An effort has been launched to determine whether U.S. commercial ships should be sailing over the bounding main

BY LINDA GARMON

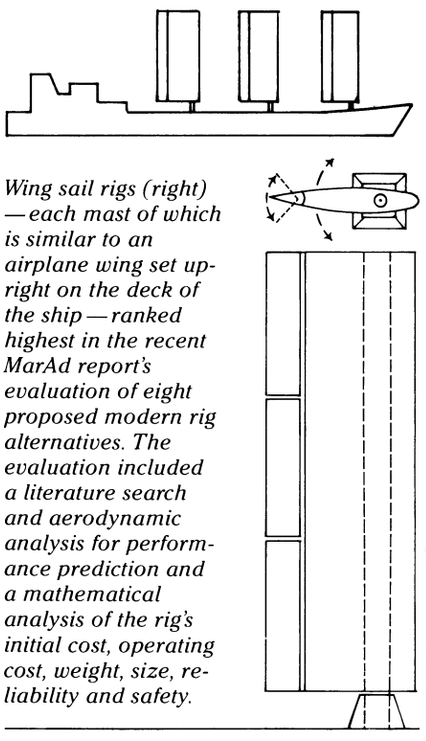
RIDE WITH THE WIND

Sailing enthusiast Lloyd Bergeson was tired of racing around the yacht club's same old buoys year after year. On June 5, 1978, the 61-year-old marine engineer cast off from Isle Au Haut, Maine, in his 31-foot *Cockatoo II* for a more challenging voyage under sail: a single-handed crossing of the North Atlantic to Norway. During Bergeson's month-long voyage, days of dolphin escorts, "frost smokes" (rising vapor), stormy petrels and blowing gales would come and go. The rather uneventful twenty-third day, however, would stay with Bergeson long after *Cockatoo*'s successful docking at Stavanger.

"In midmorning, I happened to look out the companionway and there, just 1 mile astern and headed due west, was a steamer," Bergeson entered under Day 23 in the logbook he later published in the June, July and August 1979 issues of CRUISING WORLD. "It was pleasant on deck and as the steamer faded into the distance, I wondered why it couldn't and shouldn't have been a sailing cargo ship," he wrote. "What a thrill it would have been to see a purposeful working ship, say, the *Preussen* (a full-rigged, five-masted German ship built in 1902, see cover), ploughing along under sail. She would be generating no pollution and saving tons of precious oil for better use."

Thus the seed for modern sail-cargo ships was planted. And now, as president of the Wind Ship Development Corp. in Norwell, Mass., Bergeson intends for that seed to grow. In fact, his company recently began construction of a prototype rig that later this summer will be placed on a 3,000 deadweight ton (a measure of cargo-carrying capacity) ship that belongs to Ceres Hellenic Ship Enterprises Inc. of Greece. In addition, Wind Ship Development recently concluded its study "Wind Propulsion for Ships of the American Merchant Marine" — the results of which indicate that sail-assisted vessels could burn 15 to 25 percent less fuel than conventional commercial ships over certain routes. The study was prepared for the U.S. Maritime Administration (MarAd).

MarAd officials were attracted to the idea of wind power in the wake of the 1973 oil crisis. In 1974, they commissioned John B. Woodward and colleagues of the University of Michigan at Ann Arbor to study the "Feasibility of Sailing Ships for the American Merchant Marine." Woodward and colleagues reported that as long as fuel prices were lower than $11.25 per barrel, sailing ships were marginally uneconomical. Now, according to Platt's Oilgram Prices Report, a barrel of marine diesel purchased in Houston costs from $39.40 to $41.50.



Wing sail rigs (right) — each mast of which is similar to an airplane wing set upright on the deck of the ship — ranked highest in the recent MarAd report's evaluation of eight proposed modern rig alternatives. The evaluation included a literature search and aerodynamic analysis for performance prediction and a mathematical analysis of the rig's initial cost, operating cost, weight, size, reliability and safety.

Wind Ship Development Corp.

