUSTRALIA	FERRY	2		500	1999	
ISTAMBUL DENIZ	TURKEY	PENDIK SHIPYARD	FERRY	2		395	2000	
REMOY FISKERISE.	NORWAY	ORSKOV	FISHING	1			2000	19.35
SWEDISH INTEREST	SWEDEN	DAEWOO MANGALIA	FISHING	1			2000	
SENJA FISKERISE.	NORWAY	VAAGLAND BAAT	FISHING	1			2001	

Shipyard Orders

Atlantic Marine To Build Cruise Vessels



Jacksonville, Fla.-based Atlantic Marine has signed a contract with the Delta Queen Steamboat Co. of New Orleans to construct the first two vessels for Delta Queen Coastal Cruises' premiere fleet of compact U.S. flag coastal ships.

Atlantic Marine will build two 300 ft. (91.4 m), 226-passenger cruise ships — with an option for a third vessel. Priced at $60 million each, and powered by two Caterpillar engines driving two Schottel Z-drives, the first newbuild is scheduled for delivery in March 2001. Its sistership is slated to enter service in June 2001.

The Seattle firms of Guido Perla & Associates and Andrea Piacentini Design (the latter as the interior designer), will mix historical ambiance with contemporary shipbuilding and modern safety technology. Both ships will boast New England Federal-style and nautical furnishings, along with first-class amenities.

Tentative itineraries include: East Coast cruises beginning or concluding in Halifax, Nova Scotia; Portland, Maine, Boston and New York City — to a name a few. As well as round-trip Pacific Northwest excursions from San Francisco to Anchorage and Juneau, Alaska; Seattle, Wash. and Portland, Ore.

Circle 31 on Reader Service Card

U.S. Army Corps Proposes Towboat Acquisition

The Marine Design Center (MDC) of the U.S. Army Corps of Engineers (USACE) plans to obtain an inland river style towboat for the purpose of serving the U.S. Army Corps of Engineers St. Louis District (CELMS) in its next mission.

With measurements of 51 x 19 ft (15.5 x 5.7 m), and a design draft of 5.3 ft (1.6 m) the towboat will have an approximate total of 880 hp. The vessel will be used to provide towing and tender service to other district plants and will be suitable for year-round operation in both shallow, and ice and drift-strewn rivers of the Mississippi Navigation System.

Designed, built and classed to ABS rules for Steel Vessels on Rivers and Intracoastal Waterways, the vessel will be a twin-screw open propeller diesel with an all-welded steel hull and superstructure.

Derecktor Shipyards To Build High Speed Catamaran

Derecktor Shipyards, located in Mamaroneck, N.Y., is scheduled to deliver a 135-ft. (41 m) high speed catamaran ferry to the Woods Hole Steamship Authority in May 2000. The vessel, a larger version of the yard's NGA 125-ft (38 m) passenger catamarans, will be powered by Paxman diesel engines driving Kamewa water jets to achieve a speed of 36 knots at its full 300 passenger capacity.

Shipyard Orders

Owner/Operators	Country (SO)	Shipbuilder	Type	No.	DWT	GT	Deliv.	$
MAURITANIAN GOVT	MAURITANIA	FASSMER	FISHING Res.	1			2000	
GUDMUNDER	UNKNOWN	ASMAR	FISHING	1			2000	14.5
LIE MANAGEMENT	NORWAY	WESTERN SHIPREPAIR	FISHING	1			1999	
LIE MANAGEMENT	NORWAY	BOURGAS SHIPYARD	FISHING	1			2000	
—	NORWAY	SAO JACINTO	FISHING	1			2000	
—	NORWAY	SOVIKNES VERFT	FISHING	1			1999	
REMOY Mgmt	NORWAY	MYKLEBUST MEK VERK	FISHING	1			1999	
HARALDUR BOD.	ICELAND	ASMAR	FISHTRAWLER	1				
PESPORT	CUBA	C.N.P. FREIRE	FISHTRAWLER	5				170
KAWASHO CORP.	SRI LANKA	MITSUI	FLOATING POW STATION	1	10,000		2000	72
SHIH WEI NAV.	TAIWAN	HIGAKI ZOSEN	GEN. CARGO	2	11,800		2000	
GLORY NAV.	TAIWAN	NISHI	GEN. CARGO	2	6,500		2000	
WAGENBORG SHIPPIN.	NETHERLANDS	WELGELEGEN	GEN. CARGO	1			2000	
MITSUI O.S.K. LINES	JAPAN	MITSUBISHI H.I.	LNG	1	78,000		2001	200
BRUNEI GAS CARRIER	BRUNEI	MITSUBISHI H.I.	LNG	1	71,000		2002	
NAVION	NORWAY	HHI	LNG	1			2000	26
SK SHIPPING	KOREA	SAMSUNG	LNG	1			2000	
PETRONAS	MALAYSIA	MITSUI	LNG	1	71,000		2001	180
TIGA LNG	MALAYSIA	MITSUI	LNG	1	70,000		2002	180
PETRONAS	MALAYSIA	MITSUBISHI H.I.	LNG	1			2001	180
SANKO KISEN	JAPAN	MITSUBISHI H.I.	LPG	1	48,500	46,300	2000	
YUYO KAIUN	JAPAN	MITSUBISHI H.I.	LPG	1	48,500		2000	65
DYNEGY	—	SAMSUNG	LPG	1	47,900	45,000	2000	
HYDROSHIP SERVICES	NORWAY	DAEWOO	LPG	1	5,500		2000	25
FORMOSA PLASTICS	TAIWAN	KAWASAKI H.I.	LPG	2			2001	
NAT. MAR. DREDGING	—	DAMEN SHIPYARDS	MAINTENANCE	1			1999	
NIESTERN SANDER	NETHERLANDS	WIJNNE & BARRENDS	Multi-Purp.	2	5,400		2000	
E. OLDENDORFF	GERMANY	FLENSBURGER	Multi-Purp.	1	20,100		2000	17
TRANSCA SHIPPING	GREECE	QING SHAN SHIPYARD	Multi-Purp.	2	13,100		2000/2001	27.2
TRANSCA SHIPPING	GREECE	BOHAI SHIPYARD	Multi-Purp.	2	13,100		2000/2001	27.2
TRANSCA SHIPPING	GREECE	WEIHEI	Multi-Purp.	2	13,100		2000/2001	27.2
TRASCA SHIPPING	GREECE	JIANGZHOU	Multi-Purp.	2	13,100		2000	27
AL-SHAM SHIPPING	SYRIA	JING JIANG	Multi-Purp.	2	10,000		2000	

OWNER OPERATOR	COUNTRY SO	SHIPYARD	TYPE	No	DWT	GT	DELIVM	US$
AUGUST BOLTEN	GERMANY	JIANGYANG	Multi-Purp.	2	8,000		2000	24
INTERSHIP NAV.	CYPRUS	JING JIANG	Multi-Purp.	5	8,000		2000/2001	47.5
GERMAN INTERESTS	GERMANY	ZHONGHUA SHIPYARD	Multi-Purp.	2	4,900			
US NAVY	US	MOSS POINT MARINE	OCEANOGRAPH	1	1,500		2001	53.6
SUEZ CANAL Auth.	EGYPT	CANAL NAVAL CONSTR.	PASSENGER	1		500	2000	
COMPAGNIE MARIT.	AUSTRALIA	AUSTAL SHIPS	PASSENGER	1			1999	
CALEDONIAN MAC.	UK	FERGUSON SHIPBUILDERS	PASS./CAR FER.	1	4,000		2000	25
STRINTZIS	GREECE	VAN DER GIESSEN	PASS./RoRo	1	4,500	20,000	2000	88
STRINTZIS	GREECE	VAN DER GIESSEN	PASS./ VEH/ FER	1		20,000	2000	85
STRINTZIS	GREECE	HELLENIC SHIPYARD	PASS./ VEH/ FER	1		15,000	2001	40
KAWASAKI KINKAI Ki.	JAPAN	IMABARI SHIPBUILDING	PASS./ VEH/ FER	1		9,000	2000	
MORE OG ROMSDAL	NORWAY	LANGSTEN SLIP & BAABYGGERI AS	PASS./ VEH/ FER	1			2000	17.5
—	NORWAY	BRATTVAAG SKIPSVERFT	PLAT. SUPPLY	1		2,000	1999	
ASTROMARITIMA	BRAZIL	ATLANTIC MARINE INC.	PLAT. SUPPLY	1			2000	
METROFIN LIMITED	SWITZERLAND	SAMSUNG	PROD.TANKER	2	105,000		1999/2000	73.8
NAKATA GUMI	JAPAN	SUMITOMO	PROD.TANKER	1	105,000		2000	39.54
NAVIX LINE	JAPAN	SUMITOMO	PROD.TANKER	1	105,000		2000	40
WORLD-WIDE SHG.	BERMUDA	DAEWOO	PROD.TANKER	2	49,000		2000	
DUNYA	TURKEY	ONOMICHI	PROD.TANKER	2	45,000		2000	54
SEAARLAND SHIPPING	AUSTRIA	DAEDONG SHIPBUILDING	PROD.TANKER	2	45,000		2000	48
VROON B.V.	NETHERLANDS	HALLA	PROD.TANKER	2	45,000		2000	60
GEMARFIN	SWITZERLAND	DAEDONG SHIPBUILDING	PROD.TANKER	3	35,000		2001	66
TALITA SHIPPING	COSTA RICA	DAEDONG SHIPBUILDING	PROD.TANKER	1	35,000		2000	24
NAV. ALTA ITALIA	ITALY	SAMSUNG	PROD.TANKER	2	11,300		2000	74
MARITIME Ent.	US	NORTH FLORIDA SHIPYARD	PROD.TANKER	1			2000	
R. NAVIGATION S. A.	LIBERIA	SHIKOKU DOCKYARD	REEFER	2	10,300	10,700	2000	
TOURSHIP GROUP	ITALY	CANTIERE NAVALE FRATELLI ORLANDO	RoRo	2	35,000		2000/2001	175
UND	TURKEY	FLENSBERG	RoRo	2	14,200		2000	80
STENA LINE	SWEDEN	DALIAN NEW	RoRo	2	12,000		2001	66
ENGSTROM	SWEDEN	ZHONGHUA SHIPYARD	RoRo	2	9,000		2001	60
NORDIC FOREST Ter.	SWEDEN	JINLING	RoRo	2	8,060		2000	40

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Circle 117 on Reader Service Card

Ships Machinery International — Dedicated To Offering An Umbrella Of Services

Since opening its doors to the maritime industry more than 30 years ago, Miami-based Ships Machinery International (SMI) has adhered to its motto: "Service is what counts." This, along with the company's lucrative production of fixed pitch tunnel thrusters, own machine ship and spare parts department, has awarded SMI with a conducive edge over its competitors. Providing services for all of its products including steering gear and rudders, box cooler heat exchangers and shipboard cranes, the company has also added to its listing of products and services — fulfilling the needs of meeting the required critical areas in the marine industry.

As U.S. agents for Brunvoll, the supplier of Thruster Systems for main maneuvering and main propulsion of ships, SMI goes to great lengths to not only act as a representative for this company, but also has the capability of housing the company's spare parts inventory and consignment stock at its Miami headquarters — critical positioning to be close to its big cruise shipowning clients.

SMI rounds out its offerings to the maritime industry with a representation of clients consisting of box cooler manufactuer, Weka Marine; rudder manufactuerer, Van der Velden; Krupp Fordertechnik, makers of shipboard cranes for container and cargo vessels; and propeller and reduction gearbox system company, Scana Volda CP

More notably, Fundilusa, the principal supplier of propellers to all European right angle drive manufacturers is SMI's most recent development.

Delving further into the service portion of SMI's offerings, the company is also certified to install and repair these safety mechanisms used on ships throughout the world, thus heightening its steady flame of growth on both ends — sales and service.

Like many marine equipment suppliers, SMI closely monitors oil pricing, cruise ship booking and general world shipyard orderbook trends in order to plot the course of demand for its products and services; particularly for its "Big Two" client categories: offshore and cruise shipping. While the company has had to endure a cyclical downturn in offshore business, it has enjoyed a remarkable cruise ship building and supply rally, while preparing for the increased business volume that will follow the next offshore E&P rally.

Circle 53 on Reader Service Card

Halter Marine Launches USN Vessel

Halter Marine Group Inc. launched a 329 ft. (100 m) oceanographic survey ship for the U.S. Navy. The first ever in the Navy's history to be named through a contest, USNS Bruce C. Heezen will collect data and physical samples from the world's oceans to provide the U.S. Navy with an understanding of its operating environment. Scheduled for delivery in December 2001, the vessel is the fifth of the T-AGS 60 class built at the Halter Moss Point.

MHI Delivers Cable Layer Subaru

Mitsubishi Heavy Industries has delivered the 9,557-gt cable layer, Subaru, at the Shimonoseki Shipyard & Engine Works to its owner, NTT World Engineering Marine Corp., a subsidiary of Nippon Telephone & Telegraph Corporation. The cable layer can load 4,000-tons of cable and is among the largest in Japan. Through reconstruction of the fleet, NTT intends to participate in international projects for submarine cable laying by operating the two large cable layers Subaru and Kuroshio Maru.

Main Particulars

Classification	NK	Draft	23 ft. (7 m)
Length, o.a.	403 ft. (123 m)	GT	9,557 tons
Breadth	69 ft. (21 m)	Speed	13.2 knots
Depth	31 ft. (9.6 m)	Complement	80

EPA Chemical Emergency Preparedness Conference Includes Maritime Issues

Regulations that impact the maritime industry are increasing, as is the need for training and communication on maritime incident responses. The U.S. Environmental Protection Agency's Regional office in Philadelphia will be addressing these issues and many more at its 1999 Chemical Emergency Preparedness and Prevention Conference. The conference theme is "Make a Difference" and it will be held September 20-23 at the Hilton Washington & Towers, Washington, D.C.

Several public and private maritime and HAZMAT response firms have been working with EPA to ensure the latest information on innovative technology and emergency response is included at the conference. These groups include the DOT's Maritime Administration, Scientific and Environmental Associates, and HMHTTC Response, a domestic and international emergency response company.

