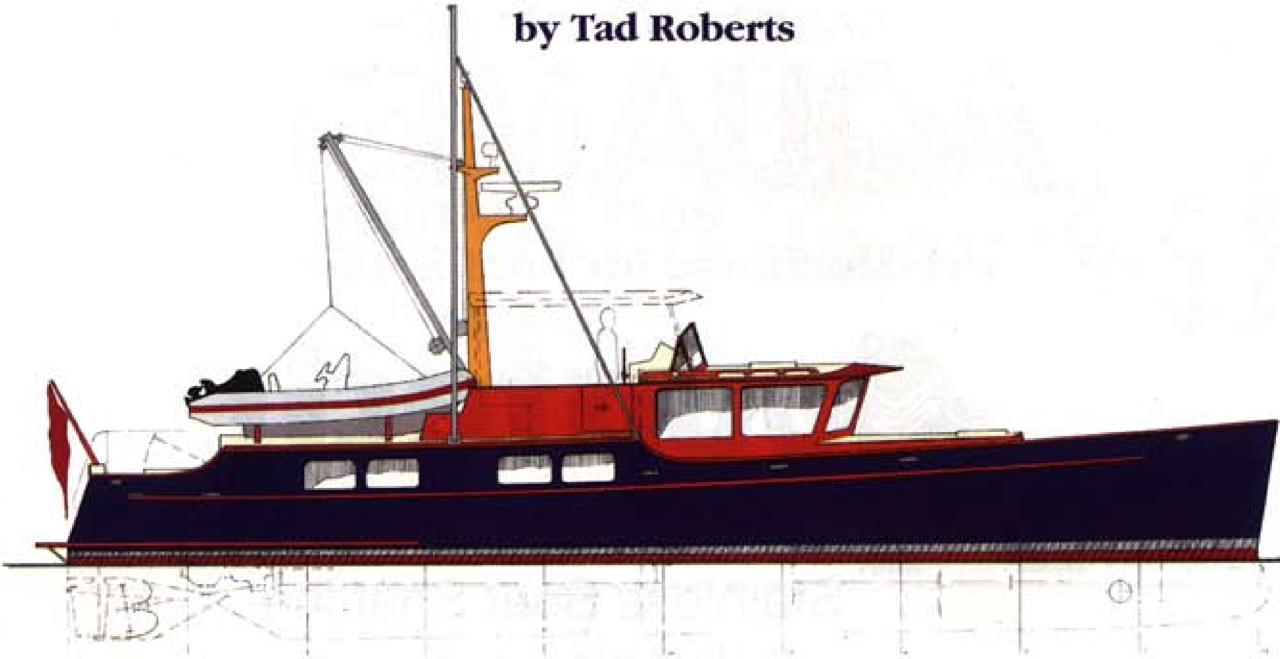
Passagemaker Lite

A modern lightweight restatement of the lean long-range power cruiser.

by Tad Roberts



TAD ROBERTS

So-called passagemaker-style production boats currently available, such as the Krogen 42 (12.8m) and the Nordhavn 46 (14m), are characterized by a high, wide, and heavy hullform—an imitation of the commercial trawler. These short and wide hulls, however, are limited to what most of us consider to be a very slow speed, or actual over-the-bottom cruising speeds of about 6.5 knots. I believe that in the next few years passagemakers will be represented by a quite different hullform: a sleek monohull that can achieve long range with speed, economy, and classic good looks.

One approach to increasing the efficiency of a displacement hull is to make it longer for a given weight, or to decrease displacement for a given length. Passagemaker Lite, the design series presented here, is a high-speed displacement hullform, a shape closer to a naval frigate than a fishing vessel. It has a long waterline, relatively narrow beam, and fine entry.

