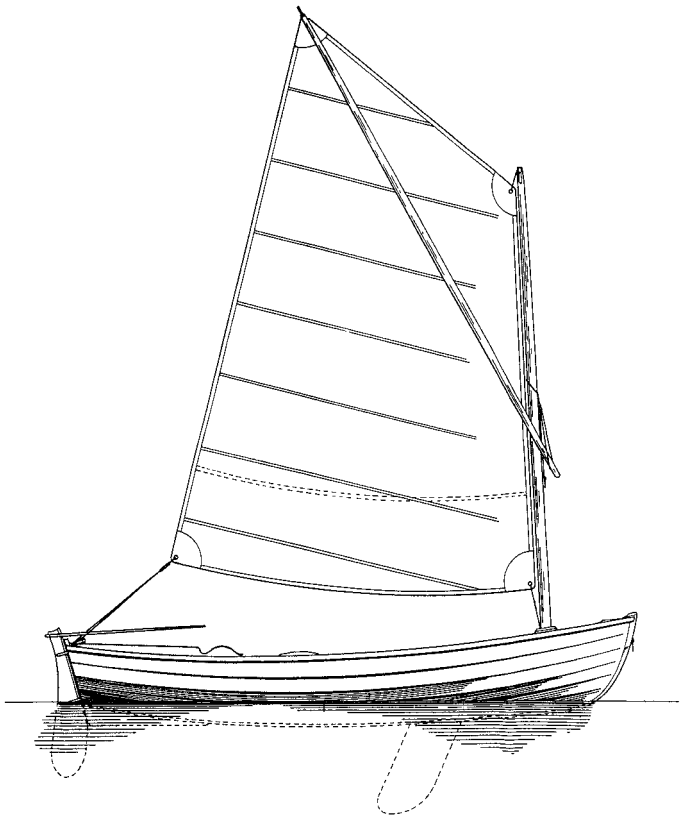
How to Build Glued-Lapstrake Wooden Boats



John Brooks & Ruth Ann Hill

A WoodenBoat Book

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Introduction

The Beauty of Glued-Lapstrake

Early in life, I decided that lapstraked boats are the loveliest there are. They never failed to please my eyes. From Viking longships to elegant Thames skiffs, I liked them all. Whenever I thumbed through a book on maritime history featuring ships, schooners, or ferries, I always peered at the smaller boats in the photos—the lapstrake boats: tenders and lifeboats stowed on decks, daysailers and rowboats tied up near the big boats, and fishing boats and yachts moored in the inner harbors.

I started out learning to be a modern boatbuilder, working in a West Coast boatyard 'glassing up hulls in molds and building the boats' interiors with plywood and modern adhesives. Solid wood entered the picture largely only for trim. Although I loved the way fine lapstrake boats looked, I thought lapstraking would be too complicated for a beginning boatbuilder like me.

A few years later, I came across a British book, *Dinghy Building*, by Richard Creagh-Osborne. (The book, originally published in 1978, is out of print, alas.) This little volume covered various methods for building British "dinghies": smallish to medium-sized racing sailboats, not tiny yacht tenders. One chapter covered lapstraking, which the British call clinker planking. Creagh-Osborne described something I'd never seen, a thoroughly modern method of building lightweight lapstrake hulls with thin, high-quality plywood planks that were glued together along the laps. Although these were boats built for speed and therefore able to withstand the considerable forces exerted on the hull by a large, tall, modern sail rig, they needed very few internal frames, vastly simplifying their construction. To quote Creagh-Osborne: "The glued clinker type of construction is very strong and quite easy for the amateur, as well as having the advantage of need-

John's 15' rowing gig ROZINANTE.

Ellen Brawley in the original ELLEN on launching day.

ing only a skeleton jig." At this time, I was especially interested in designing and building light, fast rowing and sailing craft, so not long after acquiring *Dinghy Building*, I picked up a book titled *Ultralight Boatbuilding*, by Thomas Hill (no relation) and was pleased to find that it was wholly devoted to glued-lapstrake small boats.

