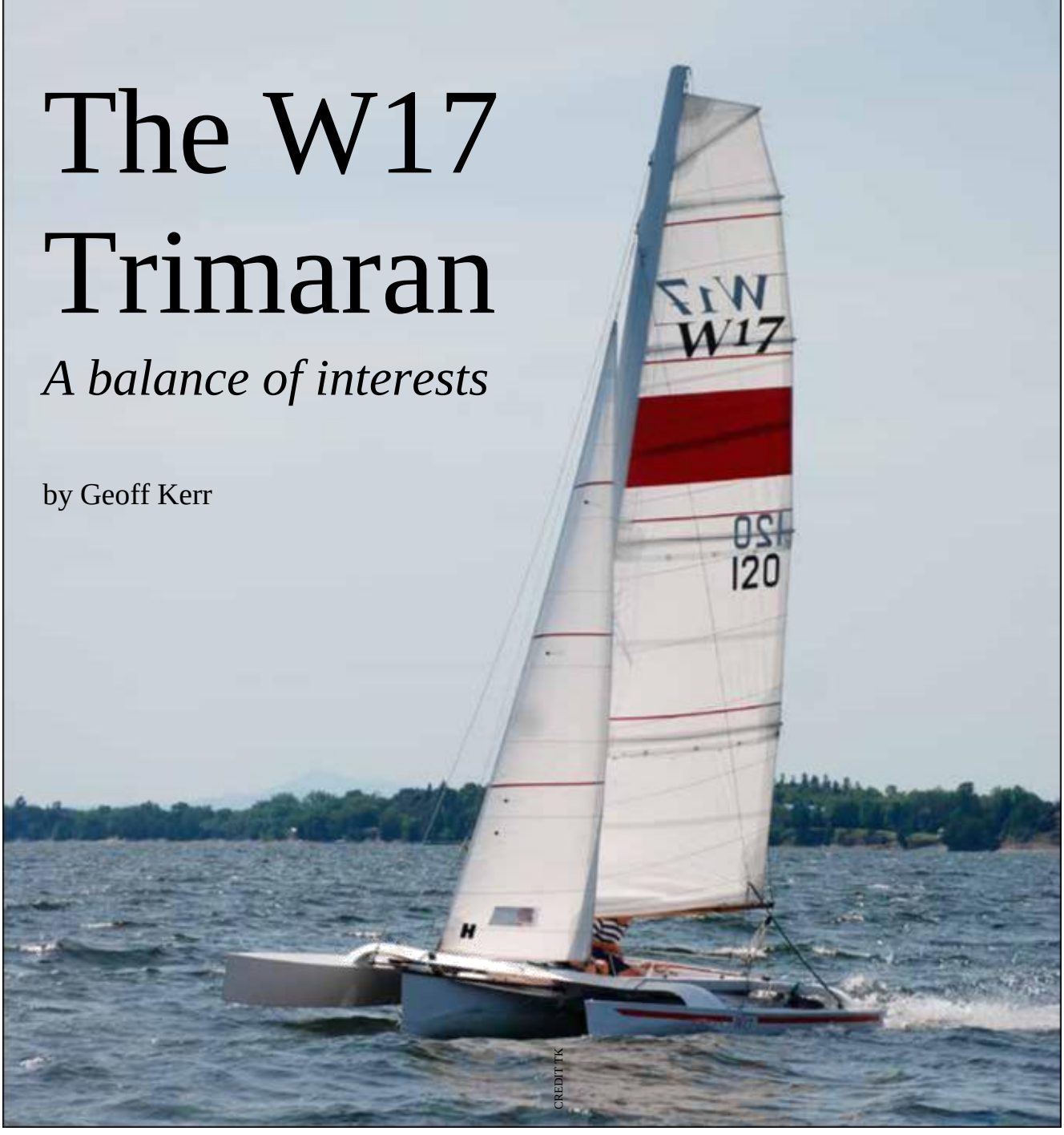
The W17 Trimaran

A balance of interests

by Geoff Kerr



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Refined high performance in a 17′ backyard- built plywood boat seems rather unlikely. Equally contradictory are the combination of easy construction with sophisticated engineering, high speed with boxy hulls, and easy handling with high-tech sailing. But in his W17 trimaran, designer Mike Waters has synthesized 60 years of sailing high-performance boats, 30 years of professional ship design, and 35 years of owning trimarans to conquer these apparent contradictions. Two hundred sq ft of sail, three fine-lined hulls, light displacement, speeds routinely topping 10 knots in seemingly effortless sailing…how did this happen?

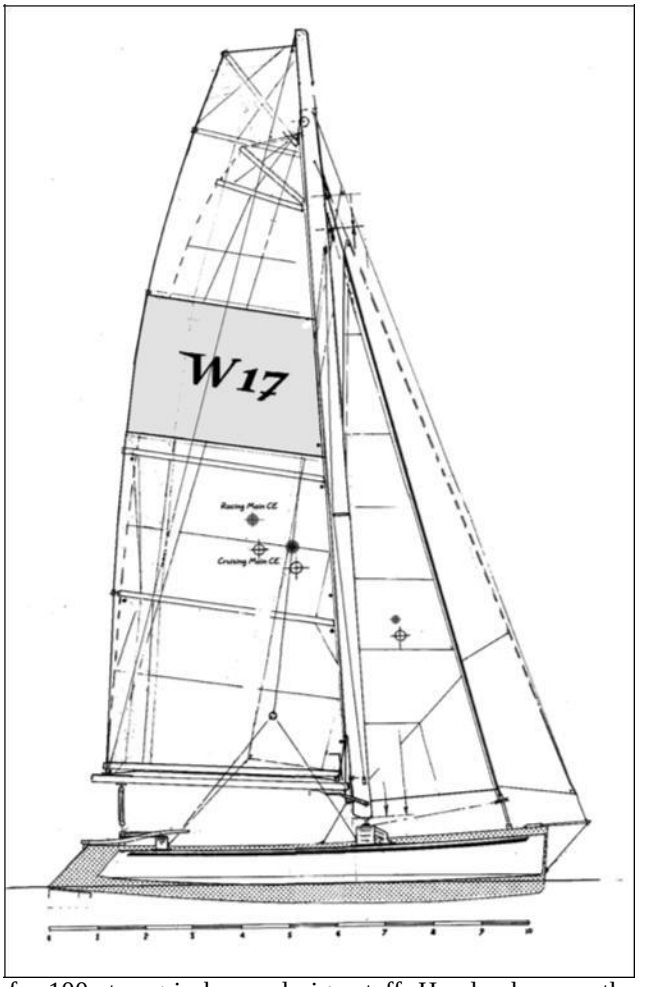
The short answer is that Waters, a retired naval architect and longtime multihull enthusiast, needed a boat.

In 2005, an acute medical problem prompted him to find a new owner for MAGIC HEMPEL, the legendary Quorning Brothers tri that he owned for some 15 years. After regaining his health, he found himself casting about for his next boat, and the idea of designing and building the W17 was born.

The choice of trimaran came naturally. Early in his career, he had found an inherent contradiction in monohulls that were designed to be wide enough and strong enough to support massive ballast keels that seemed to him to be only effective at large angles of heel, which distorted hull hydrodynamics, increased wetted surface, and rendered the boats uncomfortable and relatively slow. His experiences increasingly

***Above*— In a fresh breeze on Lake Champlain, - Vermont's « Inland Sea », Mike Waters's 17' LOA trimaran MAGIC, sails flat, fast and smooth, while the crew sit comfortably in the cockpit.**

The sailplan's solid lines depict the racing rig which has a 28ft tall, homebuilt, carbon-fiber wing mast. The dotted lines represent the more conservative cruising rig, which is designed for a 24' tall wooden wing mast that is simpler to build.



led him to realize that in modest sizes of about 35′ and under, trimarans made great sense. Waters attended the first World Multihull Symposium in Toronto, Ontario, in 1976, where he met many of the early luminaries of the movement (see WB No. 202). Thus began 35 years of multihull sailing and ownership.

