

**MARITIME  
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**DECEMBER 1989 ISSUE**

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## ON THE COVER

Photos: Cover—Clockwise from logo: Star Princess, Joseph and Clara Smallwood, Del Monte Planter, Hummel, Henry Larsen, (center) Isabella. Page 25—The USNS Rigel (foreground) and the U.S.S. Canopus in the large building basin of Bethlehem Steel Corporation's Baltimore Marine Division shipyard.

### Forecast 2000

*Forecast 2000* is a comprehensive series of articles authored by leading marine industry professionals offering their outlook for the final decade of the 20th century. The marine sectors covered include world shipbuilding, U.S. shipyards, the short cruise market, the shallow-draft vessel industry, and opportunities for U.S. companies in Europe 1992.

PAGE 12

### Outstanding Ongoing Vessels of 1989

PAGE 20

### Naval Technology & Shipbuilding—Supplement

PAGE 25

### \$576-Million Contract Awarded By U.S. Navy To Electric Boat

The Electric Boat Division of General Dynamics was recently awarded a \$576-million contract to construct an Ohio Class nuclear submarine for the U.S. Navy. The contract brings the number of Trident submarines on order or under construction at the Groton, Conn.-based company to seven.

### Houston Ship Repair Awarded \$13.4-Million MarAd Contract

A \$13.4-million contract has been awarded by the Maritime Administration to Houston Ship Repair Inc. to convert the tanker Chesapeake to an offshore petroleum discharge ship.

The work will be completed within a year by Houston Ship Repair of Channelview, Texas.

For more information and free literature on Houston Ship Repair

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## MARITIME REPORTER and Engineering News

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Telephone (212) 477-6700

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**MARITIME REPORTER**  
AND  
**ENGINEERING NEWS**

ISSN-0025-3448  
No. 12 Volume 51

118 EAST 25th STREET  
NEW YORK, N.Y. 10010  
(212) 477-6700  
Telex: MARINTI 424768  
Telefax: (212) 254-6271

ESTABLISHED 1939

Maritime Reporter/Engineering News is published monthly by Maritime Activity Reports, Inc. Mailed at Second Class Postage Rates at Waterbury, CT 06701 and additional mailing offices.

Postmaster send notification (Form 3579) regarding undeliverable magazines to Maritime Reporter/Engineering News, 118 East 25th Street, New York, NY 10010.

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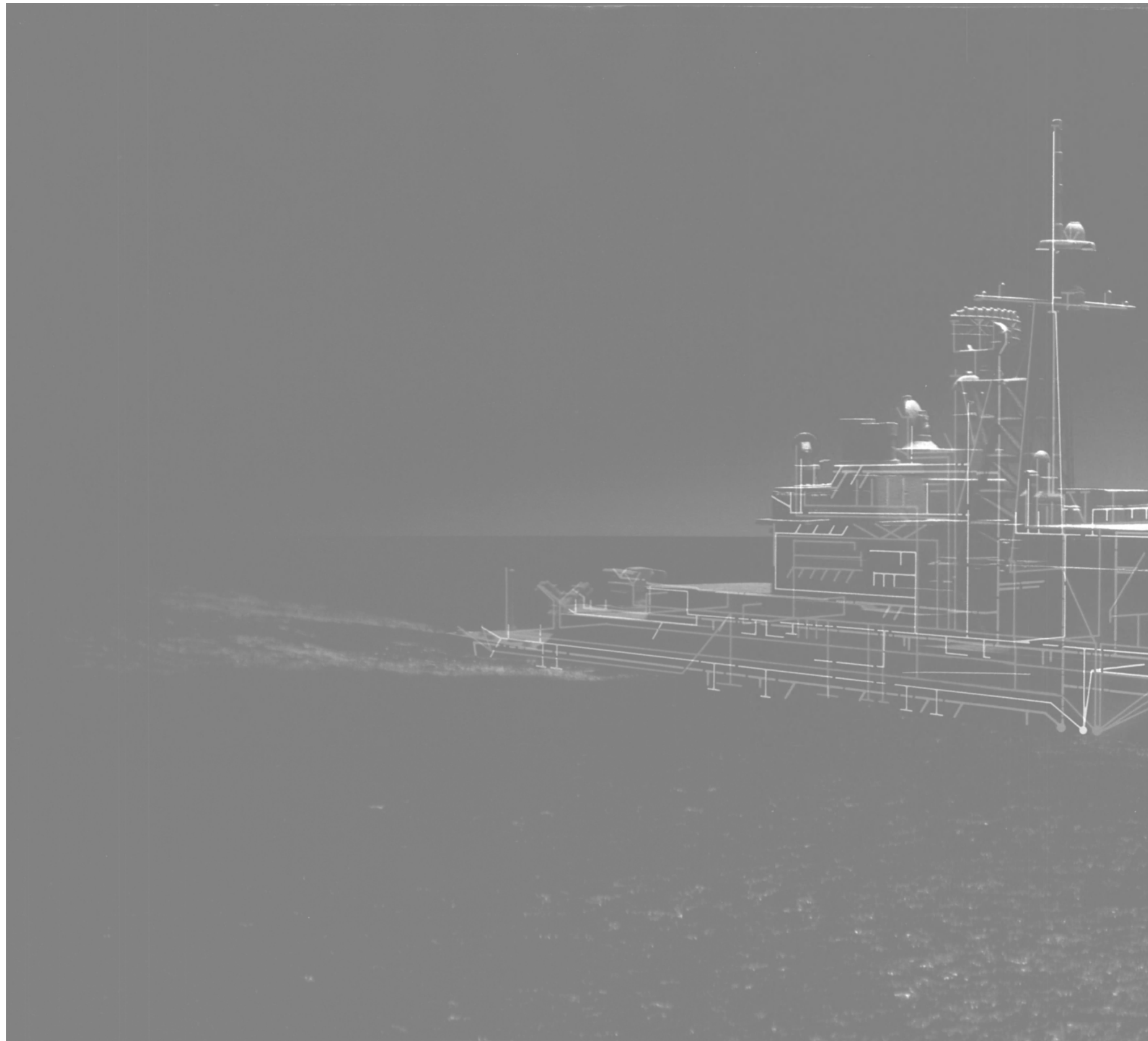
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**The Shipbuilders of Spain**



*This artist's impression portrays the vital electrical systems and circuitry on which the ship's mission depends.*

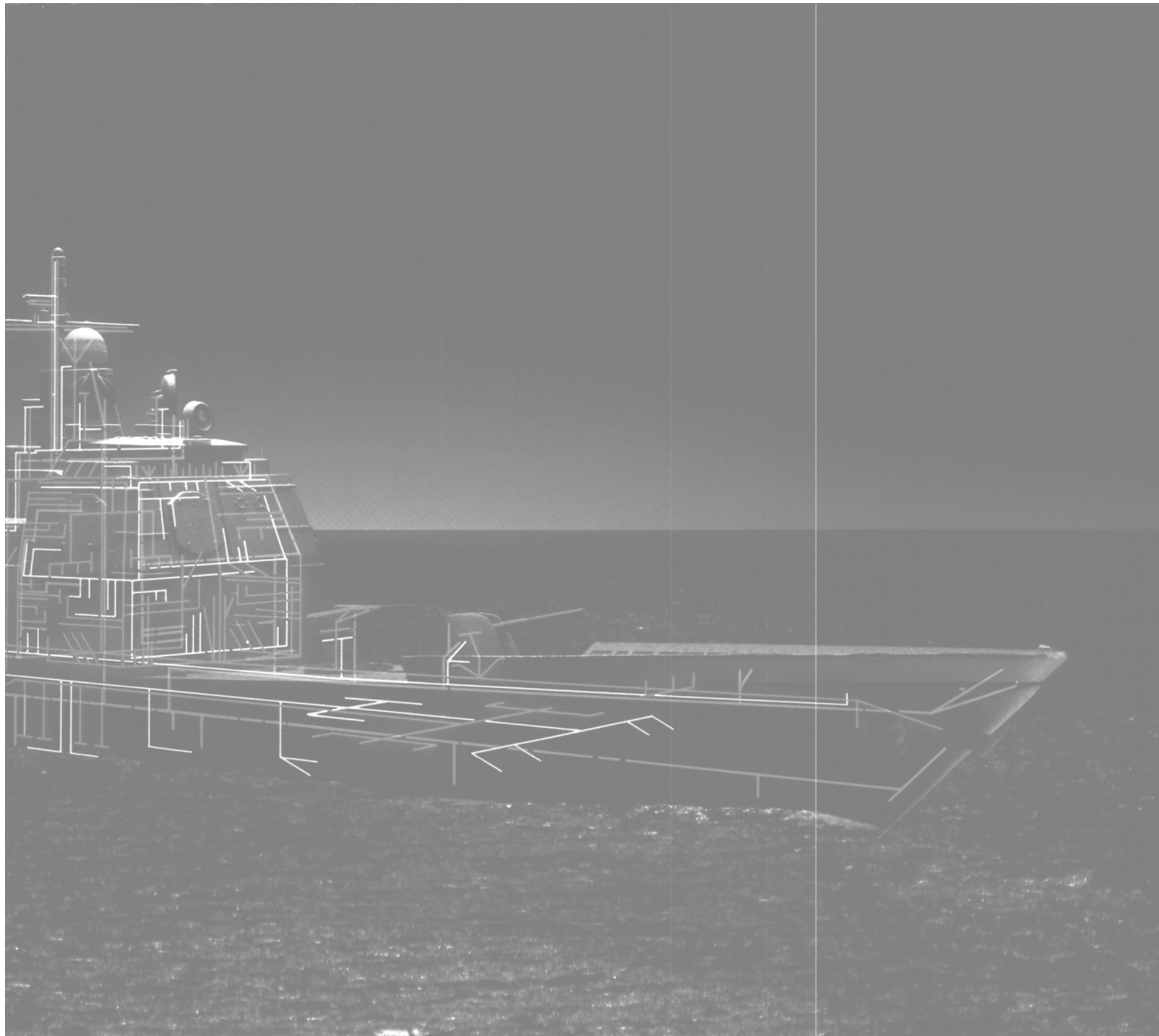
## The Power Behind the Power

Behind every advanced weapons system is an equally advanced electrical system. Consider today's fighting ship – and tomorrow's. In battle its every action and reaction will depend on clean, uninterrupted, survivable electric power.

Such a fighting ship doesn't simply "plug in." The electrical network contained within its hull and superstructure must be highly secure and perfectly tuned to meet its every performance requirement.

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Every AEGIS cruiser and destroyer in the U.S. Navy fleet receives controlled 400-Hertz power from MagnéTek frequency converters. MagnéTek is the only manufacturer of both 60- and 400-Hertz naval Mil-Spec distribution transformers. MagnéTek fault isolation units and current limiting devices are now being installed on Navy vessels. And MagnéTek is the leading



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Contact **MagneTek Defense Systems**. In the United States: 901 E. Ball Rd., Anaheim, CA 92805, (714) 956-9200, FAX: (714) 956-5397. In Europe: Zum Panrepel 2, 2800 Bremen 45, Federal Republic of Germany, (0421) 48693-0, FAX: (0421) 48693-41.



**MagneTek means power solutions for the military.**

### IMO Delaval Names Three New Managers For Turbine Division

The Delaval Turbine Division of IMO Industries Inc. recently announced that **Bern E. Deichmann** has been appointed as manager of commercial operations, **Steven W. Jadney** promoted to manager of quality operations, and **Debra J. Vietzke** promoted to

manager of project management.

**Gary Walker**, vice president and general manager, stated that the new assignments "are a reflection of our growing interest in the new unit business, as well as our continued commitment to our traditional markets: industrial, chemical, petro and chemical, oil and gas, utility and marine."

As manager of commercial operations, Mr. **Deichmann** will be responsible for marketing, product support services, project manage-

ment, field service and marketing communications for the Delaval Turbine Division.

Mr. **Jadney** has been with IMO for over 17 years, holding positions in project management, marketing and field sales. Mr. **Walker** said "... Mr. **Jadney's** promotion to manager of quality operations confirms our commitment to this important program."

Project managers will report to Ms. **Vietzke** in her new role as manager of project management. Of

this promotion, Mr. **Walker** stated, "She has the strong background needed in the area of project management which will enable us to provide close cooperation between the Delaval Turbine Division and its many customers."

As part of IMO Industries Inc., based in Lawrenceville, N.J., the Delaval Turbine Division is located on the company's original 100-acre site in Hamilton Township. It is a major supplier of 5 to 80-MW steam turbine generator sets to the MSW, industrial cogeneration, pulp and paper and independent power production industries. In addition, it is a leading supplier of mechanical drive steam turbines (to 50,000 bhp), centrifugal compressors, single and multi-stage boiler feed pumps, and double helical marine gears.

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# NAVAL BLOCK - AID

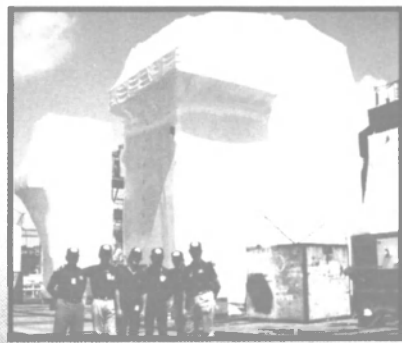
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### Schottel Takes Over Hatlapa's Transverse Thruster Program

Schottel-Werft Josef Becker GmbH & Co KD at Spay/Rhine recently took over the complete transverse thruster program from Hatlapa Uetersener Maschinenfabrik GmbH & Co.

From its headquarters at Spay, Schottel, one of the world's largest manufacturers of 360-degree steerable propulsion units and maneuvering aids for ships, will perform service, inspection, repair and spare part activities for all existing Hatlapa units. New projects and conversions will be handled by Schottel Hamburg. Orders already received will be carried out by Hatlapa, and the program will be progressively transferred to Schottel in coordination with customers and suppliers.

Both companies are convinced that Schottel's long-standing and relevant experience in the field of ship propulsion and maneuvering aids will guarantee the competent continuation of technical problem solving and the supply of highest quality products.

Hatlapa will continue to offer complete packages including its main products, deck machinery, steering gears and compressors and now, Schottel transverse thrusters as well.

For more information and free literature,

Circle 40 on Reader Service Card

### Todd Gets Contract Worth \$12.5 Million For PMA Of Support Ship

Todd Pacific Shipyards, Seattle, Wash., was recently awarded a \$12.5-million Navy contract for the phased maintenance availability (PMA) of the fast combat support ship USS Sacramento (AOE-1).

Maritime Reporter/Engineering News



**Manitowoc Engineering  
Names Fox Executive VP  
And General Manager**



William W. Fox

William W. Fox has been promoted to executive vice president and general manager of Manitowoc Engineering Co., a division of The Manitowoc Company, Inc. Mr. Fox succeeds **Ralph E. Feiertag**, who recently retired as president of Manitowoc Engineering.

In his new position, Mr. Fox will oversee the operations of Manitowoc Engineering Co., which designs, manufactures, and distributes cranes, log debarking equipment, and contract products such as large stamping presses and tunnelling machines.

He will also oversee the operations of Manitex, Inc., McAllen, Texas, which designs, manufactures, and distributes offshore pedestal cranes, boom trucks, overhead cranes, and straddle cranes.

Mr. Fox has more than 20 years of experience selling and marketing heavy equipment. He joined Manitowoc Engineering in 1980 as vice president and general manager of the company's Chicago-based sales subsidiary. Promoted to vice president in 1986, he served in that capacity until his latest promotion.

The Manitowoc Company, Inc. is a leading manufacturer of cranes and industrial products, and ship repair.

For more information and free literature,

Circle 52 on Reader Service Card

**SPD's Henschel Unit Wins  
Taiwanese Navy Contract  
For Ship Controls**

Henschel has received a contract to provide ship control systems for up to eight FFG-7 frigates being built for the Taiwanese Navy.

The contract calls for immediate production of two shipsets, with options for six additional systems.

Henschel, an SPD Technologies company, has been the premier designer and producer of ship control systems for the past 70 years. The company's installations can be found on virtually every U.S. Navy combatant vessel, and has also been used on frigates for the Australian and Spanish navies.

For more information and free literature from Henschel,

Circle 17 on Reader Service Card

**Ocean Survey Ship,  
USNS Tanner, Launched  
By Beth-Sparrows Point**

The U.S. Navy's Military Sealift Command (MSC) recently christened the ocean survey ship USNS Tanner (T-AGS-40) at ceremonies at Bethlehem Steel Corporation's Sparrows Point, Md., shipyard.

Rear Adm. **Richard F. Pittenger**, Oceanographer of the Navy, was the principal speaker. The Honorable **Mimi W. Dawson**, former Deputy Secretary of Transportation, was the ship's sponsor. Vice Adm. **Paul D. Butcher**, USN, Commander, Military Sealift Command, represented the MSC.

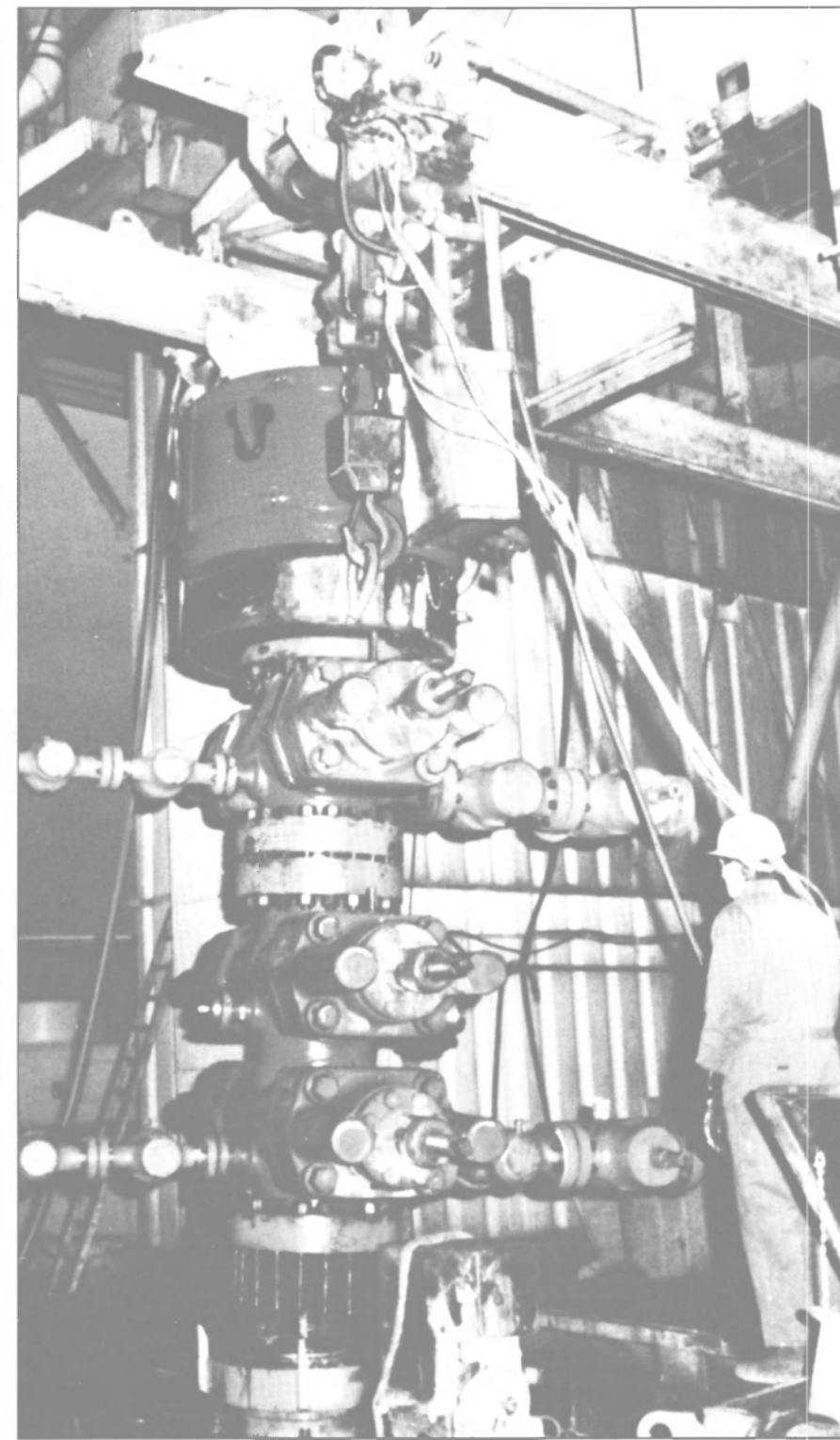
The 499-foot, 15,821-ton-displacement USNS Tanner is to conduct ocean surveys and gather es-

sential geophysical and other scientific data. Among other things, this type of information is used to map the deep ocean floor. The Tanner is expected to join the MSC's ship Special Mission Support Force in 1990.

For free literature detailing the shipbuilding and ship-repairing services of Bethlehem's Sparrows Point yard,

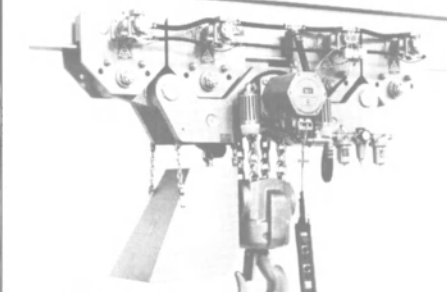
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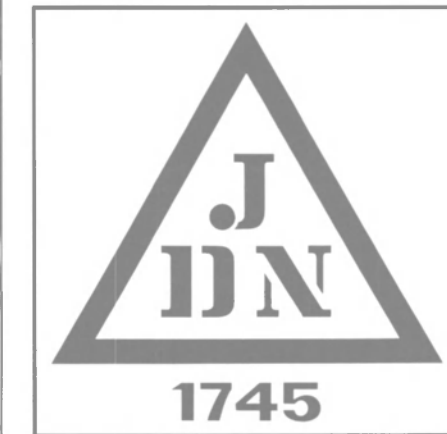
They are for instance standard built for application in areas where there is a risk of explosion. Explosion proof requirements are especially high on drill platforms. For this reason increased sparking protection is possible as an optional extra. JDN-pneumatic hoists are available with carrying capacities from 0,1 to 100 tons.

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**Unitor Ships Service  
Announces Appointments**

Unitor Ships Service, Inc. recently announced the following appointments:

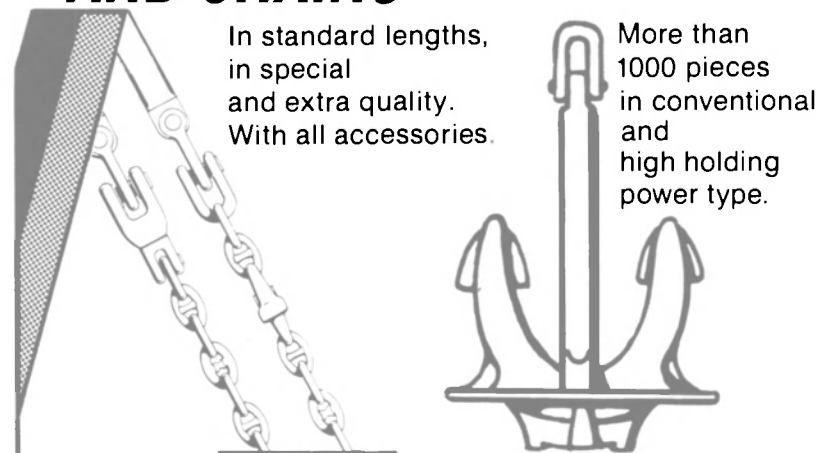
**Lasse Nergaard** has joined the operation as financial manager, Americas area. He will be responsible for all financial and administra-

tive matters in that area.

**Kevin Kelley** has been promoted to territory manager, US/Canada West Coast. He previously held the position of account sales manager, West Coast.

Both positions are based in Long Beach, Calif., Unitor's headquarters for the Americas. Both men report to **Paal Berg**, general manager.

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The recently christened USNS Pecos (T-AO-197) is powered by twin Colt-Pielstick diesel engines.

**Avondale Industries Christens  
Navy's Newest Fleet Oiler,  
USNS Pecos (T-AO-197)**

Christening ceremonies were recently held at the Shipyards Division of Avondale Industries, Inc., for the seventh in a series of seven fleet oilers under construction by the Louisiana builder.

The USNS Pecos (T-AO-197) is 667 feet long, 97 feet wide and has a maximum draft of 36 feet. Her mission along with her sister ships is to transport bulk products from shore depots to combatants and support forces under way. The fleet oilers also carry and deliver fleet freight, cargo, water, mail and personnel. Underway refueling of other ships in the fleet is accomplished using transfer rigs with transfer hoses sus-

pending by a span wire automatically maintained in a constant-tension range. T-AOs are also capable of refueling helicopters from a vertical replenishment facility aft of the superstructure.

Powered by a pair of Colt-Pielstick 10-cylinder, medium speed diesel engines, the Pecos is capable of service speeds of 20 knots. She has a capacity of 183,500 barrels of oil in 18 cargo tanks, and is capable of simultaneously receiving, storing and discharging two separate grades of cargo fuel.

For free literature detailing the shipbuilding facilities of Avondale, Circle 66 on Reader Service Card

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**Emergency Rescue Beacon  
Introduced By Litton To  
Aid Mariners In Distress**

Clifton Special Devices division of Litton has developed and is producing an emergency rescue beacon that can help rescuers locate vessels at sea to within one mile.

Litton's Emergency Position Indicating Radio Beacon can automatically transmit an emergency radio signal to polar-orbiting satellites which relay the data to ground stations for high accuracy calculation of a craft's location.

The rescue beacon is a self-contained aid that fastens securely to nautical craft. It comes in two versions. The first is fully automatic, meaning that it will activate and begin transmitting automatically should the vessel sink or capsize. The automatic deployment mechanism releases the beacon before it reaches a depth of four meters.

The second version, which can be deployed manually, is designed for use where automatic activation is not required, such as for use in a lifeboat.

Koden International, Inc. of Norwell, Mass., has been named exclusive distributor of the rescue beacon for the Litton division.

Clifton Special Devices division, headquartered in Springfield, Penn., is a unit of Litton's Servo Components group.

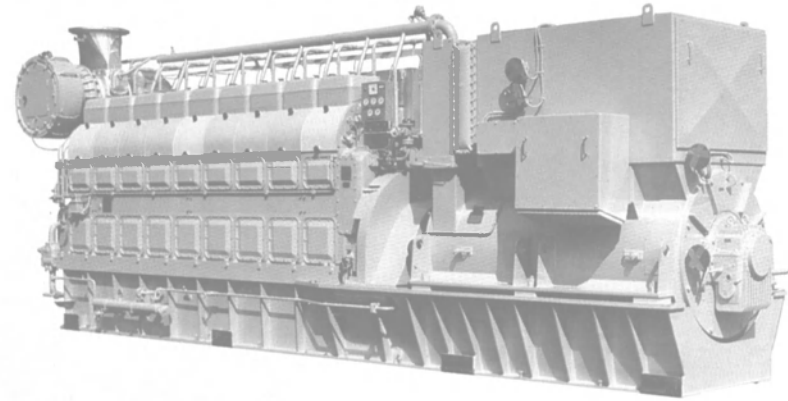
For more information and free literature on the emergency rescue beacon from Litton,

Circle 41 on Reader Service Card

**MHI To Build  
Second NYK Cruise Ship  
Under \$695.2-Million Pact**

Mitsubishi Heavy Industries Ltd. (MHI) will construct a second cruise ship for Nippon Yusen Kaisha (NYK) under a \$695.2-million contract.

The 27,000-grt ship, expected to be delivered in November 1991, is the near sister ship of the larger Crystal Harmony, presently under construction at the yard. The 600-passenger liner is aimed at the international market but with particular emphasis on the U.S.



MAN B&W Holeby diesel generator set type 9L28/32 H.

### Nine MAN B&W Holeby GenSets Ordered For Three Containerships To Be Built At Odense Shipyard

MAN B&W Diesel, Holeby has received an order from A.P. Moller of Denmark for nine diesel generator sets for three 4,200-TEU container vessels to be built at Odense Steel Shipyard, Denmark.

The diesel generator sets of type 9L28/32 H, each with an output of 2,010 kw at 720 rpm are for HFO operation according to the Unifuel principle, meaning that they are to be operated on the same low grade and thus, low cost heavy fuel oil as the propulsion engine.

One diesel generator for each ship set will be equipped with ICS, Integrated Charge Air System, developed and patent applied for by MAN B&W Diesel. The ICS concept facilitates operating the diesel generator continuously on HFO in the complete load range from full power down to and including idling.

The successful 28 series which was introduced in 1976 has, through continuous development, represented the latest state-of-art, thus

meeting changing market demands. Orders for this well-proven design have now reached a total of more than 1,200 engines, representing a total number of 1,893,000 kw in the output range 880-3,960 kw.

With the heavy fuel operating, four-stroke, medium-speed engine types of 23 and 28 series as prime movers, MAN B&W Diesel, Holeby has gained a position as market leader for heavy duty diesel power modules, primarily in form of Gen-Sets, but also as PumpSets and Combi-Sets.

The ability to offer tailor-made solutions meeting specified requirements is continuously improved by the introduction of concepts, which are expanding the deliveries to comprise not only diesel power modules but complete systems for production of electricity and alternative auxiliary power.