The glued-lapstrake boats I had seen looked gorgeous, and the method of glued-lapstraking was fascinating. I was completely hooked. It was only a matter of time before I built one. A year or two later, I drew up a design for my first glued-lapstrake boat, a 9' tender based on Captain Nathanael Herreshoff's famous *Columbia* tender, but never got a chance to build it. It was a couple more years before I did build my next glued-lapstrake design, *Rozinante*, a 15' rowing gig. This boat was just as fun to build as I thought it would be and came out looking rather nice. But she was far from perfect. I learned a number of valuable lessons, and there were things I definitely did differently on the next boat. And every boat since then has offered a chance to try new techniques and improve the method. One of the joys of glued-lapstrake for the professional builder is not being locked into building the same boat, or small group of boats, over and over again. Every boat that has come out of our shop has been an individual, even the Ellens, our most popular design.

For me, glued-lapstraking has turned into an enduring love affair and a livelihood. Here are some of the advantages that I find in glued-lapstrake construction:

Elegant and strong

Few can resist the elegant look of the sweeping curves of the lapped planks; these same laps form stringers that run from stem to stern, adding stiffness to the shell of the hull.

Lightweight and watertight

With planks made of high-quality plywood and the laps glued with epoxy, the planking can be thinner, and there is little need for all the frames found in a traditional boat. Glued-lapstrake construction effectively creates a single-piece hull that can't "work" (move back and forth) and that stays completely watertight. This quality makes glued-lapstrake ideal for smaller, lighter boats that spend a good part of their time out of the water, such as dinghies, canoes, rowboats, outboard skiffs, and daysailers.

Seaworthy

As with a traditional lapstrake boat, glued-lapstrake lends itself to seaworthy designs, plus the laps form little spray rails that help to keep the boat (and her crew) dry.

The easiest way to build a good-looking, truly round-bilged boat

Do we see some raised eyebrows out there? Consider this:

Take the 12' Ellen sailing dinghy, which we use as our primary exhibit throughout the book. She has seven planks on each side, for a total of fourteen planks to be fitted and installed. (And you make the planks in pairs, so you only have to measure and cut the seven different shapes.) If you were to strip plank the same hull, it would take more than a hundred 3/4" strips. If you decided to cold mold the hull using three layers (two diagonal, one horizontal), you would need about 150 veneers, 4" wide.

Easy to set up

Don't underestimate the value of a jig system, as it allows you to build a wide range of boat shapes, old and new, and it gives you something to work against instead of having to armwrestle with long, floppy panels in empty space. With our system of glued-lapstraking, the molds (the forms over which the hull is planked) usually are spaced 2' apart with no battens in the molds. Some methods require a batten under each lap; we use a temporary batten on top of the lap where it is much easier to

Who We Are

We wrote this book together as we run Brooks Boats, our design and boatbuilding business, together. We do have different experience and skills, and we have tried to reflect this in the text. John is the designer, builder, and teacher; it is his method and techniques that you will learn within these pages. He is also the fount of jigs. The joke around the shop is that a problem is simply an excuse to create another jig. Ruth is the writer, graphic artist, and boat naturalist; she contributes to the design work and helps with a few building operations, mainly planking. We both finish the boats, though Ruth is the color and finishing guru. John is the sailor, Ruth the paddler, and we both row and have been known to operate boats with outboards and engines. When we are not working with boats or using them for fun, we are keeping up with our young daughter, Leigh.

attach, serves as a full-length clamp, and can be reused for other planks. For a strip-built hull, you would need twice as many molds. For a cold-molded hull, you almost have to build another hull first, installing many closely spaced battens on the molds to support the thin veneers.

Building different designs is simple and efficient

Our jig is easy and inexpensive to build and can take the molds from a wide variety of boats. Setup for each new design is efficient and requires a minimal investment of money and time.