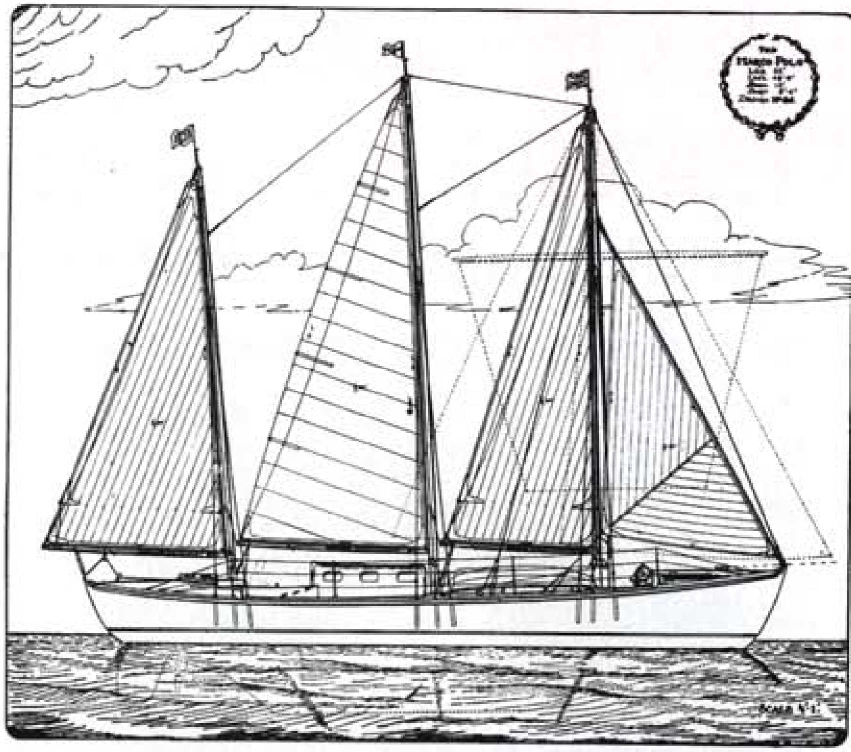
In the manner of a frigate, there is some rise to the sections aft, but there is still deep immersion of the hull at the transom. The prismatic coefficient is fairly high (.678), and displacement is spread out along the hull to counter trimming tendencies. The difference between high-speed displacement and semi-displacement (or semi-planing) is intent: a high-speed displacement hull will slip through the water with minimum resistance, while a semi-displacement form, such as a lobsterboat with its wide, flat aftersections, has dynamic lift and stability.

Let's consider some of the objections to Passagemaker Lite: low, narrow

TAD ROBERTS

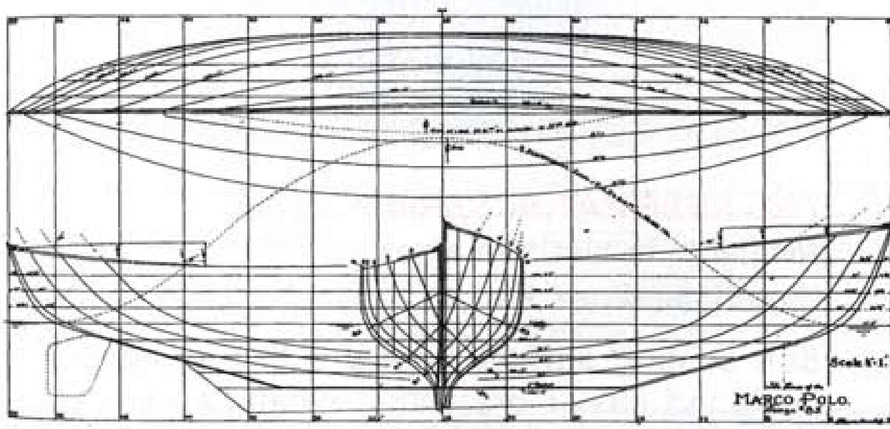
The author's Passagemaker Lite design is a displacement cruiser meant to cover long distances quickly and efficiently. Reduced wave-making due to waterline length, plus reserve buoyancy provided by a bulbous bow, help ensure a reasonably dry ride. Drawings on this page are of a 56' (17.1m) model; Roberts has other versions as well, ranging from 38' to 80' (11.6m to 24.4m).

boats are wet, and roll more than wider ones; a narrow boat will have less room for accommodations than a wider vessel; and there's the question of whether lighter craft can really be as safe.



SENSIBLE CRUISING DESIGNS/L.F. HERRESHOFF

Chief among the principal objectives of Marco Polo—the name L. Francis Herreshoff gave his design No. 85—was, he said, "a long cruising radius under power." Complete plans were published in The Rudder *magazine, and would influence many post-WWII yacht designers.*



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The beam/length ratio on the whaleboat-like Marco Polo is 0.18—rather extreme for the author, though Herreshoff's rationale was "extreme seaworthiness." The Passagemaker Lite series has a beam/length ratio between 0.20 and 0.26, creating a wider boat that offers more interior space.