For more information and free literature on MAN B&W Holeby Gen-Sets,

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### MarAd Repair Subsidy Proposal Opposed By U.S. Shipbuilders

The Maritime Administration's proposed rule making it clear that certain vessel repairs performed in foreign shipyards may qualify for subsidy is opposed by U.S. shipbuilders. **John J. Stocker**, president of the Shipbuilders Council of America, said in a recent letter that the proposed rule is "bad public policy in that it ignores a vital consideration underlying the 1936 Merchant Marine Act." Mr. Stocker said that MarAd is obligated under that law to "foster and promote the development of the ship repair base of the United States."

The proposed rule change would make it clear that whatever portion of a repair is domestic is eligible for subsidy, even if done in an overseas shipyard.

December, 1989

The shipbuilders council "totally disagrees" with the proposed rule. "Instead, the council urges that the two components of vessel repair, the part and the installation thereof, be tied together to be eligible for the payment of maintenance and repair subsidy to an operator," Mr. Stocker said.

### U.K. Yard To Build Nile Cruise Vessel

The U.K. yard of Yorkshire Dry Dock Co. will construct a 256-foot cruise vessel for operation on the Nile River.

The 160-passenger vessel, which is being built under a \$6.4-million contract awarded to engineering company Tempest Diesels, who assigned the work to Yorkshire Dry Dock, will be delivered to Nile Cruisers of Egypt.

### \$120-Million Order Awarded AESA For Two Suezmax Oil Carriers

A contract for two Suezmax crude oil carriers has been placed with Astilleros Espanoles SA (AESA) by Spain's state-owned Empresa Nacional Elcano.

Together, the ships are believed to be costing around \$120 million. Delivery of the 140,000-dwt ves-

sels will be from the Puerto Real yard of Astilleros Espanoles at the end of 1992 and beginning of 1993.

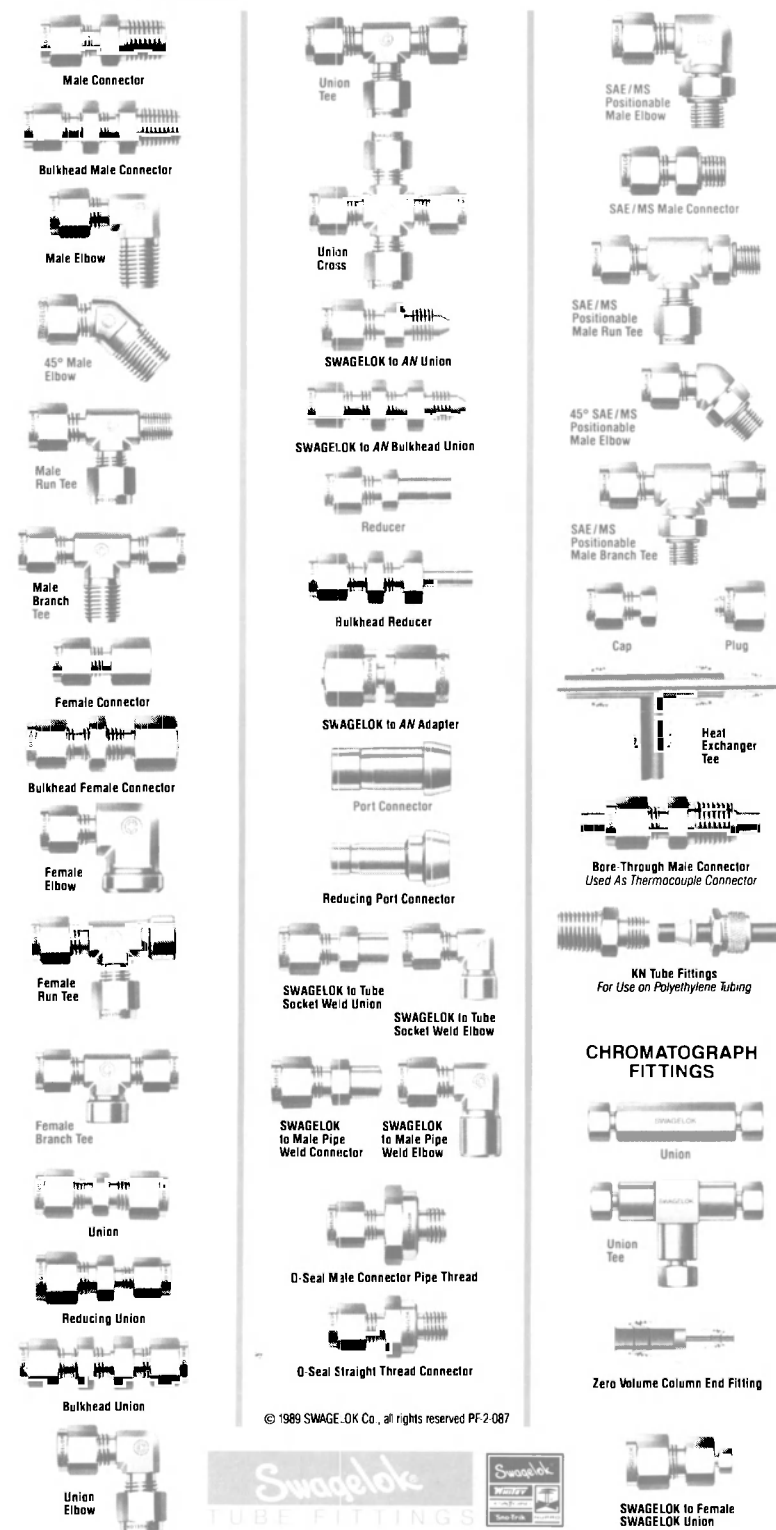
Elcano, which belongs to the same Instituto Nacional de Industria (INI) holding company as Astilleros Espanoles, intends to use the two newbuildings mainly for hauling crude from the Persian Gulf.

For free literature on the facilities and capabilities of AESA,

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## FORECAST 2000

### WORLD SHIPBUILDING A MARKET POISED FOR RAPID TAKE-OFF AND SUSTAINED GROWTH

By James R. McCaul  
IMA Associates, Inc., Washington, D.C.

*Editor's note: This article pertains to commercial shipbuilding. Details of the U.S. Navy shipbuilding program, which includes the construction of 90 vessels and three major conversions over the next five years, are highlighted in Mr. McCaul's article, "Status Report on Navy Shipbuilding and Repair," in the Naval Technology & Shipbuilding supplement in this issue.*

The past 15 years have been difficult times for many shipbuilders and marine equipment manufacturers. Massive overbuilding of internationally trading ships in the early 1970s and dramatic structural changes in the flow of international trade combined to make a very depressed situation. Many marine firms throughout the world have been unable to weather this economic storm. This difficult period, however, is coming to an abrupt end. A business turnaround is occurring in major shipping sectors and aging ships present a massive fleet replacement requirement. In fact, as will be discussed below, the take-off in worldwide ship construction has already begun.

Ignoring usual short term cyclical movements, long term business conditions in the two major marine sectors—tankers and dry cargo shipping—have dramatically improved over the past several years.

World trade in oil has been growing since the mid-1980s. OPEC production during the first eight months of 1989 was 14 percent higher than the corresponding period last year—and more than 50 percent higher than production in the mid-1980s. The world oil trade has grown from about 24 million barrels per day (MBD) in 1985 to more than 30 MBD in 1989.

As a result, tanker charter rates have climbed and resale prices of secondhand tankers have soared. For example, a 350,000-dwt VLCC built in the mid-1970s would bring a price of \$42 million today. Just one year ago, its resale price would have been \$24 million. Five years back the ship was worth \$6 million. Speculators have made vast killings in this market—including the Loews Group who is understood to be discussing sale of 50 percent interest in six 12- to 15-year-old ULCCs now valued at \$300 million.

Rates in the bulk carrier markets have also improved over the past several years. One year time charters are fetching rates which double or triple those in the mid-1980s.

ALL SHIPS IN THE WORLD ORDER BOOK AT THE END OF THE SECOND QUARTER, 1989								
Where Building	Under Construction		Not Commenced		TOTAL		Percentage of World Tonnage	Deadweight Tonnage
	No.	Gross Tonnage	No.	Gross Tonnage	No.	Gross Tonnage		
Argentina	19	68,503	11	23,979	30	92,482	0.34	140,241
Australia	25	22,638	7	5,409	32	28,047	0.10	22,033
Bangladesh	3	950	2	825	5	1,775	0.01	1,050
Belgium	5	78,000	1	20,000	6	98,000	0.36	97,000
Brazil	32	690,290	14	324,500	46	1,014,790	3.71	1,626,109
Bulgaria	5	65,434	16	152,346	21	217,780	0.80	335,390
Canada	7	30,016	2	1,400	9	31,416	0.11	4,695
Chile	7	2,400	5	2,150	12	4,550	0.02	28
*China, People's Republic of	25	283,719	52	578,457	77	862,176	3.15	1,292,915
China, Republic of (Taiwan)	7	426,500	10	592,800	17	1,019,300	3.73	1,785,490
Colombia	1	207	...	...	1	207	...	327
Denmark	23	168,686	38	608,227	61	776,913	2.84	956,147
Egypt	7	24,177	1	9,329	8	33,506	0.12	33,600
Finland	22	454,877	7	141,215	29	596,092	2.18	115,366
France	19	106,877	14	104,419	33	211,296	0.77	72,624
*German Democratic Republic	1	11,977	50	530,000	51	541,977	1.98	446,862
Germany, Federal Republic of	50	537,127	24	270,399	74	807,526	2.95	812,030
Greece	28	39,455	4	12,780	32	52,235	0.19	56,981
Guatemala	...	...	1	130	1	130	...	...
Iceland	1	143	1	200	2	343	...	100
India	62	172,099	12	106,860	74	278,959	1.02	426,118
Indonesia	15	16,884	2	7,000	17	23,884	0.09	23,270
Iran	3	2,874	1	200	4	3,074	0.01	...
Israel	1	492	...	...	1	492	...	...
Italy	69	608,349	10	177,000	79	785,349	2.87	788,103
Japan	224	3,779,147	200	4,018,714	424	7,797,861	28.53	11,556,401
Korea (South)	62	2,264,265	108	4,254,100	170	6,518,365	23.84	11,448,664
Lebanon	1	300	...	...	1	300	...	...
Malaysia	4	4,000	2	19,000	6	23,000	0.08	39,350
Malta	8	28,200	...	...	8	28,200	0.10	53,920
Mexico	25	49,984	39	19,813	64	69,797	0.26	94,254
Morocco	2	755	2	600	4	1,355	...	...
Netherlands	65	118,006	36	107,212	101	225,218	0.82	271,008
Norway	20	23,918	23	70,550	43	94,468	0.35	108,333
Pakistan	2	11,150	...	...	2	11,150	0.04	17,550
Peru	33	15,071	...	...	33	15,071	0.06	5,400
Poland	63	380,575	91	608,554	154	989,129	3.62	1,273,894
Portugal	41	76,568	6	8,946	47	85,514	0.31	120,976
*Romania	3	89,818	32	490,264	35	580,082	2.12	892,090
Singapore	15	29,208	9	19,980	24	49,188	0.18	59,551
Spain	124	462,930	89	752,794	213	1,215,724	4.45	1,856,618
Sri Lanka	1	350	...	...	1	350	...	...
Sweden	15	24,314	3	24,250	18	48,564	0.18	19,980
Thailand	1	2,500	...	...	1	2,500	0.01	...
Turkey	22	80,349	19	144,700	41	225,049	0.82	352,950
*U.S.S.R.	1	18,526	4	115,250	5	133,776	0.49	221,970
United Arab Emirates	3	1,147	...	...	3	1,147	...	1,670
United Kingdom	40	197,313	9	55,946	49	253,259	0.93	273,741
United States of America	52	26,671	64	15,078	116	41,749	0.15	46,250
Venezuela	6	650	...	...	6	650	...	200
Yemen, People's Democratic Republic of	1	144	...	...	1	144	...	250
Yugoslavia	36	801,806	27	640,820	63	1,442,626	5.28	2,308,667
<b>WORLD TOTAL</b>	<b>1,307</b>	<b>12,300,339</b>	<b>1,048</b>	<b>15,036,196</b>	<b>2,355</b>	<b>27,336,535</b>	<b>100.00</b>	<b>40,060,166</b>

Source: Lloyd's Register Merchant Shipbuilding Returns \*Information Incomplete

EXISTING FLEET—TANKERS AND COMBINED CARRIERS						
Size tdw	Year of Build (number of vessels and thousand tons deadweight)					TOTAL
	Up to 1969	1970-74	1975-79	1980-84	1985-89	
10/ 15,999	52 648	46 642	50 663	56 687	44 577	248 3,217
16/ 24,999	159 3,247	85 1,820	74 1,501	97 1,903	41 760	456 9,231
25/ 34,999	73 2,191	125 3,671	169 5,108	98 2,951	55 1,599	520 15,520
35/ 44,999	46 1,763	32 1,186	77 2,925	97 3,804	87 3,472	339 13,150
45/ 59,999	46 2,366	9 452	42 2,337	87 4,721	31 1,581	215 11,457
60/ 79,999	47 3,338	40 2,958	31 2,238	120 8,417	41 2,957	279 19,908
80/ 89,999	14 1,178	32 2,722	72 6,158	42 3,589	45 3,789	205 17,436
90/ 119,999	28 2,915	60 6,277	67 6,840	25 2,585	33 3,323	213 21,940
120/ 159,999	3 420	86 11,786	157 21,267	15 2,054	20 2,788	281 38,315
160/ 199,999	1 176	13 2,183	25 4,343	4 705	1 161	44 7,568
200/ 254,999	1 207	84 19,695	52 12,267	3 710	29 7,017	169 39,896
255/ 319,999		80 21,650	104 28,738	5 1,436	7 2,074	196 53,898
320,000/ & over		3 1,018	51 20,281	2 710		56 22,009
<b>TOTAL</b>	<b>470 18,449</b>	<b>695 76,060</b>	<b>971 114,666</b>	<b>651 34,272</b>	<b>434 30,098</b>	<b>3,221 273,545</b>
% t.d.w. of steam vessels	33.4	48.6	50.0	4.3	1.0	36.9
% t.d.w. of motor vessels	66.6	51.4	50.0	95.7	99.0	63.1

Source: Clarkson Research Studies Ltd.

As a result there has been a rise in secondhand prices for bulk carriers. For example, a 15-year-old 120,000-dwt bulker would currently bring offers of around \$22 million. Twelve months ago offers would be about \$17 million—and five years ago a price of \$7 million would be within reach.

Shipowners over the past several years have been placing new ship orders at the rate of 20 million dwt annually. By late 1988, the world

orderbook stood at 37 million dwt. This is a far cry from the early 1970s—when new orders were running 120 million dwt annually and order backlog had swollen to 240 million dwt.

The increase in freight rates has not yet fully reflected itself in shipbuilding orders. Mostly the impact has been reducing inactive tonnage and raising secondhand prices.

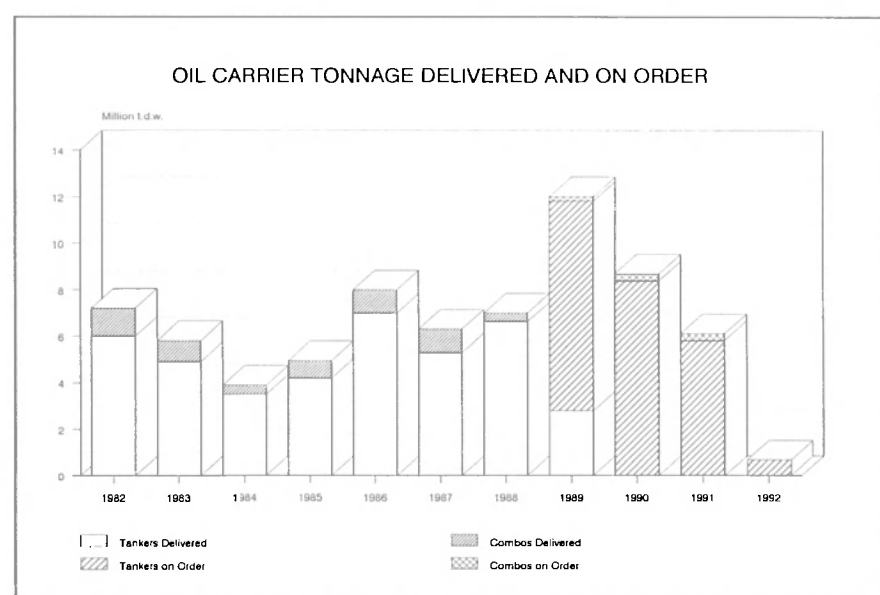
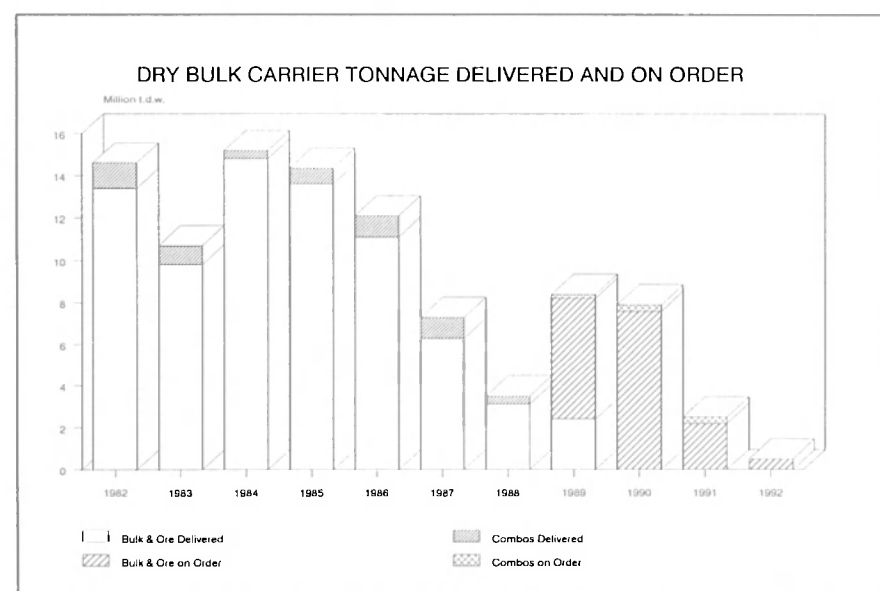
This is about to end—and, in fact, probably has already ended.


Driving future shipbuilding demand is the increasing age of existing ships. By the mid-1990s, 42 percent of ships in the world tanker

fleet will be 20 years or older. Almost 60 percent of the OBO fleet and 37 percent of world bulk carriers will be 20 years or older. While some life extension is possible—and many owners are studying extension possibilities—a ship's economic and physical life starts to close quickly at 20 years of age. To meet this replacement timing, orders have to be placed now through the early to mid-1990s.

This replacement requirement—combined with improved shipping demand—will produce a massive future shipbuilding requirement. In fact, a number of major yards are already reported to be committed well into 1992. Quite likely there are speculators now placing ship orders for which they have no intention of taking delivery. Rather, they expect to gain by selling their building berth spaces to anxious buyers—much like speculators in the mid-1980s who bought laid-up tankers for subsequent resale when market conditions improved.

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### World Shipbuilding

(continued)

Analyses of future ship construction by groups such as the Association of West German Shipbuilders and Japan's Ministry of Transport result in similar bullish outlook. The Association of West German Shipbuilders projects ship orders totaling 155 million dwt over the 1991-95 time period. Japan's Ministry of Transport projects new orders totaling 164 million dwt during the same timespan. Placed in perspective, this would be an average order rate which is about double the current world shipbuilding output.

World shipbuilding will provide a growing market for shipbuilders, marine equipment manufacturers and other marine industry suppliers. Prices for ships and ship components will climb to more profitable levels as demand begins to approach industry capacity.

All shipbuilding and marine equipment manufacturers should be positioning themselves to ride the coming world shipbuilding boom.

*IMA Associates provides assistance in developing market strategy and long-term business plans. The firm's clients include shipyards, equipment manufacturers and other marine suppliers. IMA has performed assignments for more than 100 clients in 18 countries. For more information, contact: Jim McCaul at (202) 333-8501.*

### SIZE AND AGE STRUCTURE OF VLCC/ULCC FLEET

Year Built	Size Groups: (Number of vessels and tons deadweight)			
	200/254,999	255/319,999	320,000/& over	Total
1969	1 206,972	1 280,420		1 206,972
1970	3 700,504			4 980,924
1971	7 1,563,645	3 795,062		10 2,358,707
1972	14 3,322,494	7 1,824,463		21 5,146,957
1973	22 5,131,703	17 4,610,579		39 9,742,282
1974	26 6,191,366	48 13,071,005	3 1,018,270	77 20,280,641
1975	29 6,877,935	45 12,410,869	9 3,400,242	83 22,689,046
1976	16 3,777,487	40 11,017,444	17 6,624,112	73 21,419,043
1977	3 694,705	12 3,379,663	14 5,584,239	29 9,658,607
1978	2 451,469	3 796,797	7 2,774,287	12 4,022,553
1979		4 1,133,059	4 1,898,316	8 3,031,375
1980		1 275,271	1 355,020	2 630,291
1981	2 474,998	1 267,672	1 355,020	4 1,097,690
1982		1 290,084		1 290,084
1983		2 603,313		2 603,313
1984	1 234,733			1 234,733
1985	2 490,006			2 490,006
1986	9 2,150,286	1 317,353		10 2,467,639
1987	5 1,170,334	1 259,992		6 1,430,326
1988	10 2,458,104			10 2,458,104
1989	3 748,903			3 748,903
<b>Total</b>	<b>155 36,645,644</b>	<b>187 51,333,046</b>	<b>56 22,009,506</b>	<b>398 109,988,196</b>
	Newbuilding tonnage			
1989	10 2,450,000	7 1,898,000		17 4,348,000
1990	4 970,000	8 2,156,000		12 3,126,000
1991	3 726,000	6 1,656,000		9 2,382,000
<b>Total</b>	<b>17 4,146,000</b>	<b>21 5,710,000</b>	<b>0 0</b>	<b>38 9,856,000</b>

Source: Clarkson Research Studies Ltd.

## U.S. YARDS COULD COMPETE WITH EUROPE IN 1990s\*

If foreign shipbuilding subsidies are eliminated or substantially reduced, U.S. shipyards have the potential to compete successfully with Northern European yards for construction of U.S.-owned commercial tonnage by the mid-1990s. This was the conclusion of a paper delivered at a meeting of the Society of Naval Architects and Marine Engineers (SNAME) held recently in San Diego, Calif. The paper was prepared by **Jay Carson**, an associate of Temple, Barker & Sloane, and consultant **Barbara Lamb**.

The international shipbuilding situation has changed markedly from that of the early and mid-1980s, the authors say, resulting in an improved competitive situation for the U.S. shipbuilding industry. Appreciation in foreign currencies as compared to the U.S. dollar, coupled with sharp increases in shipyard labor costs abroad, have driven shipbuilding costs up in foreign yards. In the United States, however, construction costs have gone down and shipyard labor rates have remained stable.

Furthermore, whereas throughout much of the 1980s many foreign shipyards endeavored to bid at or below costs, ship prices internationally are now on the rise. In fact, they have almost doubled in the past five years and are predicted to increase even more during the 1990s. For example, a very large crude carrier (VLCC) built in the Far East and priced at \$42 million in 1984 costs the shipowner about \$80 million today. By the late 1990s, the price tag is expected to exceed \$100 million.

Currently, the U.S. and Northern European shipyards have similar total costs for construction of a new ship. Although the European yards have overhead and productivity advantages, these are offset by labor rates that are significantly higher than those of U.S. yards. Nevertheless, the study authors warn, "without U.S. Government assistance to eliminate foreign subsidies, a substantial price differential between the U.S. and its nearest competitors is expected to remain."

While U.S. price competitiveness improved during the 1980s, the lack

of commercial orders slowed the pace of product improvements in U.S. shipyards as compared to foreign yards. Although U.S. yards have implemented advanced methods (i.e. modular construction) in building naval ships, they have not had sufficient opportunities to become skilled in applying advanced methods to commercial shipbuilding, the paper reports.

Mr. **Carson** and Ms. **Lamb** see the potential market for American shipyards as U.S. owners of foreign-flag and U.S.-flag ships. Thus, the available market in the 1990s are the U.S. owners of the 10.4 million gross tons (gt) needed to replace the 300-plus, U.S.-controlled and U.S.-registered ships that are currently 15 years of age and older (assuming a 25-year life span). This includes the 86 ships, totaling 2.14 million gt, in domestic (Jones Act) commerce. Currently, there are 41 ships—mostly product tankers—in the Jones Act trades that are already over 25 years of age. However, today's charter rates are not high enough to support newbuildings to

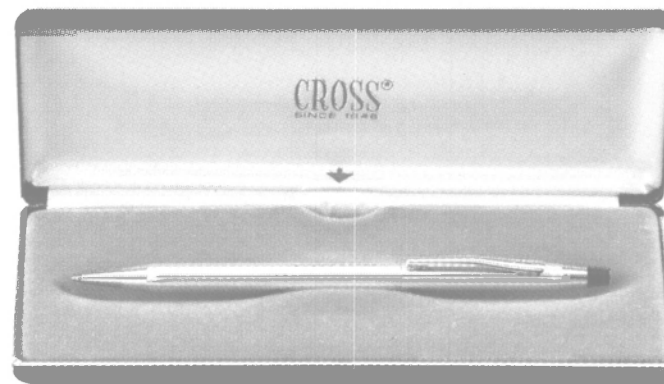
replace these aging tankers.

In addition to the ships engaged in the U.S. domestic trades, there are 76 large, oceangoing barges that are at or approaching obsolescence. Although not all of these vessels may be replaced with new, similar vessels, at least some will. According to the study, replacement tankers and barges for the domestic trades represent the primary commercial opportunity for U.S. shipbuilders in the 1990s. The best long-term opportunities for U.S. yards, however, are the more sophisticated ships engaged in international commerce. This presents a strategic dilemma which U.S. shipbuilders will have to resolve in order to determine the marketing focus and research and development emphasis throughout the 1990s.

Another problem facing the yards will be lack of skilled shipyard workers. "Manpower constraints, rather than facilities, will limit the ability of U.S. shipbuilders to meet the possible demand for commercial

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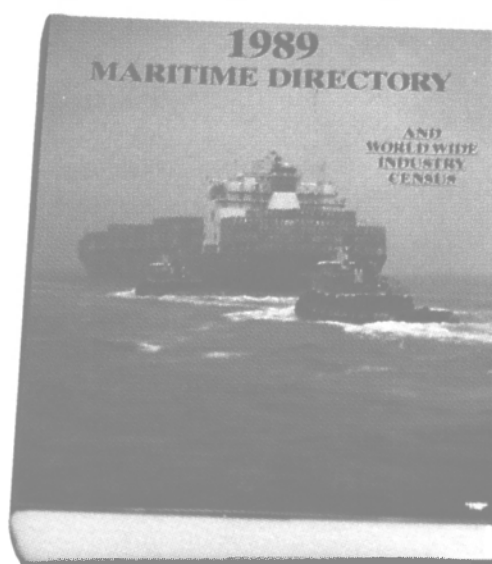
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## FORECAST 2000

### U.S. Yards

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ships in 1990s," the authors of the SNAME paper say.

Mr. Carson and Ms. Lamb recommend the following steps for U.S. shipbuilders to achieve competitiveness in the commercial market by the mid-1990s: (1) decide upon the market segment and ship types on

which to focus; (2) determine a feasible price structure for the ships; (3) develop a program to radically improve productivity in building the ships; (4) import established state-of-the-art designs or develop standard designs; and (5) actively promote the product to targeted shipowners.

The authors call on the federal government to investigate improving methods of promotion that

would stimulate the replacement of U.S.-flag ships, resume funding for commercial shipbuilding research under the National Shipbuilding Research Program, and aggressively pursue the elimination of foreign shipbuilding subsidies.

In addition, the analysts also have suggestions for shipowners: develop a long-term ship replacement plan, communicate this plan to shipbuilders, and accept that standard de-

signs are the most cost-effective way to meet their transportation needs.

*\*Editor's Note:* This article originally appeared in the October 12 issue of *Shipyards Weekly*, the weekly publication of the Shipbuilders Council of America, Washington, D.C., an organization whose members and affiliate, allied industry and associate members include major American shipbuilders and repairers, equipment manufacturers, naval architects and marine engineers.

### Is The Small Passenger Vessel Industry Still A Growth Market?

## A SHIPBUILDER'S PERSPECTIVE

By T.R. Hensley, President  
Service Marine Industries, Inc.

"Is the small passenger vessel industry still a growth market?" This is an interesting question and it could be posed by prospective boat owners and their lenders, commercial developers, municipalities, tour and charter brokers, and certainly, by shipbuilders. As one of the leading builders of these types of vessels in the U.S., we continually survey these markets, question our customers, and analyze the results of our advertising. Our conclusion at this time is a qualified "yes."

The most exciting thing that happens to a shipbuilder is receiving that telephone call which says "okay, we've got a deal." We've been very fortunate in receiving quite a few of these phone calls, with two boats delivered this year, one under construction, and one in engineering. Our construction book is solid and our inquiry load remains very high.