Topics to be presented include: "Achieving the Best Response for Marine Spills" and "HAZMAT Regulations for Vessels" presented by the U.S. Coast Guard; "Response Technology Job Aids for Marine Oil Spills" by Scientific and Environmental Associates; "Tank Vessel Regulations in Virginia" by the Virginia by the Virginia Department of Environmental Quality; "EPA Risk Management Plans for Vessels" by EPA; "Mitigating Maritime HAZMAT Incidents" by the Virginia Port Authority's Maritime Incident Response Team; and "Shipboard Emergencies Involving ISO Tanks & Containers" by HMHTTC Response. A number of maritime professionals with diverse backgrounds will also lead an exciting panel discussion on current maritime response issues.

This is the 10th EPA Region III Chemical Emergency Preparedness and Prevention Conference. According to **Willie Barnes** of the Maritime Administration, this is the first time a specific track has been designed for the maritime industry. "We are excited about the educational and networking opportunities the conference offers to everyone involved in the maritime industry," said Mr. Barnes. "EPA has lined up quite an impressive array of speakers on counterrorism, chemical accident prevention and safety, and emergency response, and we are working to ensure an equally dynamic maritime track," said Mr. Barnes. Sponsors include the Chlorine Institute and Northwest Airlines. This partnership makes it possible to present such speakers as Dr. Ohhu from Tokyo speaking on the sarin subway incident, Thomas Rayburn from the Great Lakes Spill Commission, **Don Haldimann** of the FBI on working together after a terrorist attack and **Skip Elliott** on improving hazardous materials transportation. Included in the more than 60 workshops will be several case studies including the Lodi, N.J. explosion which resulted in the release of chemicals into a nearby river.

The Washington, D.C. Local Emergency Planning Committee is the Conference host and has obtained space for up to 150 exhibitors. They also are organizing a spectacular opening reception on Monday and a banquet for Wednesday evening. The registration fee is $95 and includes all workshops, the opening reception and the banquet.

For more information, to register, or to obtain an exhibitor booth, call the conference hotline toll-free at (877) 804-CEPP or visit the Web Site at www.epacepp.com. If you have questions about the conference maritime track, you can also call Willie Barnes of the Maritime Administration at (757) 441-3280.

To Drydock or Not to Drydock?

Underwater surveys for certain passenger vessels, one year later.

In March 1998, the Commandant of the U.S. Coast Guard (USCG) issued MOC Policy Letter 3-98, which allowed the extension of drydocking periods for certain passenger vessels operating in benign environments. This policy statement has resulted in significant positive benefits for those vessel owners opting to enter and maintain their vessels in this program. Besides the obvious short-term advantages of a 30-month postponement of traditional drydocking

Thickness gauge used to check the shell plating.

(which is practically impossible for some vessels operated on restricted navigable waters), what are the other implications for the inland passenger vessel industry? Are underwater surveys economically advantageous in the long run? Has safety been compromised? Is it likely that this program will continue and possibly include more vessels than those currently eligible? This article will address these questions, and look at how the Special Drydock Extension Survey program has been applied, as well as how vessel owners, diving contractors, third party examiners, and USCG marine inspectors each play a part.

History and background

With the publication in 1980 of the research project "1980 Underwater Technology Survey for Extension of Time Between Drydockings", the USCG opened the door to underwater inspections of commercial vessels in lieu of the normal periodic drydockings. This eventually led to the 1988 revision of drydock regulations, allowing the option of substituting underwater inspections for alternate drydockings tank vessels, cargo and miscellaneous vessels, and oceanographic research vessels which are less than 15 years old. These revisions did not include passenger vessels. When riverboat gaming was authorized by several state governments in the early 1990s, many new passenger vessels were built or converted and began operating on inland waters – some in areas far from traditional shipyards and drydock facilities. Taking a vessel out of service to move it to such a facility would require laying off hundreds of workers. For ships on isolated waterways, drydocks or graving docks would have to be constructed. With the required five-year drydock surveys looming, ship owners began petitioning USCG officials for extensions. Since allowances for time extensions by USCG field offices and districts are strictly limited by existing regulations, the issue was referred to USCG headquarters.

Analyses were done to determine whether underwater surveys using these new methods could provide a safe alternative to traditional drydock examina-

tions under certain limited conditions. The conclusion was that they could, and Policy Letter 3-98 was the result.

Now, owners of all types of passenger vessels (not just casino vessels) operating in "benign, low-risk" environments may conduct a series of underwater surveys and internal examinations in accordance with the Policy Letter and receive a 30-month extension of the drydock requirement. Each vessel must be operating in "benign, low-risk environments, defined as which are operated in "...fresh water, (less corrosion risk), near-shore and/or shallow water, mud-bottom rivers, limited routes and limited time underway."

In the past year, more than a dozen casino vessels have completed Special Drydock Extension Surveys and have been granted 30-month extensions. Since the underwater surveys have been recently completed, it is difficult to make a definitive statement as to long-term reliability of the results compared to actual drydock examinations. There have been no safety problems or technical issues which might cause USCG to reconsider allowing this alternative procedure. Underwater survey reports have documented hull conditions in detail, sometimes in more quantitative terms than is normally done at a traditional drydock examination. Undeniably, the video and ultrasonic gauging records are much more extensive than those normally made during a traditional drydock examination. In fact, confidence in the program is strong enough that the existing policy is being refined and incorporated into a Notice of Proposed Rulemaking which will eventually result in new regulations.

For the gaming vessel owners who have opted to conduct Special Drydock Extension Surveys, the impact has been extremely positive. In every case, both USCG and the cognizant state gaming agency have allowed gaming to continue while the vessel was examined at the dock, except for brief periods when the hull was opened for valve, shaft or rudder removals, passenger operations were not interrupted.

In order for the Special Drydock Extension Survey program to be reliable and successful, all involved parties must know their roles and perform them correctly. The vessel owner must first decide whether the Special Drydock Extension (underwater) Survey is the right choice for his operation. Currently, for vessels operating more than six months of the year in fresh water, the drydock and tailshaft inspection interval is five years. To determine whether actual drydocking or underwater survey makes the most economic sense, he should consider all costs (direct and indirect) of each drydocking versus underwater survey. For the underwater survey program, a commitment must also be made to perform the Hull Maintenance and Assessment Program specified in the policy letter. For casino vessels, the underwater survey is the hands down winner because of the ability to continue dockside gaming throughout the process. Owners of non-casino passenger vessels may conclude that the relatively higher expense, in most cases, of an underwater survey (especially if in-water hull repairs or shaft replacements are required) makes the traditional drydock examination more advantageous. The owner should become familiar with Policy Letter 3-98 and the applicable references, such as the Navigation and Vessel Inspection Circular (NVIC) for underwater surveys. Next, proposals should be solicited from qualified diving

contractors and third party examiners several months before the ship's drydock anniversary date. The Policy Letter outlines the necessary qualifications and functions required to be performed by each.

There are more than 50 inspected casino vessels on inland waters, and numerous non-casino passenger vessels now eligible for this drydock extension program. Although about a dozen have participated so far, many casino vessels built in the mid-1990's are nearing their five-year drydock anniversary dates.

We expect that almost all eligible casino vessels will opt for this program. Some non-casino passenger vessels will probably continue to use drydocks and may decide to enter the program as well.

This leads to the question of expansion of the program beyond its current restrictions, such as allowing passenger and casino vessels on limited Great Lakes routes to participate. There are now four casino vessels operating on Lake Michigan. Risk analyses are being conducted to determine whether underwater surveys can provide a safe alternative to drydock examinations for these vessels. Looking ahead: could the program be expanded to coastwise passenger vessels? The precedent for allowing salt-water vessels to be inspected in the water exists with the NVIC 1-89. As confidence in the procedures grows and a history of safe, trouble-free operation after underwater surveys is developed, it is reasonable to assume that underwater surveys may be accepted as alternatives for drydock examinations of these vessels.

***Andrew J. Lipman** is a senior surveyor with Marine Safety Experts, Inc. **Clay A. Fust** is a marine safety consultant, surveyor, and president of Marine Safety Experts, Inc. in Gary, Indiana. Both authors have acted as Third Party Examiners for Special Drydock Extension Surveys in the past year. Marine Safety Experts, Inc. can be reached at 800 617 9288.*

Ship Repair & Conversion

QEII Again Stirs Repair Interests

Interest in the European cruiseship repair market is currently focused on which shipyard will win the $31.3 million contract to repair the 1968-built, 70,327-grt cruiseship Queen Elizabeth II, owned by Cunard Line. There are currently three shipyards shortlisted for the work — Bremerhaven's Lloyd Werft, Hamburg's Blohm + Voss Repair and the U.K.'s A&P Southampton. The contract is expected to be awarded soon, with the drydocking dates scheduled for between November 12 and December 11. Now part of the Carnival Cruise Lines (CCL) group, Cunard has also announced the drydocking programs for two other cruiseships in its fleet — the 1973-built, 24,492-grt Vistafjord (to be renamed Caronia), which will dock between November 20 and December 20, and the 1987-built, 37,845-grt Royal Viking Sun (to be renamed Seabourne Sun) during October 29 and November

Oriana arriving in Southampton.

Structural Overhaul of Western Flyer Nears Completion

After almost a year of undergoing a major overhaul to repair structural cracking detected and monitored prior to its July 1998 haulout, Western Flyer is ready to conclude its structural reinforcement project at Bay Ship & Yacht Co.

Built in 1996 for the Monterey Bay Aquarium Research Institute by SWATH Ocean Systems, the twin-hulled vessel measures 117 x 53 ft. (35.6 x 16 m) with a displacement of 419 long tons.

The newly refurbished vessel boasts the SWATH (Small Waterplane Area Twin Hull) design — distinguished by two tubular, submerged lower hulls connected to the upper catamaran hull by narrow struts. A midpoint strut located waterline provides for a stable craft with minimal motion while underway.

Circle 13 on Reader Service Card

29. The majority of work to be carried out at these drydockings will be changes to the passenger cabins and passenger facilities, with work being controlled by interior design consultant Robert Tillberg. No news on which shipyards will carry out the projects have been announced.

Meanwhile, during late April, A&P Southampton, part of the A&P Group which also has yards in Falmouth, Tyne and Chatham, docked P&O Cruises' 69,153-grt flagship Oriana for refit work. The refit saw the ship in the yard's famous King George V Drydock, which was built during 1933 to accommodate the super liners of its day, including the Queen Elizabeth and the Queen Mary.

She was at the yard for two weeks, with work including inspection/testing, repair and maintenance work, which was carried out in line with the standards of P&O. The project secured work for around 150 workers and created a further 75 jobs for the yard as well as for up to 400 sub-contractors who were carrying out 'hotel' maintenance work, including both accommodation and public areas.

Carrying on with repairs to cruiseships, Lloyd Werft has won the $5.5 million contract to carry out refit work onboard Norwegian Cruise Lines' (NCL) 76,049-grt cruiseship Norway. Duration of the project was scheduled for three weeks, and included engine, shaft and propeller overhauls and hull painting.

Meanwhile, Lloyd Werft has announced that in talks with Italian cruiseship operator, Costa Crociere, it plans to lengthen two of its cruiseships next year. The yard has taken up initial talks, but no details had yet been worked out. This type of work has become a specialized sector of the industry for the yard, with Lloyd Werft already completing several similar projects for NCL, with the 32,396-grt Norwegian Majesty, the 50,760-grt Norwegian Wind and the 50, 764-grt Norwegian Dream all undergoing lengthening work.

In addition, Airtours' 1,600-berth cruiseship Sunbird (ex-Song of America) has now docked at Merseyside's Cammell Laird shipyard for a $10 million pre-service refit and refurbishment contract. Work included the addition of nine penthouse suites and outfitting of soft furnishings in cabins and public areas. The ship, which was purchased from RCCL, will join the Airtours fleet in the Mediterranean at the end of May, this year. She is scheduled to be renamed in Palma on May 28 and will become the flagship of the U.K. cruise operators fleet.

With regards to the general repair market, Shell has decided to award the reactivation project of its 68,122-dwt LNG carrier LNG Lagos (ex-Nestor), which has been laid-up in Loch Striven for over 20 years since she was built by Chantiers de l'Atlantique, St. Nazaire, during 1976, to French shiprepair yard Sobrena. The ship is being re-activated for Shell's Nigerian project, which will be the ship's first ever commercial cargo, and arrived in Brest during the first week in May, following a tow from Loch Striven. The vessel is expected to be at the yard for three months.

During the latter part of April, this year (1999), there were nearly two million dwt worth of vessels undergoing repairs at Dubai Drydocks, UAE, with IMAC's 298,324-dwt VLCC World Creation, Olympic Shipping's 273,856-dwt VLCC Olympic Breeze, Ceres Hellenic's 413,117-dwt ULCC Kapetan Hiotis, Sosema's 269,047-dwt VLCC Licorne Pacifique and Bergesen's 322,446-dwt ULCC Settebello all dry-

docking for repairs.

Meanwhile, competition continues between Dubai Drydocks and Bahrain's Arab Shipbuilding & Repair Yard (ASRY), with the latter also drydocking a number of very large tankers. Enquiry levels at ASRY have been noted to increase towards the second quarter of this year, and the yard has already been awarded a wide range of vessels for repair in April, May and June. Among these vessels include France Shipmanagement's 306,999-dwt VLCC Picardie and the 300,000-dwt ULCC Luxembourg, ICB/Wallem's 285,690-dwt VLCC Sabang and Jahre-Wallem's 285,506-dwt VLCC Mountain Cloud.

During the past couple of weeks, the deal by which YVC Holding takes over the Wilton Fijenoord (WF) shipyard in Rotterdam, has gone ahead. WF is one of two large shiprepair/conversion yards in Rotterdam owned by Wilton Fijenoord Holdings BV, part of the RDM Group — Verolme Botlek being the other shipyard. The Schiedam-based shipyard (WF), following a period of reorganization, will now be known as Rotterdam United Shipyards (RUS).

The facilities sold to YVC include three graving docks of 42,000-dwt, 40,000-dwt (covered) and 160,000-dwt capacity and the smaller of the two floating docks, which has a capacity of some 38,000-dwt (this dock, it is understood , will be placed on the sale and purchase market by YVC). Wilton Fijenoord Holdings, which will also continue to own Verolme Botlek, will retain ownership of the larger of the two floating docks, which has a capacity of some 90,000-dwt, and will also offer this unit on the sale and purchase market.

At present, it is understood that Croatia's Viktor Lenac shipyard is negotiating for this facility. The covered graving dock has been used by WF for large scale repair and conversion work. It was originally covered as part of WF's contract to build a series of submarines for Taiwan. The subsequent supply contract of spare parts for this submarine contract has been retained by Wilton Fijeno-

Combined System of Ship Survey and Certification to surface in 2000

Shipowners who have sought a more logical and time efficient means of ensuring that their ships maintain valid international certifications, will be encouraged by last month's news from the International Maritime Organization (IMO). The organization has decided that it will enter into a harmonized system of survey and certification regarding international shipping regulations on February 3, 2000.