The Design

Waterline Length. I created Passagemaker Lite with maximum waterline length for a number of reasons. For a given displacement, the long waterline reduces wave-making, the major resistance component at the higher speed/length ratios where Passagemaker Lite will cruise. A longer waterline also means that the hull's entrance can be finer—again, reducing resistance. Finally, the long waterline provides more usable interior space than a hull of similar length with substantial overhangs. This brings us to freeboard. Passagemaker Lite's hull has moderate freeboard forward. Why? Higher freeboard means increased weight and windage. Because of the short overhang, Passagemaker Lite's bow starts to lift as soon as it encounters a wave, thus the boat can stay dry, even with lower freeboard. The bow is similar to that of modern high-performance sailboats. An important factor is keeping weights as far aft as possible, and a bulbous bow provides reserve buoyancy. Finally, I have included a full-length spray rail above the waterline to allow for increased buoyancy up high, keeping the deck drier at speed, like the configuration favored on *Jim Hawkins*, a light-displacement ocean cruiser built by Bob Derecktor and designed by Avard Fuller. *[For more on the* Jim Hawkins, *see "Lightweight Motoryachts," a sidebar on page 62—Ed.]*

Beam/Length Ratio. The best way to recognize Passagemaker Lite is beam/length ratio. With a beam of 15.42′ (4.7m) and overall length of 45.75′ (13.9m), the Nordhavn 46 has a beam/length ratio of 0.34. That of the Krogen 42 is 0.35. This is typical of most modern trawler yachts. In contrast, the beam/length ratio of L. Francis Herreshoff's offshore cruiser design Marco Polo is 0.18 and that of *Jim Hawkins* is 0.21. These are a bit extreme for my taste. My designs have more beam and thus more interior space. For example, beam/length for the Passagemaker Lite (or PL) 56 is 0.24; the PL 46 is 0.26, and the PL 80 is 0.22. I think we can safely say that typical modern trawlers have a beam/length ratio of over .32, while Passagemaker Lite will be between 0.20 and 0.26.

Because Passagemaker Lite's profile is as low as I can manage, its vertical center of gravity (VCG) will be lower than that of the high and wide trawlers. The hull is large enough to float on its own weight, so there is no need to weigh it down in the water with a lot of ballast. But, we do need a small amount of ballast to ensure quick recovery from a high-angle roll. The PL 46 will have 2,500 lbs to 3,000 lbs (1,133 kg to 1,360.8 kg) of lead in its keel, and the PL 56 will carry about 4,500 lbs (2,041.2 kg).

Stability. A major concern with both heavy- and light-displacement passagemakers is stability. A vessel's displacement is equal to the total weight of its structure, ballast, and payload. The structural weight, on the other hand, is dependent on its size: the smaller the boat, the lighter the weight. Passagemaker Lite's ballast is made more effective by using lightweight cored structures in decks and cabintops, and by minimizing the height of those structures above the waterline to reduce the boat's roll-inertia (the tendency for a mass to keep moving once in motion). Also, the lower and more centered the weights are, the less energy is required to damp out rolling once it starts.

Stability can be addressed in two areas: initial stability and ultimate stability. High, wide, heavy boats are initially very stable and are stable at the dock, but that's not ultimate stability. Alternatively, a narrow hull, if low enough, can have more stability than a wide boat. Initial stability, or "low angle" stability, is dependent on hullform. For example, wide hulls have high initial stability, which is nice at the dock on a calm day, but once the boat starts moving, motion can be jerky. In the case of wide, flat hulls, the center of buoyancy shifts outboard very quickly as the vessel heels. This damps out rolling, fast. With a deeper, narrower shape, though, the shift happens more slowly, so rolling can start more easily, but it is slower and more predictable. Ultimate stability is dependent on beam and VCG. A narrower boat has higher ultimate stability, and a boat with lower superstructure has a lower VCG. Thus, the lower, narrower boat has more reserve stability at high angles of heel. Rolling can be much reduced in the modern passagemaker, one of wide or narrow form alike, using active stabilizers, flopper-stoppers, gyro stabilizers, or flume tanks. With Passagemaker Lite, this translates into installing smaller stabilizers or handling lighter flopper-stoppers.