But Woodward says it is a "naive conclusion" to assume that commercial sailing now would be economically feasible merely because the price of fuel has risen. "Other prices have gone up also — prices for labor, synthetic material for sails," Woodward explains. "A lot of things have changed. You can't go back to the romantic age of sailing.... You can't send the boys up the mast in the North Atlantic anymore. It's like asking for more passenger trains when they can't even run from Detroit to Chicago without getting $2 of federal money for every $1 they take in on ticket sales," he says. Woodward's skepticism of wind as an alternative "fuel" for commercial ships does not prohibit him, however, from conceding that the use of sails as an *auxiliary* power — that is, with an engine — "may be a reasonable approach" to tapping wind power on the ocean.

And that is precisely what the more recent MarAd study suggests — use of a "combination of sail and screw propulsion working in concert," or motor-sailer hybrids. The results of the study indicate that the auxiliary sails should be metal wing sails — a type that resembles aircraft wings. The MarAd report cautions, however, that increasing the crew by 20 percent to man such sails "would at present fuel prices negate the economic advantage." As a result, the wing sails should be automated and remotely controlled and require only minimal maintenance. Finally, although such a system is suited for small to medium-sized (2,000 to 40,000 deadweight ton) cargo vessels, the greatest savings, the report concludes, could be realized on the smaller ships.

The use of sails to assist smaller modern ships is not a new concept. West Coast boatyards — such as the Skookum Marine Construction of Port Townsend, Wash. — have been building sail-assisted workboats for years; Rick Brown and Peter Guest of Vineyard Haven have been shuttling freight between the mainland and the

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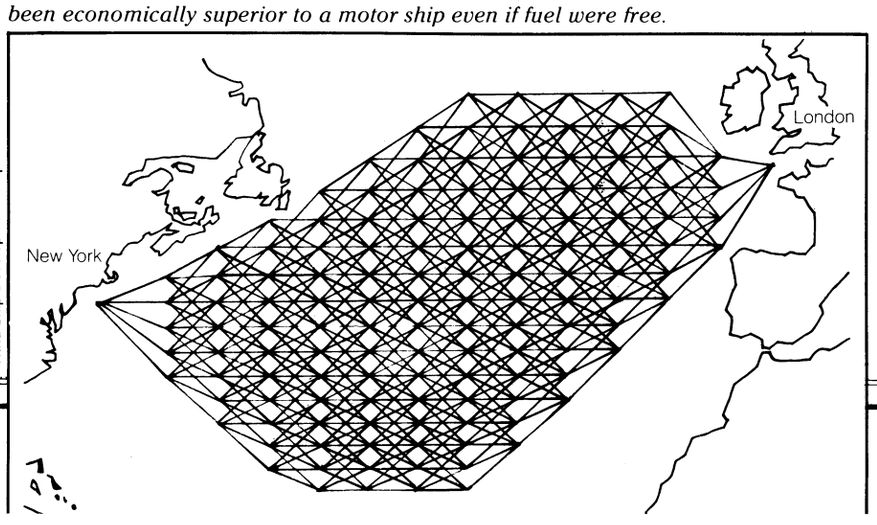
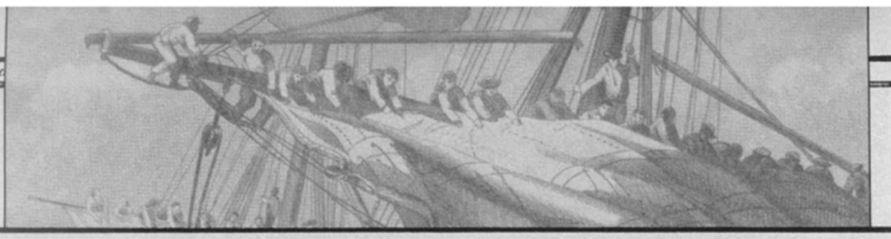
The computer-generated grid pictured below indicates there are about 45 million North Atlantic ship routes. Using weather forecasts to choose the best route offers great promise for sail-assisted ships, according to the MarAd report. In fact, for one particular simulated voyage, Wind Ship researchers claim that because of the faster transit time due to favorable wind conditions, a motor-sailer would have been economically superior to a motor ship even if fuel were free.



Wind Ship Development Corp.



SAILING FOR SCIENCE

Do sails have a place among the sensitive microscopes, temperature-measuring batfins and other scientific equipment of modern-day oceanographic research vessels? When a National Academy of Sciences research team recently conducted some preliminary investigations to address that question, at least one team member, Corey Cramer, felt the answer already had been blowing in the wind for 10 years.

