

YANKEE III

Build and Sail a Model of a Famous J Class Yacht

Being a Short History of an America's Cup Contender of the 1930s
The 1935 Free Sailing Model Based on Her
and
Instructions for a Modern Radio Version, Easy to Build and Sail

by

Earl Boebert

Illustrated by

M. de Lesseps

With a Foreword by

Russell Potts

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The US Vintage Model Yacht Group

9219 Flushing Meadows NE

Albuquerque NM 87111 USA

Tel 505 823 1046

email: boebert@swcp.com

The Curved Air Press

8 Sherard Road

London SE9 6EP

United Kingdom

Tel 020 8850 6805

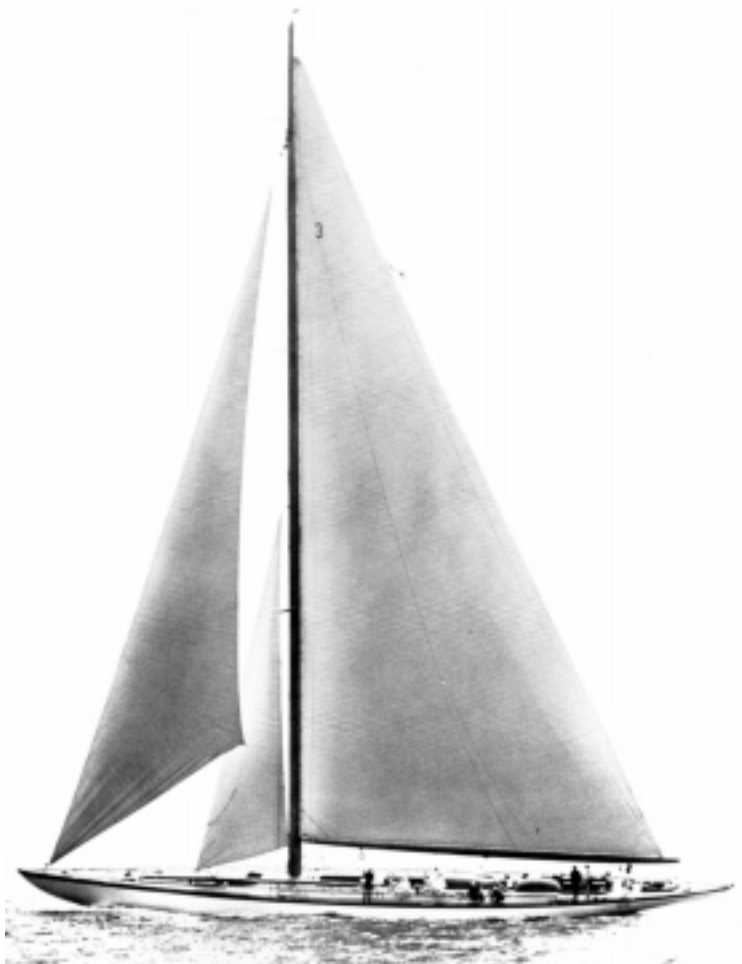
e-mail: curvedairpress@aol.com

Appendix A: *Whirlwind Jr.*

History

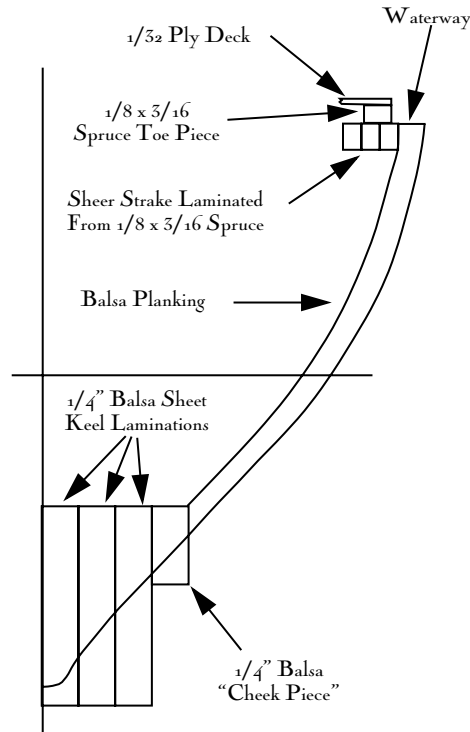
Excitement ran high in yachting circles in the Fall of 1929 when three contenders for Defender in the upcoming America's Cup races were announced: *Enterprise*, to be designed by Starling Burgess, *Yankee*, by Frank Paine, and *Weetamoe*, by Clinton Crane. There was much press speculation about a fourth "mystery ship" – this turned out to be *Whirlwind*. She was the only New York boat not developed under the aegis of the New York Yacht Club. One member of her syndicate had successfully raced a double-ended M Class boat, *Istalena*, designed by L. Francis Herreshoff, son of the celebrated Nathanael. Herreshoff stayed close to the successful hull design of *Istalena*, which was ahead of its time in many areas, including having the point of maximum beam well aft of the fashion of the time. The double-ended design enabled her to be the only J that carried a permanent backstay.