The system will encompass the following three survey and certification requirements: the International Convention for the Safety of Life at Sea (SOLAS), 1974; the International Convention on Load Lines (LL), 1966 and the International Convention for the Prevention of Pollution from Ships, 1973. All will be reformed by the Protocol of 1978 relating to (MARPOL 73/78), in addition to the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC and BCH Codes) and International Gas Carrier (IGC) Code.

Each of the above-mentioned codes also mandate a certificate of proof that these requirements have been met. Although the combined system will alleviate some of the problems resulting from noncoinciding survey dates, there is still one drawback — the ship in examination will be forced to suspend its services for a few days to receive the proper certification.

Originating in 1988, this "harmonized" system of survey and certification, was first adopted by IMO at an International Conference on the Harmonized System of Survey and Certification. Protocols to both the SOLAS and Load Lines introducing the system were also adopted in 1988 by 15 states holding a combined merchant shipping fleet of no less than 50 percent of world merchant shipping tonnage, allowing the system to be activated and met. This occurred on February 2, 1999, resulting in the Bahamas depositing instruments of accession to both instruments with IMO. With Malta's recent adoption of the 1988 protocols (Land Lines and SOLAS), both countries now total 32 states parties and hold a world merchant shipping tonnage of 54.29 percent (Bahamas) and 54.31 percent (Malta).

ord Holdings.

YVC currently operates two shipyards in Rotterdam, YVC Bolnes, operating in the repair and conversion markets, and YVC Ysslewerf, in the newbuilding market.

It is the intention to centralize all repair activities at Rotterdam United in Schiedam, a process which is expected to take up to a year to complete, and will involve the transfer of two floating docks from YVC Bolnes (25,000-dwt and 18,000-dwt capacity respectively) to Schiedam. It is also the long-term objective to transfer the newbuilding activities from Ysslewerf to Schiedam. The two workforces, 140 employed at YVC Bolnes and 250 at WF, will be amalgamated.

Throughout the past decade, WF has concentrated solely on the general repair market, while Verolme Botlek, with its large 295 ft. (90 m) wide graving dock, has had the advantage of being able to gain contracts from both the offshore and conventional shipping markets.

In the Far East, the official opening ceremony of Hyundai-Vinashin Shipyard (HVS), which is a joint venture company between South Korea's Hyundai Mipo Dockyard (HMD) and the Vietnam Shipbuilding Industry Co. (VISC), took place on April 26, this year.

Before the opening ceremony, HVS accommodated its first vessel and carried out repair work to the owner's complete satisfaction, before the ceremony was conducted.

The first vessel was the 29,693-dwt Panamanian-registered bulk carrier Olympic Mentor, owned by Springfield Shipping, an affiliate company of the Onassis Group, Greece.

The 1984-built ship underwent sandblasting and painting of cargo holds, diesel generator repairs and general repair work.

Apart from this contract, the yard has another five ships expected to dock in the near future, and a further 30 vessels are under discussion, hoping to follow the next batch of ships.

HMD, in line with its long-term strategy, Vision 2000, designed to become a leading company in the 21st century, entered into a joint venture with VISC establishing a shipyard in Vietnam and had a ground breaking ceremony during November, 1996.

During the construction period of the yard, Tran Duc Luong, the President of Vietnam, accompanied by his ministers, visited HVS last October (1998) and leading figures of government including the Prime Minister in May, last year, confirming a high interest from the local government.

HMD expects that the lower labor costs will meet the requirement of the shipowner and favorably compete with Singapore and Chinese shiprepair yards. Furthermore, HMD believes that HVS will strive to satisfy various needs of worldwide shipowners and managers with HMD guaranteeing high quality and extensive services. It is understood that around 100 HMD foremen and 900 Vietnamese workers are working together on this project.

HVS is currently considered as one of the largest shipyards in the South East Asia region, outside of the Singapore area, with two drydocks of 40,000-dwt 1,246 x 213 ft. (380 x 65 m) and 80,000-dwt 853 x 147.6 ft. (260 x 45 m) vessel capacities, a 996 m long repair quay, and four sets of jib cranes (one of 80 tons, two of 30 tons and one of 15 tons). HVS plans to diversify its activities into the shipbuilding arena from 2004.

The Use Of Standard Low Voltage Motors In New Dutch Frigates

(Continued from page 56)

increase the longevity of the motors in a demanding environment that features severe vibrations, due to warships' handling of quick accelerations and turns. Based on the Navy's technical requirements, Schelde drew up a short list of five manufacturers, out of which ABB emerged as the winner based on a combination of shock resilience, low noise, low EMI emissions and cost.

"The ABB motors have the right balance between quality and value for money, and in addition come with a world-wide service network, which was an advantage for the Navy," said **Willem den Heijer**, project manager for electrical systems at Schelde Shipbuilding.

Both large and small motors underwent extensive shock tests. The larger motors, up to 110kW output and 805 kg in weight, were tested at the independent TNO laboratory in the Netherlands, and survived acceleration up to 13g (13 times the force of gravity).

Smaller motors were tried out at the SHAPE laboratory in Bergschenhoek, the Netherlands. The 75 kW motor, which weighs 330kg, survived acceleration up to 20g; and the 2.2 kW, at 16kg, survived acceleration up to 32g.

To withstand these forces, the standard aluminium motors over 30kW were strengthened with foot mountings and end shields of nodular cast iron, used in combination with flexible mountings. The modified design has been given its own model code by ABB, which means these are now standard motors as far as the service organization is concerned. This could save significant costs as the ships are often far from their homeport on NATO assignments, and also have patrol duties in the territorial waters of the Netherlands Antilles and Aruba in the Caribbean.

The specially modified ABB motor is noted by the yard to be generally used across all equipment on board, though equipment manufacturers are free to select any type and size from the range.

"On previous Navy ships, we have used special motors that are extremely resilient to shock, however these are very expensive," Den Heijer said. "But when we started this project, we took a standard motor straight off the shelf with a view to bringing this up to Navy standard at minimal cost."

"The cost of components such as motors may not seem a significant part of the Navy's budget, but considering we have hundreds of motors on each ship, a reasonable number of ships, and hundreds of other components which may also be procured cheaper, you start to realise it all makes sense at a time when budgets are tightening," Janssen said. The keel laying of the first Dutch frigate was performed in September, scheduling the ship for a float out date of early 2000. Trials will occur during 2001, followed by the commissioning of the ship in 2002 by the Navy. The remaining three frigates are to be produced at the rate of one per year.

This puts the frigates, known as the De Zeven Provincien class, ahead of many other similar programs in the world. First conceived in 1987, the idea was to build 52 identical frigates for use within the NATO navies. Latterly whittled down to three participating countries for the platform, encompassing the Netherlands, Germany and Spain, it is now known as the Trilateral Frigate Co-operation project. The ships built for the different countries are not identical, as many details have been modified to accommodate different equipment and working practices in the various navies and shipyards involved.

The ships have an overall length of 472 ft. (144 m), a displacement of 6,048 tons and a crew of 202. The cruise speed is 19 knots and boost speed 30 knots, provided by a combined diesel or gas turbine propulsion system with two 18.5MW gas turbines and two 5MW diesel engines connected in a father-and-son arrangement. The frigates will be used for air defence and command at the centre of a task group.

Circle 23 on Reader Service Card

The preceding was authored by John Fassbender, U.S. sales manager, LV Motors, ABB Industrial Systems Inc.

LIQUIDATION SALE

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NEW Carrier 800 Ton Compressor

Model 17MF31X S/N 01282

Memarco Angle Glove Valves

Qty:12 Size: 8" Pressure: 125# No Wheels
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Hundreds of Other Valves in Stock

New England Trawler 5 - Ton Cago Winch

Rated 11,000# at 45 Feet Per Minute
Complete with 15 HP Motor & Starter

(3) Rebuilt Carrier 5H-60 Compressors

With 50 HP Motors, 1750 Rpm, 440 V

New Serck 50 - Ton Evaporator

Type RFE 50. Complete w/Accessories
Manufactured in 1995. In Original Crate.

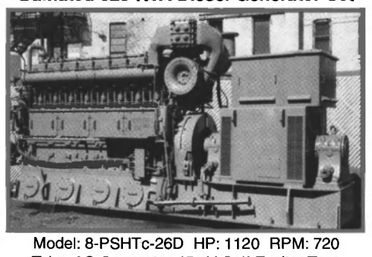
100 - Tons Mooring Chain

Sizes from 1-3/8" to 4-1/4"
ABS Chain Also Available

(8) New 6742Y Brewer & Titchner Double Blocks

Galvanized Steel w/Becket Oblong Swivel Eye 1-3/4"
Upset Shackle Swivel: 25 Ton Weight 379#

Daihatsu 925 KVA Diesel Generator Set



Model: 8-PSHTc-26D HP: 1120 RPM: 720
Taiyo AC Generator 450 V Self-Exciter Type

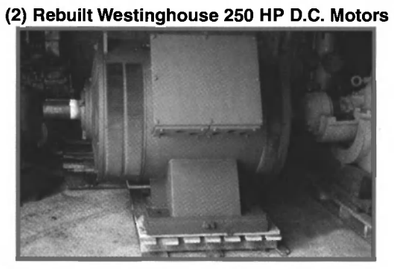
(2) 240 kW Westinghouse Steam-Turbine Gen Sets

Steam:540# Temp:322°F RPM: 9989RPM
200kW AC Generator & 40 kW DC Generator

New Woodward PGPL and UG8 Governors

New Parts for Cooper Bessemer LSV Engines

(2) Rebuilt Westinghouse 250 HP D.C. Motors



RPM:1400/1750 Volt: 230 Frame: 162

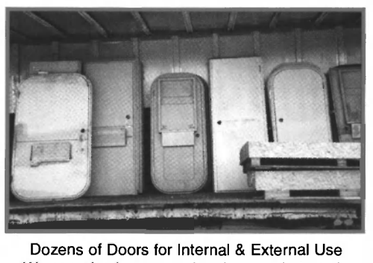
(2) Detroit Diesel 6-71 Diesels Generator Sets

Type 10637305 RPM: 1800
Brushless Generator 139/240 Volt AC, 452 Amp

(2) New Blackmer X2NFM-TB Pumps

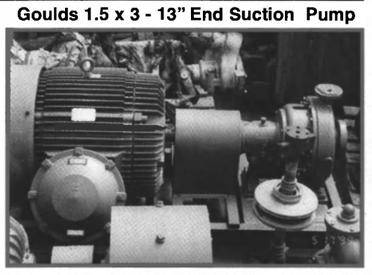
GPM: 65 RPM: 680 PSI: 200
Reliance 15 HP Motor, 440 V, 1770 RPM, 256T

Watertight & Weather-tight MarineDoors



Dozens of Doors for Internal & External Use
We can also have any size door made to order

Goulds 1.5 x 3 - 13" End Suction Pump



Model:3196 Material: 316SS Impeller: 12.75" CCW
Reliance Motor HP:125 RPM:3570 Volt:440

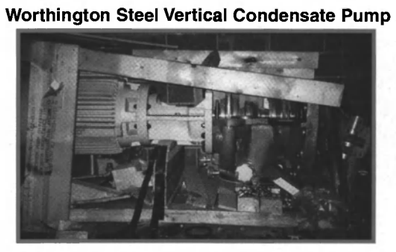
(4) Goulds 5 x 8 x 12 Model 3405 Pumps

GPM: 1000 Head: 96' RPM: 1780 RPM
S/N 287B806, 287B142, 287B441,287B387

(2) Mitsubishi CHD34 Cargo Pumps

1250 Cubic Meters at 50 Meters Head
COMPLETELY RECONDITIONED

Worthington Steel Vertical Condensate Pump



Model:6-UZVN-17 Imp:17"-18" Test Press:203 PSI
Reliance 75 HP Motor, 1150 RPM, 445 UNP Frame

Shinko KHD-450-2 Pump

Size: 18" x 24" Capacity:3500 M3/Hr
RPM: 1200 Head: 145 M S/N: 238863

Reconditioned 12" & 16" Double Bitts

Other Sizes Also Available

(2) Navy Surplus Lube Oil Pumps - Unused

Manufactured by IMO Delaval Size: 4x 5

Maritime Power Corporation

200 Marin Boulevard Jersey City,NJ 07302 USA

Phone: 201-433-0870 Fax: 201-433-9287 E-mail: marpow@marpow.com

www.marpow.com

Integrated Power System Dubbed Technical Revolution

(Continued from page 56)

version, energy storage and control for supplying propulsion and service loads within a vessel. The system is also capable of designing, procuring and supporting marine power systems across a wide range of ship types. After successful completion of factory acceptance testing in December 1998 (FAT) at the motor manufacturer's facility in Rugby, U.K., the motor was delivered to SSES via barge from its U.S. port of entry in Baltimore. The converter arrived separately a few weeks later by truck. SSES also collaborated with the manufacturer of IPS with the installation of about 1,000 printed circuit boards in the converter for upgraded unit reliability. Testing occurred at the SSES Advanced Propulsion and Power Generation Test Site for evaluation of the Full Scale Advanced Development phase.

Fishman Steps Down From Top Position At Maritime Power

For more than half a century, **Irving Fishman** has serviced the maritime industry on an international basis by supplying a selection of equipment through his company, Maritime Power Corporation located in Jersey City, N.J. In a recent announcement, Fishman voiced his decision to step down as president of the company, a position he has held since establishing his business in 1956.

Priding itself on its vast supply of scarce items with a rapid delivery, Maritime Power, who coined its slogan as, "The difficult we do right away, the impossible takes a little longer," provides pumps, turbines, gears, heat exchangers and, marine and deck machinery since its founding.

After graduating from State University of New York at Albany (Fishman majored in Physics and Chemistry), he enlisted into the U.S. Army during World War II. Stationed at Columbia, he served as a scientist on the Manhattan Project, and vying to expand his knowledge further, Fishman also took classes in Chemical Engineering.

When D-Day arrived and the war concluded, Fishman began his maritime career at Seaboard Marine, which manufactured hatch covers, liberty ship piston rings, salinity indicators and oil/water separators. He remained with Seaboard until he formed Maritime Power. Following his departure as president, Fishman will assume the position of chairman of the board; his successor has not yet been named.