Since 1971, Cramer explains, the 100-foot research schooner *Westward* has covered most of her annual 20,000 miles on the high seas with sail power. (She also has diesel auxiliary power.) The research vessel, which belongs to Sea Education Association (SEA) in Woods Hole, Mass., carries about nine crew members, 25 students and nine sails. "It is now the largest U.S. ship that does all aspects of oceanography under sail," says SEA's Cramer. While the oceanographic sailing ships *Atlantis, Vema, Albatross* and *E. W. Scripps* all are gone with the wind, and the 140-foot *Regina Maris* (operated by the Ocean Research and Education Society, Inc. in Boston) limits herself to whale research, *Westward* still collects data for marine biology, geology and engineering and meteorology, Cramer says. The ship pulled into a Bermuda port last week, for example, after measuring the pollution in the Raritan Bay (downriver from New York City), transecting the Gulf Stream and studying cold core eddies further south (SN: 11/22/80, p. 330). *Westward*'s fuel bill for such activities, says Cramer, is only 10 percent of what the sail-less cost would be.

Because of *Westward*'s success and the ever-rising cost of fuel, Cramer says researchers should consider designing a larger sail-assisted, or motor sailer, research vessel. In fact, he and other members of the NAS team report, "We will be greatly surprised if oceanographers do not eagerly seek the opportunity to sail on this ship."

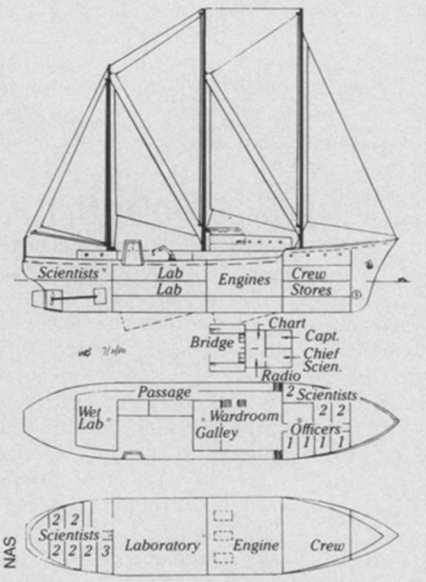
Capt. James G. Grunwell of the National Oceanic and Atmospheric Administration, on the other hand, does not expect all oceanographers to eagerly seek such an opportunity. Grunwell says that although he and NOAA colleagues would certainly consider any motor sailer that developed beyond the drawing-board stage, they do not yet share the NAS team's enthusiasm for sails of transit; instead, says Grunwell, the proper place for sails in oceanography may be in stationary work. For example, when NOAA's engine-powered research vessel *Rainier* anchored last year on the windward side of Hawaii, " The wind was blowing so hard that the high-balanced ship just kept shifting," Grunwell says. The *Rainier* crew could not safely launch her three small survey ships that were to collect data for nautical charts until the ship was steadied; so the crew turned to sail power. They used a sail to keep *Rainier* pointed into the wind and therefore steady.

"We would find sails useful for more stationary work," Grunwell says, "but we're not sure they would be economical for transit because of the people needed to operate them and the uncertain schedules." In addition, he says, "Because large research vessels have things like cranes and helicopter platforms, sails could be there on a space-available basis only."

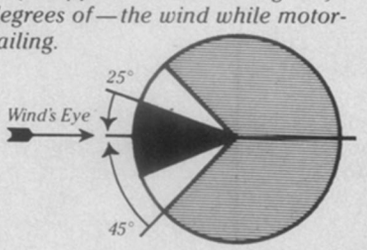
Still, the NAS team maintains, "It is now possible to build a more efficient sailing ship than has been possible before" because of decades of technological advances that have never been applied to sailing. "There is a widespread image of square riggers rounding Cape Horn in a gale with men hanging on the yards that does not fit the ship we have in mind," the team reports.