No sheathing, no fairing

Most strip-built and cold-molded boats are designed to be covered with fiberglass or other cloth and epoxy. This is a messy job that adds expense, weight, and expletives—and means another round of sanding, this time on epoxy, which isn't fun. We have heard of people sheathing glued-lapstrake boats with 'glass cloth and epoxy, but we're not sure how they managed it. We have sheathed the bottoms and/or garboards on a couple of boats that were beached daily, but the idea of doing a whole boat gives us the horrors. And it is completely unnecessary.

Then there's one of the finer advantages for glued-lapstrake: fairing the hull. The glued-lapstrake hull needs only a relatively light sanding of the bare wood before finishing…if you heed our admonitions about removing epoxy putty before it cures. Strip-built and cold-molded hulls must have all the strip edges and other irregularities in the planking smoothed out, a laborious and tedious job finished up by hand with a long sanding block known for good reason as a "misery board."

Easy to maintain

High-quality sapele (African mahogany) marine plywood provides a very stable base for finishes—some of our boats have gone three or four years before needing to be repainted. (Varnish must be recoated every year, but that is because of sunlight not the wood.) When the time comes to sand and repaint, you'll find the almost total absence of frames on the inside a delight.

A good method for beginners

Glued-lapstrake designs benefit from and reward skilled, patient work, yet the method is forgiving enough of first-time efforts to make the boats enjoyable and satisfying projects for builders with less experience. The planks overlap, not butt, each other, so there is a certain latitude in the fit of the planks. Yes, you have to bevel the laps for the next plank, but the gap-filling qualities of epoxy give you plenty of margin for error as you learn how. If the plank ends up a little narrow or a little wide, everything will fit just fine, the width of the lap will be a wider or narrower, and only you and God will know. Your boat will be fine.

Ruth tries the first Salicornia double-paddle canoe.

BUILDING THIS BOOK AND BUILDING YOUR BOAT

Back in my late twenties, I entertained the idea of becoming an instrument maker. It turned out that my grandfather had also considered instrument making in his younger days and had bought all the wood for a violin along with a thin volume on violin making. They had all sat in a box for forty years, and, one day, the box arrived in the mail. I was touched. I opened up the little book and quickly saw why the neat blocks of wood in the box had never seen a saw, chisel, or plane. The book covered the whole ocean of knowledge on violin construction in about ten gigantic steps. I stopped in the section about assembling the violin and read, "Put the back on the violin." That was it on attaching the largest piece of wood in the whole instrument; there were no little hints, no discussions of pitfalls to watch out for, no indication of how much glue to use, no "what if's" that you and I are sure to encounter.

Writing down all the details is hard work. Countless times, Ruth would interject into my (I thought) eloquent prose, "Can't see this," "Need more here," or simply "HELP?!" Writing down all the details also makes things look complicated. But we've done our best to cover everything you'll want to know—including how to avoid or deal with plenty of "interesting" situations that we've experienced (often with epoxy kicking).

We hope that you'll use this book in the shop. Launch her proper, and put her to work. Just as a boat doesn't come alive until she floats, a boatbuilding book isn't really living a full existence until she has sawdust in the binding, epoxy putty on the cover, coffee stains on the pages, and wooden bookmarks distributed liberally within.

Ready? Let's go build a boat.

Chapter 1

Plans and Lofting

IRIS, an Ellen 12' sailing dinghy design.

CHOOSING A BOAT DESIGN

First, there are the dreams: The gray walls of the cubicle billow and fill with a fresh breeze, the kids' backseat squabbling settles into the rhythmic splash of waves along lapstrake planks, the din of rush-hour traffic subsides into a steady thrum as you head out past the breakwater….

There are countless boat dreams, but no boat can fill any one perfectly. Your goal, then, is to find a design that fits your most persistent dream as closely as possible. For this, you need to climb right into your vision and look hard at the details. Bring a pencil and paper, and begin a working list. For starters:

How many people are with you? How much stuff? Check again; can your dream boat really hold all that stuff?

How does the boat work? Sail, row, paddle, motor—or some combination? Be specific: Which rig? Where do the sheets run? How many rowing stations? What size engine? Gas, diesel, or electric? Can you handle the boat alone? or with passengers with little or no experience? What sort of conditions do you expect to encounter? The best? The worst? Worse than worst?