Zollern Features Planetary Gear System

Zollern, the German manufacturer of planetary gear units for slewing and winch drives is reputable and well-known among crane makers throughout Europe. Its noted planetary gear system, features a modular system design principle providing flexibility in the selection of ratios and matching a gearbox to an application while upholding the advantages of volume production of gear parts. Used in host winches up to 275 tons, applications are mobile, harbor, ship and offshore cranes, in addition to various other types of materials handling equipment.

Harbour & Marine Engineering Inaugurates Smart Hook®

Australian-based Harbour & Marine Engineering has developed a premier concept in mooring systems, the Smart Hook. Automatically measuring mooring line tension as part of standard mooring operations, the product has set new standards in marine monitoring.

With Smart Hook, mooring line tension for each hook is displayed locally in real time at the control box on the hook/capstan unit, while visual and audible alarms alert operators of dangerous loads and imbalance between mooring lines. Once mooring lines have been attached to the hooks, no further operator intervention is required.

The World Fleet (tonnage in ,000s)

	No. Ships	DWT
ALL COUNTRIES	**26,858**	**720,040**
U.S. (Privately owned)	302	13,944
U.S. (Govt. owned)	193	3,567

Country	No. Ships	DWT	Country	No. Ships	DWT
PANAMA	3,998	120,397	ESTONIA	52	470
LIBERIA	1,587	96,515	ARGENTINA	35	461
GREECE	874	48,211	BANGLADESH	40	441
CYPRUS	1,476	38,662	LITHUANIA	64	393
BAHAMAS	954	37,549	LEBANON	62	358
MALTA	1,113	31,717	SRI LANKA	25	339
NORWAY(NIS)	626	29,295	AZERBAIJAN	68	326
SINGAPORE	753	25,240	MAURITIUS	15	312
CHINA	1,513	23,454	MOROCCO	37	272
JAPAN	744	21,997	SOUTH AFRICA	9	271
HONG KONG	223	13,857	GEORGIA	13	263
PHILIPPINES	534	13,328	CAMBODIA	28	258
INDIA	305	11,290	PERU	13	257
RUSSIA	1,655	11,126	NEW ZEALAND	20	228
KOREA (SOUTH)	449	10,173	BAHRAIN	7	219
SAINT VINCENT	683	10,112	CUBA	29	208
TURKEY	516	10,110	ECUADOR	21	188
TAIWAN	202	9,161	TUNISIA	20	176
MARSHALL ISLANDS	106	7,831	DENMARK	21	149
ITALY	352	7,564	CZECH REPUBLIC	3	132
DENMARK(DIS)	315	7,193	BELGIUM	10	120
BRAZIL	188	7,191	IRELAND	27	115
GERMANY	404	6,556	MALDIVES	20	112
IRAN	123	6,091	ETHIOPIA	13	106
MALAYSIA	303	5,892	AUSTRIA	22	102
BERMUDA	72	5,064	COLOMBIA	17	99
NETHERLANDS	445	4,952	ANGOLA	10	94
ISLE OF MAN	110	4,435	URUGUAY	3	92
KERGUELEN	72	4,263	ARUBA	13	76
UKRAINE	415	3,709	HUNGARY	10	72
ROMANIA	223	3,567	JORDAN	3	68
KUWAIT	44	3,186	TUVALU	9	68
AUSTRALIA	61	3,160	SUDAN	4	50
INDONESIA	444	3,122	ALBANIA	7	46
THAILAND	286	3,072	GHANA	6	40
POLAND	125	2,987	PAPUA NEW GUINEA	16	39
UNITED KINGDOM	140	2,815	GABON	2	38
ANTIGUA & BARBUDA	379	2,550	TANZANIA	5	37
SWEDEN	198	2,219	CAMEROON	2	34
VANUATU	98	1,870	PARAGUAY	19	32
FRANCE	54	1,695	MALAGASY	9	28
U.A.R.(EGYPT)	110	1,658	SLOVAKIA	5	26
BULGARIA	105	1,613	ICELAND	4	22
UNITED ARAB EMIRATES	51	1,440	YEMEN	3	19
IRAQ	31	1,406	FIJI	6	18
SAUDI ARABIA	66	1,400	TURKMENISTAN	6	12
MEXICO	46	1,242	TONGA	3	12
LUXEMBOURG	29	1,198	MOZAMBIQUE	4	11
PORTUGAL	73	1,185	CAPE VERDE	4	7
CAYMAN ISLANDS	42	1,155	KENYA	1	6
LIBYA	26	1,107	W. SAMOA	1	6
ALGERIA	73	1,082	JAMAICA	2	6
HONDURAS	256	1,036	OMAN	1	5
BELIZE	177	1,008	SURINAM	3	5
QATAR	20	895	EQUATORIAL GUINEA	3	5
MYANMAR	46	877	SENEGAL	1	4
FINLAND	84	876	ZAIRE	1	4
NORWAY	111	859	KIRIBATI	1	3
SPAIN	81	840	TRINIDAD - TOBAGO	1	3
ISRAEL	27	796	GUYANA	1	3
KOREA (NORTH)	98	786	LAOS	1	3
VENEZUELA	28	738	SOMALIA	1	3
CHILE	39	718	GREENLAND	1	1
LATVIA	65	700	SIERRA LEONE	1	1
PAKISTAN	26	693	SAO TOME	1	1
CROATIA	57	693	DOMINICAN REPUBLIC	1	1
BARBADOS	40	672	KAZAKHSTAN	1	1
VIETNAM	108	665	MAURITANIA	1	1
SWITZERLAND	20	654			
NIGERIA	31	620	**UNKNOWN FLAG**	179	1,712
GIBRALTAR	19	576			
SYRIA	119	541			
CANADA	50	532			

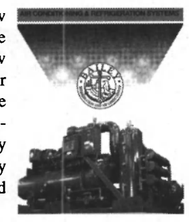
Vancouver Shipyards

Vancouver Shipyards, in business since 1902, provides construction and repair services to ships along the pacific Coast, offering a range of service unmatched by other shipyards in the region. The company repairs, maintains and builds a wide variety of vessels, including deep-sea ships, high-speed and conventional ferries, tugs, fishing vessels, Arctic class ships, offshore supply and seismic research vessels, barges of all sizes and types, as well as various offshore and marine structures.

Circle 60 on Reader Service Card

Bailey Refrigeration and Air Conditioning

Bailey Refrigeration has built a reputation as a leader in screw compressor technology for air conditioning and refrigeration. As new regulations and new information continue to limit the use of R-11 refrigerant, Bailey screw compressor systems gain wider acceptance. Bailey systems use refrigerants that are more than non-toxic, non flammable and virtually harmless to the ozone layer. They are also reliable, cost-efficient and easy to maintain.



Circle 61 on Reader Service Card

Teekay Shipping Corporation

Teekay Shipping Corp. celebrated its 25th anniversary this year. The company owns and manages the world's largest and most modern fleet of medium-sized tankers, operating primarily in the Indo-Pacific Basin. Recognized as the leading oil transportation supplier of this area, the company has a fleet utilization rate of approximately 70 percent. Teekay maintains a continuous presence in the world tanker market and employs approximately 2,000 people in its shore offices and sea-going operations.

Circle 62 on Reader Service Card

Stena Line AB

Stena Line is an international transport and travel service company and one of the largest ferry companies. During the spring of 1999, the company's network included 12 strategically situated ferry routes in Scandinavia and the U.K., including a lift-on lift-off freight route. The company has interests in three other routes through its part-ownership of P&O Stena Line and collaboration with another ferry operator. Stena Line has a modern fleet of 26 vessels, consisting of fast HSS ferries with a cruising speed of 40 knots, traditional multi-purpose ferries, RoPax ferries for freight and passengers and RoRo ferries.

Circle 63 on Reader Service Card

Oceaneering International

Oceaneering International is an advanced applied technology company that provides engineered services and hardware to customers who operate in marine, space and other harsh environments. The company has grown from an air and mixed gas diving business in the Gulf of Mexico, to a diversified, technology organization operating worldwide. In the 1998 fiscal year, the company earned a net income of $22 million on revenues of $358 million while employing approximately 2,600 people.

Circle 64 on Reader Service Card

Maritrans Inc.

Maritrans Inc. has a 71-year commitment to building and operating marine transport vessels for the U.S. domestic trade. Today, Maritrans owns and operates one of the nation's largest, independent fleets of oil tankers, tugboats and oceangoing petroleum tank barges. Revenue for 1998 totaled $151.8 million an increase of 11.8 percent from 1997. Currently, there are 29 barges, 25 tugboats and 4 oil tankers in the Maritrans fleet.

Circle 65 on Reader Service Card

Chevron

Chevron Corp. is an international company that, through its subsidiaries and affiliates, engages in fully integrated petroleum operations, chemicals operations and coal mining in the United States and approximately 90 other countries. Chevron admits that 1998 was a tough one because depressed economic conditions in Asia reduced the demand for petroleum products, and the resulting worldwide oversupply of crude oil hammered prices. Chevron's net income fell 59 percent to $1.339 billion from the record $3.256 billion earned in 1997.

Circle 66 on Reader Service Card

EXXON

Exxon states that in 1998 it operated in a difficult business environment. However, careful management of its asset portfolio and a vigorous drive to control costs permitted Exxon to achieve its fourth-highest net income in history: $64 billion-resulting in a return on capital employed of 12 percent. According to Exxon, shareholder return, including reinvested dividends, reached 22 percent, well above the average of the other international oil companies. The company has also increased their capital spending from $8.8 billion in 1997, to $10 billion in 1998 in order to take advantage of attractive investment opportunities. Exxon has one of the largest portfolios of proved reserves and production in the United States, and is Malaysia's largest oil producer and the largest supplier of natural gas to Peninsular Malaysia. The company has exploration or production operations on every continent except Antarctica.

Circle 67 on Reader Service Card

Aker Maritime

Aker Maritime is an international group with its head office in Norway and employs approximately 15,000 people in more than 20 countries. The group, along with its subsidiaries, handles a degree of maritime market operations; building and installing oil and gas production solutions on the Norwegian continental shelf, providing drilling equipment for ships and floating production units, constructing and installing production solutions tailored especially for deep water. The Group also fabricates, assembles, and commissions production units, and supplies integrated seismic surveys and geological and geophysical services.

Circle 68 on Reader Service Card

Diamond Offshore

Diamond Offshore Drilling Inc., a leading deepwater drilling contractor, owns and operates one of the largest fleets of offshore drilling rigs in the world, including more semi-submersible rigs than any other drilling contractor. The fleet consists of 30 semi-submersibles, 15 jack-ups, and one drillship. Compared to 1997, Diamond Offshore revenues rose from $956 million to $1,209 million in 1998. The companies net income also increased from $279 million in 1997 to $384 million in 1998.

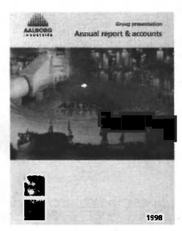
Circle 69 on Reader Service Card

CoFlexip Stena Offshore

Coflexip Stena Offshore is the most highly integrated solutions provider in the global subsea oil and gas subsea industry. The company specializes in all aspects of subsea field development and operations, from engineering to product supply, and including installation, construction and services.

Circle 70 on Reader Service Card

Aalborg Industries



Aalborg Industries provides steam, heat and power to shipyards, shipowners, industrial end users, and engine and gas turbine manufacturers. The company continuously seeks to increase its expertise in boiler plant and related combustion, heat transmission in its five core business areas: marine boilers, heat recovery steam generators, oil/gas fired boilers, heat exchangers, and inert gas systems. Aalborg Industries aim is maintaining an absolute market leading position within its selected business areas; offering customers effective global presence and much more.

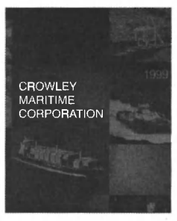
Circle 71 on Reader Service Card

Aker Yards

Aker Yards AS is a leading international shipbuilding group that comprises four groups: Aker Finland, Aker Brattvaag and Langsten Group in Norway, and Aker MTW in Germany. The Group delivers a wide range of specialized vessels and holds a unique market position in technologically advanced specialized vessels.

Circle 72 on Reader Service Card

Crowley Maritime Corp.

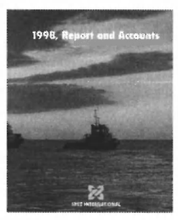


Despite the challenging operating environments of last year, Crowley Maritime continued to reinvest its profits for the long-term benefit of the company, its operating subsidiaries and customers. Crowley moved its multi-million dollar data center to Jacksonville and launched new information technology applications, added electronic commerce functions to its web site, continued its aggressive design/build program of the world's most advanced tractor tugs, purchased new cargo carrying equipment, established a new integrated logistics company, expanded into Latin America break bulk transportation and into tug and barge cargo transportation in the Mercosur trades, and enhanced and streamlined services across the full spectrum of Crowley products.

Circle 73 on Reader Service Card

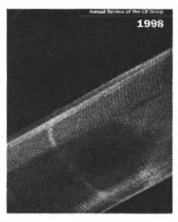
Smit International

Smit International was first developed in 1842 as a towing company that towed ailing ships from the sea to the harbor of Rotterdam. Since then, it has developed into a company that offers a wide range of non-conventional maritime services. These services include: port and coastal, maritime contracting, and salvage and towing.



Circle 74 on Reader Service Card

LR Group



Through its constitution, Lloyd's Register, at the core of the LR Group, is directed to secure for the benefit of the community high technical standards of design, manufacture, construction, maintenance, operation and performance, for the purpose of enhancing the safety of life and property both at sea and on land. It is also directed toward advancing public education within engineering and technological disciplines. LR has more than 100,000 customers, which come in all different sizes, from the mightiest multi-nationals to the owners of single ships.

Circle 75 on Reader Service Card

Pirates & Armed Robbers

Pirates & Armed Robbers, A Master's Guide, is published by the International Shipping Federation (ISF) and the International Chamber of Shipping (ICS). The guide is also supported by other shipping organizations and seafarer's unions because merchant ships are still confronted in many parts of the world with the threat of violent attacks by armed robbers, both at sea and while in port. The publication also lists general information about where most attacks take place, how they occur, and how to prevent attacks, as well as other valuable information.

Circle 76 on Reader Service Card

The Coastal Corp.

The Coastal Corporation's net earnings have risen at a compounded rate of 30 percent over the past six years. Coastal man-

aged to attain record earnings of 444.4 million, or $2.03 per share, compared to 1997 net earnings of $301.5 million, or $1.32 per share. Coastal expects to continue a successful approach in each of its businesses; the natural gas, exploration and production, refining, marketing and chemical, and coal and power.