The choice to build it himself, too, came naturally. Waters built his first boat at age 12 at his home near Christchurch in Dorset, England, not far from The Solent and the Isle of Wight. His project was inspired by reading Arthur Ransome's *Swallows and Amazons*. He immediately sought out a library book about how to build a boat, and then he and a mate built a pair of 10′ dinghies, inevitably christened SWALLOW and AMAZON. Boats soon overtook his classical piano studies.

Waters went on to study naval architecture at the University of Southampton, through an enlightened arrangement in which he simultaneously worked at the John I. Thorneycroft & Co. Ltd. shipyard, allowing him to combine his education with practical work experience. During the program, he overlapped with such notables as Ian Nicholson, Peter Milne, and John Westell. Waters tutored a shipwright classmate in math in exchange for training in racing sailboats. By his early 20s, he was designing and racing Moths (see WB No. 37), the long-lived and dynamic development class. He competed against such legends as Uffa Fox and Ian Proctor. His Flying Moth design was so successful that he formed a company to put it into production and 28 were built.

Waters took a master's degree with a specialty in industrial shipyard management. He taught in the U.K. for a year before emigrating to Canada in 1957, with the intention of picking up his teaching career there. Too late for the academic year, he talked his way into a job as a draftsman in what was then a two-man design department at a bustling shipyard, Maritime Industries Ltd. (MIL) in Sorel, Québec. Thirty one years later, he retired as MIL's Director of Engineering and Ship Design, by then in charge of a 100 strong in-house design staff. He also became the only Anglophone director of the company. MIL, which had a peak employment of 8,000 during World War II, still employed more than 1,500 into the 1980s. Waters oversaw the design and construction drawings of over 50 ships, including cargo liners, tankers, trawlers, icebreakers and ferries.

More than a "meet the specs" designer, Waters consistently looked for ways to give his company an edge. For example, when the provincial government commissioned the development of some steel offshore fishing vessels to be built in a rural seaport town by an unskilled workforce, Waters conceived of a rotary-drum building jig. The innovation allowed simple, down-hand welding throughout the construction. His rotary building concept later helped the company win a contract to build the Canadian navy vessel BRAS D'OR, a 164′ aluminum hydrofoil that reached 63 knots in her 1969 sea trials.

Throughout his career, Waters continued sailing, racing, designing, and building small boats. His first multihull was a Lock Crowther designed Buccaneer 24 and since that

Designer and builder Mike Waters demonstrates the ease with which the mainsail furls around the boom. The handle stows in a handy tool locker built into the forward aka fairing at the heel of the mast.

Hinged akas allow the amas to fold up for tranportation or storage. When folded, the amas rest on a purpose-built brace set on the beam top, relieving strain on the hinges. The flat-bottomed hull transports easily on a flatbed trailer.

experience he has owned, sailed, or crewed dozens of multihulls ranging from 12′ to 60′.

Until the W17, his most recent multihull was MAGIC HEMPEL, named for her sponsor, the Danish coatings conglomerate. The boat had taken the sailing world by storm when she won her class in the 1985 'Round Britain and Ireland Race. After that victory, this prototype of the still popular Dragonfly racked up the silver for several years under owners on both the U.S. East and West coasts before landing on a mooring at Waters's Lake Champlain cottage in 1990. "Nothing compared to this wonderful boat," Waters says. "She could sail decently to windward, tack on a dime, had a light helm, great stability, kept the crew pretty dry, and was once clocked at 25.4 knots—not half bad for a 25′6″ boat with a cabin.…"

Looking for something similar but smaller, Waters distilled this self-imposed design brief: he sought excellent overall performance in a boat that could be built at home, one that would sail efficiently and be cost-effective, comfortable, dry, and easily handled ashore and afloat. She should also "make the owner smile."