Her syndicate got a late start, which led an overworked L. Francis to specify a "composite" construction of mahogany planking over steel frames, because the other three J boats under construction had absorbed all the relevant metalworking materials and workers.



While her hull was conservative in both form and material, her rig and other details bristled with innovation. She was plagued with problems during shake-down and the Defender trials. A particular point of difficulty was her steering gear. Never sailed up to her potential, she was broken up in 1935.

Hull



Hull Cross-Section

Since *Whirlwind* was, basically, a wooden boat, it seemed inappropriate to use high-tech material such as I did with *Yankee III*.

A cedar hull would be “iffy” with regard to weight, so the logical choice was fiberglass over balsa, a well-tried technique used by competitive skippers in the 1980’s and 1990’s. It’s certainly possible to carve a balsa hull – in fact, that’s the way the first *Yankee III* prototype was built. A planked hull is more traditional, but planking the kind of full-keel hull the J boats had is very difficult. The problem is the reverse curve at the garboard, the point where the fin meets the main body of the hull.

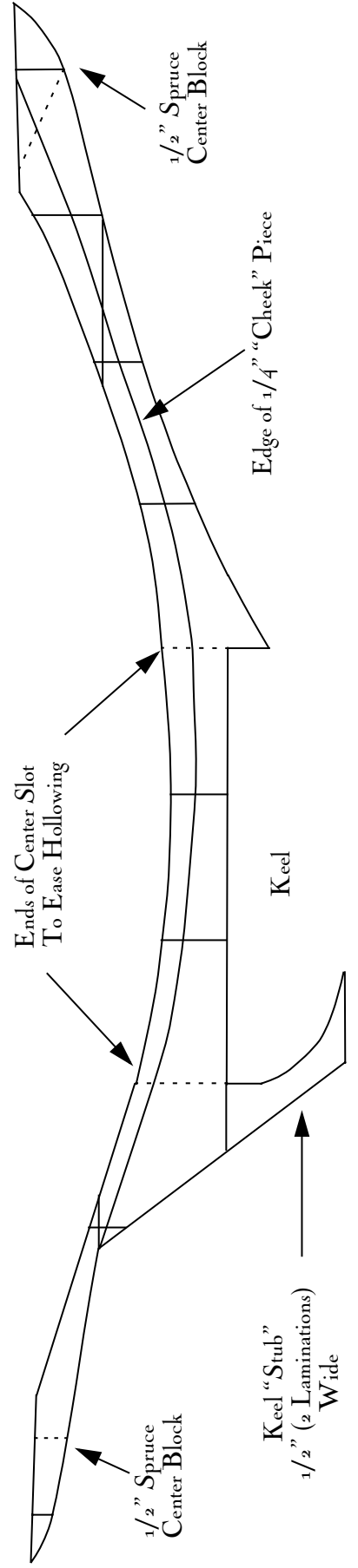
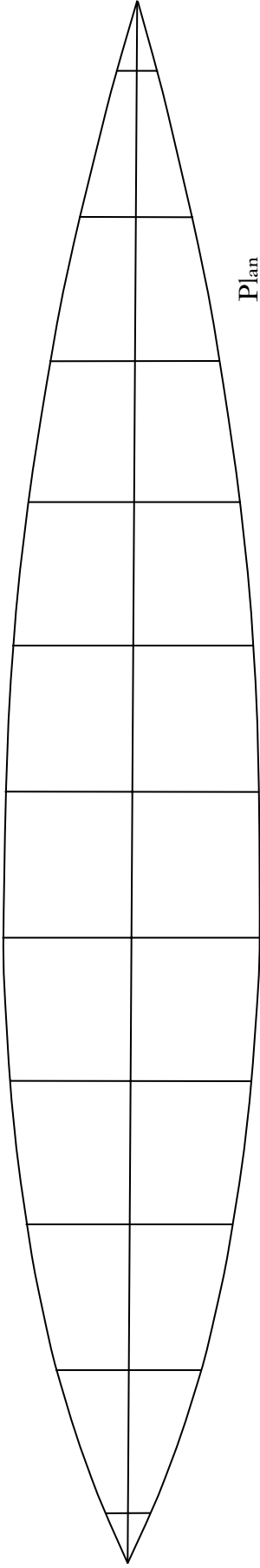
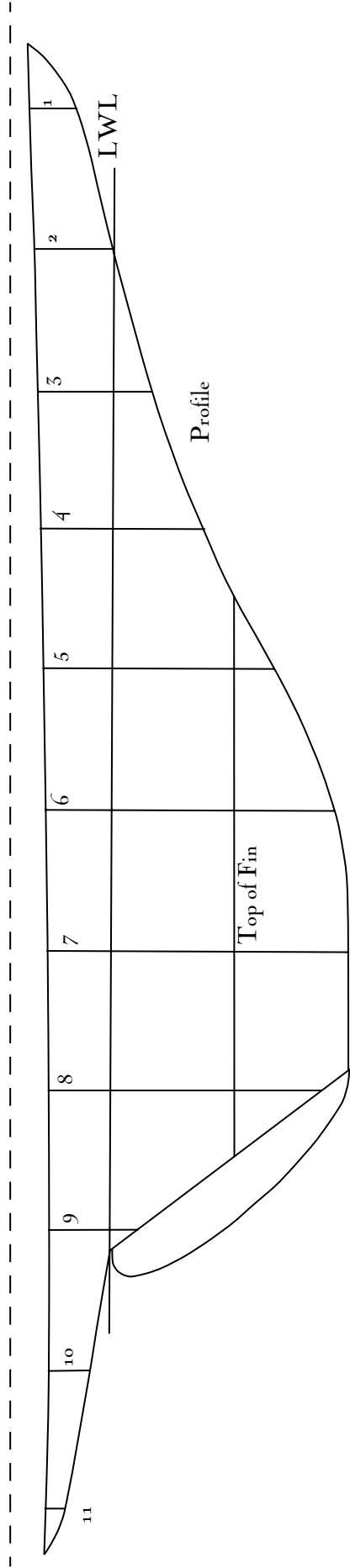
The solution I used was inspired by the design of the late Ted Geary’s *Pirate* model, many of which have been constructed by students in Seattle. Geary used a hybrid technique where the lower part of the hull was carved and the upper part planked.