There is no doubt that the public's love affair with boats has led to a phenomenal growth in the industry. The National Association of Passenger Vessel Owners (NAPVO) now has 333 members who have some 1,000 boats in operation. There are many other boat operators outside this organization who have one or more boats catering to excursion or ferry clients. It's difficult to find a seacoast town, large river town, or even landlocked lakes such as Lake Tahoe, or Lake Mead, that don't have at least one excursion boat or ferryboat.

The spectacular growth of the industry and broad coverage of the navigable water in the U.S. by small passenger boats unfortunately lead to a significant problem for operators wanting to increase their fleet, or entrepreneurs considering entering the market. Our discussions with potential customers point out the high cost of dock space or even the lack of dock space in cities that would otherwise support a boat operation. Other problems such as economical, available parking, power, water and trash and sewage disposal facilities also arise. The customer



The ultramodern Spirit of Norfolk II, built by Service Marine Industries of Morgan City, La., for Cruise International.

base may be in place, but facilities cannot be found for the operation.

Current economic news may be reason for a slowdown. This past year hasn't been one of the best for many operators. People seem to be expecting a slowdown in our economy, and are paring down their vacation plans. Whether this a short term phenomenon, no one seems to know for sure.

The cost of construction of small passenger vessels has risen over the past two years. The prices of materials and equipment have risen on an average of six percent per year, the cost of labor slightly more. However, the good news is that the price of steel has recently turned down to mid-1988 levels. Ticket and charter prices, on the other hand, have not been able to keep pace with new construction costs. This puts more pressure on the growth plans of the industry.

As most shipbuilders do, we continually try to find ways to lower the labor content of our boats, so that our prices rise at a rate lower than the rate of increase in material, equipment, and labor costs. We also try to give our customer added value in quality of workmanship and equipment installed in the boat. This added value tends to lower the operation cost of the boat through lower maintenance cost.

We also spend a lot of time in the design appeal of the boat through

styling and decoration. Our intent here is to make the boat more attractive so that the operator can increase his occupancy and perhaps even charge a premium for his boat.

Another contributor to what may be a slowdown in new construction of excursion boats is the lack of adequate sources of financing. It is the exceptional startup that has the know-how to start a limited partnership. Many times the startup operator is not able to prepare a business plan that satisfies the requirements of the lending institution. We give clients assistance in developing the plan if they ask for our help. Very few startups have the capital base required by most lending institutions, particularly banks.

We have found it necessary to locate sources of finance and to introduce our customers to those sources. Naturally, the project has to be feasible, but at least, the operator will be talking to someone who understands his business.

The four factors influencing future growth of the industry—lack of location, economic slowdown, higher construction costs, and inadequate financing—are being evaluated by the established operator, as well as startup companies, with many taking a cautious approach.

However, there are significant bright spots in the small passenger boat market. At present, the main

growth areas are ferryboats and upscale, very posh megayachts for corporate charters or large private parties.

*Yacht Vacations*, a magazine devoted to vacations on the water, recently reported on the lure of water and boats for corporate incentives and business functions. They report that the reasons corporations are organizing events on luxury yachts range from the ability to offer complete privacy from the hectic pace of the office, to the advantage of offering custom-designed charters tailored to a promotion or event.

Marie Convoy, who coordinates the charters for Mariner III and the President, offers the New York Harbor because, "new waterfront developments and the spectacular skyline have contributed to the surge in social functions aboard yachts, both corporate and private. There is no more private place to gather. The atmosphere is relaxed, and conducive to socializing and networking. The hustle and bustle of Wall Street seems so far away."

Among the shipbuilders to take advantage of this trend is the Trinity Marine Group, Trinity Industries. The company has delivered one 142-foot yacht to Kathleen and Fred Windridge, who are in the Florida charter yacht business. Soon to be delivered is the Lady Windridge, a 170-foot megayacht. All of the Windridge boats cater to the corporate and caviar crowd. The Lady Windridge will glide along the night lights of Florida's famous Gold Coast on the Intracoastal Waterway.

Trinity is also building a 97-foot yacht and will soon start a 135-foot yacht to be located in Boston. John Dane III, president of Trinity Marine Group, stated, "The yacht business is doing very well across the country, interestingly in the very small and very large sizes."

Service Marine Industries, Inc. has designed, and construction will

(continued)



## FORECAST 2000

# THE SHORT CRUISE MARKET IN EUROPE AND NORTH AMERICA

By Dr. Stanley I. Buchin and J. Duncan McDougall  
Temple, Barker & Sloane

The U.S. one-day market is one of the fastest growing segments of the North American cruise industry; the Baltic luxury ferry market is one of the most well-developed cruise markets in Europe. Why do Scandinavians purchase 27 times more short cruises per person than North Americans? How profitable are the two markets, and where is the money made? What product and service trends can be expected in the two markets? What lessons can the markets learn from each other?

Temple, Barker & Sloane, Inc., an international general management consulting firm, reported results of research and analysis it performed to answer these questions in the keynote speech of the Cruise & Ferry '89 conference held recently in London.

The research consisted of surveys of representative North American and Baltic cruise and ferry lines, industry interviews, as well as Temple, Barker & Sloane's studies of the U.S. one-day market and analysis of its worldwide cruise database.

### U.S. One-Day Cruise & Baltic Luxury Ferry Markets

While the two markets have roughly the same number of ships,

in 1988 the Baltic luxury ferry market (13 ships and 6.8 million passengers) carried over 5 times the number of passengers as the U.S. one-day market (with 9 ships and 1.3 million passengers).

US	Baltic
6	3
9	13
\$,600	26,300
1.3	6.8
\$201.5	\$1,598.0
	Revenues (Millions)

Both markets have experienced steady growth in recent years. From 1985 to 1988, the Baltic luxury ferry market grew 4.4 percent annually while the U.S. one-day market experienced an explosive 20 percent annual growth.

The U.S. one-day cruise industry acts as an important source of new passengers for the overall U.S. cruise industry because one-day cruises offer an attractive way for first-time cruisers to try the cruise experience without having to spend an extended period of time on board. About one-third of one-day

### Shipbuilder's Perspective

(continued)

soon start on, a radically new 170-foot megayacht to fit into this market. This boat will have a very plush interior and an exterior profile which will be very appealing to corporate customers. The boat will have a full menu galley, a very exclusive restaurant on the first deck, and a lounge and disco on the second deck. East Coast Investors, Ltd., will operate the American Eagle out of their new marine on Jamaica Bay, with trips to lower Manhattan.

The recent San Francisco earthquake brought home in a very graphic way the ability of ferryboats to complete highway links, even in high density traffic. Ferries from Washington and Los Angeles, and old ferryboats from San Francisco were pressed into service after the failure of the Oakland Bay Bridge. But in other areas of the country, ferry traffic is an ordinary way of travel.

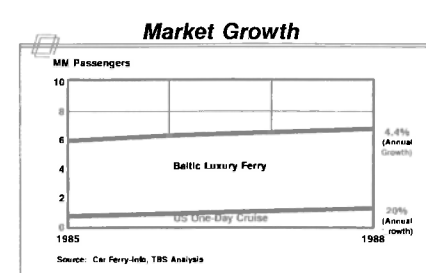
Commuters regularly travel the waters of New York and Boston Harbors, all along the East Coast mainland to offshore islands, St. Thomas, U.S. Virgin Islands, to other Virgin Islands and Puerto Rico. Other major systems include the

Washington State Ferry System, which in 1988 carried 19.3-million passengers and 8.3-million vehicles, San Francisco Bay Commuter Service, and the ferry system between San Pedro and Catalina Island.

The big players in this business have been Trinity Industries, building two 112-foot high-speed passenger ferries for the Washington State Ferry System; Avondale Industries, building new luxury surface effect boats for Metro Marine Express; and Gladding-Hearn and Nichols Bros., both building high-speed wave-piercing catamarans based on an Australian design.

Washington State Ferry System, Massachusetts Bay Transportation Authority, and Metro Marine Express, all have plans for expanding to new locations requiring new boats. Several private operators are reported to be eyeing some high density traffic areas on the East Coast that would respond to ferry operations.

While conventional dinner boat operators may be thinking about taking a breather, the operators of posh, exclusive megayachts are expanding in several major East Coast cities, and commuters are flocking to high-speed ferries in ever-increasing numbers. There is definitely still vitality in the small passenger vessel industry.



cruisers eventually go on to purchase conventional cruises.

U.S. one-day cruise ports have tended to be located in vacation destinations which offer a year-round cruising season (e.g.-Miami,

Ft. Lauderdale, Port Everglades, San Diego, etc.). Almost all one-day cruises begin and end in the same port. Baltic luxury ferries, on the other hand, usually act as a transportation link between major Baltic cities (e.g., Stockholm, Helsinki) or between ports which represent the shortest distance between key land masses (e.g.-Turku, Mariehamn).

### Typical Ship & Product Characteristics

Most Baltic luxury ferries are considerably larger than U.S. one-day cruise ships. The typical Baltic

(continued)



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## FORECAST 2000

(continued)

ferry has 27,000-30,000 grt and carries 1,800-2,000 passengers. The typical one-day cruise ship in the U.S., on the other hand, has 7,000-10,000 grt and carries 900-1,000 passengers.

### Typical Ship

U.S. One-Day Cruise	Baltic Luxury Ferry
• 7,000-10,000	• 27,000-30,000
• Late 1980s, rebuilt in mid 1990s	• Mid 1980's
• 900-1,000	• 1,800-2,000
• 8-12	• 15-17
• 30% of passengers	• 80% of passengers
• None	• 450-550

Much of the difference in ship size is due to the fact that Baltic luxury ferries carry passengers, cars, and trucks, while U.S. one-day cruise ships are dedicated to carrying passengers only. Baltic luxury ferries usually have enough cabins to accommodate approximately 80 percent of their passengers. The typical U.S. one-day cruise ship, which is substantially smaller and rarely offers overnight cruises, only has cabins for approximately 30 percent of its passengers. Some one-day cruise ships offer no cabins at all.

### Typical Passenger Profiles

U.S. one-day cruise lines and Baltic luxury ferries both attract mostly middle-aged cruisers who are repeat passengers, and both tend to have a younger passenger profile on weekends. While Baltic luxury ferries draw about 95 percent of their passengers from locals (Swedes and Finns) who live within 125 miles of the ports of departure, roughly half of the U.S. one-day cruisers are tourists to the area.

The higher percentage of tourists in the U.S. one-day market has led

U.S. operators to use a wide range of media (e.g., local print, radio, television) and depend more on travel agents to obtain bookings. About half of U.S. one-day bookings are made through travel agents. In the Baltic, where almost all passengers are "locals," most tickets are sold directly by the ferry companies which use local print and signage to promote trips.

### Trends & Implications

The potential for considerable growth still exists in the U.S. one-day cruise market. Less restrictive gaming legislation is currently under discussion in several states. If this legislation is passed, the prospects of high on-board gaming revenues may encourage new cruise lines to enter the one-day market. TBS also believes that new one-day operations are likely to be developed in the near future on the Mississippi River and in new coastal locations.

There are a variety of important issues which currently face U.S. one-day cruise lines: (1) new competitors can easily and inexpensively enter the market; (2) state regulations concerning gaming, a critical source of revenues, are constantly under review; (3) the potential surplus of 7-day cruise ships may begin to enter the market; (4) port facilities may become severely strained or limited in key locations; and (5) the aging population is becoming increasingly quality conscious and is demanding higher levels of service.

Competition will become more intense in the Baltic luxury ferry industry as new lines enter the market, and as newer, larger vessels are built. Ferry lines will be forced to increase promotional efforts to stimulate sufficient demand to keep new ships profitable. Baltic operators are also beginning to consider what effects, if any, EEC 1992 will

have on their dynamic industry.

### Suggested Steps For Action

Actions that U.S. one-day operators should consider to attract more passengers include: (1) building new ships designed specifically for the one-day market instead of refurbishing older vessels originally designed for other markets; (2) developing new home ports and itineraries; (3) including one-day cruises in travel packages; and (4) improving menus and dining facilities. To increase on-board revenues, U.S. one-day operators should consider unbundling meals, requiring a surcharge for gourmet dining, improving shops, and gaming facilities, providing more cabins, and offering health spas.

Actions that Baltic luxury ferry operators should consider to attract more passengers include: (1) including ferry passages into more travel packages; (2) selling more ferry trips to groups outside Sweden and Finland; and (3) evaluating the market for "cruises to nowhere." To increase on-board revenues, Baltic luxury ferry operators should consider providing more boutiques, improving cabin quality, offering health spas, and adding to the on-board gaming facilities.

### Summary

A final comparison of these two dynamic markets underscores their potential for increased growth and profitability:

• If 13.3 million Scandinavians purchased 6.8 million passages on Baltic luxury ferries, how much additional volume could be generated in the U.S. market from the 69 million coastal metropolitan residents who are currently buying only 1.3 million one-day cruises?

• If 1.1 million U.S. one-day cruisers spend \$40 person in on-board casinos, how much additional gam-

ing revenue could be generated in the Baltic market from the 6.8 million Scandinavians who are currently spending only \$5 per person on gaming?

TBS believes that substantial growth opportunities exist in both the U.S. one-day cruise market and the Baltic luxury ferry market. Successful operators will be those that concentrate on providing passengers with a superior cruise experience and offering them a variety of attractive opportunities to purchase on-board goods and services.

This article summarizes a keynote speech presented by Dr. Stanley I. Buchin at Cruise & Ferry 89 conference held in London on May 24-25, 1989. Copies of the speech can be obtained by writing to Dr. Buchin at Temple, Barker & Sloane, Inc., 99 Hayden Avenue, Lexington, Mass. 02173.

### ABOUT THE AUTHORS

Dr. Stanley I. Buchin is a senior vice president of Temple, Barker & Sloane, Inc., an international general management consulting firm based in Lexington, Mass. Dr. Buchin heads the firm's Travel and Entertainment Group which assists cruise lines, hotels, resorts, casinos, and entertainment companies address a wide range of issues including strategic planning, marketing, and new product development. Dr. Buchin was formerly an Associate Professor of business administration at Harvard University, and holds a B.A. from the Massachusetts Institute of Technology, and MBA and DBA degrees from the Harvard Graduate School of Business Administration.

J. Duncan McDougall, an Associate in Temple, Barker & Sloane's Travel & Entertainment Group, has provided management counsel to clients in the cruise, hotel, casino, spa, and tourism industries. Mr. McDougall formerly worked with travel companies in Alaska, Canada, and New Zealand. He holds a B.A. from Vanderbilt University and an MBA from the Amos Tuck School of Business Administration at Dartmouth College.

## EUROPE 1992: WHAT LIES AHEAD FOR U.S. COMPANIES?

By Wilford W. Middleton, Group Vice President, Marketing  
Sea-Land Service, Inc.

In all probability, the changes taking place in Europe will have a profound impact on the way ocean carriers do business in the years ahead.

Of course, no one can predict exactly what the European economy will look like in 1992. While many people expect the European Community to achieve full economic integration, it is unrealistic to assume that one unified market—where goods, services, capital and labor flow unrestrained—will be created by the end of 1992. Policies are still being set, and the true shape the market and its full impact on the

business world is largely unknown.

The exact timetable for Europe aside, we are clearly in a business environment that is taking on global dimensions. Europe is on its way to becoming a four trillion dollar market—that's four thousand billion—made up of 320 million consumers. Europe's drive toward a single market is accelerating a move toward the creation of three global trading blocs—North America, Asia and Europe. Gross domestic product in the Common Market will soon rank with that of the U.S.; it is already larger than Japan's.

Some important steps have al-

ready been made as European countries prepare for life after 1992. Many of the nearly 300 trade directives are being dismantled, eliminating cumbersome standards and regulatory procedures.

As we get closer to 1992, one significant development is the possible integration of 12 heterogeneous markets into one large market for goods and services. Companies around the globe will be looking at what could become the largest single customer base in the world.

We see a number of opportunities and some obstacles for American businesses. The unification of Eu-

rope should compel American businesspeople to look at the world as they never have before. After all, what we're seeing in Europe represents the first situation in decades where American companies will not play a leading role in a significant development in world trade. In the next five years, we expect that events in Europe will not have a dramatic impact on trade into and out of the U.S.

The changes in Europe should make it easier for firms to do business. In fact, a U.S. government official recently said that American companies currently operating in

Europe will not have to change much and that little, if any, additional investment will be required.

This might be true in some cases. But part of the ground rules for doing business in Europe will change, forcing both European and foreign firms to change the way they do business.

It's likely that all traditional forms of distribution in Europe will be subject to change. The question is, "Will American companies be on the forefront of this change, or will they be on the outside reacting to the competitive moves of others?"

American companies must stay on top of new transportation developments. Logistics will become a powerful marketing tool. Foreign firms will no longer be able to survive unless they are constantly aware of both their customers' needs and what the competition is doing.

Not only must companies know their customers's needs, but they also must know the needs of their customers' customers' in order to fully understand the complete distribution cycle.

To succeed in Europe, American companies will have to adopt a new approach to doing business. This will not be an easy transition to make. Americans are used to thinking in terms of world trade evolving in the U.S. Now they have to start thinking about how to capitalize on trade opportunities revolving in Europe.

American businesses planning to expand in Europe must consider forming ventures with their European counterparts. These linkages may take the form of alliances, partnerships or acquisitions, or they may even be start-up companies. We must figure out how to wed our strengths with those of European companies. American companies can bring to the table decades of experience in serving one large market. Europeans, on the other hand, can offer both local expertise, and in some cases, a different world perspective.

So real opportunities in world trade in the near term are going to take place in Europe. However, over the longer term, by 1994 or so, we expect to see greater demand for American products in Europe. Given the marketing experience of U.S. firms, the unification of Europe's markets should work to our advantage. After all, American companies have more experience than anyone in selling to one large market—our own. And it's easier than earmarking a message specifically for Dutch, French or Italian consumers. But again, we don't see this market growth beginning for three to five years.

We see a number of opportunities for exporters and carriers who wish to operate throughout Europe. One is increased intermodal traffic throughout the community as shippers find it easier to move their products farther inland. A second opportunity is for increased intra-European trade. This larger volume will invite more competition in each transport mode, as well as between modes.

In fact, Europe is already taking steps to facilitate the movement of goods around the community. Many observers believe that by 1992, a number of substantial improvements will be made in European transportation infrastructure.

We would welcome these improvements. Europe's infrastructure does not allow for the sophisticated transportation systems we have in the U.S. The roads are too narrow and the tunnels too numer-

ous to accommodate heavy trucking. Yet about three-quarters of the cargo moved in Europe travels over the road. Nor are the railroads as efficient as they are elsewhere. In fact, goods in Europe travel at an estimated seven miles an hour, compared with an estimated 36 miles an hour in the U.S.

As we face these developments in Europe and the globalization of the world, it's important that shippers and carriers work together. Carriers

need to make more of an effort to understand their customers' needs. Customers, on the other hand, should be willing to look at longer term relationships with carriers. By developing a close working relationship, carriers and customers can, through technology and creative approaches to logistics, make a customer's product as competitive as possible in every way—quality, price, and availability.

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which include pre-assembly of complete structural blocks up to 800 tons, exceptional levels of management and personnel: all this is a guarantee of quality and reliability which enables the Division to satisfy any requirements including technology transfers. The six yards of the Division - located at Monfalcone, Venezia/Marghera, Ancona, Castellammare di Stabia, Livorno and Genova/Sestri - have among them built more than 5,000 vessels for all flags over a period of more than 200 years. They have large and modern building docks for ships up to 300,000 tdw, but also deliver from the traditional slipways ships up to 180,000 tdw.

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### ADVENTUROUS Halter Marine

Halter Marine Inc., a member yard of the Trinity Marine Group, delivered the USNS Adventurous, the first of six identical T-AGOS ocean surveillance ships being constructed under a Navy contract with a value of approximately \$85 million.

The Adventurous (T-AGOS-13) is the 11th of 18 planned monohull T-AGOS-class ships to join the Navy's ocean surveillance program.

Operated by the Military Sealift Command (MSC) and manned by



civilian technicians, the Adventurous monitors the movement of submarines by deploying towed linear arrays of hydrophones known as the Surveillance Towed Array Sonar System (SURTASS).

The SURTASS system is comprised of flexible, neutrally buoyant cable containing a large number of passive microphones, each tuned to specific frequencies enabling identification of noises made by submarines many miles away.

The data is processed and transmitted to shore via satellite, where it supplements information from seabed arrays.

The all-steel Adventurous is 224 feet long, with a 43-foot beam, and 15-foot 1-inch draft. Main propulsion and other ship's service are diesel-electric, provided by four Caterpillar-Kato 600-kw diesel generators

driving two General Electric motors. Power is transmitted through two shafts and full load displacement is approximately 2,300 long tons. Maximum speed is approximately 11 knots and normal operating speed is about three knots.

#### USNS ADVENTUROUS Equipment List

Main engines(2)	GE
Propellers	Matsui/Nakashima
Thrusters	Schottel
Thruster Motor	GE
Generator engines(4)	Caterpillar
Generators(4)	KATO
Engine controls	GE
Steering controls	Sperry
VHF radios	ITT Mackay
Radar	Raytheon
Compass	Baker Lyman
Loran	Micrologic
Autopilot	Sperry
Pumps	Aurora/Carver/Delaval
Towed array winch	Appleton Marine

#### BONN EXPRESS HDW

West German shipbuilder Howaldtswerke-Deutsche Werft Aktiengesellschaft (HDW) delivered the new generation 2,291-TEU containership Bonn Express to shipowner Hapag-Lloyd.

Based on research and experience results from the "Ship of the Future" program, the Bonn Express along with her sister the Heidelberg Express equipped with some of the most modern ship operation centers in the world.

For the first time, a ship operation officer equally trained in nautics and technology is on duty, and this allows the owner to make optimal use of a first rate ship operation technique reducing the number of crew to 14.

Direct connection between the ship's and the owner's center in Hamburg is established by worldwide satellite communications. This enables direct transfer of ship data and cargo details.

The concept of ship management and ship operation is based on the concentration of all supervising and control functions into only two main working areas: the ship operation center (SOC) and the board man-



**Photos:** (Clockwise from top left): The rail ferry Robin Hood (Schichau Seebeckwerft); the tanker Iron Gipsland (HHI); the liner Oceanic Grace (NKK); and the tanker Neptune (HHI).

agement center (BMC). This concept was developed in the "Ship of the Future" project and was modified by the shipowner to meet his specific needs.

The Bonn Express has an overall length of 677 feet, length between perpendiculars of 633 feet 7 inches, width of 105 feet 7 inches, depth of 61 feet 7 inches and a draft of 36 feet 1 inch. Below deck, the Bonn Express's container capacity is 986 twenty-foot equivalent units (TEUs), while the capacity on deck in four tiers is 1,123 TEUs. If a 5th tier is added on deck, the container-ship's capacity is increased from 2,109 TEUs to 2,291 TEUs.

Classed by Germanischer Lloyd, 100 A4E "Container Ship" + AUT, the Bonn Express is powered by a single MAN B&W model 8L80MC main diesel engine, rated at 21,700 kw (29,100 bhp) at 85 rpm. Her service speed is 21 knots at 18,300 kw.

The concept of the main engine plant is mainly based on running-cost saving criteria such as: (1) energy saving; (2) easy maintenance of engine room; (3) central supervision; and (4) remote control of important aggregates and systems.

The ship is equipped with a total of 11 hatch covers supplied by MacGregor-Navire.

#### BONN EXPRESS Equipment List

Main engine	MAN B&W
Propeller	Ostermann
Thruster	Lips
Generator engines	Daihatsu
Generators	Taiyo
Engine controls	AEG
Steering controls	Hatlapa
VHF radio	Hagenauk
Radar	Krupp Atlas Elektronik
Compass	Anschutz
Autopilot	Anschutz
Pumps	Allweiler
Winches	Brohli
Sewage treatment	Hamworthy
Life boats	Robert Hatecke
Hatch covers	MacGregor Navire

#### COLUMBIA Hitachi Zosen

The Ariake Dockyard of Hitachi Zosen Corporation delivered the 261,163-metric-ton tanker Columbia to the Columbia Tanker Corporation.

The Columbia features a Hitachi Zosen-developed large bulbous bow and her hull is coated with a self-polishing copolymer coating to help reduce resistance and prevent long-

term pollution buildup, thereby increasing propulsion efficiency.

With an overall length of 1,070 feet, molded breadth of 185 feet 7 inches, molded depth of 93 feet 9 inches, and assigned load draft of 63 feet 6 inches, the Very Large Crude Carrier (VLCC) is powered by a de-rated slow-speed, long-stroke turbo-charged Hitachi Zosen-built MAN B&W Diesel 6S80MC, rated at 24,180 hp at 74 rpm. The main

engine can be operated via micro-computer-assisted remote-control equipment in the wheelhouse. Monitoring equipment with a built-in automation unit permits navigation even when the engine room is unmanned.

Classed by Lloyd's Register of Shipping, the 144,139-gt Columbia has a service speed of about 15 knots and a crew complement of 30.

The cargo oil steel pipe within the

tanks is arranged to enable the loading of three grades of crude oil. A highly corrosion-proof paint is used on the pipe to achieve corrosion prevention. A self-stripping system is provided to shorten unloading time and thus reduce manpower. A remote control level gage is provided to allow the monitoring of cargo oil and ballast tank levels even from the cargo control room.

(continued)

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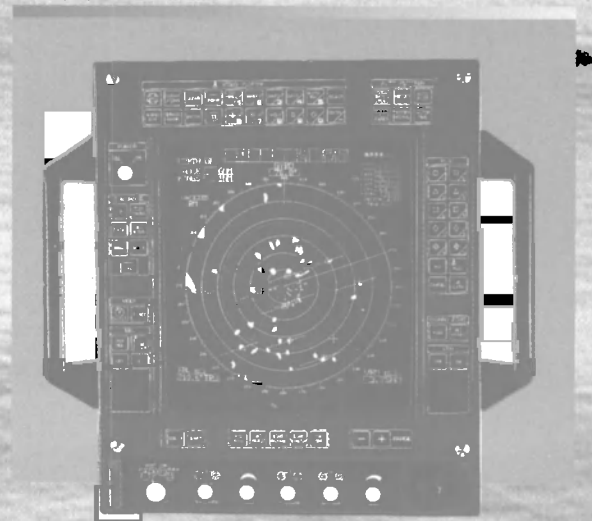
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### CRISTOFORO COLOMBO Fincantieri-CNI

The 2,232-TEU containership M/S Cristoforo Colombo built by Italian shipbuilder Fincantieri at Venezia Marghera for Italia di Navigazione, was recently delivered to her owner. The vessel immediately entered into service within the Mediterranean to North America East Coast (U.S. and Canada) service, which Italia Line is carrying out in cooperation with Evergreen and Contship-Costa Container Lines.

The 34,000-dwt Cristoforo Colombo is the first of three newbuildings ordered by Italia Line. She has an overall length of 683, molded breadth of 105 feet, molded depth of 63 feet, and scantling draft 38 feet.

Her main propulsion is provided by a slow-speed Fincantieri/GMT-Sulzer 7RTA84 diesel engine with a maximum output of 31,500 hp at 90 rpm, producing a service speed of 19.5 knots.

The new containership is among the most advanced in the world. Her integrated automation system allows controlling and monitoring all equipment on board from a simple keyboard and VDU located on the

bridge. The Cristoforo Colombo has a full Sperry Marine integrated bridge including ADG autopilot, RASCAR/ARPA, voyage management station, navigation work station, SRD-421s speed log, and MK37 gyrocompasses. The integrated navigation system controls all data from nautical instrumentation and allows automatic running of the ship on routes preestablished by the operator with the help of data coming from satellite systems (Inmarsat and GPS); charts can be digitalized and put on electronic instrumentation.

#### CRISTOFORO COLOMBO Equipment List

Main engine	GMT-Sulzer
Diesel generators	GMT
Shaft generator	AEG
Emergency generator	Isotta-Fraschini
Bow thruster	Fincantieri
Boilers	Senior Green
Automation	EGS
Navigation system	Sperry Marine
SatCom	Sperry Marine
Satellite navigation	Sperry Marine
Steering gear	AEG
Remote control	Navalimpianti
Deck machinery	Brissonneau & Lotz

### DELFIN CLIPPER Rauma Yards

The first luxury cruise ship ever built at Rauma Yards Oy, the Delfin Clipper, was delivered this past year to her Finnish owners, Delfin Cruises Ltd., by the Rauma, Finland shipyard.



pelago between Sweden and Finland. During the winter season, the Delfin Clipper will operate in warmer waters. The cruises can be tailor-made to meet the demands of clients. For example, the whole vessel can be hired for conferences and business meetings, or even for private parties.

Classed by Lloyd's Register of Shipping, the Delfin Clipper has 178 passenger cabins, eight of which are suites with private jacuzzis. Some of the cabins can be combined to make a family cabin unit. A large number of the cabins are single and especially intended for conference passengers.

Each cabin is highly equipped and provided with fully adjustable air conditioning, toilet, shower, telephone, color TV, refrigerator, and hair dryer.