Circle 77 on Reader Service Card

Intl. Chamber of Shipping

The aim of the International Chamber of Shipping (ICS) is to promote the interests of shipowners and operators in all matters of shipping policy and ship operations. ICS encourages high standards of operation and the provision of high quality and efficient

shipping services. It also strives for protection of the environment and adherence to internationally adopted standards. ICS promotes properly considered international regulation of shipping, and opposes unilateral and regional actions by government.

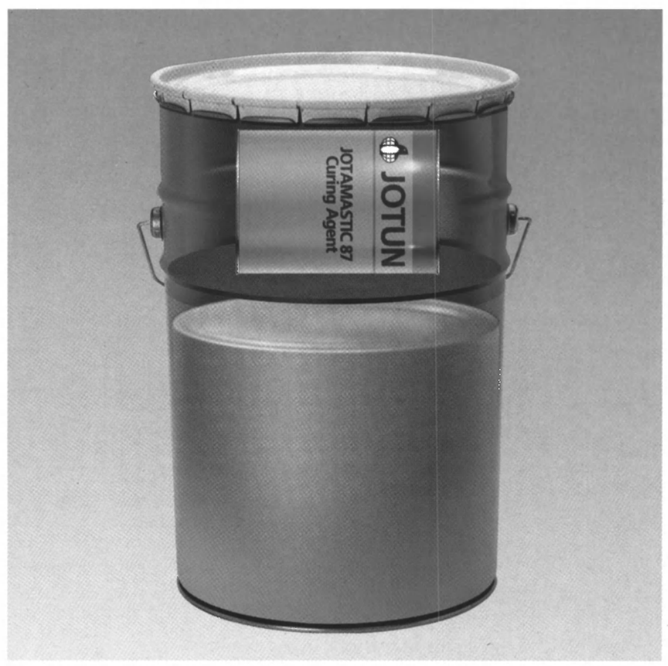
In pursuit of these objectives, the organization co-operates with other organizations both inter-governmental and non-governmental.

Circle 78 on Reader Service Card

JOTUN

Jotamastic 87 epoxy mastic

Now in one package



You asked – we delivered! Two component Jotamastic 87 is now available in a single 6½ gallon container comprising the base component and a 1 gallon can of the curing agent. Now there's no time wasted searching for missing components, no measuring, no mixing errors, no delivery errors, easier storage and thus improved productivity and better results.

For more than a decade Jotamastic 87's advanced modified epoxy technology has provided all-round corrosion protection, underwater or above water, for the protection of decks, holds, topsides and superstructures.
Jotamastic 87 saves time by keeping preparation to a minimum, saves cost through fewer coats and saves time through faster easier application.

(Left above) 'Sunnanland' – virtually free of corrosion after 2 years in service working in ice. The hull is protected with 2 coats of Jotamastic 87 and Seavictor Antifouling. The only maintenance required was fresh water cleaning, blastcleaning slipway support marks and application of 1 gallon of Jotamastic 87!
Compare this with the photo (right) of 'Sunnanland's' sister ship, protected by conventional paints with obvious damage after only 1 year in service.

Surface preparation by hydrojetting, spotblasting where necessary, followed by high pressure washing with fresh water. After drying, application of 2 coats of Jotamastic 87 then 1 coat of Penguard Topcoat.

JOTUN

Jotun Paints, Inc. 1401 Severn Street, Baltimore, MD 21230 tel: 800 638 7756/410 652 7200 fax: 410 752 0027

Circle 351 on Reader Service Card

Marine Web Site Directory

Simplex-Turmar

Simplex-Turmar, Inc. is a sales and service organization with over 35 years of experience in the marine engineering field. STI offers customers the following equipment and services: Parts and service for Simplex shaft seals, spare parts for main engine and main engine auxiliary components and also STI acts as manufacturer's representative for several offshore companies. **www.simplex-turmar.com**

Slipnot Safety Flooring

SlipNOT®products help business owners meet the legal requirements to provide a safe working environment for employees. **www.slipnot.com**

Fleet Technology

Fleet Technology Limited (FTL) carries out research, development and engineering, in support of the transportation, environment, fabrication/manufacturing and resource/energy sectors as well as Government, including the military. FTL is an established, multi-disciplinary engineering and technology company, with a 25 year record of providing high quality engineering solutions. **www.fleetech.com**

Spar Associates, Inc.

SPAR Associates, Inc. has been working for over 25 years developing and implementing computer-based planning, estimating and production management systems for shipyards in the U.S. and Canada. Today, SPAR systems are solving many problems by coordinating shipyard functions both inside and outside the organization. **www.sparusa.com**

Algae-X International

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Marine Accommodations specializes in providing the best interior design materials for the marine industry. It provides bath units, wall & ceiling panels, cabin doors, floating floors and much, much more! **www.mainteriors.com**

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The Kraissl Company is a long-time manufacturer of heavy duty simplex and duplex strainers and filters for protecting equipment in pipeline service. Materials of construction include cast iron, bronze, aluminum, steel, and other special alloys. Its complete line of duplex three-way (6-port) transfer valves was developed specifically for use with two filters, two heat exchangers, two supply tanks or with other dual systems. **www.strainers.com**

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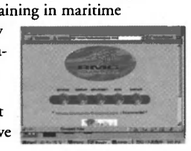
Resolve Marine Group delivers high value cargo through tug operations, training in maritime fire fighting using the only shipboard flashover simulator in the world and salvages ships, aircraft, and equipment under the most adverse conditions. Resolve Marine Group's staff of mariners, salvage experts and instructors is one of the most experienced in the industry. **www.Resolvemarinegroup.com**



Azonix Corporation

Azonix is dedicated to the design, manufacture and support of high-precision measurement and control systems. This standard, along with a reputation for exceptional ruggedness and reliability, has led to their acceptance by world leaders in extractive and process industries, discrete manufacturing, and research & development. **www.azonix.com**

Marine Web Site Directory

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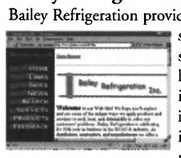

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Fuel Dynamics is the exclusive distributor of FUEL MAG diesel fuel decontamination units in North and South America. Manufactured in New Zealand, the product is marketed worldwide under the name FUEL MAG. **ww.fueldyn.com**

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www.waterweights.com

Autonav Marine Systems

Autonav Marine Systems Inc. designs and manufactures manual hydraulic and electro-hydraulic steering systems, their electronic controls and monitoring systems, as well as a range of autopilots suitable for vessels from 18 to over 300 feet (5 to 90 meters) in length. **www.autonav.com**

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Marine Web Site Directory

and refurbishes Navy standard pumps.
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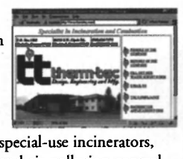
Thermtec



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Calhoon MEBA Engineering School

Calhoon MEBA Engineering School is dedicated to remaining involved with, and participating in, evolving technologies and their related regulations. The instructors and staff are members of pertinent national and international industry professional organizations.
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SEALINK is a user-friendly, on-line equipment selection tool that allows end users to compare required form, fit, function, and performance requirements to readily available and supported commercial equipment and components.
www.sealink2000.com

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Cambridge Applied Systems, Inc.

Cambridge Applied Systems, Inc. manufactures viscometers and viscosity control systems. The company was formed 14 years ago and markets a powerful technology for measuring the viscosity of most any fluid. Since that time we've installed several thousand viscosity management systems.
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KVH Industries, Inc., is a leading international provider of digital navigation systems and mobile satellite communication products for the commercial, military and marine industries. Since its founding in 1982, the company has developed and manufactured a range of innovative products that set the pace for new technology applications in navigation and communication.
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Marine Web Site Directory

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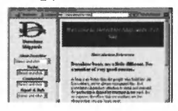
www.phillystran.com

Derecktor Shipyard



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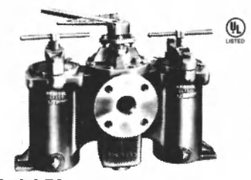
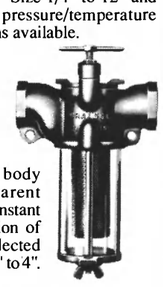


Model 72
Simplex & Duplex Strainers

For fuel oil, lube oil, cooling water or any fluid service. Protects pumps, nozzles, meters, heat exchangers and process lines. Size 1/4" to 12" and larger. High pressure/temperature special designs available.

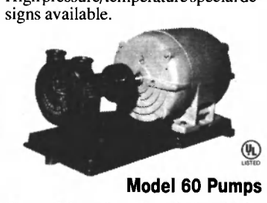
Model 73 Sea-View Strainers Simplex-Duplex



Cast bronze body with transparent sump permits instant visual inspection of flow and collected debris. Sizes 1" to 4".

Model 72AA Transfer Valves

Six (6) port plug valve for duplexing two tanks, heat exchangers, filters, or other systems with minimum piping and space. Easy 1/4 turn, one stroke plug valve operation switches flow from one side to the other. Sizes 3/8" to 8" and larger. High pressure/temperature special designs available.



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General line of cast iron fuel and lube oil pumps—direct connected for light oils, reduction drives for heavy oils. High temperature special designs available. Sizes 3/8" to 2".

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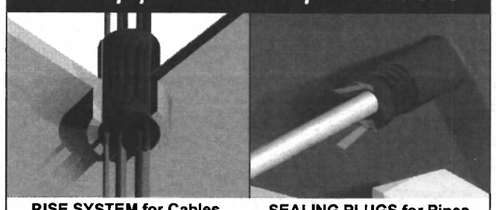

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Gives you accurate readings anytime.

MODEL R101

MODEL B202-4 *with 4 digital displays (3 volt meters and 1 cycle meter) for 3 phase systems*

MODEL B202-3 *for a single phase two leg system with 3 digital displays (1 volt meter for each leg and 1 cycle meter)*

MODEL PL 100-V & PL 100-C *single displays which can be made to your specifications to contain either a volt meter or a cycle meter to be mounted on the generator panel to replace old analog meters.*

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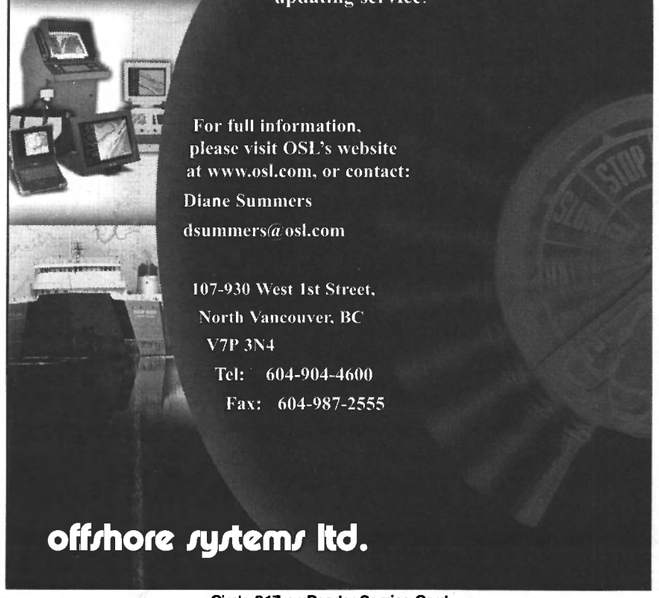

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Circle 317 on Reader Service Card

(Continued from page 58)

Molten Sulphur Tanker Sails Four Years Sans Freeze-Ups

ups. ControTrace bolt-on thermal maintenance modules are made of a shaped carbon steel tube, contoured to exactly mate with the outside diameter of process pipe. Sections are strapped lengthwise onto the piping, either individually or in heated, multiple element panels providing for excellent heat transfer.

ControHeat bolt-on jackets fit closely to valves, pumps, and other process system components. They are made up of patented, aluminum cast-to-fit pieces that match the component precisely. Embedded in the casting is a fabricated, steel, pressure-containing chamber through which flows the heating medium — steam, hot water/glycol or hot oil liquid/vapor. Independent pressure boundaries isolate the process stream from the heating medium to eliminate the possibility of cross-contamination.

Together, the ControTrace and ControHeat modules provide an integrated thermal maintenance system for the Sulphur Enterprise. "The success aboard a sulphur transport ship applies directly to land-based sulphur processing, recovery, and transport," says CSI vice president Henry Gaines, "In fact, tanker service is a more demanding test. For sulphur handling today, bolt-on technology is definitely the better choice."

Sulphur Enterprise was built by McDermott Shipyard, and since entering service in October 1994, the vessel has proven itself a maritime and chemical engineering success. According to Mr. Johnston, "The ship and particularly the thermal maintenance system is performing better than we ever expected. Sulphur Enterprise travels faster and discharges cargo faster than anticipated, and it has been really problem-free. For a project of this size and complexity, that's remarkable."

Under long-term charter to Freeport McMoran Sulphur, LLC New Orleans, the 524 ft. (159.7 m) Sulphur Enterprise is one of 16 operational molten sulphur tankers in the world.

Aboard the ship, four heated, fiberglass-insulated steel tanks in individual holds each contain about 6,000 tons of molten sulphur. They are filled and emptied through 1,345 ft. (410 m) of pipe controlled by approximately 35 wafer or butterfly valves. Like the big tanks, the transfer pipes and valves must be temperature controlled at all times to keep from freezing shut. The ship maintains its hectic schedule with no downtime for thermal system maintenance.

Sulphur remains liquid at temperatures from 240 to 310(F, but quickly increases in viscosity above 320(F and freezes at 240(F. The bolt-on thermal maintenance system of Sulphur Enterprise is designed to maintain its cargo at 278(F throughout loading, transit, and discharge. "We're like a great, big floating thermos bottle," says chief engineer Rick King. "If we allowed this cargo to freeze-up, we'd be a long time getting it moving again."

The thermal maintenance system aboard the Sulphur Enterprise, designed by CDI Marine Company in Jacksonville, Fla., uses two hot oil circuits at 425 and 320(F. When the ship is underway, the primary circuit is heated to 425(F by the exhaust of the 9,840 hp Wartsila diesel powerplant. Alternatively, an auxiliary boiler heats the first oil circuit when the Sulphur Enterprise is in port or if more heat is needed. As a safety feature, the high temperature system is designed to dump excess heat into the ocean.

Each molten sulphur tank incorporates 2,200 ft. (670 m) of oil-circulating coils to keep the contents fluid.