Resistance and Speed Predictions. For the Passagemaker Lite 56, I chose a pair of John Deere 4045DFM 4-cyl naturally aspirated engines. These engines produce a maximum of 75 BHP@2,400 rpm, and have ZF 63 IV V-drive reduction gears mounted directly on them. A reduction of 2.477:1 is a maximum of 970 rpm at the propellers. Exact resistance figures for the PL 56 await tank-testing, but I can make some predictions based on the work of Roger Compton, the current dean of Webb Institute. His 1986 paper "Resistance of a Series of Semi-Planing Transom Stern Hulls," published

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The author placed a full-length spray rail on his Passagemaker Lite for increased buoyancy up high, a detail seen on Jim Hawkins ***(left)****, a 61' (18.6m) Avard Fuller-designed light-displacement ocean cruiser built by Dereckor and launched in 1969.*

Lightweight Motoryachts: A Brief Background

The history of lighter-weight fast boats with serious cruising range goes back almost 100 years. In the early part of the last century, motoryachts such as the 75' x 14' (22.9m x 4.3m) *Nokomis*, built in 1903, began as refinements of fashionable and elegant sailing yachts. These became the rumrunners and fast commuters of the Roaring Twenties. Engines of the day were of fairly limited power, so efficiency was achieved with long, lean hullforms. *Marlin*, built in 1930 for Edsel Ford to a design by Walter McInnis, is a fine example of this type. Measuring 51'6" x 12'6" (15.7m x 3.8m) with 3' (.9m) draft, the boat was powered by twin 245-hp Sterling gas engines producing a top speed of 24.5 knots at 1,500 rpm. The design was an interesting combination of commuter and sportfisherman. *Marlin* was capable of 20-knot sprints up Long Island Sound, but most of its cruising would have been at 14 to 15 knots. It is at this speed that the vessel would have headed offshore in search of swordfish. McInnis was well known as a rumrunner designer and *Marlin*'s design roots included high-speed cargo boats, as well as the fast yachts McInnis had created while working at the now long-gone Lawley and Nock yards earlier in his career.

These lighter-displacement yachts of a more refined style were, to quote L. Francis Herreshoff, "better suited to the conveyance of ladies and gentlemen than dead fish." Their hulls were designed to derive excellent performance from a limited amount of power, whereas current practice is to start with a given accommodation plan and wrap a hull around it, then try to improve performance with various bulbs, fins—or by just adding horsepower.

Transoceanic cruising in powerboats began in 1937 when French yachtsman Martin Marie crossed the Atlantic alone in

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by the Society of Naval Architects and Marine Engineers, is a useful guide to predicting the resistance of this hull type.

According to Compton's method, the John Deere 4045s would push the PL 56 to a top speed of just over 11 knots. That's in calm sea, with flopper-stoppers out of the water. (The engines are rated to produce 75 hp continuously, 24 hours a day.) But, we will back off a bit for long-distance cruising. Let's look at a distance cruising speed of 10 knots, which would require approximately 88 hp total, 44 hp from each engine. This is about 2,100 rpm, and will consume 2.6 gal/hr (9.8 l/hr). Total fuel capacity for the PL 56 will be 1,100 gals (4,164 l)—let's say, 900 (3,406.9) usable with 200 (757.1) in reserve or to run a small generator. Those 900 gallons of fuel will take us about 1,700 miles (2,735.9 km) at 10 knots. That's a long cruise along the coast, but not quite enough to cross an ocean. If we drop back to 1,900 rpm, we'll burn about 3.9 gal/hr (14.8 l) total and our 900 gallons will last 230 hours. At 9.5 knots through the water and 9 over the bottom, our range will now be 2,075 miles (3,339.4 km), which will get us across the Atlantic, but is still short for the cruise from the West Coast of the United States to Hawaii—a crossing that would require another speed reduction, to about 8.5 knots over the bottom.

Internal Volume. Internal volume is another question. Cubic numbers can be useful in comparing vessels of differing dimensions. This is simply length x beam x depth. Length is LOA + LWL divided by two. Depth is height from main deck to fairbody. The Nordhavn 46 has a cubic number of 42.04 x 15.5 x 8 = 5,200. That of *Jim Hawkins* is 59.66 x 13 x 7.5 = 5,800 (about 11% more). The Nordhavn has more interior above the main deck level and therefore achieves similar volume. This comes at the cost of a higher center of gravity. The cubic number of the PL 56 is about 4,900 (94% of the Nordhavn's). It will have somewhat less space because the only double-decking will be where the flybridge/boat deck extends over the main cabin.