How do you transport the boat? If she is carried, how many people does it take? Does the dream include buying a new truck to haul her? Where does the boat live during the active season? Where and how will you store her?

And so on. Once you have a good list, you can start shopping.

Buying your plans

If a design piques your interest, most designers will send you a brochure or catalog giving descriptions, specifications, and small, simple overview drawings. These can give you enough information to know whether or not you want to proceed, but in many cases you'll want more before making up your mind completely. You will want to see a study plan, which gives you a more detailed overview. Most designers will supply one for nominal cost and may apply the cost of a study plan to the price of a full set. If the design passes the study plan review, you should order the full set of plans and take a good look at her lines as well as her construction details. If there are

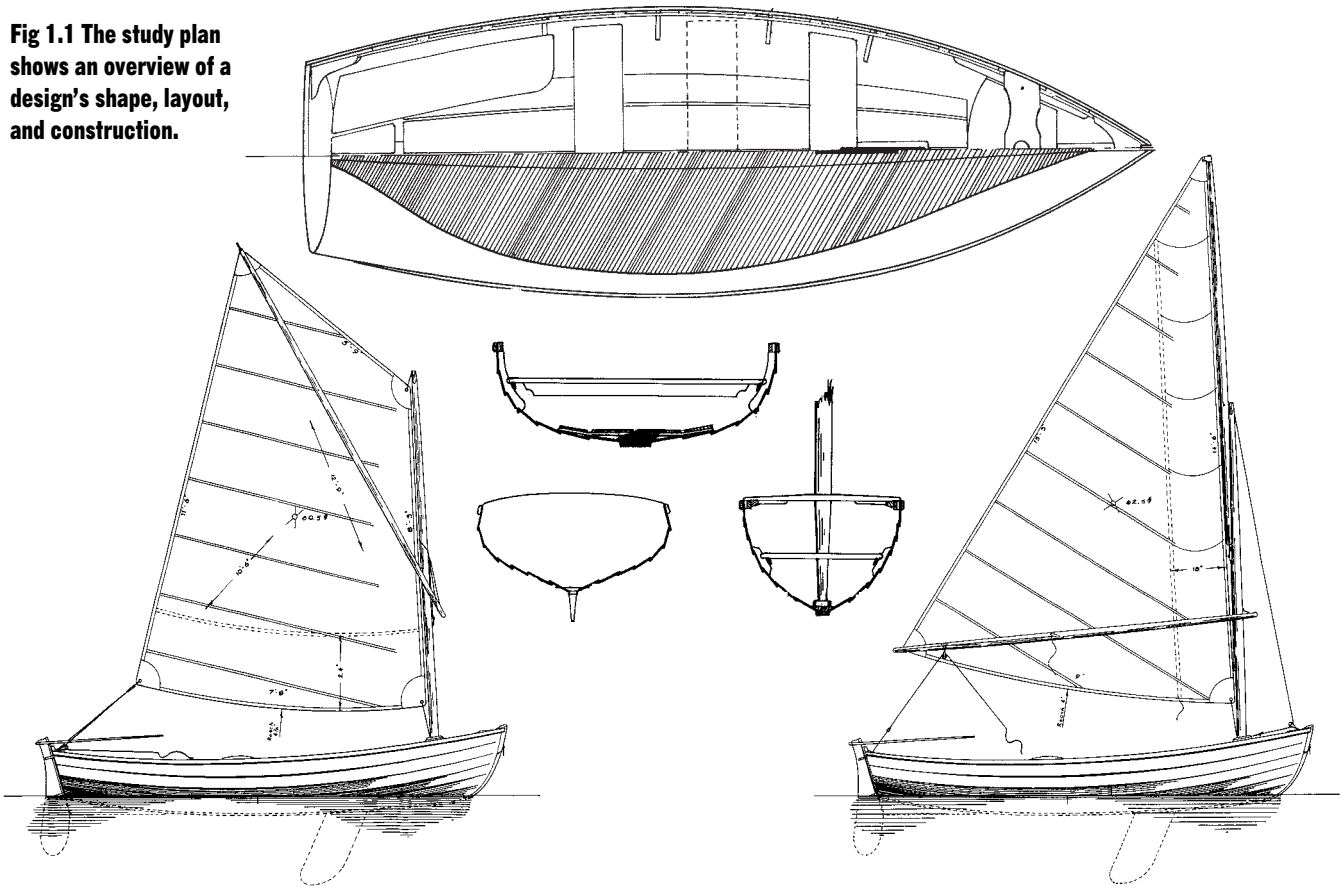

Fig 1.1 The study plan shows an overview of a design's shape, layout, and construction.

Some Frequently Asked Questions

Is this a good first project? *The answer to this depends entirely on your skills, patience, desire to learn, ability to handle frustration, and availability of expert advice when the going gets sticky. Only you can decide if you would be better off building a simpler boat first or whether you won't be able to stay inspired to keep going unless you build the boat of your dreams, no matter how challenging that might be.*

How long will it take me to build her? *This one's a poser. It is impossible for us to offer an accurate answer, because it's impossible to know your skill level, how your shop is set up, and the way you work. We recommend taking estimated building times with the proverbial grain of salt, especially if you will be working on the project on weekends and such. It nearly always takes longer that way, because you must set up anew each time you recommence work. Instead of trying to gauge total hours, consider whether you feel good about taking on the project and seeing it through to the end, even if it takes twice as long as you thought.*

How much will she cost? *The plans or designer may give you a rough estimate, but your choices can make a tremendous difference. You'll have to sit down with the plans and list of materials, make your choices, and call around for prices.*