Sulphur in the transfer lines, above and below the decks, is heated by bolt-on systems with redundant oil paths. Sensors on the return side of the oil loop report oil temperature to six computers in the engineer's office, deck office, and engine room. Display screens cue the ship's engineer to problems, and remote actuators automatically vary the flow of oil to regulate line temperature.

The designers of the Sulphur Enterprise originally specified a welded jacket thermal maintenance system for the ship's transfer pipe and valves. However, the shipyard's estimate of fabrication costs reportedly found double-walled pipe an expensive solution, as the bolt-on system segments promised to be 25 percent cheaper. The 1,300 ft. (396.2 m) of pipe on the Sulphur Enterprise required more than 6,300 ft. (1,920 m) of heating elements. Pipes from .75 to 14 in. in diameter take from one single element to six elements installed as two panels of three elements each depending on the diameter and length of the pipe. ControHeat bolt-on jackets also cover 34 90-degree elbows, 8 and 12 in. diameter, and a collection of valves.

"We've never had to remove any thermal maintenance modules." Mr. King observes, "In the unlikely event we have to make repairs, I can just unbolt one ControTrace module and bolt a new one on. We can replace a small panel without interrupting cargo operations."

Significantly, no bolt-on heating element has required replacement in four years.

Circle 37 on Reader Service Card

ABS Ships "Least Likely" Detained

According to recently released Port State Detention Statistics issued by the USCG and the Australian Maritime Safety Authority (AMSA), vessels classed by ABS are noted as the least likely to be detained for class related deficiencies of all ships classed with IACS Member societies.

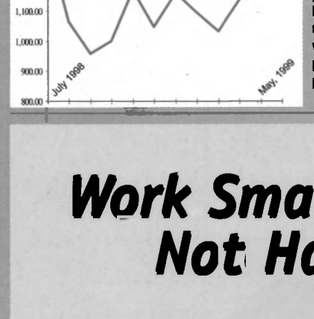
Circle 51 on Reader Service Card

IUM Announces Promotions

Interocean Ugland Management Corporation (IUM), a ship management company located in Voorhees, N.J., has promoted **Mitchell D. Walker** to vice president-marine operations and **Robert B. Rogers** to vice president-industrial relations. Walker, who is a graduate of Maine Maritime Academy will manage IUM's commercial and government fleet, while Rogers, who graduated from the United States Merchant Marine Academy, will supervise the crewing and insurance.

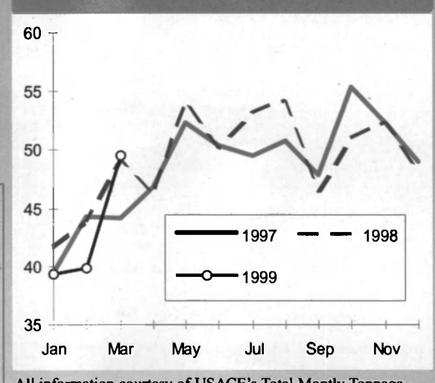
Market Indices

MW40 (July 1998 to May 1999)



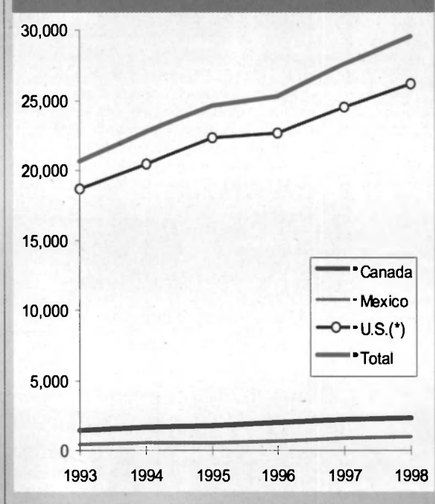
MW40 is indicative of the price fluctuation of 40 top international maritime firms. The index is published weekly in the pages of *Maritime Week*.
For a free trial subscription to *Maritime Week*, please visit www.marinelink.com complete and return the form on page 124.

Monthly Tonnage
(Jan. 1997 to Mar. 1999)

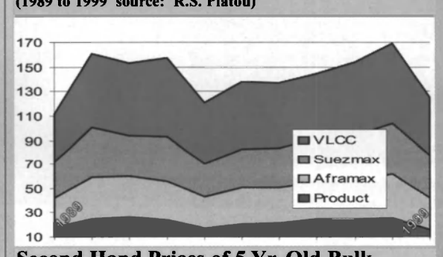


All information courtesy of USACE's Total Montly Tonnage Indicator, located on the Waterborne Commerce website (http://www.wrc-ncd.usace.army.mil/ndc/wcmthind.htm). The information shows internal tonnage moved, solely within the boundaries of the U.S.

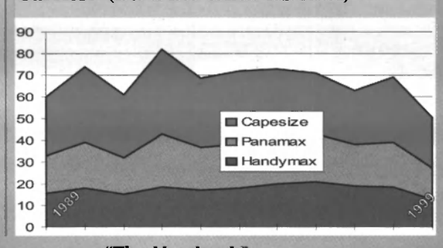
N. American Port Container Activity
(Country Totals 1993-1998; TEUs ,000; source: AAPA)



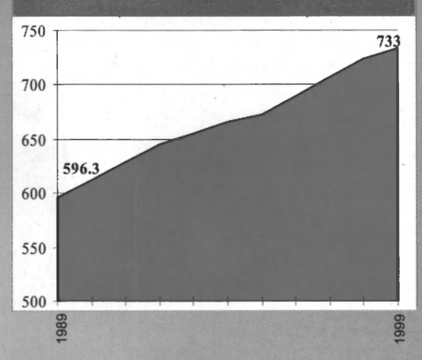
Second Hand Prices of 5 Yr. Old Tankers
(1989 to 1999 source: R.S. Platou)



Second Hand Prices of 5 Yr. Old Bulk Carriers (1989 to 1999 source: R.S. Platou)



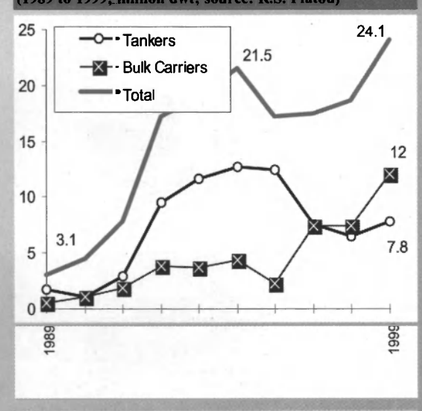
The World Fleet Development
(1989 to 1999; million dwt; source: R.S. Platou)



WORLD FLEET DEVELOPMENT

Year	Tankers	Bulk carriers	Combined carriers	Others	Total
1989	233.9	196.9	33.2	132.3	596.3
1990	240.5	202.5	32.9	136.2	612.1
1991	247.4	210.8	31.8	139.6	629.6
1992	255.4	214.8	31.4	143.5	645.1
1993	261.8	215.0	31.3	146.7	654.8
1994	266.9	219.0	28.7	151.3	665.9
1995	265.0	225.5	25.9	157.2	673.6
1996	263.2	237.3	24.5	164.5	689.5
1997	267.2	247.7	21.1	171.8	707.8
1998	268.7	258.9	19.1	177.4	724.1
1999	273.6	258.9	17.2	183.3	733.0

Ship Scrapping
Tonnage Broken Up, Lost & Other Removals
(1989 to 1999; million dwt; source: R.S. Platou)



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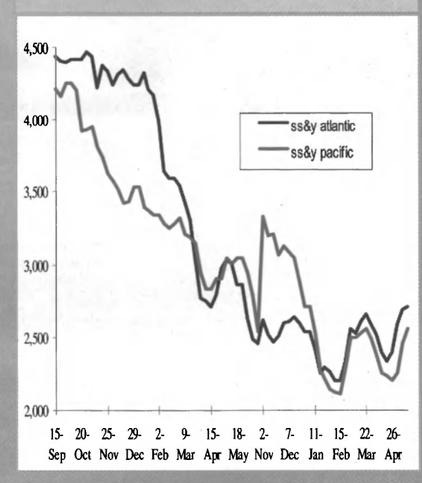

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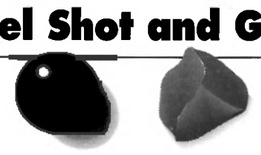

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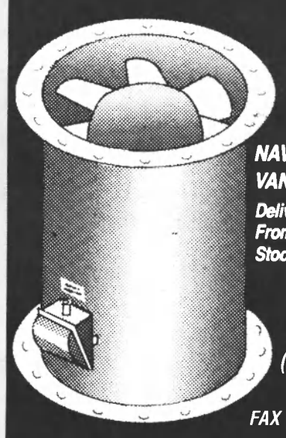

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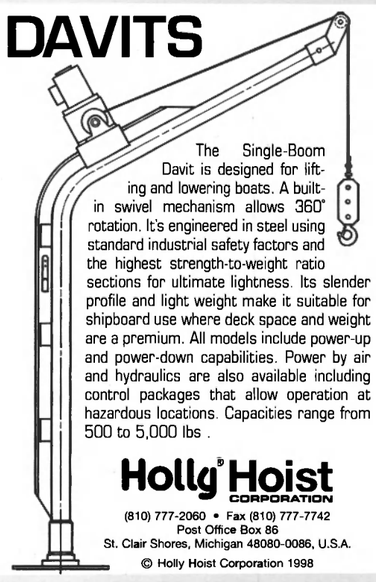

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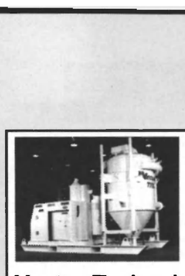

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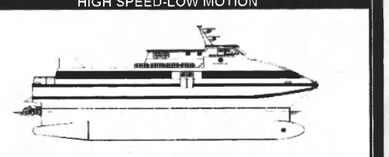

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Crandall Dry Dock Engrs., Inc., P.O. Box 505804, Chelsea, MA 02150
Crane Consultants, 15301 First Ave S., Seattle WA 98148
C.R. Cushing, 18 Vesey St., New York, NY 10007
CT Marine, 56 Crooked Trail, Rowayton, CT 06853
Cunningham & Walker, 1762 Providence Hollow Lane, Jacksonville, FL 32223
Arthur D. Darden, 3200 Ridgelake Dr., Suite 403, Metairie LA 70002
DeJong & Lebel, Inc., 1734 Emerson Street, Jacksonville, FL 32207
Design Associates Inc., 14360 Chef Menteur Highway, New Orleans, LA 70129
Designers & Planners, 2120 Washington Blvd. Ste.200, Arlington, VA 22204
Encon Mgmt & Engineering Consultant Services, P.O. Box 7760, Beaumont, TX 77706
Fleet Technology, 311 Legget Dr., Karata, Ontario, Canada K2K 1Z8
GHM Inc. (Ind. Measurement Consultants), P.O. Box 1836, Newport News, VA 23601
Gibbs & Cox, Inc., 50 West 23rd St., New York, NY 10010
Heger Dry Dock Engineers, Inc., P.O.B. 6605, Holliston, MA 01746
John W. Gilbert & Assoc., Inc., 199 State St., Boston, MA 02109
The Glosten Assoc. Inc., 600 Mutual Life Bldg., 605 First Ave., Seattle, WA 98104
Guido Perla & Assoc., 720 3rd Ave., Ste. 1200, Seattle, WA 98104
Morris Guralnick Associates, Inc., 130 Sutter St., Ste. 400, SanFrancisco, CA 94104
JJH Inc., 3412 Progress Dr., Bensalem, PA 19020
R.D. Jacobs & Associates, 11405 Main St., Roscoe, IL 61073
Kvaerner Masa Marine Inc., 201 Defense Highway, Suite 202, Annapolis, MD 21401
James S. Krogen, 799 Brickelli Plaza Ste. 701, Miami, FL 33131
Rodney E. Lay & Associates, 13891 Atlantic Blvd., Jacksonville, FL 32225
MCA Engineers, Inc., 2960 Airway Ave., #A-103, Costa Mesa, CA 92626
Alan C. McClure Associates, Inc., 2600 South Gessner, Houston, TX 77063
McElroy Machine & Mfg Co., Inc., P.O. Box 4454, Biloxi, MS 39535-4454
John J. McMullen Associates, Inc., 4300 King St., Suite 400, Alexander, VA 22302
Fendall Marbury, P.O. Box 2321, Annapolis, MD 21401
Marine Design & Operations, Inc., 225 E. 1st Ave., Roselle, NJ 07203
Marine Power Associates, 1010 Turquois St., Ste 217, San Diego, CA 92109
Maritech, Seadiff, Bay Road, Newmarket, NH 03857
Maritime Design, 13000 Sawgrass Village Circle, Ponte Vedra Beach, FL 32082
R.J. Mellusi & Co., 71 Hudson St, New York, NY 10013
Nautical Designs, Inc. 2101 S. Andrews Ave,Suite 202, Ft Lauderdale FL 33316
Olsen Marine Surveyors Co., P.O. Box 283, Port Jefferson, NY 11777
M. Rosenblatt & Son, Inc., 350 Broadway, New York, NY 10013
Sargent & Herkes, 225 Baronne St., Suite 1405, New Orleans LA 70112
Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029
Sea School, 10812 Gandy Blvd, St. Petersburg, FL 33702
Seaworthy Systems Inc., P.O. Box 965, Essex, CT 06426; 17
Washburn Doughty, P.O. Box 296, E. Boothbay, ME 04544
George G. Sharp, Inc., 100 Church St., New York, NY 10007
R.A. Stearn, Inc., 253 N. 1st Ave., Sturgeon Bay, WI 54235
MSCL Inc., 1452 Duke Street, Alexandria, VA 22304
A.K. Suda & Ass., 3004 19th St., Metairie, LA 70002-4989
TIMSCO, P. O. Box 91360, Mobile AL 36691
Sea Transport Corp., PO Box 1043, Southport Qld 4213 Australia