I minimize the narrow feeling in Passagemaker Lite designs by utilizing the full hull width as much as possible with a raised topsides and flush deck. Raised topsides also add to the boat's ultimate stability range, creating a safer vessel than the usual trawler with its low side decks. My designs achieve their light weight by being narrower and lower in profile. Thus, they are of smaller section than wider,

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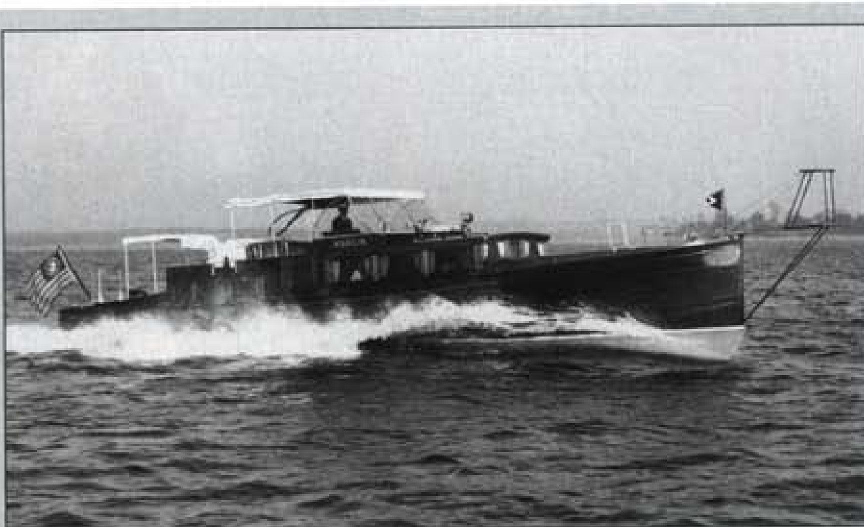
Arielle. There had been several transatlantic stunt voyages prior to that, but this was the first real ocean cruise in a powerboat. Marie was a marine painter, and he wished to spend time with his subject. *Arielle* was 42'6" (13m) LOA and of moderate displacement and proportion; certainly not a massive heavyweight. He drew up extensive specifications for his vessel, including the addition of a wheelhouse—a first for ocean-cruising powerboats. Fitted with a 75-hp Baudoin diesel and 1,500 gallons (5,678 l) of fuel, the boat cruised from New York to Le Havre, France, in 19 days. This calculates out to a respectable average speed of 6.7 knots for the distance of 3,063 miles (4,929.4 km). *Arielle*'s cruise passed without incident: the engine ran smoothly, and the crew met no heavy weather. Therefore, the journey generated no dramatic press. Ocean cruising under power was obviously not heroic and possibly considered a bit boring.



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Marlin, *built in 1930 to a design by Walter McInnis, is an example of a refined yacht based on the fast rumrunners of the 1920s that achieved good performance with limited power.*

After the Second World War, Herreshoff published a design for a long-distance offshore cruiser he called Marco Polo. Long, lean, and light, Marco Polo was designed for efficiency under power, but was also equipped with sails for steadying, additional drive, and get-home power. A three-masted rig provided adequate sail area down low with lots of combinations available, depending on wind strength and velocity. No sail was too large for the single watch-keeper Herreshoff envisioned. The Marco Polo models were intended to be driven around the clock at 10 knots, a tremendous speed at a time when sailing ocean cruisers averaged 100 miles (161 km) per day. The boat is 55' x 10' (16.8m x 3m), with a designed displacement of 42,500 lbs (19,277.7 kg). On a 49' (14.9m) waterline this is a displacement/length ratio of 161. Marco Polo has an outside ballast keel of 14,600 lbs (6,622.5 kg)—34% of its displacement—reflecting the fact that the vessel carries 812 sq ft (75.4 sq m) of sail. Herreshoff claimed it would sail well in moderate and heavy weather, as well as go farther and faster than many pure powerboats.

Herreshoff's Marco Polo influenced the thinking of a number of designers, including Robert Beebe, who wrote the book *Voyaging Under Power* (International Marine/McGraw-Hill, 3rd edition, 1994). After a 1957 voyage from New York to the Bahamas in a Marco Polo, Beebe wrote in *The Rudder* magazine, "The hull is terrific. The action of the boat in a seaway was a joy to behold." There was later talk that the boat's motion and speed were too lively, and that it was uncomfortable. But, it seems this may have been a function of short, steep seas. Also, that particular

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higher vessels. Because of their length, they still provide reasonable interior space. And, less tankage means more interior space for accommodations.

Weight. Can Passagemaker Lite be built to this seemingly optimistic weight target? I believe so, but it will take a slight shift in mindset to achieve it. In the current crop of wide heavy trawler-yachts, heavy is good. This is true if you're trying to weigh down a huge hull designed to carry a load of fish, or if you're trying to slow the motion of a high and wide hull. Passagemaker Lite is the opposite. I want to make it stronger and lighter. This is the same principle driving the creation of both modern trawler cats and ultralight sailing cruisers.

