



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 Derektor 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 yachtman Martin Marie crossed the Atlantic alone in

Continues on page 64

Continues from page 62

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.

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



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.

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

Continues on page 66

Continues from page 64

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 Derektor, 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 Derektor, see PBB No. 75, page 126—Ed.]

Jim Hawkins' design included several innovative features, the first being Bob Derektor'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 tremen-

dous 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