NAVIGATION & COMMUNICATIONS EQUIPMENT
Byrne Rice & Turner, 1172 Camp St., New Orleans, LA 70130
C-Map/Commercial, 133 Falmouth Rd., Mashpee, MA 02649
Coretec Inc., Prince Charleds Bldg., 120 Torbay Rd., Suite E100, St. Johns, Newfoundland, Canada A1A 2GB
Electronic Marine Systems, 800 Ferndale Pl., Rahway, N.J. 07065
Furuno U.S.A., 271 Harbor Way, S. San Francisco, CA 94080
ICS Electronics Ltd., Unit V, Rudlord Industrial Estate, Ford, Arundel, West Sussex, UK
Mackay Communications, 2721 Discovery Dr., Raleigh, N.C. 27616-1851
Negron Marine Consultants, 840 Bond Street, Elizabeth, NJ 07201
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017
Scandinavian Micro Systems P.O. Box 155, N-1411, Kolboton, NORWAY
Simrad, 19210 33rd Avenue West, Lynwood, WA 98036
Simrad Robertson, 10801 Hammerly, Suite 100, Houston, TX 77043-1923
Standard Communications, P.O. Box 92151, Los Angeles, CA 90009
Trimble Navigation, 585 North Mary Avenue, P.O. Box 3642, Sunnyvale, CA 94086
Waterway Communications System, Inc. 453 E. Park Pl., Jeffersonville, IN 47130
Offshore Systems International, 5013 Pacific Hwy East, Fife, WA 98424
Offshore Systems International, 107-930 W. 1st St., N.Vancouver, BC Canada V7P3N4
Litton Marine Systems, 1070 Seminole Trail, Charlottesville, VA 22901-2591
Magellan Systems Corp., 960 Overland CrL, San Dimas, CA 91773-1742
Icom America, Inc., 2380 116th Ave. NE, Bellvue, WA 98004
KVH Industries, Inc., 110 Enterprise Center, Middleton, R.I. 02842-5268

NOISE & VIBRATION
Soundcoat, 1 Burt Dr., Deer Park, NY 11729

NOZZLES/NOZZLE SYSTEMS
Harrington Metals, 6720 124th Ave., Fennville, MI 49408
Custom Nozzle, P.O. Box 547, Pascagoula, MS 39568

OFFSHORE BUILDINGS
Pinnacle Buildings Sys., LLC, 306 Caldwell Ave., Earth, LA 70533

OIL—Marine—Additives—TESTING
Mobil Oil Corporation, 3225 Gallows Road, Fairfax, VA 22037-0001
Castrol North America, 1500 Valley Rd., Wahne, NJ 07470

OIL TANK CLEANING
Brain Industries Australia, Pty. Ltd., 21 Bearing Rd., Seven Hills, NSW 2147 AUSTRALIA

OIL/WATER SEPARATORS
AlfaTec, Inc., 4027 21st Ave. West, Seatle, WA 98199
Alfa-Laval Separation, Inc., 955 Mearns Rd., Warminster, PA 18974-0556
Blohm& Voss U.S.A. Reps:Simplex-Turmar Inc., P.O. Box 168, Little Neck, NY 11363-0168
Fast Systems, 3240 North Broadway, St. Louis, MO 63147
MMC International, 60 Inip Dr, Inwood NY 11096
Nelson Industries, Highway 51 West, Stoughton, WI 53589
RGF Environmental Group, 3875 Fiscal Court, W.Palm Beach, FL 33404

PARTS LOCATOR SERVICE
Inventory Locator Service, 3965 Mendenhall Road.,Memphis, TN 38115

PIPE FITTINGS/CUTTINGS/CONNECTING/ SYSTEMS
Jesse Engineering, 5225 7th St. East., Tacoma, WA 8424
Georg Fischer DISA Pipe Tools Div., 407 Hadley St., Holly, MI 48442
Lokring Corp., 396 Hatch Drive, Foster City, CA 94404
Victaulic Co., 4901 Kesslersville Rd., Easton, PA 18042
Blucher Josam, 2501 S. Front Street, Philadelphia, PA 19148

POLLUTION CONTROL PRODUCTS
Enecon Corporation, 125 Baylis Rd., Melville, NY 11747-3800

POWER SUPPLIES
Schaefer, Inc., 200 Butterfield Dr., Ashland, MA 01721

PROPELLERS
Kahlenberg Bros, P.O. Box 358, Two Rivers, WI 54241
Associated Marine Technologies, 4016 Seaboard St., Portsmouth, VA 23701
Byrne Rice & Turner, 1172 Camp St., New Orleans, LA 70130
Holland Roer Propellers, 2273 Batataria Blvd, New Orleans LA, 70072
Rice Propeller, Av Rios Espinoza No. 88, Col. Benito Juarez, Mazatlan, Sin, Mexico 82180
Rolla SP Propellers SA, P.O. Box 251, Via Silva 5, 6828 Balerna, SWITZERLAND

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
ABB Drives Inc., P.O. Box 372, Milwaukee, WI 53201-0372,
ABB Industry Oy, P.O. Box 185, 00381 Helsinki, FINLAND
ABB TURBOCHARGER, INC.,1460 Livingston Avenue, N. Brunswick, NJ 08902
Aquamaster-Rauma Ltd., Box 220, SF-26101, Rauma, FINLAND
Kamewa America Inc., 106 Park Place, Suite 200, Covington, LA 70433, USA
Kamewa AB, Box 1010, S-68129, Kristinehamn, Sweeden
Kamewa Finland Oh, "Aquamaster", Box 220, FIN-26101 Rauma, Finland
Brunvoll A/S, P.O. Box 370, N-6401, Molde, Norway
ZF Marine-3131 SW 42nd St., Ft. Lauderdale, FL 3312
Caterpillar, 100 NE Adams Street, Peoria, IL 61629-2320
Centa Corp., 8185 Cass Ave., Darien, IL 60561
Cincinnati Gear Co., 5657 Wooster Pike, Cincinnati, OH 45227

deWijs Marine International B.V., Postbus 320, 1969 NJ Heemskerk, Nederland
The Falk Corp., PO Box 492, Milwaukee, WI 53201-0492
Fincantieri, Diesel Engines Div—GMT, Bagnoli della Rosandra 334, Trieste, ITALY
GEC ALSTHOM Diesels Inc., 10801 Kempwood Dr. Ste 1, Houston, TX 77043-1412
Goltens Worldwide, 160 VanBrunt St., Brooklyn, NY 11231
Harbormaster Marine Inc., 31777 Industrial Rd., Livonia, MI 48150
Harrington Metal, 6720 124th Ave. Lennville. MI 49408
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
Krupp Mak, 7555 Danbro Crescent, Mississauga, Ontario, CANADA L5N 6P9
LIPS B.V., P.O. Box 6, 5150 BB Drunen, The Netherlands
Lohmann & Stolterfoht, P.O. Box 1860, D-58408 Witten, Germany
Lo-Rez Vibration Control, 186 West 8th Ave., Vancouver, BC CANADA, V5Y 1N2
Mapeco , Inc., 91 Willenbrock Rd., Unit B4, Oxford CT 06478
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 Holeby, DENMARK
MAN B&W Diesel A/S, Alpha Diesel, Niels Juels Vej 15. DK-9900 Frederikshavn, DENMARK
MAN B&W Diesel GmbH, Stadtbachstrasse 1, D-86153 Augsburg 1 GERMANY
Orion Corp., 1111 Cedar Creek Rd., Grafton, WI 53024
Oy Wartsila Ab, Vasa and Abo Divisions, P.O. Box 244, SF65100 Vasa, FINLAND
Karl Senner Inc., 25 W Third, Kenner LA 70062
Schottel-Werft, Manizer Strasse 99, D-56322 Spay/Rhein, GERMANY
Schottel Inc., 500 Industrial Blvd., Sugar Land, TX 77478
Siemens Electric Ltd., 1180 Courtneypark Rd., Mississauga, ONTARIO
Stewart & Stevenson, 1400 Destrehan, P.O. Box 8, Harvey LA 70059-0008
Thrustmaster of Texas, P.O. Box 840189-12227 IFM 529, Houston, TX 77284-0189
Ulstein Bergen Diesel A/S, P.O. Box 924, N-5002, Bergen, NORWAY
Ultra Hydraulics Limited, Cheltenham Road East, Gloucester, GL2 9QN, ENGLAND
Voith Hydro Marine Technology, P.O.B. 1125, D89509, Heidenheim, GERMANY
Marine Propulsion Inc., 1505 Corbin Ave., Hammond, LA 70403
The Cincinnati Gear Company, 5657 Wooster Pike, Cincinnati, OH 45227
Renold Hi-Tec, 512 W. Crescentville Rd, Cincinnati, OH 45246
U.S. Rep: Voith Schneider America Inc., 121 Susquehanna Ave., Great Neck, NY 11021
Schottel-Werft, Josef Becker Gmb11 & Co. KG, Mainzer Strasse 99, D-56322 Spay/Germany

PUMP—Repair—Drives
Scardana Americas Bkg., 502 Empire St., Greefield Park, J4V1V7 Canada
Advanced Environmental Systems, 2 Sutton Rd., Webster, MA 01570
Gilkes, Inc., PO Box 628, Seabrook, TX 77586
Hamworthy Marine, Inc., 1129 Hospital Dr. Ste 3C, Stockbridge, GA 30281
Marine Electric & Process Control, 3931 Leary Way NW, Seattle, WA 98107
Kraissl Co., 299 Williams Avenue, Hackensack, NJ 07061
Vita Motivator, 566 Parker St., Newark, NJ 07104
Alfa Tec Inc., 4027 21st Ave. West, Seatle WA 98199

RADARS—ARPAS
Furuno USA, Inc., 271 Harbor Way, S. San Francisco, CA 94080
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017

REFER COMPRESSORS
CMP Corporation, P.O. Box 15199, Oklahoma City, OK 73155

REFRIGERATION COMPRESSOR REPLACEMENT PARTS
CMP Corporation, P.O. Box 15199, Oklahoma City, OK 73155

RH PROPULSION
Boll Filter, 15 International Dr., East Granby, Ct., 06206
Goltens,160 Van Brunt St., Brooklyn, NY 11231

RIGID INFLATABLE BOATS
Avon Marine, 11215 Young River Ave., Fountain Valley, CA 92708
Willard Marine, Inc. 1250 N. Grove St., Anaheim, CA 92806
Zodiac of N. America Thompson Creek, P.O. Box 400, Stevesville, MD 21666

ROPE—Manila—Nylon—Hawsers—Fibers
American Mfg. Co., 200 Southpark Rd., Lafayette, LA 70508
Bayer AG, D-41538, Dormagen, GERMANY
Phillystran, Inc., 151 Commerce Drive, Montgomeryville, PA 18936-9628
Puget Sound Rope, 1012 Second St., Anacortes, WA 98221
Rasmussen Equipment Co., P.O. Box 81206, Seattle, WA 98108
Yale Cordage, 26 Morin, St., Riddeford, Maine 04005

RUDDER BEARINGS & BUSHES
Duramax Marine, 16025 Johnson St., P.O Box 67, Middlefield, OH 44062-0067
Thordon Bearings, Inc., 3225 Mainway, Burlington, Ontario Canada L7M 1A6

SAFETY PRODUCTS
Viking Life Saving, 1625 N. Miami Ave., Miami, FL 33136
Welin Lambie N.A., Inc., 18 Ridgecrest Drive, Bridgewater Nova Scotia, Canada B4V 3V8
New England Marine & Industrial, 200 Spaulding Turnpike, Portmouth, NH 03801
Nautical Safety Products, P.O. Box 590462, Houston, TX 77259

SANITATION DEVICE—Pollution Control
Byrne, Rice & Turner, Inc., 1172 Camp Street, New Orleans, LA 70130
Exceltech International Corp., 1110 Industrial Blvd.,Sugarland, TX 77478
Envirovac Inc., 1260 Turret Dr., Rockford, IL 61111
Fast Systems, 3240 North Broadway, St. Louis, MO 63147
AlfaTec, Inc., 4027 21st Ave. West, Seatle, WA 98199
Owens Mfg., Hwy 92, Youngsville, LA 70592
Byrne Rice & Turner, 1172 Camp St., New Orleans, LA 70130

SATELLITE COMMUNICATIONS
Boatracs, Inc., 6440 Lusk Blvd. #D-201, San Diego, CA 92121-2758
Furuno USA, Inc., 271 Harbor Way, S. San Francisco, CA 94080
KVH Industries, Inc., 110 Enterprise Center, Middleton, R.I. 02842-5268
ICG Satellite Communications, 8400 NW 52nd St., Suite 110, Miami, FL 33166
Mackay Communications, 2721 Discovery Dr., Raleigh, N.C. 27604-1851
Iridium N.A., 8449 S.River Pkwy, Tempe, AZ 85284
Norwegian Telecom, Postboks 6701 St. Olivs Plass, N-0130, Oslo, Norway
PTT Telecom, Station 12. P.O. Box 30150-2500 JD The Hajue, NETHERLANDS
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017
Singapore Telecom, 15 Hill Street, Telephone House, 2nd Storey, Singapore 0617
Telstra Mobile Satellite & Radio Services, 79 St. Hilliers Rd., Auburn NSW 2144, AUSTRALIA
Magellan Systems, 960 Overland Court, San Dimas, CA 91773
Stratos Mobile Networks, 150 Metcalf St., Suite 1900, Ottowa, Ontario K2P 1P1 Canada
Comsat Maritime Services, 6560 Rock Spring Drive, Bethesda, MD 20817-1146

SCARIFIERS
Desmond-Stephan, P.O.B. 30, Urbana, OH 43078

SEALS
John Crane Marine, USA, 1536 Barclay Blvd, Bufallo Grove, IL 60089
Biohm & Voss Industrie GmbH, P.O. Box 10 07 20, D-20457 Hamburg, GERMANY
Duramax Marine, 16025 Johnson St., Middlefield, OH 44062
Circle Seal Controls Inc., 2301 Wardlow Circle, P.O. Box 3300 Corona, CA
U.S.A. Reps: Simplex-Turmar Inc, P.O. Box 168, Little Neck, NY 11363-0168

SEATING
H.O. Bostrom, 818 Progress Ave., Waukesha, WI

SHAFT HORSEPOWER MEASURING SYSTEM
FCS, Inc., 22 Main Street, Centerbrook, CT 06409
Instruments Computers & Controls, 70 South Bow Rd., Hookset, N.H. 03106

SHAFT SEALS
Duramax Marine, 16025 Johnson St., Middlefield, OH 44062

SHIP LIFTS
Synchrolift Inc., Two Datran Center, 9130 S. Dadeland Blvd., Miami, FL 33156-7850