Other amenities offered include conference facilities for 150 persons, saunas with swimming pool and jacuzzi, tax-free shop, lounge, casino, veranda bar/cafe, nightclub/disco, beauty salon, as well as hospital unit. The large restaurant can seat all the passengers at a single sitting.

Close to the sun deck and the swimming pool there is a cozy winter garden.

#### DELFIN CLIPPER Equipment List

Main engines(2)	Wartsila Vasa	Galley	Metos Marine
Auxiliary engines	Wartsila Vasa	Cabin windows	Het Anker
Alternators	Leroy Somer	Superstructure	
Propellers & shafts	JW Berg	windows	Autolasi
Reduction gears	Renk-Tacke	Carpets	Brintons
Shaft bearings & seals	Waukesha-Lips	Furniture	Asko/SF-Kaluste
Steering equipment	Wartsila-EES	A/C	Semco-Novenco
Bowthruster	Ulstein	Lifeboats	Waterman
Fin stabilizers	Blohm & Voss	Davits	Schat-Davit
Diesel generators	Leroy Somer	Evaporators	Alfa-Laval Nirex
Shaft generators	Leroy Somer	Oil purifiers	Alfa-Laval
Pumps	Allweiler	Compressors	Sperre
Pumps	Iron	Sewage treatment	
Pumps	Mako	plant	Aquamaster-Rauma
Pumps	Kolmeks	Integrated monitoring	
Heat exchangers	GEA Ahlborn/Alfa-Laval	& alarm system	SHIPA/Selma
Emer. generator	Stamford	Radars, log & echo	
Emer. generator engine	Cummins	sounder	Krupp Atlas Elektronik
Vacuum toilet	Evac	Radio station & telephone system	ITT
Sewage treatment	Aquamaster-Rauma	P/A & entertainment system	Philips
Ventilation	Hi-Pre	Video/data communication	
Air cooling compressors	Sabroe	system	Vidacom
Boilers	Wiesloch	Administration &	
Cabins	Parma	cash register system	Micros

### DEL MONTE PLANTER Astilleros Espanoles

Spanish state-owned shipbuilder Astilleros Espanoles S.A. (AES) recently delivered the Del Monte Planter, the first of four 370,000-cubic-foot reefer vessels for Del Monte under construction at its Sevilla yard.

Classed ABS 1 E MS +RMC CCU, the Liberian-flag reefer Del Monte Planter has an overall length of 462-1/2 feet, length between perpendiculars of 426-1/2 feet, beam of 73 feet, depth of 42 feet and draft of 30 feet. Like her sister ships, the Planter is powered by an AESA-built MAN B&W Diesel 6L60MC engine, which has a specific fuel oil consumption of 124.5 grams/bhp/hr, with a maximum continuous rating of 13,750 bhp at 117 rpm. The 10,000-mt refrigerated cargo vessel will be able to obtain a speed of 20 knots at her design draft of 22-1/2 feet, and 18 knots at her full draft of 30 feet.

Each of the four 370,000-cubic-foot reefers has four holds optimized for the carriage of palletized cargoes, with single hatches. All the holds have similar cubic capacities.

Deep fuel oil tanks are arranged fore and aft of the holds aboard the 8,990-gross-ton vessels. Even though the machinery space and accommodations are located aft, the machinery space and uptakes are not integrated with the accommodation block. There are 16 single crew cabins on board.

The 124-FEU (forty-foot equivalent)

unit) Del Monte Planter has three 'tweendecks, with 16 refrigerated spaces divided into eight thermally independent parts. She is fitted with two sets of 19-mt lifting capacity twin cylinder topped electrohydraulic cranes. A single 3-mt cylinder topped electrohydraulic crane has been installed for stores and provisions.

Furthermore, the Del Monte Planter will feature computerized Spare Parts Inventory Management (SPIM), Planned Maintenance (PMS) and Condition Monitoring (CMS) systems from Marine Man-

#### DEL MONTE PLANTER Equipment List

Main engine	MAN B&W-AESA
Auxiliary engines	MAN B&W-Bazan
Propeller	Navalips
Pumps	Tune Eureka
Sanitary pumps	Itur
Compressors	Hamworthy
Emer. generator	Caterpillar
Alternators	Indar
Boilers	San Carlos
Generating sets	Asea
Steering gear	Brown Bros.-Eimar
Radar	Racal Decca
Echo sounders	Simrad
Radio transmitter	ITT
Speed log	Sperry Marine
SatCom	Magnavox
Automation	Soren T. Linso
Purifier	Alfa Laval
Hatches	MacGregor-Navire
Cranes	Hagglunds-San Carlos
Refrigeration	Stal
Firefighting equipment	Pefipresa
Galley	Buraglia
Paint	International Paint
Insulation	Reefer Engineering
Life boats	Pesco
Rafts	Duarry

agement Systems, Inc. (MMS) of Stamford, Conn.

The fully integrated systems were installed under a contract awarded by Del Monte Fresh Fruit International of Hamilton, Bermuda, to MMS.

According to **Don Logan**, MMS vice president, the systems will be installed on the eight other Del Monte reefers under construction at AESA.

The shipboard systems will interface with MMS's SPIM and PMS systems being installed at Del Monte's operation office in Hamilton, as well as at an additional shore office expanded to support a warehouse system. Working together, these systems will provide full inventory and maintenance management control for the Del Monte fleet of vessels.



**DOCERIO**  
Verolme do Brasil

The Rio de Janeiro, Brazil, shipyard of Verolme do Brasil, delivered the 170,000-gross-ton bulk carrier Docerio this past summer to her owners Docenave.

The American Bureau of Shipping-classed vessel has a length between perpendiculars of 721 feet 7 inches, beam of 150 feet 10 inches, depth of 78 feet 1 inch and draft of 56 feet 7 inches. She is powered by a single MAN B&W Diesel 6L80MCE main engine, rated at 17,100 hp at 74 rpm, which was built by Mecanica Pesada S.A. of Brazil, a licensee of MAN B&W. The 90,633-grt (international) bulk carrier is fitted with three MAN B&W L23/30 auxiliary engines, rated at 780 kw each at 720 rpm. Other equipment on board includes three GE ATI 271R266 alternators, 875 kva, 450 v, and 60 Hz each; a 120-kw Elle Hammers emergency generator; Sunrod main boiler; and Verb-Vertical Wather Tube exhaust gas economizer.

The Docerio has an optimized hull to diminish resistance and an asymmetric rudder with bulbous bow and stabilizer fins.

**FANTASY**  
Wartsila Marine

The 70,000-grt superliner Fantasy, built by Finnish shipbuilder Wartsila Marine Industries, was delivered to Carnival Cruise Lines, Miami, Fla.

The 855-foot, 2,600-passenger

vessel is one of the most expensive ships ever built. The 14-passenger cruise vessels under construction at Wartsila Marine each feature 2 x 14 MW Cyclo propulsion drives, 6.6 kv switchboards, four 10.3 MVA main and two 6.8 MVA auxiliary generators, plus six thruster motors and the main transformers, all engineered and supplied by ABB Marine of Helsinki. Six Wartsila-Sulzer diesel engines with a total of more

than 57,000 bhp are the prime movers of the diesel-electric propulsion system. The Fantasy is also fitted with two highly skewed KaMeWa type 144 x F3/4W controllable-pitch propellers. Six Brunvoll 1,500-kw thrusters provide the ship with added maneuverability.

Cabins aboard the Fantasy are reportedly the largest afloat among the cruise industry's new generation of megaton ships, according to CCL.

Carnival introduced a new cabin category on the Fantasy called "demi-suites." These new cabins are substantially larger than standard cabins and feature private balconies. A standard inside cabin measures 183 square feet and standard outside cabin 190 square feet, while the 26 demi-suites are 226 square feet, all with 36-square-foot private balconies. The 28 suites are 360

(continued)

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**Principal Particulars**

Length b.p.	216.00 m
Breadth mid.	32.20 m
Depth mid.	19.35 m
Design draught	12.60 m
Deadweight at design draught	60,600 t
Trial speed	15.00 knots
Main propulsion engine	"3.MAJ/SULZER" 7RTA 62
Main engine output	8760 kW at 861 r.p.m.

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100,134 DWT OIL TANKER

**Principal Particulars**

Length b.p.	238.00 m
Breadth mid.	42.48 m
Depth mid.	20.70 m
Design draught	14.43 m
Deadweight at scantling draught	110,174 t
Trial speed	14.60 knots
Main propulsion engine	"3.MAJ/SULZER" 5RTA 72
Main engine m.c.r.	10550 kW at 78 r.p.m.

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square feet with 71-square-foot private balconies.

The Fantasy also has the "first true spa" at sea, unprecedented in size, number of facilities, selection of programs and state-of-the-art equipment.

At nearly 12,000 square feet, the Nautica Spa provides passengers tremendous space in which to exercise or simply seek some pampering and relaxation.

One of the spectacular design fea-

tures of the Fantasy and her sisters is a six-deck atrium, the Grand Spectrum, conceived by Miami architect Mr. Farcus. On the Fantasy, Mr. Farcus has created an atrium which rises six full decks, crowned by a skylight.

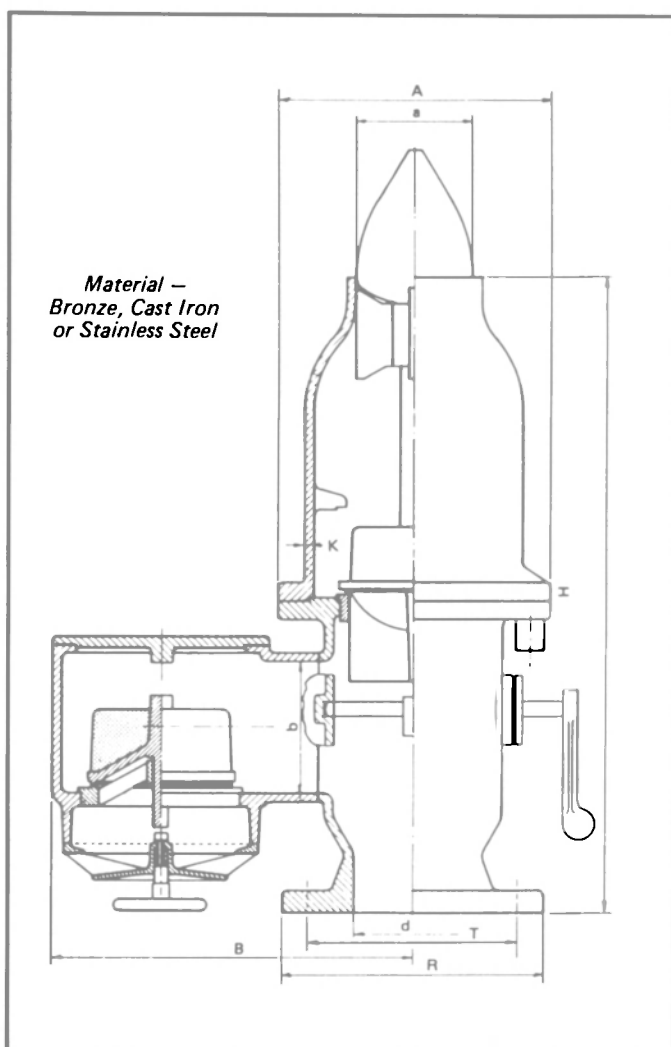
#### FANTASY Equipment List

Main engines (6) . . . . . Sulzer-Wartsila

Alternators (6) . . . . . ABB Drives/Stromberg  
Electric propulsion motors (2) . . . . . ABB Drives/Stromberg  
Engine controls . . . . . KaMeWa/Stromberg/Valmet  
Propellers (2) . . . . . KaMeWa  
Thrusters (6) . . . . . Brunvoll  
Steering gear . . . . . Frydenbo  
Stabilizers . . . . . Brown Bros.  
Switchboards . . . . . Stromberg/Wartsila Marine  
Oil-fired boilers . . . . . Sunrod  
Distilling plant . . . . . Serck-Como  
A/C plant . . . . . Svenska Flakt  
Compressors . . . . . Stal

Sprinkler & alarm system . . . . . Wormald  
Deck machinery . . . . . Pusnes  
Anchors . . . . . Marine Equipment  
Side doors . . . . . Wartsila Marine  
Watertight doors . . . . . Wartsila Marine  
Windows . . . . . Samen (Bilbao)  
Sewage plant . . . . . Hamworthy  
Purifiers . . . . . Alfa Laval  
Bearings . . . . . Lohmann & Stoleroft  
Elevators . . . . . Dan Elevator/Kone  
Lifeboats . . . . . Waterman  
Life rafts . . . . . Viking  
ARPA . . . . . Krupp Atlas Elektronik  
Rascar . . . . . Sperry Marine  
Loran C . . . . . Furuno  
Omega navigator . . . . . JRC  
Weather fax . . . . . Furuno  
Speed log . . . . . Sperry Marine  
SatNav system . . . . . Magnavox  
Radio direction finder . . . . . JRC  
VHF/RFD . . . . . Furuno  
Gyrocompass . . . . . Sperry Marine  
Adaptive autopilot . . . . . EMRI  
Magnetic compass . . . . . JC Krohn/Marine Data  
Echo sounder . . . . . Krupp Atlas Elektronik  
SatCom . . . . . JRC  
Telefax . . . . . JRC  
Communication equipment . . . . . Jeumont-Schneider  
Steering controls & rudder indicator . . . . . EMRI  
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Radio station . . . . . Marconi  
Joiner systems . . . . . Rockwell

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*All dimensions are in inches. MM dimensions are available upon request. Valves with 3, 5, 7, or 12 inch diameters are available upon request. B.C. designates Bolt Circle.*

a (dia.)	2-1/2	4	6	8	10
b (dia.)	2-1/2	4	6	8	10
d (dia.)	2-1/2	4	6	8	10
A (dia.)	7	9	12-1/2	16	19
H	18	21	23	32-1/2	35
B	14	17	18-1/2	21	24
R (dia.)	7	9	11	13-1/2	16
T (B.C.)	5-1/2	7-1/2	9-1/2	11-3/4	14-1/4
Holes (qty.-dia.)	(4)-3/4	(8)-3/4	(8)-7/8	(8)-7/8	(12)-1
Wt. (lbs.)	100	170	200	500	680

WAUKESHA PRES-VAC High Velocity Pressure Relief Valves are certified by I.M.O., SOLAS, the U.S.C.G., and meet all the test requirements of all classification societies.

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device is needed which allows the tank to breathe, to compensate for thermal changes. Finally, the device should vent the effluent clear of the personnel on deck. The WAUKESHA PRES-VAC High Velocity Pressure Relief Valve will do all this for you.

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### HENRY LARSEN Versatile Pacific

The Northern Vancouver yard of Versatile Pacific Shipyards, Inc. (VPSI) delivered the Type 1200 Arctic Class 4 icebreaker Henry Larsen to the Canadian Coast Guard. She is now in operation providing large vessel escort service in the Gulf of St. Lawrence during the winter months and in the Eastern Arctic in the summer months.

Commenting on the delivery of the Henry Larsen, David Alsop, president and chief executive officer of VPSI, said the ship performed well during her sea trials and "we are confident the Government of Canada and the Coast Guard are taking delivery of a first class vessel that will meet all expectations."

The Henry Larsen is 327.5 feet long, has a beam of 64.6 feet and displacement of 8,290 tons at a draft of 23.7 feet. She is powered by an AC marine propulsion plant consisting of three main generator sets, cycloconverters and synchronous motors. Three Wartsila Vasa type 16V32 diesel engines each rated at 5,250 kw at 720 rpm, drive General Electric Canada AT1 synchronous generators with brushless exciters. Each generator is rated at 5,000 kw, 4,160 v, 6,250 kva at 720 rpm. Cullen Canada Inc., Vancouver, B.C., Canada, supplied the main propulsion generator sets.

Auxiliary power is supplied by a 625-kw Stromberg HSP10/653 generator driven by a Wartsila Vasa 6R22 rated at 960 kw at 1,200 rpm. She is also fitted with a Caterpillar emergency generator set.

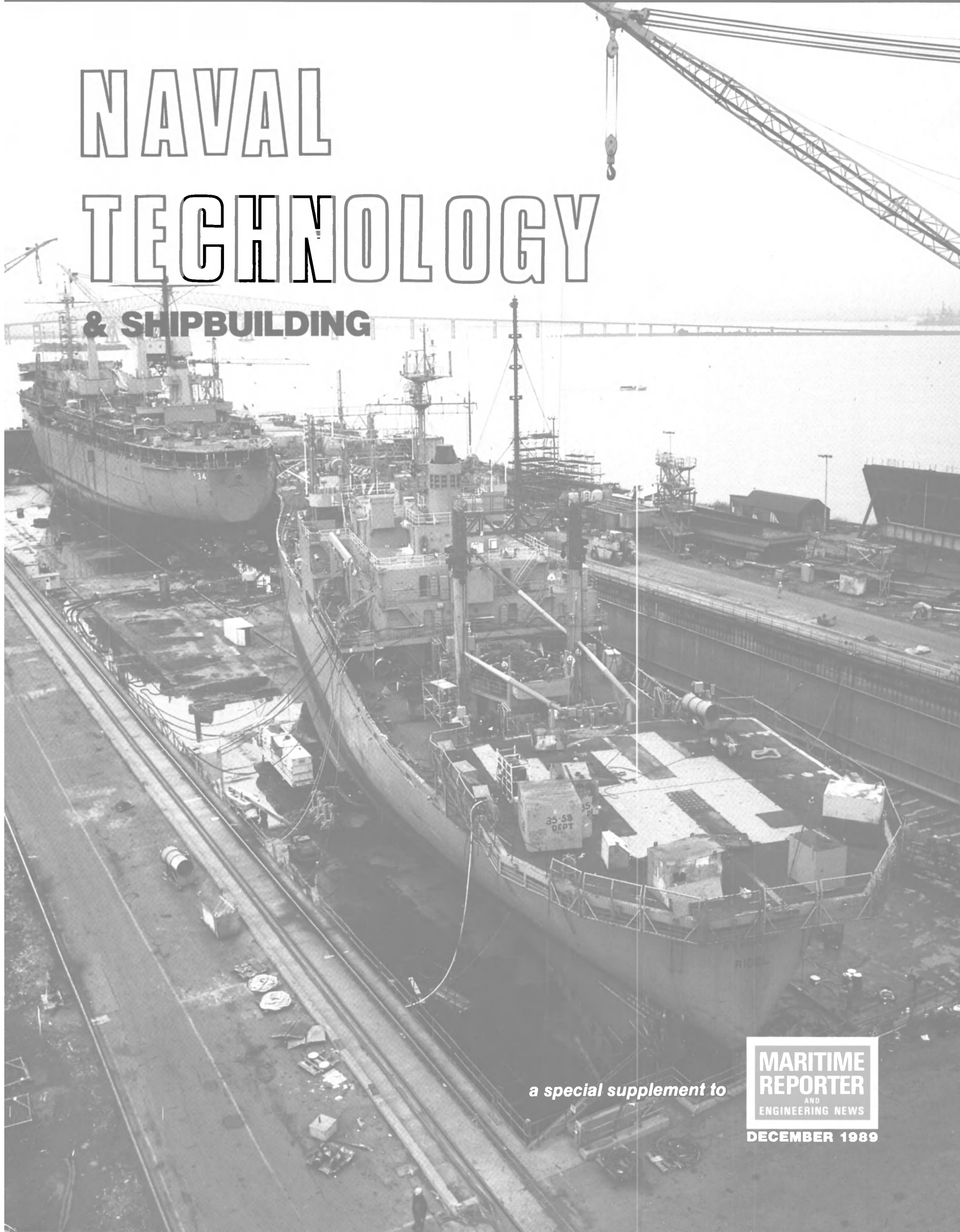
The Henry Larsen can accommodate a crew of 72, has a cruising range of about 15,000 nautical miles, a cruising speed of about 13.5 knots and a total shaft horsepower of 12,000 kw through two Lips propellers.

(continued on page 37)



# NAVAL TECHNOLOGY

**& SHIPBUILDING**



*a special supplement to*

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REPORTER**  
AND  
ENGINEERING NEWS  
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## A STATUS REPORT ON NAVY SHIPBUILDING AND REPAIR

SENATE APPROVES \$1 BILLION FOR SEALIFT SHIP PROCUREMENT

By James R. McCaul  
IMA Associates, Inc., Washington, D.C.

The U.S. Navy continues to be the major source of business for shipyards and marine equipment manufacturers in the United States. This article is an excerpt from recent IMA quarterly business reports on Navy shipbuilding and repair.

### **Navy Shipbuilding**

The Navy plans to build 90 ships and perform three major modifications/conversions over the next five years (FY 1990-94). The breakdown of this program and a comparison to FY 1989 is provided in Exhibit 2.

As of early November, Congress had not yet passed either an authorization or appropriation bill for defense spending. Exhibit 1 shows the status of funding for the proposed FY 1990 shipbuilding program. This information is as of 1 November.

The Senate recently approved \$1 billion for procurement of four fast sealift cargo ships and two sealift tankers. This past summer, a similar measure was included in the approved House Defense Appropriations Bill.

Projected 5-Year Navy Spending Program 1990-1994 (as of November 1989)	
	Projected Annual Spending (\$ in billions)
New Ship Construction	from 10 to 12
Ship Repair/Modernization	from 4 to 6
Electronics & Systems	from 5 to 6
Weapons	from 5 to 7
RDT & E	from 9 to 11
Annual Total	from \$33 billion to \$42 billion
<b>PROJECTED FIVE-YEAR TOTAL*</b>	from \$165 billion to \$210 billion

\*Total does not include spending for aircraft



## Major Navy Contracts

Compiled by Maritime Reporter Staff

**General Ship Corporation**, Boston, Mass., was awarded a **\$10,192,346** firm-fixed-price-with-performance-fee contract for the Extended Drydocking Selected Restricted Availability (EDSRA) for USS Oliver Hazard Perry (FFG-7). Work is expected to be completed in June 1990. The Naval Sea Systems Command is the contracting activity (N00024-85-H-8157).

**Continental Maritime of San Diego**, San Diego, Calif., was awarded a **\$5,154,532** firm-fixed-price contract for the drydocking selected restricted availability of USS Acadia (AD-42). The Supervisor of Shipbuilding, Conversion and Repair, San Diego, California, is the contracting activity (N00024-85-H-8212).

**Great Lakes Dredge and Dock Company**, Staten Island, N.Y., was awarded a **\$16,390,500** firm-fixed-price contract for dredging at Naval Weapons Station, Earle, N.J. Work is expected to be completed in May 1990. The Naval Facilities Engineering Command, Northern Division, Philadelphia, Pa., is the contracting activity (N62472-87-C-0040).

**Unisys Corporation, Shipboard & Ground Systems Group**, Great Neck, N.Y., was awarded a **\$5,544,483** firm-fixed-price contract for three Aegis T-1348/SPG Continuous Wave Illuminator (CWI) radar transmitters. Work is expected to be completed in January 1993. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-89-C-5170).

**Ingalls Shipbuilding, Inc.**, Pascagoula, Miss., was awarded a **\$12,014,650** cost-plus-fixed-fee contract for Post Shakedown Availability for USS Wisconsin (BB-64). The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-89-C-2088).

**General Electric, Government Electronics Systems Division**, Moorestown, N.J., was awarded a **\$88,555,249** cost-plus-award-fee contract for engineering support services for the Aegis combat system on DDG-2313, a Japanese Self-Defense Force ship. Work will be performed in both Moorestown, New Jersey (93%) and Japan (7%) and is expected to be completed by March 31, 1993. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-87-C-5107).

**The United Kingdom Ministry of Defense, c/o the British Embassy**, Washington, D.C., was awarded a **\$5,300,000** firm-fixed-price contract for an existing floating accommodation barge to be delivered to the Philadelphia Naval Shipyard. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-89-C-2196).

**General Electric Company, Naval and Drive Turbine Systems Department**, Fitchburg, Mass., was issued a **\$13,798,176** firm-fixed-price delivery order under a basic ordering agreement to provide four high pressure turbines, four high and low pressure high speed couplings, four transfer valves and one low pressure astern ring for the Service Life Extension Program of USS Constellation (CV-64). Also included are the refurbishment/overhaul of three low pressure propulsion turbine rotors and associated components, plus technical data. Work is expected to be completed in September 1991. The Naval Regional Contracting Center, Philadelphia, Pa., is the contracting activity (N00140-83-G-0196).

**International Business Machines Corporation, Federal Systems**, Manassas, Va., was awarded a **\$75,500,000** firm-fixed-price contract for materials for AN/BQQ-5 and AN/BQQ-6 sonar equipments for submarines. Work is expected to be completed in December 1992. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-89-C-6033).

**International Business Machines Corporation, Federal Systems**, Manassas, Va., was awarded a **\$7,980,552** firm-fixed-price contract for materials to upgrade the

21B64 sonar operator trainer. Work is expected to be completed in July 1993. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-89-C-6081).

**General Dynamics Corporation, Electric Boat Division**, Groton, Conn., was awarded a **\$26,980,723** modification to a previously awarded cost-plus-fixed-fee contract for steam and electric plant development for SSN-21 class submarines. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-87-C-4086).

**General Electric, Electronic Systems Department**, Moorestown, N.J., was awarded a **\$9,252,115** modification to a previously awarded firm-fixed-price contract for the fabrication of additional production acceptance test equipment with required equipment enclosure for the Aegis Production Test Center, Moorestown, New Jersey. Work is expected to be completed December 1, 1991. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-88-C-5140).

**General Dynamics, Electric Boat Division**, Groton, Conn., was awarded a

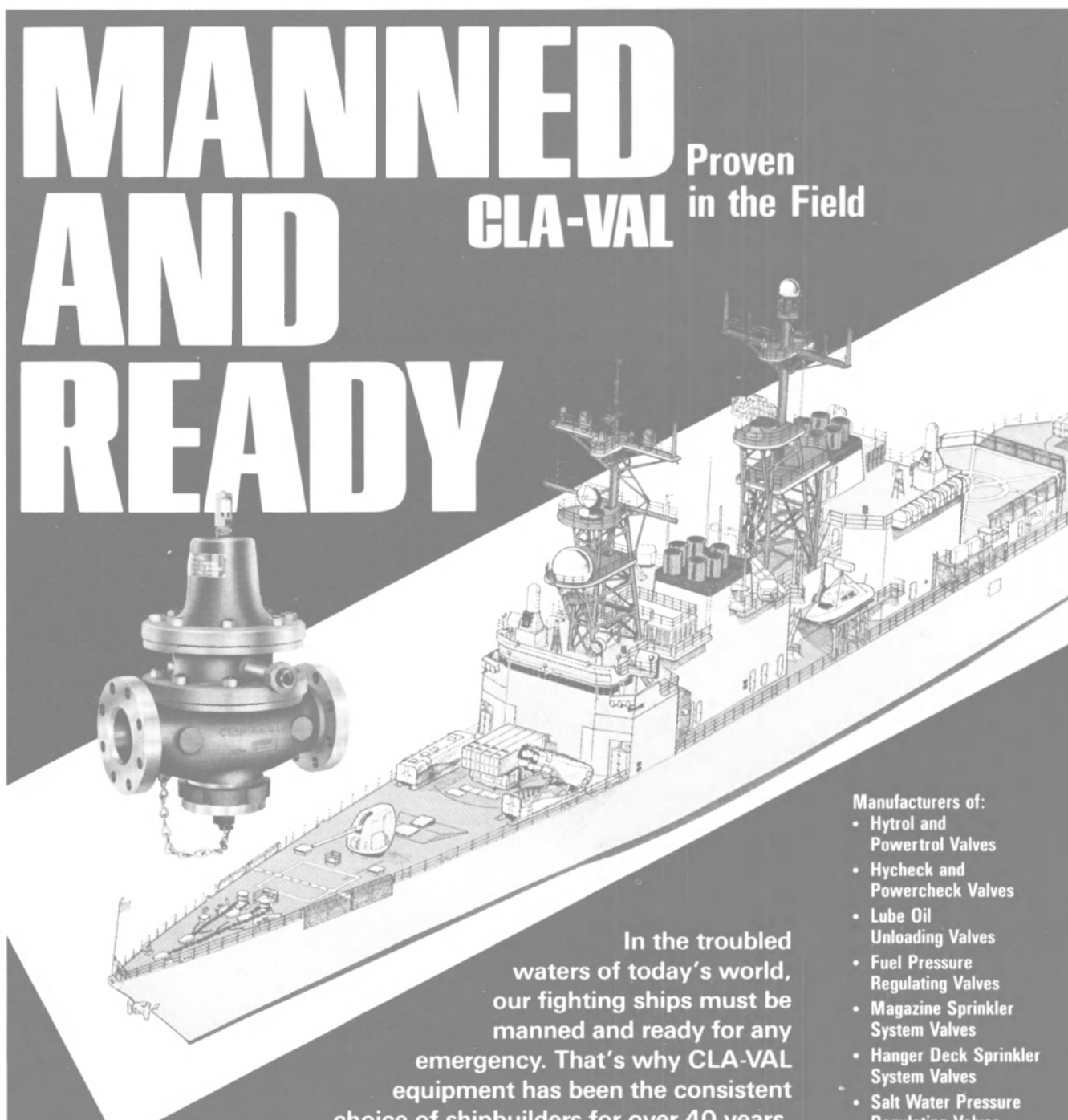
**\$5,000,000** modification to a previously awarded cost-plus-fixed-fee contract for design agent services for SSBN-741. Work is expected to be completed in December 1993. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-88-C-2148).