The Design

Cost-consciousness and ease of construction quickly pointed Waters toward plywood for the new boat's main hull. This hull has a flat bottom, which makes the W17 easy to beach and to transport on a trailer. Its topsides are nearly vertical, and the resulting low wave resistance contributes to good speed. With the amas, or outrigger hulls, providing stability and buoyancy, no flare was necessary in the main hull's topsides, making it easy to build. The amas, too, are designed with simple, nearly square sections, but with a twist: the bottom panels are canted to be deeper inboard, presenting a V-shape to the water surface.

The akas—the crossbeams joining the amas to the main hull—were engineered as box-sectioned wooden beams. A simple hinge on the top surface of each aka and a latch on the bottom allows the amas to be folded upward over the main hull for trailering. Each aka is made in three sections: The straight middle piece is simple to attach to the main hull's deck, and the outboard sections on each side are also built as square-sectioned box beams but have a pronounced downward curve to mate with the decks of the amas. This profile keeps the akas high and clear of the waves. The forward aka, located well aft of the bow, carries about two-thirds of the load and is therefore larger than its aft counterpart and has a lightweight plywood spray deflector built onto its forward face.

The self-bailing cockpit—which for ease of construction was made rectangular—has a flat sole for unencumbered seating and lounging. Built into the forward end of the sole is the slot of the trunk that houses a pivoting dagger-board. This is no misnomer: the designer devised this hybrid board as a solution to the challenges of a shallow and rocky home cove. He wanted to avoid the speed-stealing turbulence created by a long center-board slot, and experience had proven to him that gaskets meant to close off the slot can be shortlived. Nevertheless, the painful memory of suffering broken ribs during a high-speed, abrupt stop in a previous daggerboard boat also lurked in his mind. So the W17′s board shifts up and down as any daggerboard does, but the trunk is built with enough length and angle to allow the board to be deliberately raked aft to reduce draft by 12″—which also much reduces the shock of a grounding. This has proven to be enough clearance for working into the shallows. If the board bumps the bottom, the crew can heed the warning and raise the board. The resulting slot is only about half as long as a comparable centerboard's. On top, the slot is flush with the cockpit sole, making it self-draining.

The rudder presented yet another conundrum: beaching ability versus sailing efficiency. Waters's practical solution was inspired by a kayak rudder and a visiting boat. He uses

Generous side benches and high coamings allow up to four to sit to windward and each bench allows one person to stretch out comfortably. The trampolines outboard of the mainhull invite lounging & tents can be set up for overnight.

Left **: The daggerboard trunk's top is flush with the sole, making the cockpit self draining. The board is shown here partly retracted and pivoted forward for working in the shallows : bungee cords hold it in place.**
Above **: The mast rotates as the mainsheet is trimmed, but its angle of attack can be fine-tuned by easing or tightening the lanyard connecting the mast tiller (visible below the gooseneck) to the boom.**

a small balanced spade rudder in an assembly fitted with a horizontal, wedge-shaped, turbulence-catching upper plate. That top-plate mates to a cutout in a section of the bottom planking that, along with the side planking, extends aft of the transom. The entire rudder assembly (blade, endplate, post and tiller) pivots up and out of the water on a horizontal hinge mounted on the aft edge of the deck. Lines to raise and lower the rudder assembly are easily tended from the cockpit.

The wing mast is stepped on a deck-mounted pivot pin at the forward end of the cockpit. A pair of shrouds lead to rings on bridles secured outboard on the akas. The forward end of each bridle is fixed and the aft end is rigged as a multipart lanyard for adjustment. The forestay, rigged with a roller-furling jib, anchors on the main deck aft of the stem. A short plank bowsprit reinforced by a bobstay provides a pad-eye for securing the tack of the downwind sails. The mainsail hoists in a luff groove and its halyard leads to a convenient snubbing winch for tensioning.