Avard Fuller managed to produce a lightweight voyager by building in aluminum and simplifying the interior arrangement. Aluminum would certainly be a good option for Passagemaker Lite, and it would be the first choice for those concerned with possible collisions offshore. The boat could be built even lighter if every part of the hull, deck, house, stringers, and bulkheads were constructed of fiberglass skins over a foam core. Using this all-bonded structure, we could add an interior of the same materials. The cabin sole, lockers, shelves, counters, and berths could all be bonded to the hull and become part of the structure, increasing stiffness without adding any extra parts. Once bonded in, the glass faces could be filled and painted or veneered with wood. Covering the bulkheads and overhead with fabric is also stylish and lightweight. Light-colored painted surfaces, small amounts of wood trim, and bright upholstery can create a comfortable and livable interior that's lightweight, as well.

The PL 46 and 56

I've drawn Passagemaker Lite in lengths from 38' to 80' (11.6m to 24.4m), but let's focus on the PL 46 and 56. Common features for the boats include a forward pilothouse with an upper outside bridge aft over the main living area, which is low in both boats, with the cabin sole at approximately a foot (300mm) below the waterline. This minimizes motion—a welcome feature for the cook trying to work at sea. Another feature the boats have in common is the aft engineroom; there is no having to live around, or on top of, engines. The main machinery is completely isolated by a full-height watertight bulkhead. Fire, flood, noise, heat, and vibration all are kept apart from the living quarters. We rely on video equipment and alarm systems to continuously monitor the machinery. Access is down a ladder from the

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Marco Polo was not built as designed. Finally, the motorsailing potential of Beebe's Marco Polo was never realized, because he and his crew *sailed* the entire distance. The designer's performance claim was substantiated, however, when the boat averaged 6 knots over 1,000 miles (1,609.3 km), mostly in heavy seas under reduced sail.

Avard Fuller, an amateur designer, saw potential in long, lean hulls, as well. While working with builder Bob Derecktor, Fuller developed a series of light-displacement ocean cruisers. One example of Fuller's work is *Jim Hawkins*, a 61' x 13' (18.6m x 4m) yacht launched in 1969 that displaced 47,500 lbs (21,545.6 kg), fully loaded. With a 58'4" (17.8m) LWL, the displacement/length ratio is 107. Two Volvo Penta MD29 engines generate 64-hp each and push the boat at a maximum of 9.5 knots in smooth water. At 7.5 knots, and a speed/length ratio of 0.98, the engines are running at 1,850 rpm and burning 2 gal/hr (7.6 l/hr). When new, *Jim Hawkins* ran the 1,170 miles (1,882.9 km) from Morehead City, North Carolina, to St. Thomas, Virgin Islands, in 140 hours while burning 561 gallons (2,123.6 l) of fuel. Average speed was 8.35 knots and fuel consumption was just over 4 gal/hr (15.1 l/hr). *[For a profile of Bob Derecktor, see PBB No. 75, page 126—Ed.]*

Jim Hawkins' design included several innovative features, the first being Bob Derecktor's spray rail, which is a wide horizontal shelf well above the DWL. The idea was to achieve fine waterlines down low for minimum resistance, and to add buoyancy in the topsides. At higher speeds the spray rail is also necessary to stop the wake from running up the topsides. *Jim Hawkins*' "shelf" is 6" (152.4mm) wide at the stem, tapering to nothing at station eight. Fuller also included two methods of roll stabilization aboard the boat. The first was a very short sailing rig, which was understandable since Fuller had been a sailor for 30 years. But, he found the sails were only useful when he had a stiff breeze on the beam—a rare occurrence. As speed under power increased, the apparent wind moved forward and the sails luffed uselessly.

His second method of stabilization was more successful: a daggerboard that extended *Jim Hawkins*' draft by 5'6" (1.7m). Fuller stated in an article in *Yachting* magazine (June 1972) that the daggerboard damped out most of the rolling in all ordinary conditions and made the boat quite comfortable. Of course, there are structural concerns, but it would be interesting to compare drag and roll-damping between this type of daggerboard and the bilge keels or fins that have become common today.

The Nordhavn 46 (14m), a trawler-type motoryacht with a displacement similar to that of *Jim Hawkins* but with a waterline 20' (6.1m) shorter and a displacement/length ratio of 383, burns an additional gallon an hour for the same 7.5 knots. Therefore, fuel use increases 50%, due solely to hullform. It would take tremendous power for the shorter, wider vessel to reach *Jim Hawkins*' 9.5-knot top speed. We could redesign the trawler hull as a semi-displacement vessel and install more power to manage the 9.5 knots. Then, it would take about 160 hp to push our modified vessel to a speed/length ratio of 1.53. With this much power the boat would burn 9.6 gal/hr (36.3 l/hr), two-and-a-half times the amount burned by *Jim Hawkins*.