**Unisys Corporation, Shipboard & Ground Systems Group**, Great Neck, N.Y., was awarded a **\$8,244,887** firm-fixed-price contract for four Aegis MK-82 directors and four MK-200 director controls. Work is ex-

(continued on page 32)

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- AFFF System Control Valves
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## A New Generation: GE Hardened And Ground Gears For The *Arleigh Burke* Class.

*Arleigh Burke* (DDG 51), the lead ship in a powerful new class of AEGIS destroyers, was launched recently at Bath Iron Works. Her motto: "Fast and Feared." Her propulsion system: GE gas turbines with advanced hardened and ground gears that set a new standard for small, quiet, light, high power density gear design. This lead destroyer is named to honor Admiral Burke, former Chief of Naval Operations and World War II hero. Renowned for his courage at the Battle of Cape St. George, "31 knot Burke" raced his GE powered destroyers at flank speed to arrive in time to soundly defeat a larger enemy force.

GE is proud to take part in helping the Navy maintain superiority at sea. We are committed to advancing the Navy's mission into the 21st Century. Millions of dollars were invested in facilities and technical expertise to make state-of-the-art hardened and ground gear technology a reality for America's surface Navy. Our commitment goes beyond DDG 51, as we are manufacturing and testing follow-on gear sets for her sister ships at our facility in Lynn, Massachusetts. As the experience leader in advanced hardened and ground gears, we stand ready to power all future ships of the *Arleigh Burke* Class.

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## U.S. NAVY

(continued from page 28)  
next two fiscal years which will be available to commercial shipyards. This figure includes 20 overhauls, 116 selected availabilities, 113 phased maintenance availabilities, and 10 past shakedown availabilities. Navy has estimated the budget to perform this work to be \$2.3 billion.

IMA Associates provides assistance in developing market strategy and long term business plans. For more information contact: Jim McCaul at (202) 333-8501.

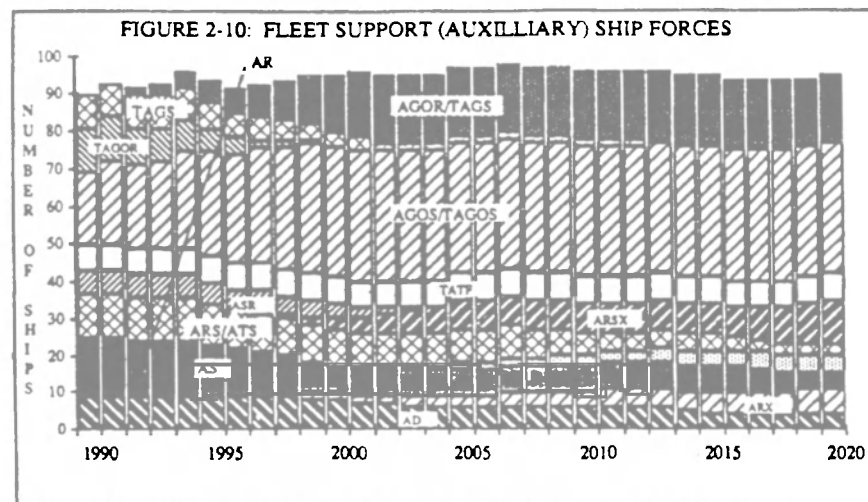


Exhibit 2—Navy Shipbuilding and Conversion Budget  
FY 1989-1994

	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	TOTAL
<b>Construction</b>							
Trident Submarine (SSBN)	1	1	1	1	1	1	6
Attack Submarine (SSN 688)	2	1	0	0	0	0	3
New Attack Submarine (SSN 21)	1	0	2	3	3	3	12
Destroyer (DDG 51)	5	5	5	5	5	4	29
Mine Countermeasure Ship (MCM)	0	3	0	0	0	0	3
Minesweeper (MHC)	2	1	3	4	4	2	16
Amphib. Landing Craft (LSD 41)	0	1	1	1	1	1	5
Amphib. Assault Ship (LHD 1)	1	0	1	0	1	0	3
Ocean Surveill. Ship (TAGOS)	3	1	0	2	1	2	9
Fleet Oiler (TAO-187)	5	0	0	0	0	0	5
Fast Combat Support Ship (AOE)	1	1	1	1	1	1	6
Ammunition Ship (AE)	0	0	0	0	1	2	3
Salvage Ship (ARS)	0	0	0	0	0	1	1
Repair Ship (AR)	0	0	0	0	0	1	1
Ocean Research Ship (AGOR)	0	3	1	2	2	1	9
Landing Craft (LCAC)	(15)	(9)	(12)	(9)	(9)	(9)	(63)
<b>Total Construction</b>	<b>21</b>	<b>17</b>	<b>15</b>	<b>19</b>	<b>20</b>	<b>19</b>	<b>111</b>
<b>Conversion</b>							
Carrier Modernization (CV SLEP)	0	1	0	0	1	0	2
Fleet Oiler Lengthening (AO 1)	2	1	0	0	0	0	3
<b>Total Conversion</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>5</b>
<b>Total Budget</b>	<b>23</b>	<b>19</b>	<b>15</b>	<b>19</b>	<b>21</b>	<b>19</b>	<b>116</b>

Note: Figures in parentheses not included in totals

Source: Department of the Navy

## Major Navy Contracts

(continued from page 29)  
pected to be completed in January 1993. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-89-C-5171).

**Bethlehem Steel Corporation, Baltimore Marine Division**, Sparrows Point, Md., was awarded a \$5,504,823 firm-fixed-price contract for the drydocking selected restricted availability of USS Canopus (AS-34). The Supervisor of Shipbuilding, Conversion and Repair, Charleston, S.C., is the contracting activity (N00024-85-H-8120).

**Bender Shipbuilding and Repair Company Incorporated**, Mobile, Ala., was awarded a \$5,614,917 firm-fixed-price contract for the overhaul and drydocking of USNS Mississippi (T-ESB-12). The Military Sealift Command fleet oiler. Work will be performed in Mobile, Alabama and includes: assorted main engine repairs; repair of the motor generator, fire detection sensors, and assorted sea valves; replacement of steel boilers and boiler safety valves; boiler refractory renewal; overhaul of auxiliary condenser pump and motor and overhaul of assorted winches. The Military Sealift Command, Washington, D.C., is the contracting activity (N62381-89-C-0225).

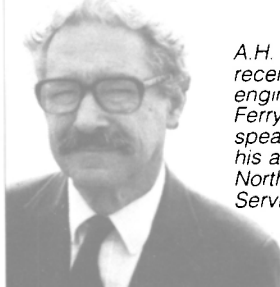
**Maersk Line Limited**, Madison, N.J., was awarded a \$61,403,121 firm-fixed-price plus reimbursables contract for the operation and maintenance of 12 Military Sealift Command ocean surveillance ships (T-AGOS). The contract performance period is three years, with the first ship being turned over approximately October 1, 1989 and the last in September 1990. The Military Sealift Command, Washington, D.C., is the contracting activity (N00033-89-C-4002).

**Robert E. Derektor of Rhode Island, Incorporated**, Middletown, R.I., was awarded a \$14,507,408 option to a previously awarded firm-fixed-price contract for the production of two large U.S. Army tugs. Work is expected to be completed in May 1991. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-88-C-2136).

**Halter Marine, Incorporated**, Gulfport, Miss., was awarded a \$9,396,567 firm-fixed-price contract for the production of four 77-foot fast patrol craft plus associated data

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Maritime Reporter/Engineering News



and training. Work is expected to be completed June 9, 1991. This contract is executed for the government of the Republic of the Philippines under the Foreign Military Sales Program. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-89-C-2020).

**G. Marine Diesel Corporation**, Brooklyn, N.Y., was awarded a \$5,706,399 firm-fixed-price contract for the regular overhaul of Los Alamos (AFDB-7). Work is expected to be completed in April 1990. Contract funds will expire at the end of the current fiscal year. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-85-H-8650).

**Crowley Towing and Transportation Company**, Jacksonville, Fla., was awarded a \$7,353,066 firm-fixed-price plus reimbursables contract for the charter of the tug Bruce A. McAllister (or substitute) along with Tank Barge CMC 450-10. This tug and tank barge will be used for standby service, providing for the transportation of potable water from Jacksonville, Florida, to Naval Station, Guantanamo Bay, Cuba. The unit was delivered October 15, 1989. The contract performance period is 18 months with one six-month option. The Military Sealift Command, Washington, D.C., is the contracting authority (N00033-89-C-1711 and N00033-89-C-1712).

**Raytheon Company, Submarine Signal Division, Portsmouth, R.I.**, was awarded a \$5,525,138 modification to a previously awarded firm-fixed-price/price-incentive contract for Engineering Change Proposal 001 for the MK II Submarine Combat Control System. Work is expected to be completed in February 1993. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-88-C-6067).

**M. Rosenblatt & Son, Incorporated**, New York, N.Y., was awarded a \$9,547,205 cost-plus-award-fee contract including options to provide engineering and technical services to the Military Sealift Command's Engineering and Ship Introduction Directorate. These services include investigative and design efforts relating to the design, overhaul, modification, maintenance, repair, improvement and regulatory certification of Military Sealift Command ships. The Military Sealift Command, Washington, D.C., is the contracting authority (N00033-89-C-3006).

**Ingalls Shipbuilding Incorporated**, Pascagoula, Miss., was awarded a \$13,750,000 modification to a previously awarded cost-plus-award-fee contract for on-board spares and repair parts for Aegis cruisers. Also included are installation and checkout spare parts. Work is expected to be completed in December 1991. The Supervisor of Shipbuilding, Conversion and Repair, Pascagoula, Miss., is the contracting activity (N00024-87-C-2165).

**Southwest Marine, Inc.**, San Diego, Calif., was awarded a \$27,835,705 firm-fixed-price contract for Regular Overhaul (ROH) of USS Gridley (CG-21). Work is expected to be completed in March 1991. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-85-H-8221).

### \$23-Million Navy Contract Awarded Avondale To Enlarge Auxiliary Oiler

Avondale Industries, Inc. has been awarded a \$23-million contract to enlarge an auxiliary oiler of the AO-177 Class.

The award is the result of the Navy exercising an option in the contract Avondale received on July 15, 1988 which provided for jumboizing two oilers with options for two additional vessels in fiscal 1989 and one in fiscal 1990. The Navy previously exercised the option for the two vessels for fiscal 1989.

December, 1989

**Albert L. Bossier Jr.**, chairman and CEO, stated that the exercise of this option increases the contract value from \$97 million to \$120 million. The contract will total about \$130 million with certain component options and the cost of inflation added. It will require 400 Avondale workers at its peak and will continue until 1993.

The AO-177 oilers were built by Avondale in the early 1980s and their capacity is being enlarged by 50 percent.

Avondale Industries, Inc., headquartered in metro New Orleans, is one of the nation's leading marine fabricators. In addition to its shipbuilding operations, the company specializes in boat and LCAC con-

struction and is a major repair contractor for commercial and Navy ships. It is also involved in the modular construction of plants and components for a variety of land-based industries.

For free literature detailing the facilities and capabilities of Avondale Industries,

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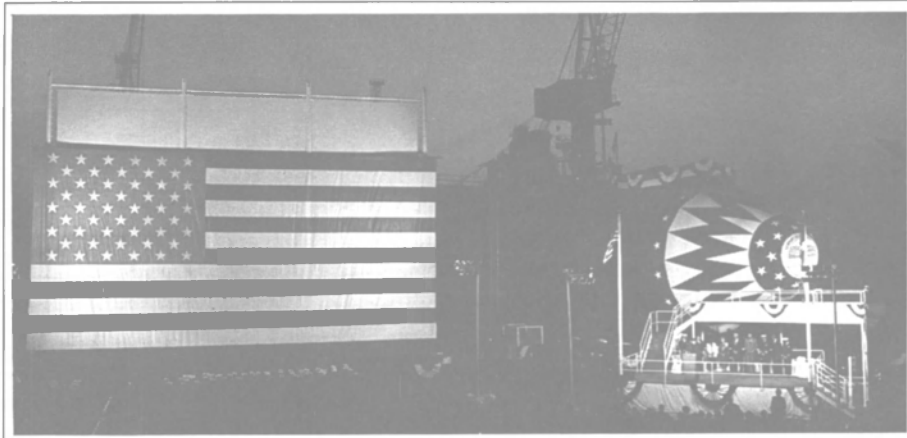
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33



**NEWPORT NEWS CHRISTENING**—Newport News Shipbuilding, Newport News, Va., recently christened the USS Asheville (SSN-758), the second submarine built in the yard's modular outfitting facility. The evening christening ceremonies for the 360-foot Los Angeles Class submarine were attended by U.S. Senator **Jesse Helms** of North Carolina and Vice Adm. **Daniel L. Cooper**, Assistant Chief of Naval Operations (Undersea Warfare). Mrs. **Dorothy Coble Helms**, the Senator's wife, christened the vessel.

**Trident Marine Receives \$2.3-Million Navy Contract For Corrosion Control**

Trident Marine Corporation of Hampton, Va., was recently awarded a U.S. Navy contract for corrosion control. The award is for a one-year period at \$2,259,510, with two option years to follow.

Trident Marine's vice president and general manager **John W.**

**Byrd** has announced that the corporation is moving into new facilities located in Hampton, Va., to better serve the U.S. Navy's Aircraft Corrosion Control requirements.

Trident Marine Corporation has been a prime contractor involved in shipboard corrosion control for 26 years.

For more information and free literature,

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**U.S. Coast Guard Patrol Boats To Be Repowered With Cat Engines**

The U.S. Coast Guard has awarded Caterpillar a \$5.7-million contract to repower 43 cutters with Cat 3412 marine engines and Twin Disc 518-M marine gears. Each 83-foot patrol boat uses two of the Cat engines, each rated at 750 hp. The contract also calls for one additional engine with gear to be used for instruction at the Coast Guard Training Center in Yorktown, Va.

The Cat engines are expected to almost double the life until overhaul of the units being replaced, according to a company spokesman. Cat Dealer Holt Company of Louisiana will be the subcontractor for packaging the marine engine, marine transmission and associated controls and shipping the modules to Coast Guard distribution points.

These cutters are steel-hulled with aluminum superstructures and are used for port security, search and rescue. The A Series was constructed in 1960-61, the C Series in 1961-67, and the D Series in 1970.

There are no discernible differences among the various series of Point Class vessels.

For free literature detailing Caterpillar engines,

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Caterpillar, Inc. recently received a \$5.7-million contract to furnish 87 engines to repower 43 U.S. Coast Guard patrol boats. The vessels will be repowered with two engines apiece, with the remaining engine being used for training instruction.

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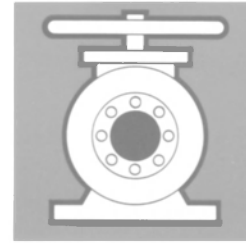
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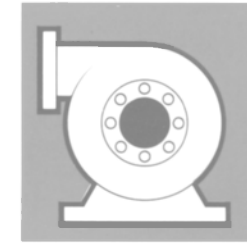
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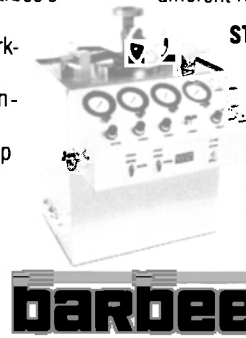
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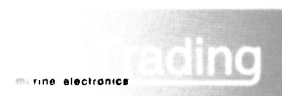
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(continued from page 24)

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Completed under a C\$96.8-million contract as one of several new-buildings and modernizations planned or underway in the Canadian Coast Guard's Capital Projects, the Henry Larsen is one of Canada's largest icebreakers. To enhance her icebreaking capabilities and increase her maneuverability, she is fitted with a Wartsila Air Bubbling System, which reduces friction between the hull and the surrounding ice. Additionally, she is fitted with a heeling/stabilizing system by Interling of Germany through Jastram Canada.

#### HENRY LARSEN Equipment List

Main engines (3)	Wartsila Vasa
Main generators (3)	General Electric Canada
Propellers	Lips
Auxiliary generator engine	Wartsila Vasa
Auxiliary generator	Stromberg
Emergency genset	Caterpillar
Steering gear	Wagner Engineering
Integrated automation system	Asea Brown Boveri
Radar	Racal-Decca
Gyrocompass	Canada Marconi
Air compressors	Hamworthy
Evaporator	Alfa-Laval
Deck machinery	Hytac Equipment
Heeling & stabilization system	Interling
Vacuum toilet system	Envirovac
Sewage plant	Red Fox
Paints & coatings	International Paints (Canada)

#### HUMMEL

##### Lindenau Shipyard

During the past year, the Kiel-Friedrichsort shipyard of Lindenau GmbH Schiffswerft & Maschinenfabrik delivered the 12,100-dwt chemical tanker Hummel to her owners Carl Buttner Shipping Company of Bremen.

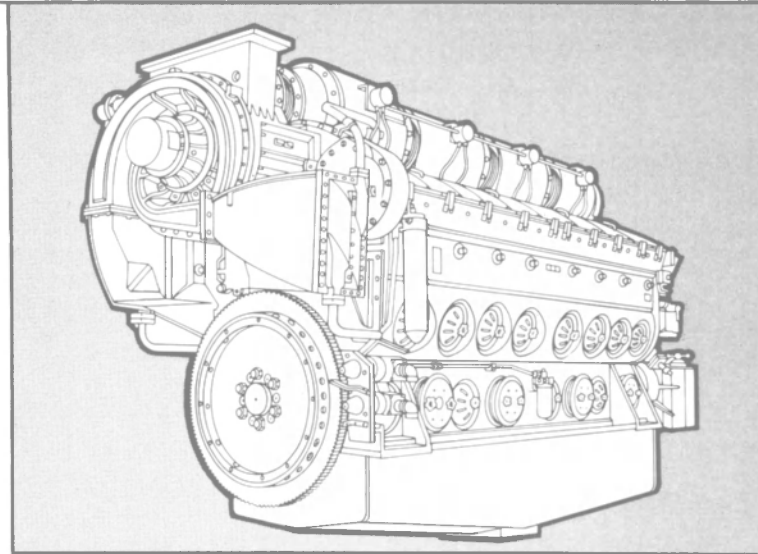
The 477-foot Hummel is the sister ship of two vessels delivered by Lindenau Shipyard to Carl Buttner in December 1984 and July 1986, respectively. The Hummel is an energy saving oil and chemical tanker classed by Germanischer Lloyd + 100 A4 E3 "Chemical Tanker Type II" "Oil Tanker" + MC E3 AUT. The double-skin tanker has a deadweight tonnage on summer freeboard of 12,326 tons, gross tonnage of 7,421 tons and net tonnage of 4,069 tons.

Powered by a Krupp MaK 8M551 diesel engine with a nominal output of 4,250 kw (5,695 bhp) at 450 rpm, the 14-knot Hummel was designed and built especially for the transport of chemicals and mineral oil products. The ship has 20 cargo

tanks that are divided into seven side tanks (including two for slops) and six center tanks. The total volume is 14,365 m<sup>3</sup>. Due to her double bottom and double hull, the Hummel can transport products of IMO Type II in all her cargo tanks. All cargo tanks and cargo lines are coated with Camcote N3. All cargo tank internals, heating coils and stairs are of stainless steel. Therefore, the Hummel can transport

more than 400 high-class chemicals and products. The double hulls of the Hummel increase the security of the ship and environment by lowering the risk of collision and therefore lowering the risk of environmental pollution. Her double-hull design also provides the benefits of faster cleaning of her tanks (because of smooth inner tank walls); heat energy savings; separation of cargo and ballast water; and the capability

of transporting high-class liquids. Other innovative design features of the Hummel include: optimized hull lines; an efficient stripping/oil discharge monitoring system; a loading control station in the deckhouse; a steam-heated Butterworth heater with a capacity of 4.2 Gcal/h, which means up to eight tank washing machines can operate simultaneously; and segregated ballast system.



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HUMMEL Equipment List									
Main engine	Krupp MaK	Freshwater generator	Atlas Danmark	Echo sounder	Simrad	Stern tube		seals	Simplex/Blohm & Voss
Gears	Renk-Tacke	Sewage plant	Hamworthy	Speed indicator	Sagem	Plate freezer		Refrigerating plant	Schmidt
Coupling	Vulkan	Centrifugal pumps	IRON, Sihi	Gyrocompass	Anschutz	Separators		Fire extinguishing system	Westfalia
PTO coupling	Voith	Compressors	Sauer & Sohn	Telephone system	Telefunken System Technik	Heat exchangers		Provision crane and	Prang
VP propeller	KaMeWa	Deck auxiliary engines	Norwinch	Automation	Janssen	cargo-handling crane		Steam converter	Bergfeld & Heider
Auxiliary diesel	Yanmar	Roller chain stopper	Norwinch	Emergency diesel generator	Deutz/Siemens	Accommodation			HW-Metalbau
Generators	Siemens	Cargo tank gate valves	VAG	Spare cargo pump	Frank Mohn				
Electric motors	AEG	Main switchboard/distribution board	Siemens	Cargo tank level indicator	Whessoe				
Steering gear	Frydenboe	Switchboards and consoles	Janssen	Radio system	Telefunken System Technik				
Bowthruster	Jastram/ABB	Cargo pump switchboards	AEG	Lifeboats	Fr. Fassmer				
Steam boiler	Aalborg	Cable work and lighting	Siemens	Boat davits	Schat Davit				
		Radar	Krupp-Atlas Elektronik	A/C, ventilation	ROM				

### IRON GIPPSLAND IHI

The Kure Shipyard of Japan's Ishikawajima-Harima Heavy Industries Co., Ltd., (IHI) delivered the 52,902-gt crude oil tanker Iron Gipsland to Broken Hill Proprietary, Ltd., in the first quarter of this year.

The 765-foot Iron Gipsland has a beam of 139 feet 9 inches, and extreme draft of 42 feet 6 inches. She is powered by an IHI-Sulzer 7RTA62 main engine with a total horsepower of 12,400. Her service speed at full load is 14 knots, with a fuel consumption of 29.3 metric tons/day.

Classed by Lloyd's Register of Shipping +100A1/Oil Tanker/+LMC MC/IGS, the Australian-flag Iron Gipsland features an integrated wheelhouse including cargo control/engine control console. Other highly sophisticated features include: MIDC (Maritime Industry Development Committee) of Australia applied for reduced manning vessel; LAN system including engine monitoring system and cargo monitoring CRT; hydraulic deck machinery system and hydraulic hose-handling deck crane; self-polishing antifouling paint and impressed current system for outside hull; and an IHI bulbous open stern.

Capacities aboard the Iron Gipsland are as follows: cargo oil tank, including her slop tanks is 104,000 m<sup>3</sup>; heavy fuel oil tank: 2,410 m<sup>3</sup>; and water ballast tank: 39,400 m<sup>3</sup>.

### ISABELLA Brodosplit

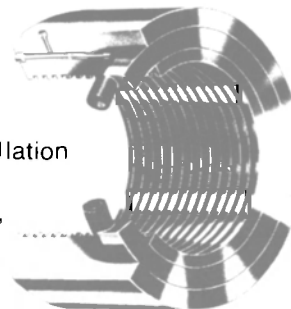
The second of two new generation Baltic cruise ferries, the 34,386-gt Isabella, was delivered by Split Shipbuilding Industry (Brodosplit) to her owners, SF Line of Mariehamn, for operation by Viking Line on the Turku-Mariehamn-Stockholm service route.

Classed by Det norske Veritas 1A1, ICE 1A, Car Ferry A, MCDK, EO, pwdk, bis, Finnish Ice Class 1A Super, the 2,200-passenger-capacity super ferry, which can also accommodate 620 cars/53 trucks, has an overall length of 555-1/2 feet, breadth of 90-1/2 feet, depth of 28 feet and draft of 19-1/2 feet. With a deadweight of 2,800 metric tons, the Isabella is powered by four SEMT Pielstick-Jadranbrod 12PC2-6V/400E diesel engines rated at 7,965 hp (5,940 kw) each at 520 rpm. The 12-deck vessel, which has 565 passenger cabins, can reach speeds in excess of 21 knots.

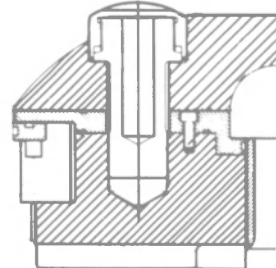
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(continued from page 24)

One special feature of the Henry Larsen is her advanced Asea Brown Boveri (ABB) Integrated Automation System. The system provides true integration of control and instrumentation functions, integrating prime mover control with electronic governors, start permissives and safety systems; alarm and monitoring; fan, valve, pump and compressor control; power management; fuel consumption calculation and presentation; and tank gauging.

Completed under a C\$96.8-million contract as one of several new-buildings and modernizations planned or underway in the Canadian Coast Guard's Capital Projects, the Henry Larsen is one of Canada's largest icebreakers. To enhance her icebreaking capabilities and increase her maneuverability, she is fitted with a Wärtsilä Air Bubbling System, which reduces friction between the hull and the surrounding ice. Additionally, she is fitted with a heeling/stabilizing system by Interling of Germany through Jastram Canada.

#### HENRY LARSEN Equipment List

Main engines (3)	Wärtsilä Vasa
Main generators (3)	General Electric Canada
Propellers	Lips
Auxiliary generator engine	Wärtsilä Vasa
Auxiliary generator	Stromberg
Emergency genset	Caterpillar
Steering gear	Wagner Engineering
Integrated automation system	Asea Brown Boveri
Radar	Racal-Decca
Gyrocompass	Canada Marconi
Air compressors	Hamworthy
Evaporator	Alfa-Laval
Deck machinery	Hytac Equipment
Heeling & stabilization system	Interling
Vacuum toilet system	Envirovac
Sewage plant	Red Fox
Paints & coatings	International Paints (Canada)

#### HUMMEL

##### Lindenau Shipyard

During the past year, the Kiel-Friedrichsort shipyard of Lindenau GmbH Schiffswerft & Maschinenfabrik delivered the 12,100-dwt chemical tanker Hummel to her owners Carl Buttner Shipping Company of Bremen.

The 477-foot Hummel is the sister ship of two vessels delivered by Lindenau Shipyard to Carl Buttner in December 1984 and July 1986, respectively. The Hummel is an energy saving oil and chemical tanker classed by Germanischer Lloyd + 100 A4 E3 "Chemical Tanker Type II" "Oil Tanker" + MC E3 AUT. The double-skin tanker has a deadweight tonnage on summer freeboard of 12,326 tons, gross tonnage of 7,421 tons and net tonnage of 4,069 tons.

Powered by a Krupp MaK 8M551 diesel engine with a nominal output of 4,250 kw (5,695 bhp) at 450 rpm, the 14-knot Hummel was designed and built especially for the transport of chemicals and mineral oil products. The ship has 20 cargo

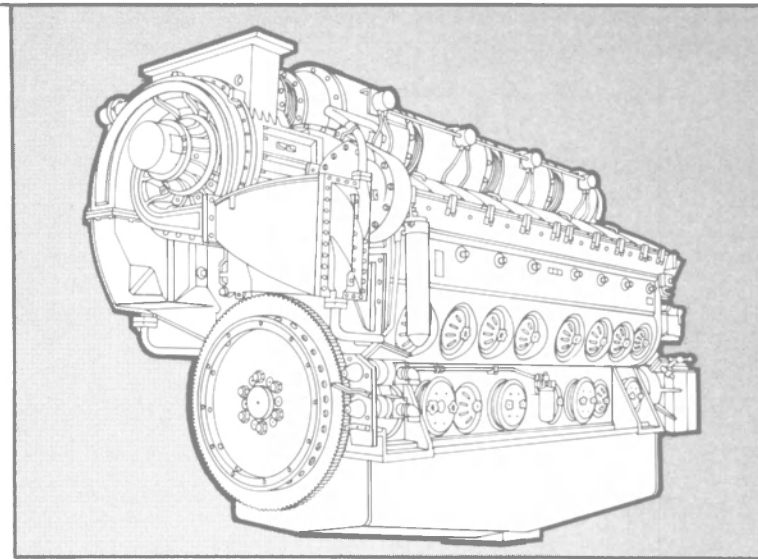
tanks that are divided into seven side tanks (including two for slops) and six center tanks. The total volume is 14,365 m<sup>3</sup>. Due to her double bottom and double hull, the Hummel can transport products of IMO Type II in all her cargo tanks. All cargo tanks and cargo lines are coated with Camcote N3. All cargo tank internals, heating coils and stairs are of stainless steel. Therefore, the Hummel can transport

more than 400 high-class chemicals and products. The double hulls of the Hummel increase the security of the ship and environment by lowering the risk of collision and therefore lowering the risk of environmental pollution. Her double-hull design also provides the benefits of: faster cleaning of her tanks (because of smooth inner tank walls); heat energy savings; separation of cargo and ballast water; and the capability

of transporting high-class liquids. Other innovative design features of the Hummel include: optimized hull lines; an efficient stripping/oil discharge monitoring system; a loading control station in the deckhouse; a steam-heated Butterworth heater with a capacity of 4.2 Gcal/h, which means up to eight tank washing machines can operate simultaneously; and segregated ballast system.