The halyard is made off along-side the mast on a unique low-profile jamcleat, backed by a camcleat. The arrangement is clean, simple, effective, and inexpensive. The mast rotates via a strut mounted below the gooseneck and coupled to the boom by an adjustable tackle. Thus the entire mast trims with the sail, but the angle of attack still can be tuned.

The amas are easily folded for storage or transport. Pins are removed from the latches on the bottom of each joint. With two, the ama can easily be lifted and then lowered on to a purpose-built supports amidships. If no help is available, a strut can be strapped to the ama with its inboard end landing on the cockpit sole, supporting the ama until the skipper can move into the cockpit to lower it the rest of the way.

Stepping the 28′ mast is a conventional process. The pivot pin is built into a sort of shoe that bolts to the deck keeps the butt aligned and under control; a gin pole sockets into the mast; and a pair of guys guide the effort. Pad- eyes for these guys are permanently mounted on the akas. Waters's own experience, corroborated by reports from

Far Left : **The entire rudder assembly is attached via a deck-mounted hinge, allowing the rudder to be raised easily.** ***Left :*** **When lowered the unit's lower flange mates into the bottom planking, allowing the spade rudder to operate efficiently and in very little turbulence.**

Waters built MAGIC under a temporary rain shelter sized to just fit the project. The cockpit, mounted here on the main hull, is rectangular, making it simple to build while maximizing useful space.

other owners, suggests that it now takes less than 45 mins to set up the boat from trailing to launch.

The Construction

The plans consist of 15 sheets, each 24″ × 16″, are provided in PDF form on a CD, or in hard copies for an additional charge. These drawings include layouts to guide the efficient use of plywood panels. The detailed, step-by-step manual is full of photos of Waters's own construction, with numerous illuminating diagrams and detail sketches. MAGIC, as he named his boat, was built using only common power tools under a small, temporary back-yard shelter just big enough to contain the main hull.

Construction starts with building a platform on which to fabricate and pre-sheath the hull panels. The molds and bulkhead are then erected on the same table for each of the hulls in sequence. After a hull's stringers, stem, transom, and planking panels are finished, the hull can be cleaned up and faired and its exterior sheathed in fiberglass cloth set in epoxy before the hull is turned over. Once upright, the hull's interior filleting can be attended to, along with beams and other structure, followed by the decks. When one hull is finished, it can be set aside while the next one is set up on same table. The cockpit structure makes the main hull the most complicated one to build, but once it is upright all the components seem to follow a logical sequence with good access and easy assembly.

Next come the akas. Their parts are numerous, but simple and of manageable size. A patient dry assembly will help determine the glue-up sequence and clamping arrangement. When the forward beam is complete, its 3mm, two-panel fairing is installed. When all is complete, the hinges and latches are mounted. MAGIC used stock stainless-steel hinges, but with custom-manufactured, laser-cut stainless-steel hardware so readily available these days, Waters has turned to designing his own laboratory-tested latches, which he sells separately. With careful attention to alignment, the akas fold up smoothly.

The materials list specifies 17 sheets of marine plywood, in 3mm, 4.5mm, and 6mm thicknesses, plus some 40 bd ft of hardwood and softwood lumber, 6 gallons of mixed epoxy, and 70 square yards of fiber-glass cloth. The designer estimates the materials cost about $5,000, and the hours of work for the project at between 350 and 500. (Precut plywood parts are available by an arrangement with Witt Designs in Australia and Chesapeake Light Craft in North America. Fynboats will also offer kits in Europe).

The W17 has multiple rig options, including a relatively inexpensive, used, beach-catamaran rig. But Waters favors the performance provided by a wing mast. He provides two such sail plans, one a cruising rig with a 120 sq-ft mainsail and 47 sq-ft jib and the other a racing rig with a 147 sq-ft mainsail and 53 sq-ft jib. The 24′ long cruising mast is easily fabricated of wood, with a 'glass-and-epoxy -sheathed plywood skin. The racing rig, which Waters used on his own MAGIC, calls for a 28′ long home-built carbon-fiber mast for which plans are available.