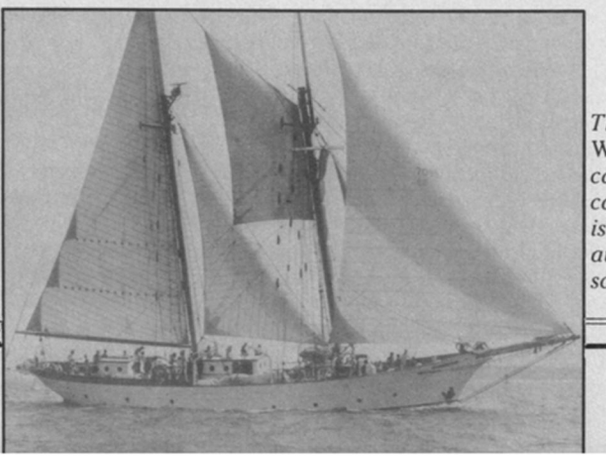
The ship the NAS team does have in mind is a 250-by-50-foot, steel-hulled, 1,400-deadweight-ton vessel with retractable centerboards (in place of a fixed keel), 160-foot-high masts, power-furled, triangular polyester sails and room for an 18-member crew and 24 scientists. The vibrations and noise caused by propulsion units would be greatly reduced on such a ship ("making it easier to use microscopes, to think and rest"); the ship would be computer-steered; and it could sail as close as 25 (as opposed to the normal 45) degrees to the eye of the wind. Says the NAS team, the tallest obstacle researchers will have to clear in designing such a motor sailer "may be the state of mind of some scientists or administrators who know little about large sailing ships and may react negatively before investigating the possibilities."

Blueprint for a modern motor-sailer



One advantage of a modern motor-sailer over sailing ships of the past is it could sail much closer to — or within 25 (as opposed to the average 45) degrees of — the wind while motor-sailing.





Norman Fortier

The research vessel Westward, *the Sea Education Association's campus on the high seas, is a 250-ton steel auxiliary-powered schooner built in 1961.*

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Ride With the Wind

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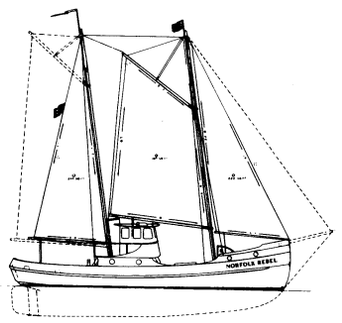

Rebel Marine Service

The *"Tugantine"* Norfolk Rebel.

islands of Martha's Vineyard and Nantucket, Mass., in the sailing, 40-foot *Lily of Tisbury* since 1979; and finally, there's Capt. Lane Briggs of Rebel Marine Service, Inc., in Norfolk, Va., who has been using wind power as the result of a joke he played six years ago.

In 1975, Briggs hosted a regatta, or yacht race, and party for the sailboats at his marina. According to the regatta rules, Briggs had to participate in the race to attend his own party so he fitted his 46-foot tug *Steel Rebel* with sails. "It was no joke a few days later when the *Steel Rebel* was towing a barge on Chesapeake Bay and... [I] decided to raise his sails," Briggs says. The tug was more than a knot-and-a-half faster, and Briggs was able to throttle back his engine and use less fuel.

Briggs's experience with his *Steel Rebel* led to the design and construction of the sail-assisted, 48-foot *Norfolk Rebel.* And now, the government is keeping tabs on this *Rebel,* says National Marine Fisheries Service (NMFS) energy coordinator Ed Loughin: NMFS recently provided $72,000 toward the *Norfolk Rebel*'s first year of operation in order to study the potential for fuel savings through the use of sail-assisted fishing vessels.

Loughin says the use of sails on U.S. ships probably will be limited to smaller vessels like the *Norfolk Rebel.* "The Japanese [who last summer launched the *Shin Aitoku Maru,* an oil tanker with sails] are most likely to proceed with and be the leader of sail-assisted ships, because they don't have an indigenous source of alternative fuel," Loughin says. "The United States, on the other hand, has a number of alternative ways to power its major commercial fleet for the next 20 years... and sail-assisted ships is way down the line as an alternative." In fact, operators of large- and medium-sized U.S. cargo vessels probably will convert to a coal slurry, Loughin predicts.

Still, he says, sail-assistance may prove to be the preferred energy option for small-ship owners in the United States. "They're not about to pull out their diesel engines and convert to alternative fuel engines," Loughin explains. "They're going to be stuck with diesel engines so they'll have to minimize diesel use." □