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HUMMEL Equipment List					
Main engine	Krupp MaK	Freshwater generator	Atlas Danmark	Echo sounder	Simrad
Gears	Renk-Tacke	Sewage plant	Hamworthy	Speed indicator	Sagem
Coupling	Vulkan	Centrifugal pumps	IRON, Sihi	Gyrocompass	Anschutz
PTO coupling	Voith	Compressors	Sauer & Sohn	Telephone	Telefunken System Technik
VP propeller	KaMeWa	Screw displacement pumps	Bornemann	Automation	Janssen
Auxiliary diesel	Yanmar	Deck auxiliary engines	Norwinch	Emergency	Deutz/Siemens
Generators	Siemens	Roller chain stopper	VAG	diesel generator	Frank Mohn
Electric motors	AEG	Cargo tank gate valves	Siemens	Spare cargo pump	Whessoe
Steering gear	Frydenboe	Main switchboard/ distribution board	Janssen	Cargo tank level indicator	Telefunken System Technik
Bowthruster	Jastram/ABB	Switchboards and consoles	AEG	Radio	Fr. Fassmer
Steam boiler	Aalborg	Cargo pump switchboards	Siemens	Lifeboats	Schat Davit
		Cable work and lighting	Krupp-Atlas Elektronik	Boat davits	A/C. ventilation
		Radar			ROM
					Stern tube
					seals Simplex/Blohm & Voss
					Plate freezer Schmidt
					Refrigerating plant BBC-York
					Separators Westfalia
					Fire extinguishing system Minimax
					Heat exchangers Prang
					Provision crane and cargo-handling crane Heinrich Schroder
					Steam converter Bergfeld & Heider
					Accommodation HW-Metallbau

### IRON GIPPSLAND IHI

The Kure Shipyard of Japan's Ishikawajima-Harima Heavy Industries Co., Ltd., (IHI) delivered the 52,902-gt crude oil tanker Iron Gippsland to Broken Hill Proprietary, Ltd., in the first quarter of this year.

The 765-foot Iron Gippsland has a beam of 139 feet 9 inches, and extreme draft of 42 feet 6 inches. She is powered by an IHI-Sulzer 7RTA62 main engine with a total horsepower of 12,400. Her service speed at full load is 14 knots, with a fuel consumption of 29.3 metric tons/day.

Classed by Lloyd's Register of Shipping +100A1/Oil Tanker/+LMC MC/IGS, the Australian-flag Iron Gippsland features an integrated wheelhouse including cargo control/engine control console. Other highly sophisticated features include: MIDC (Maritime Industry Development Committee) of Australia applied for reduced manning vessel; LAN system including engine monitoring system and cargo monitoring CRT; hydraulic deck machinery system and hydraulic hose-handling deck crane; self-polishing antifouling paint and impressed current system for outside hull; and an IHI bulbous open stern.

Capacities aboard the Iron Gippsland are as follows: cargo oil tank, including her slop tanks is 104,000 m<sup>3</sup>; heavy fuel oil tank: 2,410 m<sup>3</sup>; and water ballast tank: 39,400 m<sup>3</sup>.

### ISABELLA Brodosplit

The second of two new generation Baltic cruise ferries, the 34,386-gt Isabella, was delivered by Split Shipbuilding Industry (Brodosplit) to her owners, SF Line of Mariehamn, for operation by Viking Line on the Turku-Mariehamn-Stockholm service route.

Classed by Det norske Veritas 1A1, ICE 1A, Car Ferry A, MCDK, EO, pwdk, bis, Finnish Ice Class 1A Super, the 2,200-passenger-capacity super ferry, which can also accommodate 620 cars/53 trucks, has an overall length of 555-1/2 feet, breadth of 90-1/2 feet, depth of 28 feet and draft of 19-1/2 feet. With a deadweight of 2,800 metric tons, the Isabella is powered by four SEMT Pielstick-Jadranbrod 12PC2-6V/400E diesel engines rated at 7,965 hp (5,940 kw) each at 520 rpm. The 12-deck vessel, which has 565 passenger cabins, can reach speeds in excess of 21 knots.

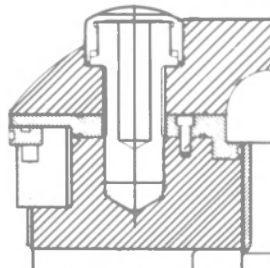
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The 70,000-grt Fantasy, delivered by Wartsila Marine Industries of Finland to Carnival Cruise Lines.

The order for the Isabella and her sister ship, the Amorella, which was delivered last year, represents an important breakthrough for Brodosplit into the passenger ferry building sector.

The Amorella and Isabella are the offspring of an international relationship, beginning when SF Line (Mariehamn) consulted the design office of Elomatic Oy, Turku, Finland, and were directed to MARIN (Maritime Research Institute Netherlands). Semi-tunnel hull configuration lines were selected for the two vessels after extensive research and testing was conducted. The semi-tunnel line configuration of the vessels allowed for larger propellers (higher efficiency) and adequate propeller/hull clearances (less vibration). In order to insure good

performance in ice conditions, the lines were developed in close cooperation between Elomatic Oy and MARIN. Semi-tunnel line configurations for the cruise ferries not only offered improved performance for the vessels as compared to previous Baltic ferries, but also insured that the Amorella and Isabella would have excellent resale value because of their ability to operate outside the Baltic.

One outstanding feature of the Isabella is that 90 percent of her passengers will have berths, whereas current generation Baltic ferries on the route provide only about 60 percent of the passengers with berths.

The outfitting of the Isabella's public spaces was subcontracted to Danish company Aalborg Vaerft.

#### ISABELLA Equipment List

Main engines(4)	Wartsila-Pielstick
Marine gears	Lohmann & Stolterfoht
Auxiliary engines (4)	Wartsila-Vasa
CP propellers	KaMeWa
Clutches	Lohmann & Stolterfoht
Bowthruster	KaMeWa
Main generators	Stromberg
Emergency generator	Uljank
Electric motors	R. Koncar
Radar	Krupp Atlas
Speed log	Krupp Atlas
Echo sounder	Krupp Atlas
Gyrocompass	Anschutz
Magnetic compass	Ludolph
Radio equipment	ITT
Switchboards	R. Koncar
Transformers	R. Koncar
Fin stabilizers	Sperry
RO/RO equipment	MacGregor-Navire
A/C	Svenska Flakt
Mooring & anchoring winches	Vulkan
Paints	International/Hempels
Lifeboats	Greben
Escape slides	Viking
Lifeboat & raft davits	Greben
Interiors	Lesnina
Partition bulkheads & wall linings	Termika
Ceilings	Dampa/Termika
Galley catering equipment	Metos/Elektrolux
Elevators	Dan Elevator
Cables	Elka
Public address	Ericsson
Telephone exchange	Ericsson
Automation	Norcontrol
Fire detection	Salwico

#### JOSEPH & CLARA SMALLWOOD MIL-Davie

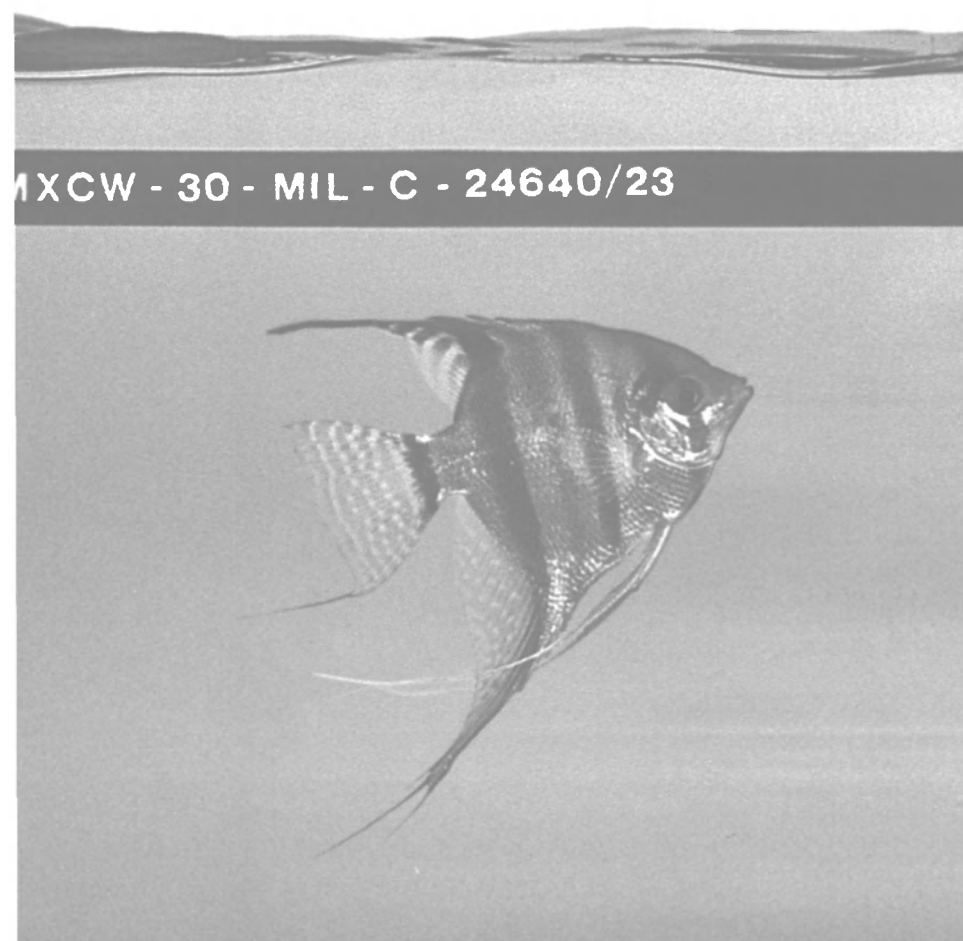
MIL Davie Inc., Lauzon, Quebec, delivered one of the most sophisticated and powerful passenger/vehicle ferries ever built in North America, the 587-foot Joseph & Clara Smallwood.

Built for Marine Atlantic Inc., Atlantic Canada's major ferry operator, the Joseph & Clara Smallwood will serve the seasonal Argentia, Newfoundland to North Sydney, Nova Scotia route. She is the sister ship to the successful M/V Caribou, which entered service for Marine Atlantic in 1986 on the North Sydney to Port aux Basques, Newfoundland route.

Like the Caribou, the Smallwood is a 1,200-passenger, 28,000-hp vessel, capable of carrying 350 automobiles or 90 tractor trailers. The vessel's powerful propulsion system and sleek hull design will shave over six hours off the current crossing time of 19 hours.

The Smallwood's main propulsion machinery consists of four non-reversible, turbocharged, four-stroke, medium-speed Krupp MaK 8M552 diesel engines, driving two controllable pitch KaMeWa propellers through flexible couplings and Lohmann & Stolterfoht reduction gears. The Krupp MaK 8M552 die-

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sel engines, equipped for operation with heavy fuel oil having a viscosity of 380 cSt at 50 degrees C, are designed to permit operation in two speed ranges—engine at 500 rpm, propeller at 115 rpm, and engine at 428 rpm, propeller at 95 rpm. The power plant and the propulsion system are operated from a centralized control system located in the machinery control room and the console carries a complete mimic display of the main propulsion system and auxiliary engines arrangement. There are both automatic and manual modes of operation.

The Smallwood is capable of operating at speeds from 15 knots to 23 knots. A speed of about 23 knots will be attainable on occasion using Maximum Continuous Rating (MCR) of the propulsion machinery. The normal operating speeds will be at 22, 18 and 15 knots. The 22-knot speed will be attained at approximately 85 percent MCR at a design draft of 21 feet (6.4 meters). An operational draft of 21.6 feet (6.6 meters), it is predicted that 90 percent MCR will be necessary to attain a speed of 22 knots. Operation in ice will be up to 85 percent MCR.

She has two full decks with a total capacity of about 85 tractor trailers in the North Sydney/Argentina service, with an internal ramp in use and 91 tractor trailers with internal ramp not in use in the North Sydney/Port aux Basques service.

All vehicle decks operate on a

roll-through concept with both bow and stern door bilevel loading and off-loading when operating between North Sydney and Port aux Basques. An internal, hinged vehicle ramp is arranged to permit vehicle access to No. 3 Deck operating at the one level facility at Argentina.

While the Smallwood will outwardly resemble the 587-foot (179-meter) Caribou, she will have a somewhat different interior layout and improved passenger amenities for the longer Argentina route.

Some of the Smallwood's features will include plexiglass canopies and windscreens on two exterior decks, enabling enhanced outdoor activity while on board. The day-nighter lounge areas have been divided into eight separate areas, providing a more quiet atmosphere, and better designation of nonsmoking and smoking areas.

Excellent quality day-nighter seats will be installed in the lounges, featuring a much greater recline and a full leg and foot rest.



**MARA LOLLI-GHETTI**  
**3.Maj**

The Rijeka, Yugoslavia, shipyard of 3.Maj delivered the 60,600-deadweight tonnage ore/bulk/oil (OBO) carrier Mara Loli-Ghetti to Ecoban Steamship Co. earlier this year.

The 736-foot 10-inch OBO, classed by the American Bureau of Shipping (ABS) 1 E Bulk Carrier or Oil Carrier "strengthened for heavy cargoes, Holds No. 2, 4 and 6 may be empty," MS, CCU, COW, IGS, has a length between perpendiculars of 708 feet 6 inches, molded breadth of 105 feet 7 inches, molded depth of 63 feet 6 inches, and scantling draft of 41 feet 4 inches. The 39,836-gt

(continued)

JOSEPH & CLARA SMALLWOOD Equipment List			
Main engines(4)	Krupp MaK	Escape slides	Viking
Propellers(2)	KaMeWa	Life rafts	Viking
Thrusters(4)	KaMeWa	Shaft generators	Siemens
Generator engines(3)	Krupp MaK	A/C	Norris Warming Canada
Generators	Siemens	Purifying equipment	Alfa Laval
Reduction gears(2)	Lohmann & Stolterfoht	Elevators	& escalators Westinghouse Canada
Engine controls	ABB	Fire detection system	Mirtone
Monitoring & alarms	ABB	Halon, sprinkler & deluge systems	Securiplex
Steering controls	Wagner	Emergency generator	Caterpillar
Stabilizers	Sperry Marine	W.T. radio station:	
VHF radio	ICOM of America	Main receiver	Marconi
SSB radio	Raytheon	& transmitter	Marconi
Radar	Sperry Marine	Reserve receiver	Marconi
Compass	Sperry Marine	& transmitter	Marconi
Loran	JRC	Watchkeeping receiver	Marconi
Autopilot	Wagner	Automatic radio direction finder	Marconi
Pumps	Hamworthy/Peacock	Echo sounder	Simrad
RO/RO system & equipment	MacGregor Marine	Manual emergency radio beacon	Jotron
Rescue boats & davits	Harding Shepherding	Tank gauging system	ABB
		W.T. sliding doors	Stone Vickers
		Boilers	Senior Green/Ampower
		Sewage treatment	Envirovac
		Galley equipment	L.T. Julien

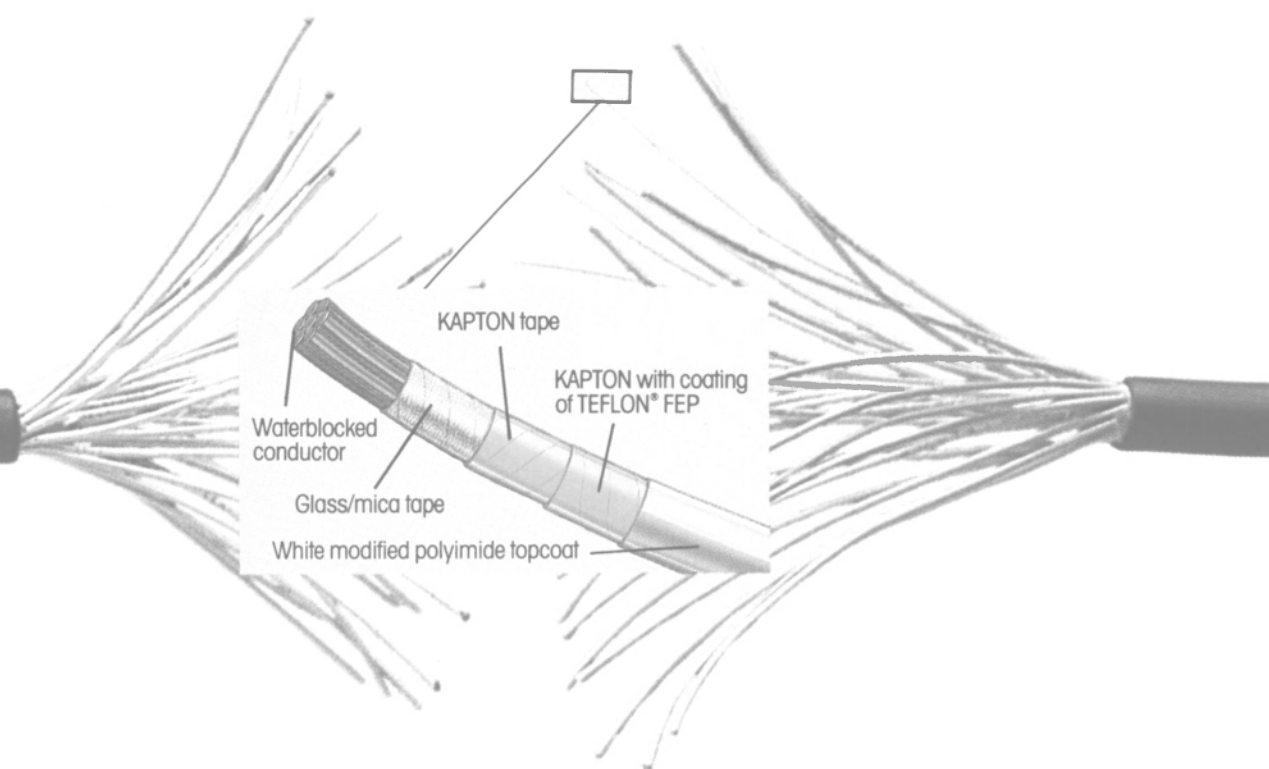
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Liberian-flag OBO is powered by a single 3.Maj-built Sulzer 7RTA62 diesel engine, with a maximum continuous rating of 8,760 kw (11,747 hp) at 86 rpm. Consumption of heavy fuel oil of the main engine at 85 percent MCR is 29.4 tons per day. Her trial speed at 100 percent MCR at a draft of 41 feet 4 inches was almost 15 knots. Her cruising range at a speed of 13.8 knots, 2,000 tons of heavy fuel oil is 22,000 nm.

The Mara Lolli-Ghetti is designed and built for worldwide service suitable to carry bulk cargoes, such as coal or grain, in all her cargo tanks/holds, ore in alternative tanks/holds, and crude oil (densities of not more than 1.05 and flash point below 60 degrees C) and oil products in all cargo tanks/holds and two slop tanks. Cargo piping can be performed for loading/unloading of two different liquid car-

goes simultaneously.

Her liquid cargo capacity at 98 percent occupancy including her slop tanks is 72,471 m<sup>3</sup>. Her dry cargo capacity at 100 percent occupancy is 72,491 m<sup>3</sup>. Manned by a crew of 33, the Mara Lolli-Ghetti is fitted with two centrifugal self-priming type electrically driven pumps for stripping, with a capacity of 200 m<sup>3</sup>/per hr. at 12 bars head, two centrifugal ballast pumps, an exhaust gas/

inert gas generating system, and a single 150-KN SWL, 360-degree slewing cargo hose handling crane.

#### NEPTUNE HHI

Hyundai Heavy Industries Co., Ltd. (HHI) delivered the 39,720-dwt product carrier Neptune to her American owner, Overseas Shipholding Group, Inc. (OSG), in the first quarter of this year.

The product carrier is the standard type developed by Hyundai shipyard and the second of four identical ships ordered by the American owner.

Neptune has an overall length of about 610 feet, molded breadth of 90 feet and a design draft of 37 feet 9 inches. She is designed to have seven cargo tanks and two slop tanks.

The cargo is handled by four steam turbine-driven cargo pumps of vertical, centrifugal type, each with a capacity of 1,000 m<sup>3</sup>/hour against a total head of 150 m.Th. And the cargo pumping system is designed to discharge half of the capacity of the ship within 14 hours including stripping. She is capable of unloading the cargo at a rate of up to 4,000 m<sup>3</sup>/hour and loading up to 6,000 m<sup>3</sup>/hour. Dual inert gas deck distribution system is installed on the ship to prevent cargo contamination by vapored gas.

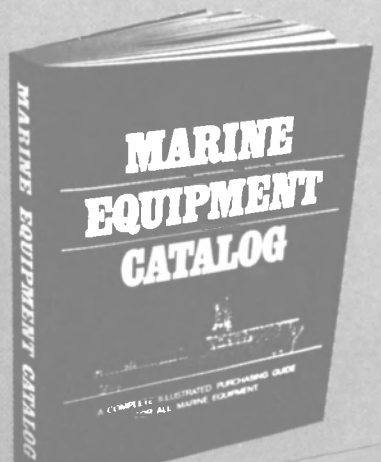
The ship is powered by a two-stroke, turbocharged Hyundai-built MAN B&W 5S50MC main engine developing an NCR of 7,650 bhp at 114 rpm. The engine drives an Aerofoil, four-bladed propeller with a diameter of 18 feet 8 inches. In her engine room, she has four auxiliary engines including three five-cylinder Ssangyong-MAN B&W 5T23LH-4E diesel engines each direct coupled to a 500-kw generator. The M/E remote control system is of electro-pneumatic type and starting, stopping, reversing and speed control of the main engine are controlled by an engine telegraph lever which is used as a maneuvering lever.

Neptune is classed by ABS, 1(E) Oil Carrier, MS, CCU, IGS, COW. She has a service speed of 14 knots at NCR of 7,650 bhp with 15 percent sea margin.

#### NEPTUNE Equipment List

Main engine	MAN B&W-Hyundai
Generator engine	Ssangyong-MAN B&W
Propeller	Hyundai-Kobe Steel
Generator	HEECO
Boiler	Sunrod
Purifier	Alfa-Laval
E/R control console & monitoring system	Hyundai
Navigation lighting	Alhemaan-Schlatter
Echo sounder	Skipper
Gyrocompass/autopilot	Hokushin
RDF	JRC
Main radio equipment	JRC
Engine controls	HEECO-Terasaki
Inert gas plant	Maritime Protection
Cargo oil pump	Shinko
Tank-cleaning machine	Gun-Clean
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Galley equipment	Electrolux
ICCP system	Wilson Walton Int'l
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Bonn Express	Containership	633* x 105.6 x 41	36,800 dwt	MAN B&W	Hapag-Lloyd	HDW
Columbia	Crude Tanker	1026.6* x 185.6 x 64.2	260,000 dwt	MAN B&W-Hitachi	Overseas Shipholding Group	Hitachi Zosen
Cristoforo Colombo	Containership	683 x 105 x 38	34,000 dwt	GMT-Sulzer	Italia di Navigazione	Fincantieri-CNI
Delfin Clipper	Passenger Liner	315 x 51 x 14.4	5,700 gt	Wartsila	Delfin Cruises	Rauma Shipyards Oy
Del Monte Planter	Reefer	462.5 x 73 x 30	8,900 gt	MAN B&W-AESA	Del Monte	Astilleros Espanoles
Docerio	Bulker	722* x 151 x 57	170,000 gt	MAN B&W-Mecanica Pesada	Docenave	Verolme do Brasil
Fantasy	Passenger Liner	855 x 118 x 25.4	70,000 gt	Wartsila-Sulzer (6)	Carnival Cruise Lines	Wartsila Marine
Henry Larsen	Icebreaker	327.5 x 64.6 x 23.7	8,290 t	Wartsila-Vasa (3)	Canadian Coast Guard	Versatile Pacific
Hummel	Chem. Tanker	477 x 64 x 27.5	12,100 dwt	Krupp MaK	Carl Buttner Shipping	Lindenau Shipyard
Iron Gippisland	Crude Carrier	765 x 140 x 42.6	87,000 dwt	IHI-Sulzer	Broken Hill Proprietary	IHI
Isabella	Cruise Ferry	555.5 x 90.5 x 19.5	34,386 gt	Wartsila-Pielstick (4)	SF Line	Brodosplit
Joseph & Clara Smallwood	RO/RO Ferry	587 x 84 x 21.6	27,200 gt	Krupp-MaK (4)	Marine Atlantic	MIL-Davie
Mara Lolli-Ghetti	OBO	708.5* x 105.6 x 41.3	60,600 dwt	3.Maj-Sulzer	Garden Gate Shipping	3.Maj
Neptune	Product Carrier	610 x 90 x 37.7	40,000 dwt	MAN B&W-Hyundai	Overseas Shipholding Group	HHI
Oceanic Grace	Passenger Liner	341 x 50.5 x 13	5,050 gt	Wartsila-Vasa (2)	Oceanic Cruise	NKK
Osco Star	Product Tanker	577 x 105 x 36.7	40,200 dwt	MAN B&W-Uljanik	Osco	Uljanik
Petrobulk Mars	Product Tanker	750 x 106 x 52.5	84,000 dwt	MAN B&W-Hyundai	Petrobulk Carriers A/S	Burmeister & Wain
Robin Hood	Rail Ferry	581 x 84.5 x 20	24,000 t	MAN B&W (4)	AB Swedcarrier	Schichau-Seebeckwerft
Star Princess	Passenger Liner	809 x 106 x 25.3	62,600 gt	MAN B&W (4)	P&O Cruises	Alsthom-Atlantique

Asterisk (\*) indicates length between perpendiculars

**OCEANIC GRACE  
NKK**

The 338-foot Oceanic Grace entered service this past April as Japan's first domestic luxury cruiser. Ordered by Oceanic Cruise Ltd. during 1987, Oceanic Grace was built by Nippon Kokan K.K. (NKK) at its Tsu Works. The ship flies the Japanese flag and is classed with the Japanese classification society NK. The Dutch firm of Studio Acht worked for the vessel's conceptual design, exterior styling and interior design.

The Oceanic Grace was constructed to meet increasing leisure enthusiasm in Japan in recent years and was designed to offer passengers the pleasure of cruising in a private yacht-like atmosphere. It has deluxe cabins all located forward, away from the engines, all with a private bath and all with a view.

The passenger public space has a total area of 900 m<sup>2</sup>, unusually spacious for a passenger ship of this size. Deck 3 houses a 120-seat restaurant which serves meals on one-sitting basis. The areas include a lounge, bar, small lounge, shop, library, sauna, gymnasium, and beauty parlor.

In order to limit noise and vibrations, finite element analysis was used to identify any potential problem areas regarding vibration and the NKK's noise prediction system called "Cabinoise" was employed. The system works by input of all known noise sources into a comput-

OCEANIC GRACE Equipment List			
Main engines(2)	Wartsila Vasa	Doppler sonar & depthsounder	Furuno
Generator engines	Wartsila Vasa	Facsimile receiver	JRC
Generators	Taiyo Electric	Gyrocompass & autopilot	Tokyo keiki
Bowthrusters	MHI	Radio direction finder	JRC
Steering gear	MHI	Battery	Azuma
Rudders	Nakashima Propeller	Automatic telephones	JRC
Fin stabilizers	Nippon Steel	Fluorescent lamps	Koko-sya
Engine room console	JRCS	Heating, ventilation & A/C plants	Sabroe
Remote gaging	Musashino Machinery	Refrig. cooling plant	Namiroe
Propulsion machinery	JRCS	Freshwater generator	Sasakura
remote control	JRCS	Centrifugal pumps	Shinko kinzoku
Stern tube bush & sealing	Kobe Steel	Gear pumps	Taiko kinzoku
LO/FO separator	Tomoe Kogyo	Main air compressor	Yanmar
Emer. alternators, transformers & emer. switchboards	Taiyo Electric	O/W separator	Marics
Integrated nautical equipment	JRCS	Sound signal equipment	Ibuki Kogyo
Radar	JRC	Incinerator	Sunflame
		Sewage treatment units	Taiko kikai
		Sanitary vacuum system	Ina
		Sanitary units	Iseko

er program with details of structural arrangements and interior materials. By adoption of these systems and proper countermeasures, the Oceanic Grace has achieved excellent passenger comfort even cruising at full speed.

The main propulsion system consists of Wartsila Vasa diesel engines, type 16V22HF, each with an output of 3,530 hp at 1,000 rpm. The main engines are coupled with two single

**OSCO STAR  
Uljanik**

The Pula, Yugoslavia shipyard of Uljanik Shipyard delivered the second in a series of three 40,200-deadweight product tankers, the Osco Star, to the Osco Carriers Pool,

input/output gearboxes to turn two shafts with fully hydraulically operated, highly skewed four-bladed Mitsubishi Heavy Industries CP propellers.

To improve operability in harbors, flap-type high-lift rudders are equipped and both wings of bridge is provided with joy-stick (single lever) control stands for engine, CPP, rudder, and bowthruster operation.

under the commercial management of Osco Shipping A/S.