How much does she weigh? *Your plans should give you an estimated weight, but keep in mind that your choices can affect the weight of your boat as built. For example, choosing mahogany over pine thwarts and seats and adding full-length cedar floorboards and gunwale guard adds about 20 pounds to a 12′ Ellen sailboat, a sizable gain to a boat that normally weighs 120 pounds. Though you might not think about it, surface coatings also can add significant weight to a small boat. Start covering surfaces with epoxy (with or without cloth) or fancy two-part finishes, and watch the scale climb. (We don't recommend these two operations for other excellent reasons; please see Chapter 2, "Materials and Tools," and Chapter 12, "Painting and Varnishing.")*

By the way, don't confuse displacement with hull weight. Displacement includes the weight of the boat, plus people, critters, and cargo. The displacement given in the plans is usually for an average loaded condition.

several close contenders, order the plans for all of them. It's the only way to adequately compare and consider the different designs and is a small investment in helping to choose the right boat for you.

WORKING WITH PLANS

Boat plans must depict a complex, curvaceous, three-dimensional object on two-dimensional paper. To do this, the boat must be broken apart into different views. You often have to look at two or three views to get an idea of what a part or shape will look like in the finished boat. Combining these in your mind to see the true shape can be a real trick if you're not used to it. And, some shapes cannot be accurately reproduced on flat paper. The only way to be certain of these is to build a model or build the boat.

An experienced musician can hear the music while reading sheet music; an experienced boatbuilder or designer can see the boat while looking through a set of plans. Don't get discouraged if your set of plans seems confusing at first. Plans are put together with a language and logic all their own. As you work with them, things will become much clearer.

What's in a set of plans?

The plans for the 12′ Ellen sailing dinghy (for example) include the following twelve drawings:

1. Study plan
2. Lines
3. Construction plan
4. Construction sections
5. General construction details
6. Sail plan
7. Spar plan
8. Sections and transom; full-sized patterns
9. Stem and transom profile; full-sized patterns
10. Daggerboard trunk; full-sized patterns
11. Rudder, daggerboard, tiller; full-sized patterns
12. Alternate sections and transom, for wineglass transom; full-sized patterns

The Ellen plans also include written specifications for the construction drawings, spar plan, rigging, and materials