From the Marco Polo and *Jim Hawkins* prototypes, various designers have generated a long line of similar boats over the years. In 1948, British designer Laurent Giles produced the lovely *Woodpecker*, a 70' (21.3m) LOA yacht with a 14'1" (4.3m) beam and a displacement/length ratio of 90. In 1955 William Garden created *Little Goose*, which was 60' x 15' (18.3m x 4.6m), running at 9 knots with 120 hp. My Passagemaker Lite arrangement (see main text) is descended from that of *Little Goose*. For other examples, consider Tom Fexas, who brought us the 44' x 11' (13.4m x 3.4m) and 52' x 13' (15.8m x 4m) Midnight Lace models in the late 1970s. And, designer Penn Edmonds recently completed *Fayerweather*, a 60' x 11'6" (18.3 by 3.5m) boat that weighs just 25,000 lbs (11,339 kg). In every case, the designers were chasing comfortable and seaworthy speed, achieved with boats of small midsection driven by moderate-sized engines. As a side product, they also created some very handsome boats.

—*Tad Roberts*

TAD ROBERTS

The PL 80

Arrangement aboard the Passagemaker Lite 80 is somewhat different than the PL 46 and 56 (discussed in the main text), due mostly to its size. In this case, I raised the sole in the main living area to about 8" (203.2mm) above DWL to allow for extensive integral tankage below the waterline in the correct longitudinal position. The forward section of the boat is given over to staterooms with dinghy storage above. I moved the pilothouse from the foredeck to above the saloon to increase visibility from the helm. The 80 does have an aft engineroom similar to the PL 46 and 56.

The possibilities for ocean-crossing performance with the PL 80 are impressive. With a pair of 3306 Caterpillar engines producing a maximum 355 BHP, top speed is about 14.5 knots. At 12 knots, range is 3,400 miles (5,471.8 km). With good weather, a West Coast (U.S.)-to-Hawaii crossing could be made in less than eight days, and the 2,550 miles (4,103.8 km) from Bermuda to the Canary Islands could be completed in under nine.

—*T.R.*

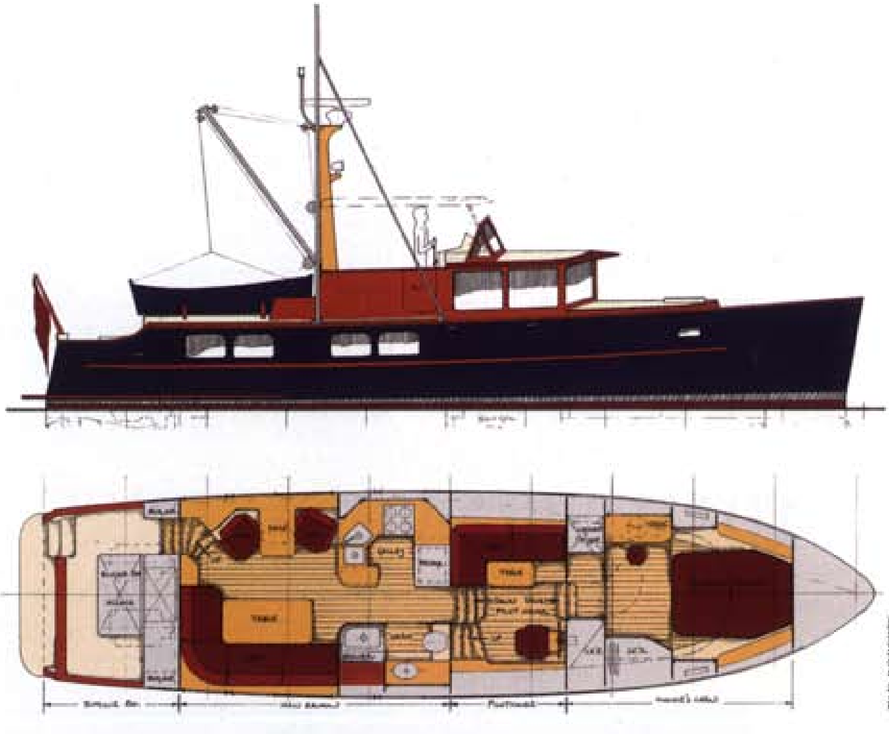
afterdeck, but a watertight door/window could be installed from the main saloon to the engine space.