The Osco Star, like her sister ships, will serve to widen the scope and flexibility of the pool which currently totals 11 vessels. The three sisters from Uljanik reflect the Osco policy of constant fleet renewal and improvement with the emphasis placed firmly on economy, efficien-

cy and capacity, qualities which have enabled the company to establish a reputation as a world leader in specialist oil/chemical trades.

Classed by Det norske Veritas as A1 Tanker for Oil and Caustic Soda, EO, COW, Inert, the 577-foot Osco Star is propelled by a MAN B&W-Uljanik slow-speed, long-stroke, direct reversible, constant turbo-charged 5L50MC diesel engine. The specified power for propulsion without the shaft generator is 9,225 hp at 111 rpm. Maximum continuous output is 10,500 hp. The specific fuel consumption is 170 g/kwh. The four-bladed, fixed propeller was supplied by Lips BV.

Auxiliary engines comprise two 6ATL250 Jugoturbina-Sulzer diesel engine sets, each developing 1,200 kw at 900 rpm. The generators are Uljanik-built Siemens type S7198 with nominal power of 1,350 kva.

The Osco Star has a molded beam of 105 feet, depth of 49.5 feet, summer draft of 36.8 feet deadweight at design draft of 34,300 dwt and deadweight at summer draft of 40,200 dwt.

Her cargo tanks are laid out in a configuration with six center tanks and 14 wing tanks with an aggregate capacity of 45,000 m<sup>3</sup> when 100 percent filled. Wing tanks No. 3 port and starboard are for segregated ballast, and the two small tanks aft of No. 6 port and starboard are slop tanks for cargo. Segregated ballast is carried in the fore peak tank, double bottoms beneath all cargo tanks, No. 3 port and starboard wing tanks and the after peak tank.

(continued)

OSCO STAR Equipment List			
Main engine	MAN B&W-Uljanik	Pressure/vacuum valve	
Shaft generator	Uljanik	for cargo tanks	Press-Vac
Propeller	Lips	Salt water and scrubber pumps	Iron
Auxiliary engines	Jugoturbina-Sulzer	Tank cleaning pumps	IMO
Generators	Uljanik-Siemens	Discharge oil monitoring system	Seres
Emer. diesel generator engine	Famos	Sounding control system	Autronica
Alternator	Uljanik-Siemens	Hydrostatic gages	KDG GMS
Oil-fired boilers	TPK	Pneumatic control instruments	Jucker
Speed log	Simrad	Ballast/bilge ejector	Ellehammers
Echo sounder	Simrad	Hydraulic power plant	
Gyrocompass, automatic pilot	C.Plath	for ballast & cargo valves	Skarpenord
Radar	Krupp Atlas Elektronik	Slop tank coating	Kansai
Navigation system	Racal Decca	Cargo hose cranes	Uljanik
Radio direction finder	Marconi	Exhaust gas heat exchanger	TPK
Navigation lights	Uljanik Tesu	Oil-fired boilers	Saake
Satcom	Marconi	Steering gear	Vulkan
Facsimile recorder	Simrad	Bow anchors	Blohm & Voss
Sound-powered telephones	Debeg	Halon extinguishers	Walter Kidde
Cargo pumps	Eureka Pumps	Fire extinguishing pumps	Iron
Centrifugal pumps	IMO	Lifesaving equipment	Greben

### PETROBULK MARS Burmeister & Wain



The first ship in the world to be equipped with a one-man operated bridge, the much-talked-about 84,000-dwt product tanker Petrobulk Mars, was delivered by Danish shipbuilder Burmeister & Wain. Sperry Marine Inc. supplied much of the electronic navigation and steering control equipment for

the first one-man bridge to be approved by Det norske Veritas.

According to Hans E. Rasmussen, Sperry Marine regional manager in Denmark, the only modifications made to the Sperry equipment to meet DnV's requirements were alarm modifications to the RASCAR touchscreen control radar/ARPA and to the SRP-690 autopilot.

In addition to dual RASCARs and the SRP-690 autopilot, Sperry Marine equipment on board the new tanker includes the SR-220 gyrocompass, SRD-421S dual axis speed log, marine data TMC/Off course alarm, separate helmsman steering stand, and Sperry's Rate of Turn System.

The vessel is classified by Det norske Veritas with the new class registration "Watch 1—Ocean Areas and Coastal Waters" (W1-OC), which means that it can be operated safely by only one person on the bridge day and night under normal

operating conditions, as soon as this has been approved by the IMO, the United Nations' International Maritime Organization. According to the international conventions, this has so far only been allowed in the daytime, and on approval of the highest ranking officer of the watch. Some of the largest seafaring nations are now working on an extension of this convention so as to apply also to navigation at night.

The class registration "W1-OC" means that the ship fulfills special requirements as far as instrumentation and surveyance are concerned. The bridge design enables the officer of the watch to operate all instruments unassisted at all times, have a clear view in all directions, be able to hear all signals, and by means of alarms be able to register any irregularities and errors no matter where they may occur onboard the ship. Furthermore, operational procedures are established which ensure that the bridge is manned at all times and that another qualified operator can attend the bridge within a specific response time in case of operator unfitness.

The Vanuatu-flag product tanker, type CPT 54E, has an overall length of 750 feet, molded breadth of 105 feet 9 inches, and design draft of 38 feet. She is powered by a single two-stroke, constant pressure turbocharged MAN B&W Diesel 5L70MCE engine, with a nominal MCR of about 12,250 bhp at 95 rpm and a specified MCR of 10,900 bhp at 84 rpm. Auxiliary power is provided by four sets of four-stroke, single acting turbocharged diesel engines, totaling approximately 4,000 bhp at 720 rpm. The main and auxiliary engines and boilers are arranged for operation on heavy fuel up to 6000 sec. Redwood no. 1 at 100 degrees F.

The ship was contracted by Sonderjysk Erhvervsinvestering K/S-16 and chartered on a 15-year bareboat charter to Nordan Tankers 1 Inc. The owners behind the project are Naess, Jahre & Partners in cooperation with PetroBulk Carriers, consisting of Bulls Tankrederi A/S, Norway, Exmar N.V., Belgium, Mitsui O.S.K., Tokyo, and Shipping Development Company Limited (Erling D. Naess, Bermuda). The ship will be operated commercially by PetroBulk Carriers A/S and technically by Naess Shipping (Holland) B.V. on behalf of Nordan Tankers 1 Inc.

### ROBIN HOOD Schichau Seebeckwerft

West Germany's Schichau Seebeckwerft AG of Bremerhaven, delivered the second of two of the world's largest railway/freight ferries, the 581-foot Robin Hood, to Rederi AB Swedcarrier, the pool partner of Hamburg-based TT-Line.

The Robin Hood, with a molded breadth of 84-1/2 feet, draft of about 20 feet, tonnage of about 24,000 and deadweight of 7,800 tons, is powered by two main propulsion plants consisting of four MAN B&W main engines. Each main pro-

pulsion plant consists of a MAN B&W 6L40/45 diesel, with an output of 3,170 kw at 524 rpm, and a MAN B&W 8L40/45 diesel engine, with an output of 4,230 kw at 524 rpm. The total power for the two main propulsion plants (all four engines) is 14,800 kw. For maneuverability, the vessel is equipped with Lips variable pitch propellers and Frydenbo rudder plants. She has a service speed of about 18 knots.

The all-around combicarrier entered service on the TT-Line route between Travemunde and Trelleborg, Sweden. Her three decks are interconnected by internal ramps, and she loads and discharges via a stern ramp.

The lower deck, or combi deck, is equipped with 910 meters of rail length distributed on six tracks, allowing for the transportation of 36 long-type railway wagons or 75 rail wagons of average size.

On the two upper decks, there is space for about 100 trucks/trailers. When not in use for rail cargo, the lower deck can accommodate an additional 60 trucks/trailers.

Furthermore, the Robin Hood has accommodations for 300 passengers in 122 cabins, a restaurant, lounge/bar, cinema and conference rooms.

### ROBIN HOOD Equipment List

Main engines(4)	MAN B&W
Propellers(2)	Lips
Thrusters	KaMeWa
Generator engines	MAN B&W Holeby
Generators	Telefunken System Technik
Reduction gears	Lohmann & Stolterfoht
Engine controls	Noris
Steering controls	Frydenboe
Radar	Sperry
Compass	Sperry
Autopilot	Kockums
Pumps	Behrens Pumps
Echo sounder	ELAC
Speed log	Jungner
Ramp/doors	MacGregor Naviere
Mooring winches	Hatalapa

### STAR PRINCESS

#### Chantiers de l'Atlantique

The sleek 1,700-passenger luxury cruise liner Star Princess, P&O Cruise newest addition, was delivered this past year by GEC Alsthom's Chantiers de l'Atlantique shipyard at St. Nazaire, France.


Operated by Princess Cruise, the 805-foot 8-inch cruise liner has a molded breadth of 105 feet 8 inches, service draft of 25 feet 3 inches and tonnage of 63,524 grt. Manned by a crew of 600, the Star Princess has 13 decks, with 735 cabins which incorporate: 14 suites, 36 mini-suites, 510 outside cabins, 165 inside cabins and 10 wheelchair-accessible cabins. Passengers sailing on the Star Princess are treated to such cabin amenities as telephones, twin beds which convert to queen size, five-channel color television, four music channels, card key access, outdoor terraces in suites and mini-suites, and refrigerator and bar.

As for entertainment aboard the Liberian-flagged liner, passengers can enjoy such public areas as: the Galleria, a large shopping arcade; La Patisserie, a specialty pastry-esspresso lounge; the Vineyard, a wine

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**STAR PRINCESS  
Equipment List**

Main engines (4)	MAN B&W
Auxiliary engines(4)	MAN B&W
Propulsion motors	CGEE Alsthom
Main alternators	CGEE Alsthom
Electric motors	CGEE Alsthom
Thrusters	Stone Vickers/Fincantieri
Fin stabilizers	Brown Brothers
Steering gear	Hastie
Main switchgear	SACE
SatCom	Sperry Marine
Exhaust gas boilers	Senior Green
Oil separators	Westfalia Separator
Oil-fired boilers	Sunrod
Evaporators	Aquachem
Coolers	Alfa-Laval
Air compressors	Harnworthy
Centrifugal pumps	Guinard/Harnworthy
Lighting apparatus	Philips Eclairage
Galley	Sea-King
Sewage system	Deerberg

bar; the two-level, 788-person-capacity showroom Starlight Show-lounge; and Images, an exercise and beauty center. Other on-board entertainment includes the casino and gaming room, disco and nightclub, a domed forward observation lounge, a pizzeria, library, two polls, and a cinema.

The diesel-electric propulsion plant of the Star Princess, which provides a service speed of 19.5 knots, comprises four medium-speed MAN B&W Diesel model 8L 58/64 engines, rated at 13,207 bhp at 400 rpm, each driving a 9.4 MW

CGEE Alsthom alternator. The alternators supply two 16,000-hp CGEE-Alsthom electric propulsion motors which drive twin fixed-pitch propellers. Four MAN B&W Diesel generator sets produce an output of 9,270 kw each. The 40 megawatts of electric power generated is equivalent to the power supply for an industrial town of 80,000 inhabitants.

For stability, the Star Princess is designed with Brown Brothers fin-type roll stabilizers, and for added maneuverability, is fitted with three transverse thrusters, two forward and one aft.

The interior design of the vessel was the sole responsibility of Los Angeles-based naval architecture and marine engineering firm Ellerbe Becket Associates. The centerpiece of the Star Princess are its spectacular three-deck atrium, the Plaza, and elegant two-deck dining room, the Fountain Court. Both the atrium and open dining area meet stringent Lloyd's Register and U.S. Coast Guard standards.

The Star Princess, which made her inaugural voyage on March 24, operates in eastern and western round-trip Caribbean sailings from Ft. Lauderdale in the winter, and 12-day Alaska sailings round-trip from San Francisco in the summer.

**MHI Receives Order  
To Build VLCC**

Mitsubishi Heavy Industries Ltd. (MHI) of Japan recently received a contract to build a 260,000-dwt tanker for Navix Line of Japan. The VLCC will be delivered in 1991.

**Fincantieri Launches 'Scarabeo 5'  
Semisubmersible Drilling Rig**

The semisubmersible drilling rig Scarabeo 5 was recently launched in Italy at the Sestri Ponente (Genoa) shipyard of Fincantieri-Cantieri Navali Italiani SpA. Construction on the rig started in May 1987, and delivery is forecast for 1990.

Ordered by the Italian company of Saipem (ENI Group), Scarabeo 5 is a semisubmersible, column stabilized, dynamically positioned drilling unit based on a Maritime Engineering design. The unit has a length of about 364 feet, breadth of 237 feet and height of 143 feet.

Scarabeo 5 is fitted with an Integrated Management System. It consists of a totally integrated, thoroughly distributed process control and data acquisition system, based on a proven hardware and LAN, with built-in simulation facilities and field configuration tool. Main functions are automatic power management; fluid management (including stability calculation); rig management such as drilling, logistics and survey; automatic thruster assistance to mooring, including EMP dual redundant hydroacoustic reference system.

Mooring system up to 900 meters will be assured by eight 15-ton anchors, while on depths from 900 to 1,800 meters, Scarabeo 5 will operate in "dynamic positioned mode" by means of eight thrusters based on eight 2,350-kw electric motors. Scarabeo 5 will be able to operate



Semisubmersible drilling rig Scarabeo 5, now under construction at the Sestri Ponente shipyard of Fincantieri, will have a drilling capability of up to 7,600-10,000 meters.

in severe environmental conditions: in operation, it will be able to resist winds up to 33 m/s, current up to 1.0 m/s and significant wave height up to 9.0 meters.

Scarabeo 5 has air-conditioned living quarters for 100 people. All working areas are protected, fully ventilated and air conditioned to allow maximum comfort and safety for the crew.

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- DATE OF FILING: October 3, 1989
- FREQUENCY OF ISSUE: Monthly
- NO. OF ISSUES PUBLISHED ANNUALLY: 12
- ANNUAL SUBSCRIPTION PRICE: \$44.00
- LOCATION OF KNOWN OFFICE OF PUBLICATION: 118 East 25th Street, New York, New York 10010.
- LOCATION OF THE HEADQUARTERS OR GENERAL BUSINESS OFFICES OF THE PUBLISHERS: 118 East 25th Street, New York, New York 10010.
- NAMES AND ADDRESSES OF PUBLISHERS AND EDITOR: PUBLISHER: John E. O'Malley, Charles P. O'Malley, Maritime Reporter/Engineering News, 118 East 25th Street, New York, New York 10010. EDITOR: John Snyder, Maritime Reporter/Engineering News, 118 East 25th Street, New York, New York 10010.
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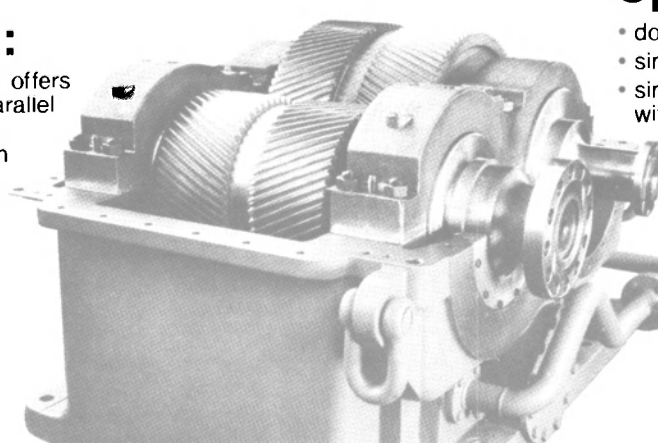
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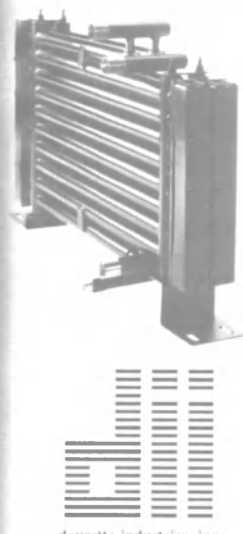
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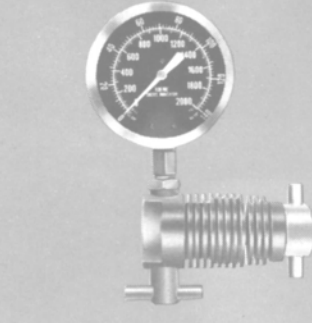
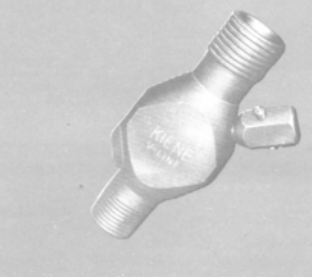
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## \$150 Million In Orders For Three Tankers Won By AESA From Uddevalla

Orders worth a total of just under \$150 million for three one-million-barrel tankers to be built by Astilleros Espanoles SA (AESA) yard were recently confirmed by Uddevalla Shipping.

Two of the 143,000-dwt vessels will be delivered in June 1991 and March 1992, while the third—a resale from France's CNN/Worms—will be delivered in October 1990.

AESA's Puerto Real yard in Cadiz, Spain, will build all three vessels.

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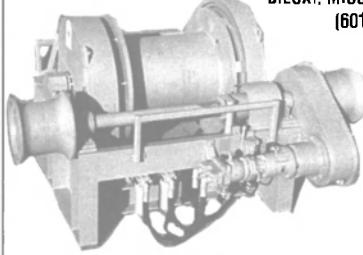

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**L&C Associates Installs Protective Sealing And D/H Aboard USNS Waccamaw**

L&C Associates recently announced the completion of the installation of a dehumidification and sealing system aboard the USNS Waccamaw, a Mispillion Class jumboized carrier.

L&C Associates dehumidification systems differ from traditional hard blanking methods of sealing in that a patented flexible sealing system is used. This Protective Sealing System, PSS®, has been approved by MSC for sealing hatches, air intakes, and ventilation openings leading to dehumidified spaces.

The use of L&C's dehumidification and sealing system aboard the 35,000-ton MSC vessel greatly reduces moisture-induced corrosion and, because the seals are strippable, the vessel can be easily reactivated.

L&C Associates Inc., specialists in equipment preservation for over 20 years, are industry leaders in the development of turnkey dehumidification and sealing systems for marine applications.

For more information and free literature,

Circle 46 on Reader Service Card

**MTIS Offers Information Packages On N.Y. Homeport**

Marine Technical Information Services (MTIS) is offering information packages on current contracting and planning for shore facilities construction for the Battleship Surface Action Group Homeport, currently under construction on Staten Island, N.Y.

Information includes planned ship repair and maintenance facilities, electronic systems support, public works, shore operation center, warehousing, bulkhead wall construction and dredging activities for the Stapleton and Fort Wadsworth locations.

Other forms of database research are available.

For more information and free literature containing complete details,

Circle 92 on Reader Service Card

**Rexroth Offers 502-Page 'Proportional, Servo, Electronics' Catalog**

Titled "Proportional, Servo, Electronics," Rexroth's catalog Volume 2 covers information on the electronic proportional pump controls and valves, servo valves, electronic amplifier cards and control systems (RA 29 003/1.88).

For a free copy of this 502-page catalog from the Rexroth Corporation,

Circle 19 on Reader Service Card

**Autronica Receives Order For Radar-Based Level Gaging Systems**

Autronica has received the order for GL-90 radar-based level gaging systems for the 56,000 m<sup>3</sup> LPG/NH<sub>3</sub>/VCM carriers ordered at the Kvaerner Govan yard in Glasgow. The system will measure the level in eight cargo tanks and is connected

to an Autronica alarm and control system covering the cargo monitoring functions.

For these ships Autronica will also supply an extensive alarm and control system for the engine room, type KD-10S20 and incorporated in this system is a fire alarm system KDF-00 based on analogue, addressable detectors. Alarm presentation and control will be on the CCRTs.

For condition monitoring of the main diesel engine, Autronica will supply the MIP-Calculator NK-5 which is becoming "the tool" for the engineers onboard, with orders received this year to reach about 100 ships.

For more information and free literature from Autronica,

Circle 42 on Reader Service Card

**SATISFACTION**  
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HEAVY INDUSTRIES CO., LTD.

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## FOR MORE INFORMATION ON EQUIPMENT AND SERVICES ADVERTISED IN THIS ISSUE

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The listings above are an editorial service provided for the convenience of our readers.

### Cummins-Powered 'Grand Romance' Begins Excursion Service On St. Johns River In Florida



According to one of the owners, "Cummins engines and generators were selected for the Grand Romance because of their quietness, economy, dependability and low initial purchase price."

The 136-foot, triple-decked excursion vessel "Grand Romance" recently began excursion service on the St. Johns River between Sanford and Jacksonville, Fla.

Designed by John Brever, an associate of Florida Naval Architects, Inc. of East Palatka, the 600-passenger vessel was constructed by Freeport Shipbuilding & Marine Repair.

Powered by a pair of fuel-efficient NT-855-N Cummins engines with two NT-855G/GC2 Cummins generators—all supplied by Cummins Alabama, Inc.—the Grand Romance replaces its predecessor, the 110-foot "Rivership Romance," that operated out from Sanford for seven years.

The steel-hulled Grand Romance has a 46-

foot beam and a draft of four feet 6 inches when fully loaded. Other features include Mircro Commander electronic engine controls, a Hydro-Electric dual steering system, Twin Disc reduction gears, 4-inch Aquamet 18 shafts, and five-blade, 40-inch pitch, 42-inch-diameter propellers supplied by Bird-Johnson.

On an enclosed fourth level wheelhouse, the captain has a Ratherscan 16-3 radar unit at his disposal, along with two Raytheon 33 all channel VHF units, a pair of 2600 digital Raytheon depth sounders, a 12-inch Ritche compass, a 410 Talkback Raytheon loud hailer, and a Miner channel whistle.

In addition to U.S. Coast Guard-approved running and navigation lights, the Grand Romance is equipped with two Carlisle & Finch 500-watt searchlights; two Crown BH-71, 60 PSI bilge/ballast/fire pumps; two Tait #5 SAS jet pumps; a Quincy D-325 air compressor; and a 10,000-gallon holding tank.

For free literature on the facilities of Freeport Shipbuilding and Marine Repair,

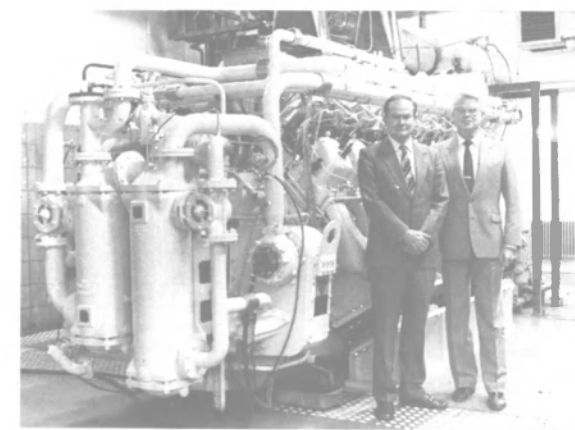
Circle 55 on Reader Service Card

For free literature on Cummins engines,

Circle 56 on Reader Service Card

### Australian Admiral Test-Starts New Sub Engine At Hedemora Diesel—Literature Available

Rear Adm. Oscar Hughes, project leader with overall responsibility for the Royal Australian Navy's new submarine project, recently visited Sweden's Hedemora Diesel AB to test-start a prototype engine that is one of a series of engines intended for six submarines.



The order, which includes a total of 19 engines, including logistics, is a significant breakthrough for Hedemora Diesel in the international naval vessel market. It is also confirmation that the company is manufacturing engines that satisfy the technological requirements of the 1990s.

The test-start of the prototype engine is an important milestone in the total delivery program, ordered by Australian Submarine Corporation, ASC, which will be completed in stages between 1990 and 1995.

Hedemora Diesel engines are currently installed in a large number of industrial, marine, naval-defense and railway application areas, worldwide.

For the 1990s, Hedemora Diesel is focusing increasingly on the development of high-performance engines for naval-defense installations.

For free literature on engines from Hedemora Diesel AB,

Circle 53 on Reader Service Card

Maritime Reporter/Engineering News

### MSI/CAORF Trains How To Avoid Ship Accidents Before They Happen

Marine Safety International (MSI) operates three facilities whose purpose is to study the causes of accidents, train ship personnel in a full fidelity simulator, examine potentials for human error and stress-related mistakes and look at the layouts of specific harbor and channel designs and make recommendations for accident avoidance . . . before they happen.

The flagship facility of MSI is the Computer Aided Operations Research Facility (CAORF), located on the grounds of the U.S. Merchant Marine Academy at Kings Point, N.Y. Originally built by the Federal Government as the National Maritime Research Center, CAORF houses one of the most sophisticated ship simulators in the world.

The simulator bridge contains actual tanker equipment, including radar, communications and steering mechanisms. Encompassing the bridge is a massive 240-foot horizontal 24-foot vertical panorama of the actual port conditions. The simulation can be varied by type of vessel, cargo load, time of day, atmospheric and tide conditions, other ships passing and tug effects.

In all, three dozen vessels can be simulated in almost 30 geographical locations at MSI/CAORF alone. All this is accomplished through several rooms of computers and high-tech video hardware (the software alone at the CAORF facility is worth over \$20 million). The CAORF facility is so unique that both the Coast Guard and the National Transportation Safety Board have contracted to study the Valdez accident 5,000 miles away from the point of its occurrence—at MSI/CAORF.

Simulation technology combined with ongoing training reduces the risk to our environmentally sensitive waterways by increasing the margin of safety. Maritime personnel can demonstrate their skills and psychological makeup on this massive scale safely—on land. This lets them react to emergencies before they occur in real life.

For free literature giving full information on MSI/CAORF,

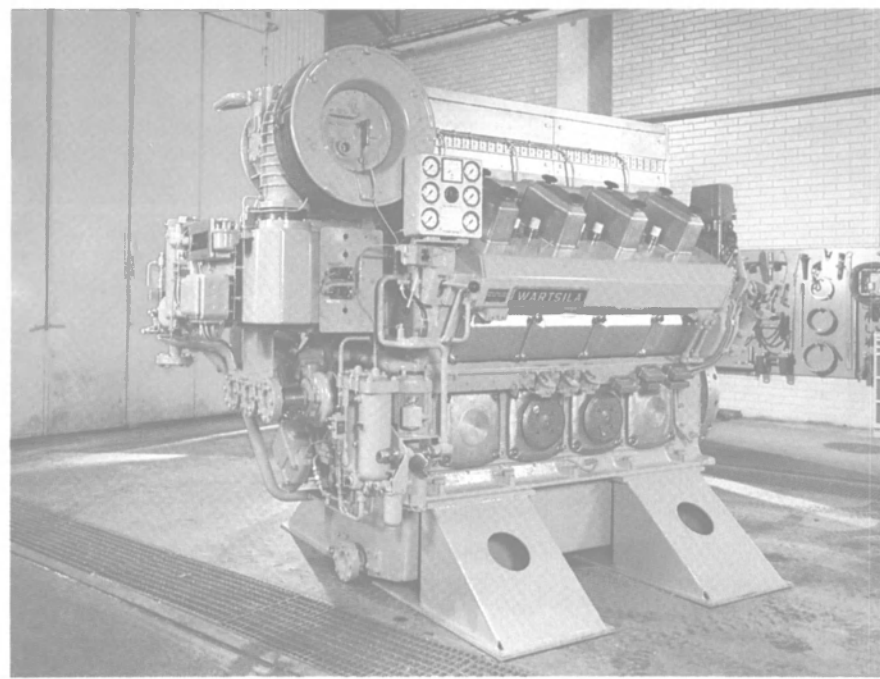
Circle 15 on Reader Service Card

### Meyer Werft To Build Second Cruise Ship For Chandris Cruises

The Papenberg shipyard of West German shipbuilder Meyer Werft has received a contract believed to be worth \$200 million to construct a second cruise ship for Chandris Cruises.

The 45,000-grt cruise ship, which will be the sister ship to the Horizon presently under construction at Meyer Werft, will be operated by Chandris Celebrity Cruises, the luxury cruise division of Chandris. To be christened the Zenith, the luxury liner will be delivered in 1992 for operation out of Miami.

December, 1989



The Wartsila-Vasa 8V22 diesel engine offers fishing vessel operators one of the most efficient and compact units in its output range.

### Wartsila Diesel Repowers Seattle Fishing Vessels

Wartsila Diesel Vasa type engines have been recently installed in three fishing vessels for Seattle-based owners. In each case, older less efficient engines were replaced by Wartsila Vasa diesel for use as the main propulsion machinery.

The first vessel, the F/V American Eagle owned by American Eagle Associates, was repowered with a Wartsila Vasa 8V22, producing 1,768 bhp at 1,000 rpm. The engine will be used to drive a controllable-

pitch propeller and a 600-bhp power takeoff from the free end of the engine which will be connected to a series of hydraulic pumps.

The second vessel, the F/V Viking owned by Westward Trawlers, was also repowered with a Wartsila Vasa 8V22 with the same output. The Wartsila Vasa 8V22 is widely known as one of the most efficient and compact fishing boat engines in its output range.

The third vessel, the F/T Endur-

ance owned by Alaska Trawl Fisheries, was repowered with two Wartsila Vasa 12V22 main diesel engines, each developing 2,652 bhp at 1,000 rpm. A power take off of 1,100 bhp is arranged off the free end of each engine; it will drive a shaft alternator for electricity generation.