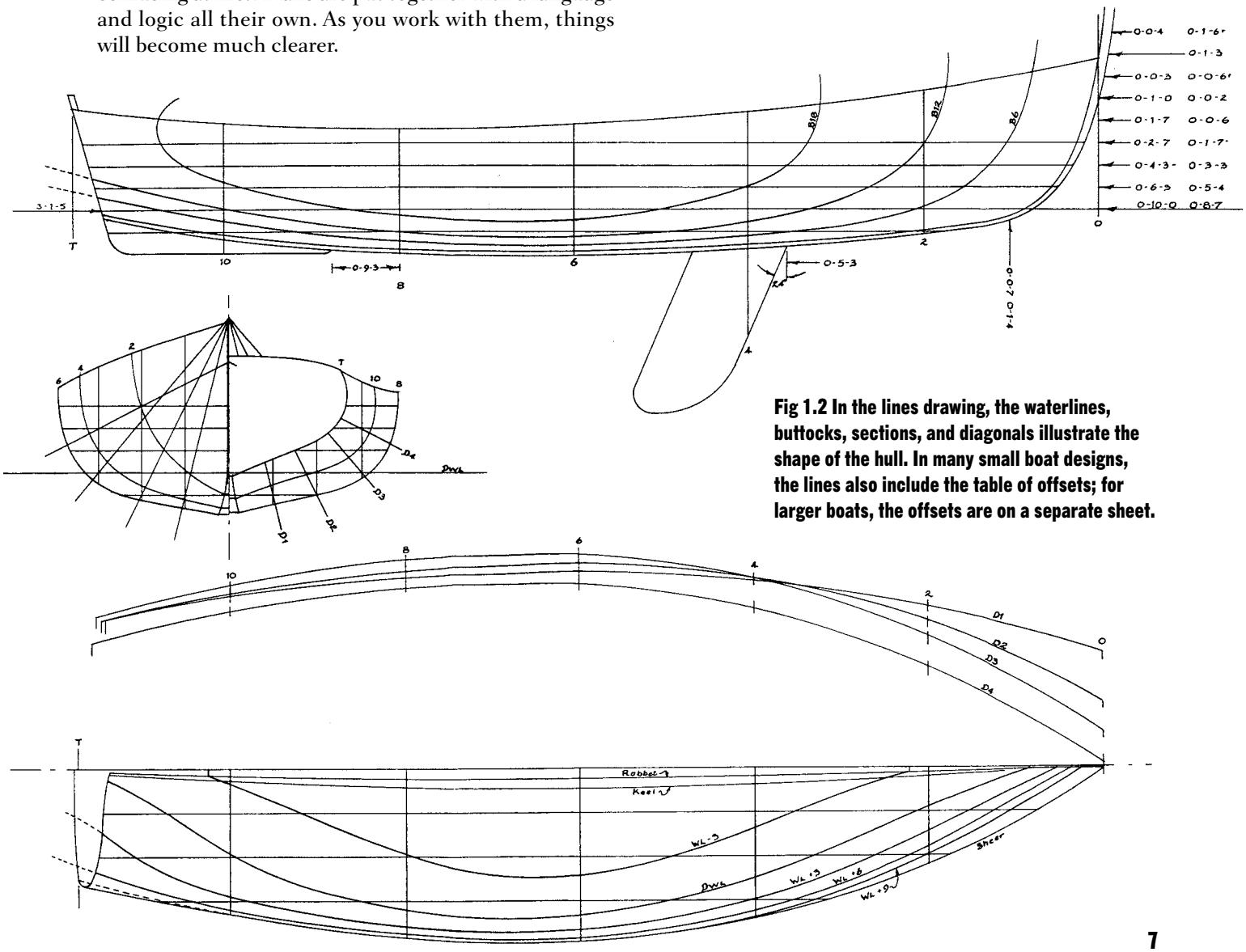

Fig 1.2 In the lines drawing, the waterlines, buttocks, sections, and diagonals illustrate the shape of the hull. In many small boat designs, the lines also include the table of offsets; for larger boats, the offsets are on a separate sheet.