Although building a carbon-fiber wing mast might seem daunting, one can take heart in the manual's photos showing Waters's own spar being built on the open deck

Right **: Viewed end-on, an ama under construction emphasizes its fine lines and canted bottom panel. With its flared shape, the ama's buoyancy increases quickly as the boat heels.**
Far right **: Before the decks are installed, the simple and easily fitted elements are apparent.**

Waters takes in his first reef when the wind speed reaches about 18 knots, reducing sail area by about 28%. He rigged trapezes mainly to keep the crew entertained as even without the trapeze, the buoyancy of the leeward ama ably keeps the boat on its feet.

of his cottage, not in some high-tech clean room. In simple terms, the builder pre-epoxies a series of full-length, carbon-fiber cloth tapes, folding-in small flanges, then assembles them step-by-step using simple jigs to form the desired curved sectional shape. The flanges keep the strips straight during assembly.

Tubing built into the trailing edge is eventually slotted to form a luff groove. End caps, halyard trucks, hounds, and other pieces of mast hardware are fabricated and mounted at appropriate times, and the entire assembly is built up to the specifications with layers of carbon-fiber cloth and a pre-woven tubular sleeve, ready for smoothing. Anyone who has gotten as far as completing the W17 hulls should be able to build a mast this way, using the detailed manual available.

Under Sail

Sailing the boat *does* make one smile. She sails incredibly flat and is smooth and steady at speed, with no pitching and no spray, which is rather a revelation for the uninitiated. The fully battened mainsail is quiet and well-mannered. The mainsheet's five-part tackle and well-led, quick-release cam cleat make sail trim sure and easy. Jib sheets can be cleated at one of two points on each side, so either the crew or skipper can tend them. She steers lightly, deliberately, and intuitively, with fingertip effort. Even though it was unfamiliar to me, I required no adjustment to this boat and rig. Tacks were crisp, with no hesitation in coming about, and with the trimaran's inherent stability there was no need to jump around in the cockpit—we just casually changed sides as needed.

On my first outing we consistently topped 11 knots on an afternoon with winds reaching 15 knots. But she remained very calm and comfortable at speed. I never felt on the edge, and I saw no sign of that dreaded beach-cat tendency to bury the lee bow. The gracious cockpit layout, with the edge of the benches on the leeward side within easy reach for a foot brace when needed, contributes greatly to comfort. Two people, or even four, have ample room on the windward side, even when shifting weight aft to keep her bow up. She is remarkably dry. Waters has tested MAGIC over three seasons, logging some 800 miles and reaching a top observed speed of 14.5 knots. He handily demonstrated many of the W17's finer points: acceleration off the wind, pointing ability, and her speed response to changes in crew trim. She also responds to pushing and sophisticated sailing. After finding it absolutely natural to step aboard and sail the W17, I can confirm that she is fast, fun, and hospitable, and she would be welcoming to all ages and interests.

Even after all those miles, Waters has not finished "developing" the design. Between my first sail and a return two weeks later, he had received and tested a stylish new storm sail designed for those awkward times when one is caught out in 30 knots of wind or more. It's essentially a fully battened mainsail with a quarter of the area of the working sail. Rolled up, it stashes below the foredeck, barely occupying the space of a large umbrella. When I last visited Waters in September 2016, a new mainsail prototype covered his cottage floor awaiting testing. Beyond selling W17 plans and supporting builders with advice and parts, he has also released plans for his W22, a larger but more complicated boat to build.

As we parted on my most recent visit, he paused and quickly sketched a rather outrageous hull section he has in mind for his entry into a new 10′ tri development class. The gleam in his eye might well have been the same as the day he launched his first boat, or from his Moth days some six decades ago.

Geoff Kerr is the proprietor of Two Daughters Boatworks in Westford, Vermont. He is a regular contributor to WoodenBoat.

For more information, see Mike Waters's website, which shows a link to a W17 Main Page at www.smalltridesign.com.