Wartsila Vasa engines were chosen because of their excellent fuel efficiency and low spare parts consumption.

Wartsila Diesel is one of the world's largest suppliers of medium-speed diesel engines. The company has production plants in Finland, Sweden, Norway, France, and Spain. Wartsila has licensees in Brazil, Korea, and Indonesia, and a worldwide sales and service network. In the U.S., Wartsila Diesel is represented by Wartsila Diesel Inc., with its main office in Chestertown, Md., and service centers in Seattle, New Orleans, and San Juan, Puerto Rico.

For free literature fully detailing the full line of medium-speed engines offered by Wartsila Diesel,

Circle 63 on Reader Service Card

### \$1.8-Million Repair Contract Awarded To Northwest Marine

Northwest Marine Iron Works, Portland, Ore., was recently awarded a Ready Reserve Force (RRF) repair contract worth \$1.8 million.

Under the contract awarded by the Maritime Administration, Northwest Marine Iron Works will perform the drydocking and repair of the RRF vessel Shoshone.



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in Oklahoma

Circle 232 on Reader Service Card

**Workboats Northwest  
Delivers Versatile  
58-Foot Fishing Vessel**

Workboats Northwest of Seattle, Wash., recently completed a 58-foot vessel, Lady Kimberly, that can quickly be converted from longliner to seiner, crabber, and tender for owner Kodiak Island fisherman Jim Peterson.

Workboats Northwest president Bruce Reagan said that while several designers worked on the boat, Mr. Peterson, a long-time set net fisherman, should be credited with basic ideas for the versatile boat.

The conveniently laid-out engine room on the Lady Kimberly contains the vessel's Caterpillar 3408B, 443-hp engine which drives a 66 x 55-inch propeller through a Twin Disc 516 reduction gear using a 6:1

ratio to swing the big wheel. The seiner will utilize the Model 516's "trolling gear" in such applications as picking up crab pots rather than using a clutching system.

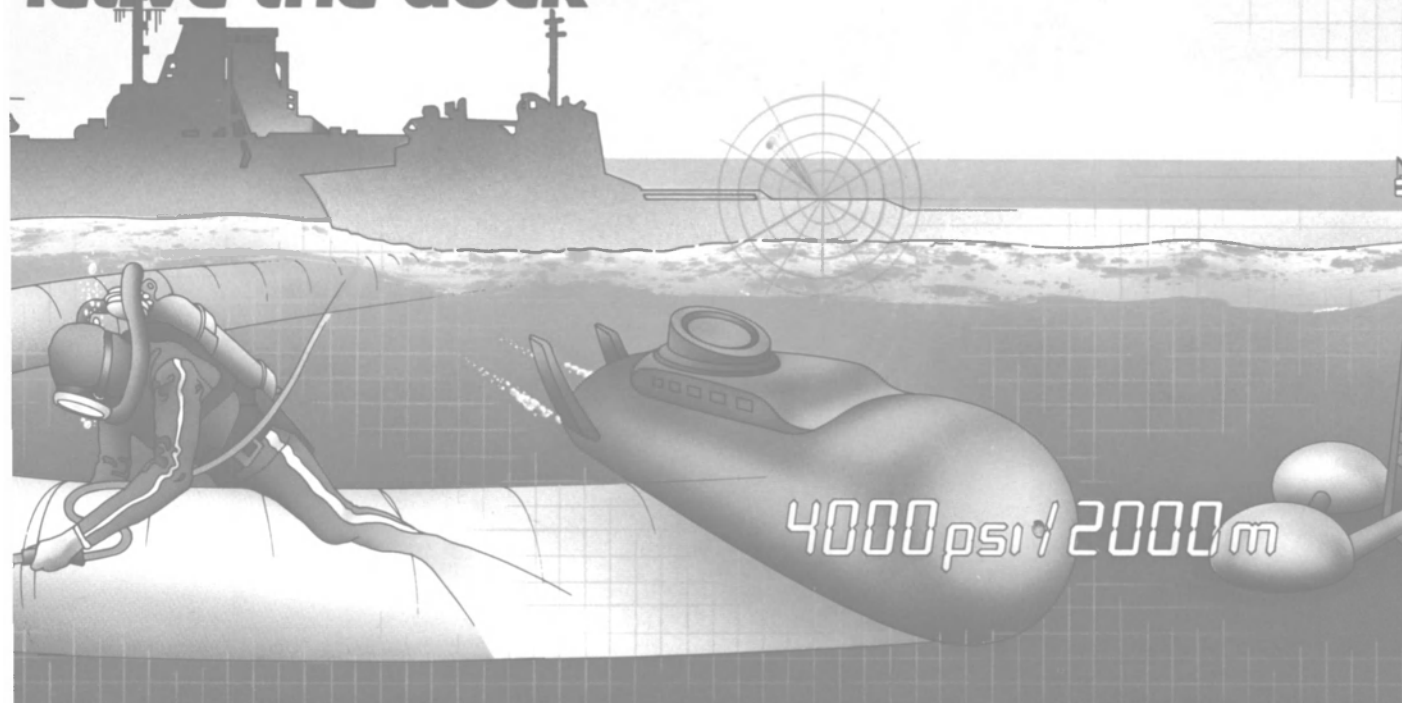
The main generator is a 75-kw Isuzu/Lima and the standby, a 35-kw Isuzu/Lima, both from Marine Engine Repair in Seattle. A dry exhaust system uses Cowles silencers.

The hydraulic system, designed by Ed Bevis of Seattle, is driven



Caterpillar-powered Lady Kimberly, built by Workboats Northwest, is shown undergoing sea trials in Elliott Bay, with Seattle as a backdrop. The boat was designed to fish 365 days a year—longlining, seining, crabbing and tending.

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leave the dock**



**RISIC Couplings**



Aeroquip RISIC 3 Couplings provide improved system flexibility for piping on ship water and oil service. **RISIC 3 is approved on U.S. Navy surface and subsurface vessels.**

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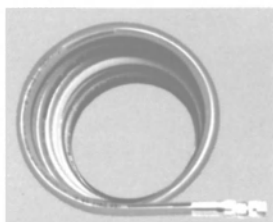
**Marine Hose and Fittings**

Aeroquip's FC300 AQP hose now has **NAVSEA** approval. FC300 hose has been engineered for demanding high-temperature shipboard applications and is available with a complete selection of fittings. FC300 exceeds SAE 100R5 specifications.

Request Catalog 306

**Polygon™ Hose**

Specially formulated thermoplastic hose designed for tight hose bend applications. Temperatures to +200°F and pressures to 10,000 psi.



Request Bulletin 2068

**Reusable Fittings with Convoluted Teflon® Hose**

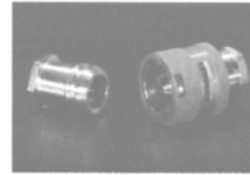
**NAVSEA** approved reusable fittings for rapid replacement of hose lines. Three piece, bolt-together fittings are easily assembled with hand tools for emergency repairs.



Request IEB 319 and Catalog 306

**Quick-Disconnect Couplings**

Aeroquip offers hundreds of styles of quick-disconnect couplings, including our new Deluge Coupling for fire quenching applications in rocket launching chambers. Couplings are available in steel, stainless, and brass in diameters up to 1½" and with pressure ratings to 10,000 psi.



Request Bulletin 258B

**Aeroquip products meet strict MIL, NAVSEA, and USCG specifications,** and are available through a worldwide network of distributors.

Our Marine/Military Customer Service Group is a team of experienced professionals who speak your language. For assistance, call them at 419-238-1190. Aeroquip Corporation, 300 South East Avenue, Jackson, MI 49203-1972.

off both generators, and utilizes Parker pressure flow compensated pumps. Among hydraulic deck equipment, H.A. Thompson supplied the long line hauler. The crab pot hauler and anchor winch are Nordic equipment.

Two fish holds—the 1,552-cubic-foot aft and 388-cubic-foot forward tanks—accommodate a refrigerated seawater system. Alaska Marine Refrigeration designed the heart of this system which is nicely fitted into the engine room: a big 30-hp Royce compressor, a Freon 512 refrigerant system, and a 5-hp compressor to chill the coils.

An extensive electronics suite was supplied by Northern Marine Electronics. Much of the equipment bears the Furuno trademark—1900 and 1510D radar, color video plotter, color sonar, datafax, LC-90 loran, and video sounder. Other equipment includes Si-Tex flasher, Wagner MK-4 autopilot, SEA VHF-FM, SEA SSB, ICOM VHF, RDI bridge watch, Raytheon loud hailer, and Cobra CB.

Workboats Northwest used High-Wagner components in the steering system and Hynautics components in propulsion controls.

Bruce Reagan, who heads Workboats Northwest, said the firm continues active construction of workboats and fish boats. Recent deliveries include a fast Bristol Bay gill netter, several versions of Mr. Reagan's "Forerunner" line of 21-foot and 24-foot boats, and others.

For free literature on the facilities and capabilities of Workboats Northwest,

Circle 54 on Reader Service Card

**F/V LADY KIMBERLY  
Supplier's List**

Engine	Caterpillar
Reduction gear	Twin Disc
Propeller	West Coast Propeller
Propulsion controls	Hynautics
Steering	Wagner Engineering
Silencers	Cowles
Main generator	Lima/Isuzu
Standby generator	Lima/Isuzu
Switchboards	Square-D
Air compressor	Sears
Arc welder	Miller
Loran	Furuno
Sonar	Furuno
Radar	Furuno
Video sounder	Furuno

For literature on Aeroquip products, circle the appropriate number of the reader service card: Hose & Fittings—Circle 205; Polygon Hose—Circle 206; Teflon Hose—Circle 207; Quick-disconnect Couplings—Circle 208.



Marine Products from **TRIJOVA**

# BUYERS DIRECTORY

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

## AIR CONDITIONING AND REFRIGERATION—REPAIR & INSTALLATION

Adrick Marine Corp., 320 Cantor Ave., Linden NJ 07036  
Bulley Group, 2323 Randolph Ave., Avon, NJ 07001  
Stal Refrigeration AB, Butangsgatan 16, S-60187 Norrköping SWEDEN

## BALLAST

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

## BARGE BUILDING

Conrad Industries, P.O. Box 790, Morgan City LA 70381

## BARGES—Leasing

McDonough Marine Service, P.O. Box 1825, Parkersburg WV 26101  
Zidell Explorations, Inc., 3121 SW Moody Ave., Portland OR 97201

## BASKET STRAINERS

Beard Industries, P.O. Box 31115, Shreveport, LA 71130

## BEARINGS—Rubber, Metallic, Non-Metallic

B.F. Goodrich (formerly L. Q. Moffitt, Inc.), P.O. Box 5550, Akron, OH 44313

## Kohlberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241

## Kingbury Inc., 10385 Drummond Rd., Philadelphia PA 19154

## Thomson Gordon Ltd., 3225 Mainway, Burlington, Ont., CANADA L7M 1A6

## BOILER CLEANING

Asea Stal, 50 Chestnut Ridge Rd., Montvale NJ, 07645

InfraSonik Inc., 12511 131st Court NE, Kirkland WA 98034; InfraSonik AB, Skeppsholmen, S-111 49 Stockholm SWEDEN

## BROKERS

Captain Astad Company, Inc., P.O. Box 350486, Ft Lauderdale FL 33335; P.O. Box 1093, Houma, LA 70360

Jack Faulkner, 2419 Caddy Lane, P.O. Box 371, Flossmoor IL 60422

Newbury's Tug & Barge Sales Corp., 35 De Hart St., Morristown NJ 07960

## BULKHEADS

The Waugh Co./Rockmet (TNF), 5111-6 Baymeadows Rd., Suite 394, Jacksonville, FL 32217

## BUNKERING

Zidell Explorations, Inc., 3121 SW Moody Ave., Portland OR 97201

## CARGO ACCESS EQUIPMENT

Morgan Crane Co. Inc. (Hiab SeaCranes and QMC Trident, Ferrari, Fassi marine cranes), 1300 Normandy Place, Santa Ana CA 92705

## CHAIN

Crandall Dry Dock Engineers Inc./Marit Chain, 21 Pottery Lane, Dedham MA 02024

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

Washington Chain & Supply, 2901 Utah Ave South, Seattle WA 98124

## COMPACTORS

ICI Multi-Pak Inc., 14719 Carolcrest, Houston TX 77079

Resource Technology Group, P.O. Box 159, 1015 Middletown Ave., Northford CT 06472

TTC Corp., 9819 Logan Ave., So., Minneapolis MN 55431. Sales Agents: American United Marine, 5 Broadway, Rte 1, Saugus MA 01906

## COMPUTERIZED INFORMATION SYSTEMS

THASCO, P.O. Box 91360, Mobile AL 36691

## CONDENSERS/SEPARATORS

Beard Industries, P.O. Box 31115, Shreveport LA 71130

Doucette Industries, Inc., 701 Grantley Road, P.O. Box 2337, York, PA 17405

Wright Austin Co., 3250 Franklin St., Detroit MI 48207

## CONTROL SYSTEMS—Monitoring

ASEA, Inc., 4 New King St., White Plains, NY 10604

The Clark Reliance Corporation, 16633 Falts Industrial Parkway, Strongsville OH 44136

IMO Industries, Gems Sensors Division, One Cowles Rd., Plainville CT 06062

Indicon Division, Metravit Instruments Inc., 28 New St., Cambridge, MA 02138

MMC International (Marine Moisture Control), 60 Inip Dr., Inwood NY 11695

NIMCO Controls, 7567 Tyler Blvd, Mentor OH 44060

Schroder Bellows, P.O. Box 631, Akron OH 44309

TANO Marine Systems Inc., 4301 Poche Court West, New Orleans LA 70129

Telerelex Inc., 771 First Ave., King of Prussia, PA 19406

## CRANES—HOISTS—DERRICKS—WHIRLEYS

ASEA-Hogglund, Inc., 30 Chestnut Ridge Rd., Montvale NJ 07645

The Crosby Group, Inc., P.O. Box 3128, Tulsa OK 74101

Del Gavo Marine Hydraulics Inc., 207 W. Central Ave., Maywood NJ 07607

EFER S.p.A., 40013 Castel Maggiore, Bo, ITALY

Leibherr-Werk Nenzing GES.mbb, P.O. Box 10, A-6710 Nenzing, AUSTRIA

Marine Travelift, Inc., 49 E. Yew St., Sturgeon Bay, WI 54235

Morgan Crane Co. Inc. (Hiab SeaCranes and QMC Trident, Ferrari, Fassi marine cranes), 1300 Normandy Place, Santa Ana CA 92705

J.D. Neuhaus, Hebezeuge, D5810, Witten Heven, West Germany

Petibone-Tiffin Corp., 235 Miami St., Tiffin, OH 44883

Reco Crane Co., P.O. Box 10296, New Orleans LA 70181

Westmont Industries, 10805 Painter Ave., Santa Fe Springs, CA 90670

Zidell Explorations, Inc., 3121 SW Moody Ave., Portland OR 97201

## DECK MACHINERY—Cargo Handling Equipment

All Set Marine Lashing AB, P.O. Box 14112, S-161 14 Bromma, SWEDEN

Braden Carco Gearmatic, P.O. Box 547, Broken Arrow, OK 74013

Gearmatic—see 'Braden Carco Gearmatic' above.

Markey Machinery Co., Inc., 79 S. Horton St., Seattle, WA 98134

McElroy Machine & Mfg. Co., Inc., P.O. Box 4455, Biloxi MS 39535

Morgan Crane Co. Inc. (Hiab SeaCranes and QMC Trident, Ferrari, Fassi marine cranes), 1300 Normandy Place, Santa Ana CA 92705

Schoellhorn-Albrecht, P.O. Box 22110, St. Louis MO 63116

Willems Rot b.v., P.O. Box 29102, 3001 GC Rotterdam, The Netherlands

## DEHUMIDIFIERS

L&C Associates, 216 Lafayette Rd., North Hampton NH 03862

## DIESEL ACCESSORIES—CYLINDER LINERS

Acurex Corporation, Autodata Division, 555 Clyde Ave., P.O. Box 7042, Mountain View, CA 94039

Colt Industries Inc. Fairbanks Morse Engine Div. 701 Lawton Ave., Beloit, WI 53511

Diesel America Inc., 5217 River Rd., New Orleans LA 70123

General Thermodynamics Corporation, 210 South Meadow Road, P.O. Box 1105, Plymouth, MA 02260

Kiene Diesel Accessories, 325 S. Fairbanks St., P.O. Box 386, Addison IL 60101

## DIESEL ENGINE—Spare Parts & Repair

Bergen Diesel A/S, P.O. Box 924, N-5001 Bergen NORWAY

Bergen Diesel Inc., 2701 Delaware Ave., Kenner LA 70062

Colt Industries Inc. Fairbanks Morse Engine Div. 701 Lawton Ave., Beloit, WI 53511

Cummins Engine Company, Mail Code 60011, Box 3005, Columbus, IN 47202-3005

Kim Hotstar Mfg Co., E 5724 Broadway Ave, P.O. Box 42, Spokane WA 99210

MAN B&W Diesel GmbH, Stadtbachstrasse 1, D-8900 Augsburg 1, Federal Republic of Germany

MAN B&W Diesel, 50 Broadway, 18th Fl., New York, NY 10004

Markisches Werk GmbH, P.O. Box 1442, D-5884 Halver 1, Federal Republic of Germany

Sims Pump Valve Co., Inc., 1314 Park Ave., Hoboken NJ 07030

Sulzer Brothers Inc., 200 Park Ave., New York, N.Y. 10166

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L. F. Gaultier & Co., Inc., P.O. Box 50500, New Orleans LA 70150

MMC International (Marine Moisture Control), 60 Inip Dr., Inwood NY 11696

SPD Technologies, 13500 Roosevelt Blvd., Philadelphia PA 19116

Ward Leonard Electric, 31 South St., Mt. Vernon, NY 10550

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Instruments, Computers, & Controls, Inc., 6942 Haven Creek Dr., Katy TX 77449

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Dynabrade, 72 E Niagara St., Tonawanda NY 14150

Maritime Power Corp., 200 Henderson Street, Jersey City, NJ 07302

Space Machine & Engineering Corp., 2346 16th Ave North, St Petersburg FL 33713

## EVAPORATORS

Aqua-Chem, Water Technologies Div., P.O. Box 421, Milwaukee WI 53201

Beard Industries Inc., P.O. Box 31115, Shreveport LA 71130

Equipment Engineering, 646 Baker St., #265, Costa Mesa CA 92626

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Carling Turbine Blower Company, 10 Nebraska St., P.O. Box 88, Worcester MA 01613

Jan A. Iiss Associates, Inc., 411 Barel Ave., San Mateo, CA 94402

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Hardware Specialties Co., Ships Division, 48-75 56th St., Long Island City NY 11101

Lee Brass Company, P.O. Box 1229, Anneton AL 36202

Non-Ferrous Bolt & Mfg Co., 4085 Nesso Dr., Suite C, Las Vegas NV 89105

Okabe Co., Inc., 175 Lively Blvd., Elk Grove Village, IL 60007

FENDERING SYSTEMS/BUOYS—Deck & Vessel

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

Seaward International, Inc., Clearbrook Industrial Park, P.O. Box 98, Clearbrook VA 22624

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Fuel Conditioning, 2500 Hampton Blvd., Norfolk VA 23517

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

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

Meyer Machine & Mfg Co., Inc., P.O. Box 4454, Biloxi MS 39535-4454

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Coast Marine & Industrial Supply Inc., 398 Jefferson St., San Francisco, CA 94133

Rampmaster Inc., 9825 Oxeola Blvd., Vero Beach, FL 32960

Westmont Industries, 10805 Painter Ave., Santa Fe Springs, Los Angeles, CA 90670

Wooster Products Inc., 1000 Spruce St., P.O. Box 896, Wooster, OH 44691

## HEAT EXCHANGERS

Alfa Laval Inc., 2115 Linwood Ave., Fort Lee NJ 07024

Beard Industries, Inc., P.O. Box 31115, Shreveport LA 71130

Doucette Industries, Inc., 701 Grantley Road, P.O. Box 2337, York, PA 17405

## HORNS/WHISTLES

Kohlberg Bros Co., P.O. Box 358, Two Rivers, WI 54241

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Aerogrip Corporation, 3000 Strayer, P.O. Box 631, Maumee, OH 43537-0631

Cunningham Marine Hydraulics Co., 201 Harrison St., Hoboken NJ 07030

Del Gavo Marine Hydraulics Inc., 207 W Central Ave., Maywood NJ 07607; tel: 132610 DELMARINE

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Watz & Krenzer Inc., 1300 Mt. Read Blvd., Rochester NY 14606

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C.T. Marine, 18 Church Street, Georgetown, CT 06829

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Crandall Dry Dock Eng'rs, Inc., 21 Pottery Lane, Dedham, MA 02026

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Diversified Technologies, 812 Live Oak Dr., Chesapeake VA 23320

E.Y.E. Marine Consultants, Belmont House, 33 Alderney Dr., Suite 350, Dartmouth, NS CANADA B2Y 2N4

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Burmah-Castrol Inc., Raritan Plaza II, Raritan Center, Edison NJ 08837  
Exxon Company International, 200 Park Ave., Bldg 222, Room A279, Florham Park NJ 07932  
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Bergen Diesel Inc., 2701 Delaware Ave., Kenner LA 70062  
Boston Metals Co., 313 E. Baltimore St., Baltimore, MD 21202  
Burmester & Wain Alpha Diesel A5, DK-1400 Copenhagen K, Denmark  
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Cincinnati Gear Co., 5657 Wooster Pike, Cincinnati, OH 45227  
Call Industries Inc. (Fairbanks Morse Engine Div.), 701 Lawton Avenue, Beloit, WI 53511  
Cummins Engine Company, Mail Code 60011, Box 3005, Columbus, IN 47202-3005  
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Electro-Motive Division of GM, 9301 W. 55th St., LaGrange, IL 60525  
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GE Naval & Drive Turbine Systems Department, 166 Boulder Dr., Fitchburg MA 01420  
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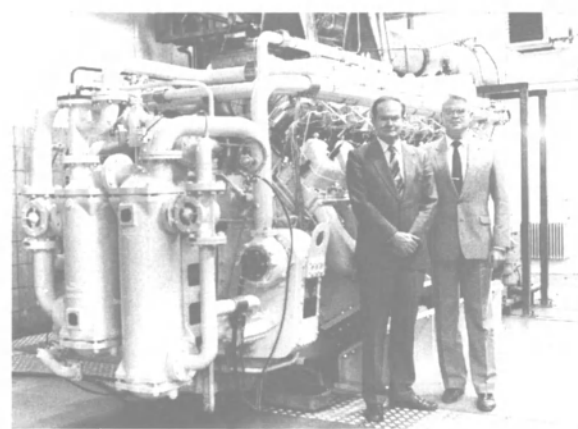
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## Australian Admiral Test-Starts New Sub Engine At Hedemora Diesel—Literature Available



Rear Adm. Oscar H. Hughes (left), Royal Australian Navy, is shown with Jan-Erik Falck, chief designer, Hedemora Diesel, during recent visit to test-start prototype engine that is one of a series intended for six submarines.

Rear Adm. Oscar Hughes, project leader with overall responsibility for the Royal Australian Navy's new submarine project, recently visited Sweden's Hedemora Diesel AB to test-start a prototype engine that is one of a series of engines intended for six submarines.

The order, which includes a total of 19 engines, including logistics, is a significant breakthrough for Hedemora Diesel in the international naval vessel market. It is also confirmation that the company is manufacturing engines that satisfy the technological requirements of the 1990s.

The test-start of the prototype engine is an important milestone in the total delivery program, ordered by Australian Submarine Corporation, ASC, which will be completed in stages between 1990 and 1995.

Hedemora Diesel engines are currently installed in a large number of industrial, marine, naval-defense and railway application areas, worldwide.

For the 1990s, Hedemora Diesel is focusing increasingly on the development of high-performance engines for naval-defense installations.

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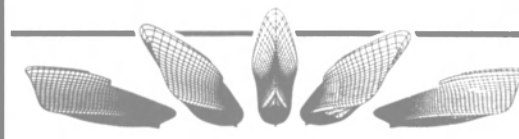
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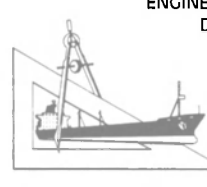
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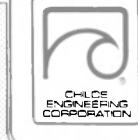
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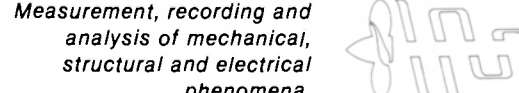
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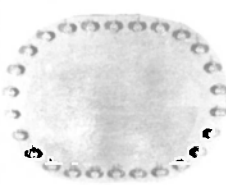
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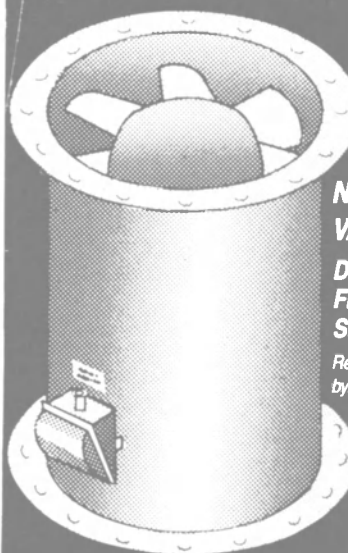
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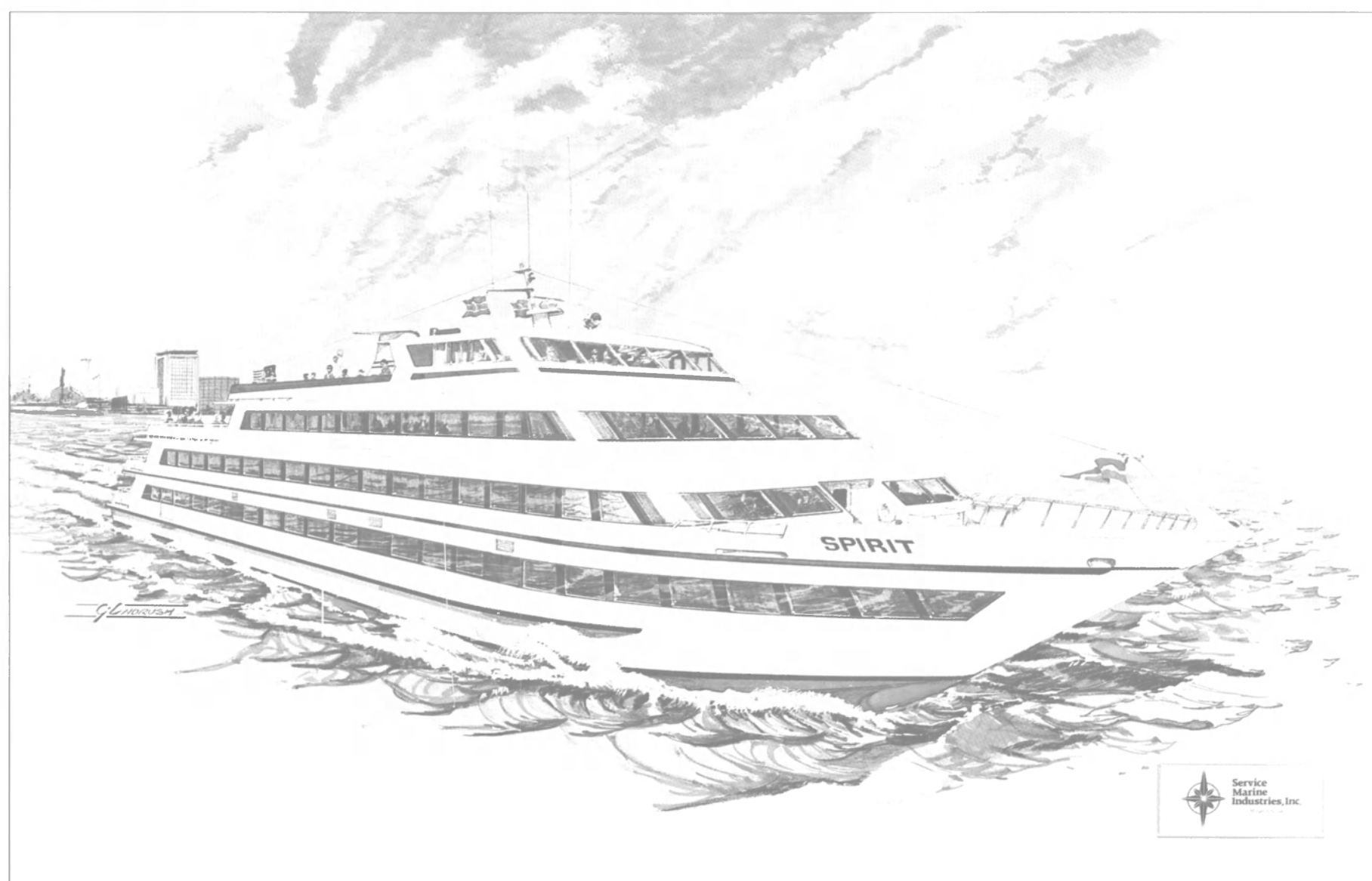
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