SHIP VALUATION
Capt. E.S. Geary, P.O. Box 1246, Fajardo, P.R. 00738

SHIPBOARD MANAGEMENT SYSTEMS
Spar Associates, 927 West St., Annapolis, MD 21401

SHIPBOARD TESTING
Dayton T. Brown, 555 Church St., Bohemia, NY 11716

SHIPBUILDING—Repairs, Maintenance, Drydocking
American Eagle Mfg., 780 Pearle Jensen Way, La Conner WA 98257
Amfels, Inc., P.O. Box 3107, Brownsville, TX 78523
Astilleros Espanoles, S..A. Ochandiano, 14-16 28023 El Plantio SPAIN
Atlantic Marine, Inc.,P.O. Box 3202, Mobile, AL 36652
Atlantic Marine, Inc., 8500 Heckscher 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
Bisso Marine Co., P.O Box 4113, New Orleans, LA 70178
Blount Marine, 461 Water St., Warren, R.I. 02885
Bollinger Lockport & Larose, P.O. Box 250, Lockport, LA 70374
Caridoc, P.O. Box 1147 Port Of Spain, Trinidad, W.I.
Chris-Marine AB, P.O. Box 9025, S-2000 39, Malmo, SWEDEN
Conrad Industries, 1501 Front Street, P.O. Box 790, Morgan City, LA 70381
Eastern Shipbuilding Group, 2200 Nelson Street, Panama City, FL 32402
Fincantieri SpA Cantieri Navali Italiani, Via Cipro 11, 16129 Genoa ITALY
Goltens, 160 Van Brunt St., Brooklyn, NY 11231
Gulf Coast Fabrication, Inc., P.O. Box 539, Lakeshore, MS 39558
HDW, Kiel, Germany,USA Rep.; Roland Marine Inc., 90 Broad St., NY, NY 10004
Halter Marine Group, Inc., 13085 Industrial Seaway Rd, Gulfport, MS 39503
Hitachi Zosen, Hitachi Shipbuilding & Engineering Co., 1-1-1 Hitotsubashi Chiyoda-Ku Tokyo 100 Japan
In-Place Machining Co., Inc. 929 North Buffum Street, Milwaukee, WI 53212-3793
Jacksonville Shipyards, 750 E. Bay St., Jacksonville, FL 32202
Jeffboat, Inc., P.O. Box 610, Jeffersonville IN 47130
Kvaerner Masa-Yards Oy, Box 132, SF-00151, Helsinki, FINLAND
Leevac Shipyards, P.O.Box 1190, HWY 90 East, Jennings, LA 70546
Lindenau Gmbh, Skagerrakufer 10, Postfach 9093 D-2300 Kiel, Friedrichsort GERMANY
Motor-Service AB, Box 2115, 144 04 Ronninge, SWEDEN
Munson Hammerhead, 780 Pearle Jesen Way, La Conner WA 98257
Newport News, 4101 Washington Ave., Newport News, VA 23607
Peterson Builders. Inc., 101 Pennsylvania Ave., Sturgeon Bay, WI 54235-0650
Thomas Marine, 37 Bransford Street, Patchogue, NY 11772
Samsung Heavy Ind., 25, 1-ka, Bongrae-dong, Chung-ku, Seoul, Korea
SeaArk, P.O. Box 210, Monticello AR 71655
SeaFab, P.O. Box 1651, 4111 Cedar St. Pascagoula, MS 39567
Service Marine Industries, P.O. Box 3606, Morgan City LA 70381
Southwest Marine, Foot of Sampson Street, P.O. Box 13008, San Diego, CA 92170
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
Talleres Navales del Golfo, Islote San Juan de Ulva S/N, 91800 Veracruz, Ver. Mexico
Washburn Doughty, P.O. Box 296, E. Boothbay, ME 04544
Westport Shipyard, P.O. Box 308, Westport, WA 98595
Willard Marine, inc., 1250 N. Grove St., Anaheim, CA 92806
Zodiac of North America Inc., Thompson Creek Rd., P.O. Box 400, Stevensville, MD21666
Friede Goldman, 525 E. Capitol Street, Suite 402, Jackson, MS 39201
Tampa Bay Shipbuilding, 1130 McClosky Blvd., Tampa, FL 33605
Ocean Technical Services Inc., 1140 Peters Rd., Harvey, LA 70058-1705
FirstWave/Newpark Shipbuilding, 2102 Broadway, Houston TX 77102
Goltens Worldwide, 160 Van Brunt St., Brooklyn, NY 11231
Cascade General Inc., 5555 N. Channel Ave., Bid. 71, Portland, OR 97217

SHIPYARDS
Derektor Shipyard, 311 E. Boston Post Rd., Mamaronek, NY 10543
Ocean Technical Services, 1140 Peters Rd., Harvey, LA 70058

SHIPYARD / CABLES
American Shipyard Corp., One Washington St., POB 570,Newport, R.I. 02840-0943
Anixter Wire & Cable, 2617 Edenboro Ave., Metairie, LA 70002

SHIVES
Skookum, P.O. Box 280, Hubbard, OR 97032

SHOWERS AND FAUCETS
Scanmix Corp., 230 Bartlett St., Lewiston, ME 04240

SHRINKWRAP CONTAINMENT
Hipp Plastic Wrap, 4070 Kearny Mesa Rd., Sand Diego, CA 92111

SILENCERS
Silex Inc., 7850 Tranmere Dr., Mississauga, Ontario L5S1L9
Applegate Industrial, 1440 Government Street, Baton Rouge, LA 70802
Beaird Industries Inc., P.O. Box 31115, Shreveport LA 71130
Nelson Division, Exhaust & Filtration Systems, Hwy. 51 West, P.O. Box 428, Stoughton, WI 53589
Houston Marine Training Services, 5728 Jefferson Hwy, New Orleans, LA 70123
Applied High Technology , 4 Place Dee Commerce Brossard, Suite 201 Quebec Canada J4W-3B3
Marine Safety, Marine Air Terminal, Laguardia Airport, NY 11371

SIMULATION TRAINING
Ship Analytics, Inc., Rte. 2 & 184, N. Stonington, CT 06358

SKILLED LABORERS
Amerifore, 650 E. 27th St., Jacksonville, FL 32206

SOUND CONTROL
Soundcoat, One Burt Dr., Deer Park, NY 11729

STAIRMASTER SAFETY TREADS
SlipNot Safety Flooring, 2545 Beaufait St., Detroit, MI 48207
Wooster Products, Inc., 1000 Spruce Street, Wooster, OH 44691

STEERING GEARS/STEERING SYSTEMS
A. Van der Velden B.V. Rotterdam, P.O.B. 2061, 2930 AB Krimpen a/d Lek, NETHERLANDS
Cunningham Marine Hydraulics Co., 201 Harrison St., Hoboken, NJ 07030
Summer Equipment, 24 West 4th Ave., Vancouver, B.C. V5Y1G3
Kobelt Manufacturing Co., Ltd., 8238-129 street, Surrey, B.C. V3W0A6
Jastram Engineering, 485 Mountain Hwy N., North Vancouver, B.C. CANADA V7J 2L3

STERN TUBE BEARINGS/ BUSHES
Biohm & Voss, Industrie Gmb H, P.O.B 100720, D-20457, Hamburg GERMANY
IHC Lagersmit, P.O.B. 5 - 2960 AA Kinderdijk - HOLLAND
Railko Ltd., Loudwater, High Wycombe, Bucks Hamshire ENGLAND HP109QV
Duramax Marine, 16025 Johnson St., P.O Box 67, Middlefield, OH 44062-0067
Thordon Bearings, Inc., 3225 Mainway, Burlington, Ontario Canada L7M 1A6
Vesco Plastics, P.O. Box 40647, Cleveland 2022, South Africa

STERN TUBE SEALS
Biohm & Voss Industrie GmbH, P.O. Box 10 07 20, D-20457 Hamburg, GERMANY
Duramax Marine, 16025 Johnson St., P.O Box 67, Middlefield, OH 44062-0067
U.S.A. Reps: Simplex-Turmar Inc, P.O. Box 168, Little Neck, NY 11363-0168
IHC Lagersmit, P.O.B. 5 - 2960 AA Kinderdijk - HOLLAND
John Crane Marine USA, 1536 Barclay Blvd., Buffalo Grove, IL 60089

STORAGE/WORKSHELTERS
Poly-Steel Shelters, 1209 E. Ocean Blvd., Stuart, FL 34996

STRAINERS
Kraissl Co., 299 Williams Ave., Hackensack, NJ 07061

STUD/BOLT TENSIONERS
Superbolt, P.O. Box 683, Carnegie, PA 15106

SURFACE PREP TOOLS
Advanced Environmental Systems, 2 Sutton Rd., Webster, MA 01570
Aurand Mfg., 1210 Ellis St., Cincinnati, Ohio 45223
Graco, Inc., P.O. Box 1441, Minneapolis, MN 55440-1441
Flow International Corp., 23500 64th Ave. S., Kent, WA 98032

SURGE SUPPRESSOR
Engineered Data Products, P.O. Box 565, Woodbury, NJ 08096

TANK LEVELING INDICATORS
Bergan Tank, 3409 Gulf Breeze Pkwy, Gulf Breeze, FL 32561
ERL Marine Products div, PO Box 1026, New Albany, IN 47151-1026
Ian-Conrad Bergan, 3409 Gulf Breeze Parkway, Gulf Breeze, FL 32561
Kockum Sonics, Inc., 933 Industry Rd., Ste105, Kenner, LA 70062
MMC International, 60 Inip Dr, Inwood NY 11096
Prime Mover Controls, 3600 Gilmore Way, Burnaby V5G 4R8 CANADA
Saab Marine Electronics AB, P.O. Box 13045, S-402 51 Goteborg SWEDEN
Technical Marine Service, 6040 North Cutter Circle, Portland, OR 97217
Electronic Marine Systems, 800 Ferndale Pl., Rahway, N.J. 07065
King Engineering, P.O. Box 1228, Ann Arbor, MI 48106
Auxitrol, 166 Bureaux de la Colline, 92213 Saint-Cloud Cedex, France
King Engineering Corp., P.O. Box 1228, Ann Arbor, MI 48106
Kockum Sonics, Inc., 933 Industry Rd., Ste105, Kenner, LA 70062

TESTING SERVICES
Wyle Laboratories, 7800 Govern's Dr. S.W., Huntsville, AL 35807
Fleet Technologies, 311 Legget Dr., Kanata, Ont, K2K 1Z8 Canada

THICKNESS TESTING
Cygnus Instruments, 1993 Moreland Parkway, Suite 202, Annapolis, MD 21401
M.A.C.E., 5910 N.E. 15th Ave., Fort Lauderdale, FL 33331

TORSIONAL VIBRATION SPECIALISTS
M.A.C.E., 5910 N.E. 15th Ave., Fort Lauderdale, FL 33331
T.W. Speetgens, 186 W. 8th Ave., Vancouver, BC, CANADA, V5Y 1N2
Vibranalysis Engineering Corp., 9300 Gamebird, Houston, TX 77034

TRANSMISSIONS
ZF Marine 3131 SW 42nd St., Ft. Lauderdale, FL 3312

TURBOCHARGERS
ABB Turbocharger Co., 1460 Livingston Ave., North Brunswick, NJ 08902

ULTRASONIC TESTING
Coast Diving Services, P. O. Box 1548, San Pedro CA 90733
M.A.C.E., 5910 N.E. 15th Ave., Fort Lauderdale, FL 33331

UNDERSEA CABLE CHARTS
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Jets Vacuum Sewage System, P.O. Box 14, N-6060 Hareid, NORWAY

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Leslie Controls, 12501 Telecom Dr., Tampa, FL 33637
Loeffler Corp., 201 E. Lincoln Hwy., Penndel, PA 19047-4097
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RGF Environmental Group, 3875 Fiscal Court, W Palm Beach, FL 33404
Red Fox Environmental Services, P.O. Box 53809, Lafayette, LA 70508-2529
Uniservice Americas, 57174 Hardin Rd., Slidell, LA 70461

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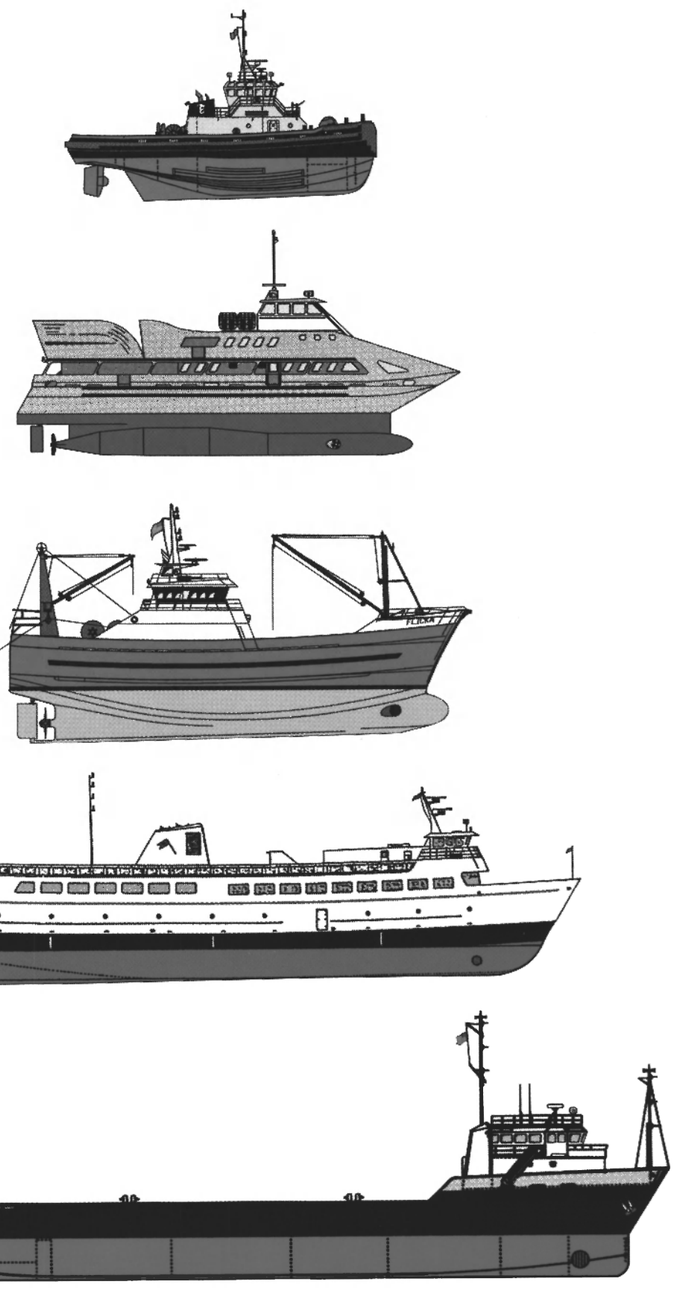

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