Interior arrangements for the 46 and 56 include the single head and sleeping cabins forward. These accommodations are intended for a couple to live aboard long-term, with occasional guests or crew on board for passages. During a passage, the off-watch will sleep on the seat in the wheelhouse or in the saloon aft. Coastal cruising or at anchor, the owner's cabin forward provides privacy from guests sleeping aft.

The deck layout of these two boats is very similar, differing only in the size of particular areas. Boarding is from the stern, via a swim step and up a few stairs to the after well-deck. Here, there is seating on the engine-room trunk, which opens to provide full access to the engine area. You can change out or rebuild an engine or generator without disturbing the liveaboards. From the well-deck, there are stairs starboard up to the boat or bridge deck, and port down into the saloon. The boat deck stretches from rail to rail, with room to store a good-sized hard-bottomed inflatable. At the forward end is a mast with boom to handle the dinghy, along with stabilizer poles port and starboard.

The bridge deck is forward of the boat-storage area on both the 46 and 56, with outside controls, seating, and dining area sheltered from the elements by a windshield and canvas top. The enclosing half walls have sliding gates port and starboard; access to the wheelhouse is down a sliding hatch to starboard. What's important about this setup is that the helmsman is only a couple of steps away from line handling when docking the boat. All the way forward is another well deck, this one for safety while handling ground tackle.

Moving the machinery aft shortens shaft runs and minimizes noise and vibration in the living areas of the boat. It also frees up space under the wheelhouse and saloon to place tankage directly over the center of



TAD ROBERTS

*Passagemaker Lite 46 **(above)**, like PL 56 on the opening page, has accommodations for a liveaboard couple with room for occasional guests or crew. The yacht features a forward pilothouse, with an upper outside bridge aft over a main living area kept low to minimize motion for those on board.*

flotation. This means trim changes little as the fuel burns and water gets consumed. Fuel and water loads are the largest single weight aboard these boats, so centralizing and keeping it low, again, reduces pitching and rolling moments.

Why twin engines? Unquestionably, a bigger engine with a single large-diameter propeller would be more efficient. But, a single large prop would mean more draft, even with a propeller pocket. The two here are in pockets behind substantial skegs, which will protect them and hold the ship upright when it takes the ground. In looking at moderately sized, serious offshore yachts, I note two, three, or even four engines aboard. Most owners of single-engine vessels opt for the security of a wing engine, with a generator or two for backup. I suggest that two small engines on Passagemaker Lite could serve as redundant propulsion systems, and be belted or coupled via PTO (power takeoff) to generators. Thus, these two (excluding the dinghy's outboard) would be the sole engines aboard.

The payoff for lighter displacement and a longer waterline is more speed with the same or less power. For example, the Nordhavn 46 crosses oceans at a speed/length ratio of about 1.2, which translates to 7.4 knots. At a speed/length ratio of 1.2, the PL 46 travels at 8 knots. And, for the PL 56, it is 8.8 knots. On a long voyage, such as the 2,200 nautical miles from southern California to Hawaii, this can make a difference of days. Two thousand two hundred miles at 7.4 knots is 297 hours, while at 8 knots it is 275 hours, and at 8.8 knots it is 250 hours. The PL 56 would take about two days less than the Nordhavn 46 on the same passage.

To obtain greater speed from the short and fat trawlers, builders are going to ever-larger engines. But, it's expensive to push wide, high-displacement hulls fast. It is also true that as displacement/length ratios drop, speed/length can increase. Short heavy boats with a displacement/length of 350 will be limited to a speed/length ratio of about 1.4, maximum. My longer, lighter designs will run up to a speed/length ratio of 1.6 and beyond. This is possible with modest power; the PL 56 will achieve 12 knots with a pair of 105-hp engines; twin 150-hp engines push it up over 14 knots.

Not only can we cruise the world's oceans without having to imitate heavy-displacement commercial vessels, but we can make relatively fast long-distance passages in yachts designed expressly to combine seaworthiness, beauty, economy, *and* long range with comfortable motion and accommodations. PBB

About the Author: *After 14 years with Bruce King Yacht Design in Newcastle, Maine, Tad Roberts opened his own design office on Gabriola Island, British Columbia, Canada. He has worked extensively with yacht builders such as Abeking & Rasmussen, Royal Huisman, Hinckley, and Hodgdon.*