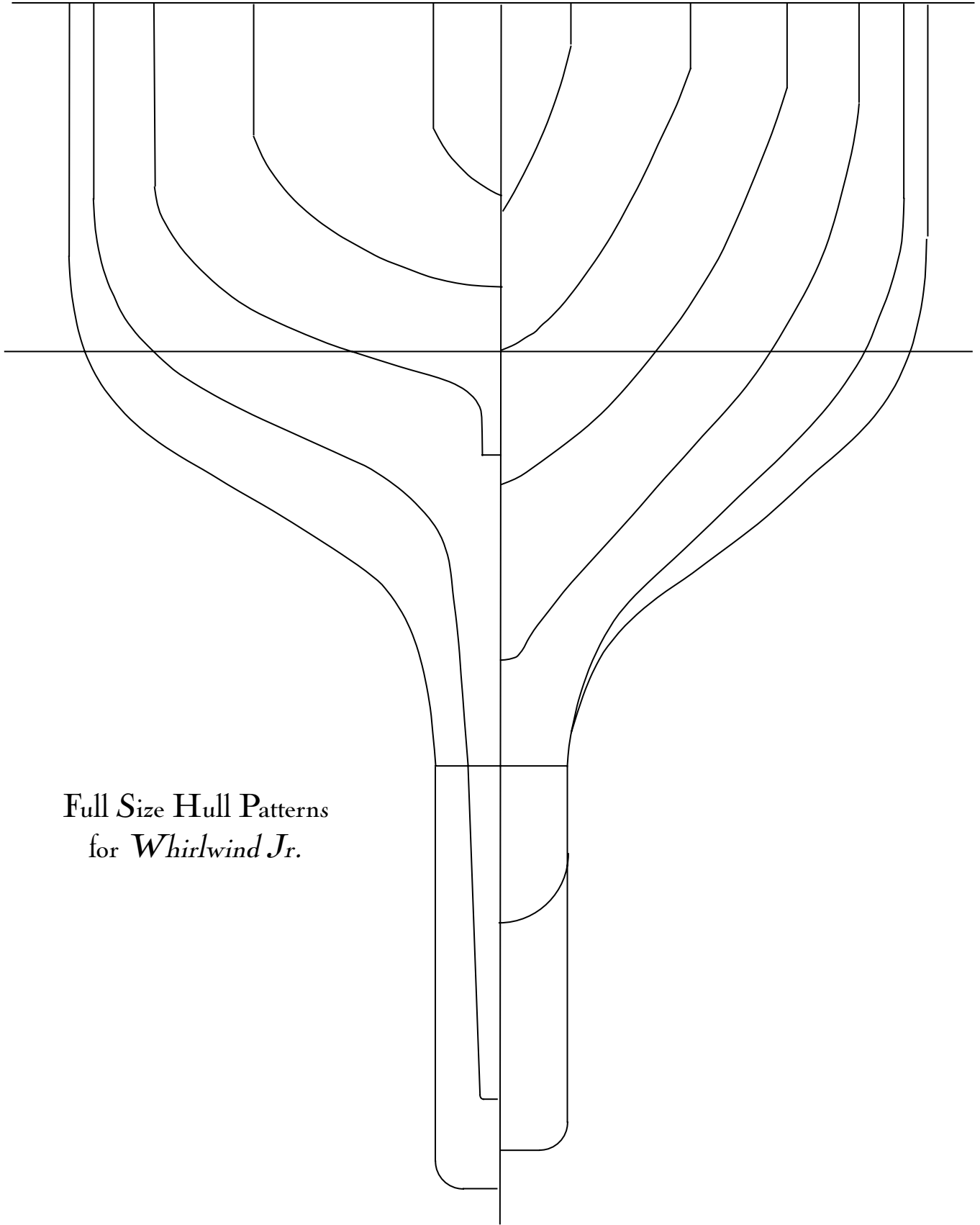
This is done on *Whirlwind Jr.* by making a two inch wide keel laminated out of 1/4 inch balsa sheet. The outer laminations, or “cheek pieces,” are made smaller to save material and work. A slot is left where the fin is attached to simplify the process of hollowing.

The hull and keel plans are 1/4 full size. To check your enlarging, the hull should be 37.3 inches long. The section plans show the outside of the hull; subtract planking thickness to make the shadows. I planked with 1/8” balsa but 3/32 would probably work as well.

Getting the sheer strakes right is a very important step, as the sheer line really determines what the boat looks like on the water. For *Whirlwind Jr.* I used the same technique as with *Yankee III*: curving the strakes in plan (top view) ahead of

Baseline





Full Size Hull Patterns
for *Whirlwind Jr.*

time by laminating them out of smaller strips, then springing them to proper profile on the hull, in this case on the shadows.



Make sure you lay out the strakes to the inside of the planking, as shown in the cross-section diagram.

The strakes fixed in place only at the ends and at two stations, No. 5 and No. 9. The distance from the baseline to the top of the strakes at each measured position is as follows:

Stem	0.32
Station 5	0.80
Station 9	1.06
Stern	0.85

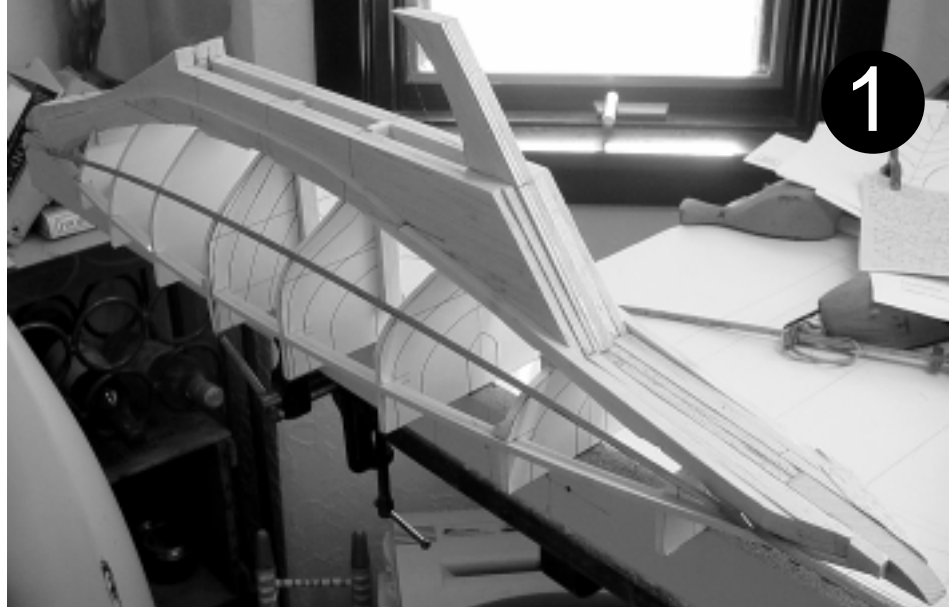
Leave room at the other stations to let the strakes spring to shape, and sight down them to make sure they lay fair. Don't worry if you have to adjust the attachment points to get them there. As always, remember Alan Vaitses' parting words in his classic textbook, *Lofing*: "A fair line supersedes any given measurement."

The planked portion of the hull is a simple, convex canoe shape which lends itself well to the planking technique called "spiling."

Spiling

Spiling is a basic technique of wooden boat building. It is the method whereby the exact shape of a plank is transferred from the hull to a board. It is particularly useful when fitting the garboard plank. *Whirlwind* is a good boat to learn it on, since it has such nice fair lines.

There are two basic methods. One involves transferring a curve to a "spiling board" and then to a plank. This takes an extra step but can be more economical of material. The second, illustrated here, transfers the curve directly to the board which will become the plank.

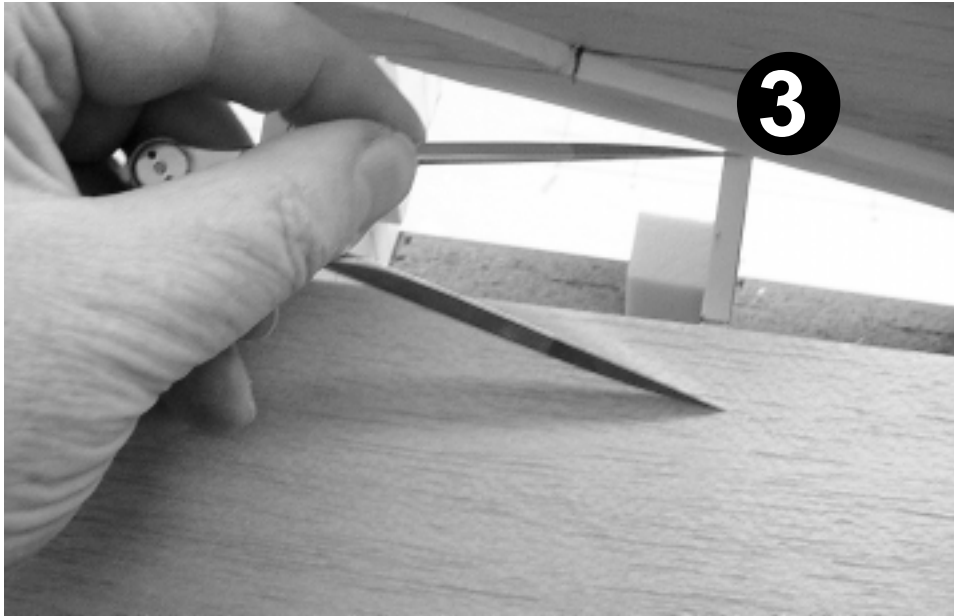


The first picture shows the hull before planking, with the wide keel set onto the “shadows,” or temporary frames. The angle of the photograph is from the stern forward. The laminated sheer strakes have been set in place. The stub keel sticking up and the notch forward of it will be used to align the foam keel which will be hollowed later. You can also see temporary alignment pieces which go up through the “slot” that will be used to hollow the keel after glassing. Don’t cut the ends of the keel the way I did -- it was a mistake that had to be fixed later with filler blocks.

1. The first step in spiling is to lay a batten down the hull at the outer edge of the “floor,” or the flatter part of the hull. Let the batten lie naturally in a nice fair line. This line will be the outer edge of the garboard, plank. Mark where the edge of the plank goes with soft-tip pen on each shadow.



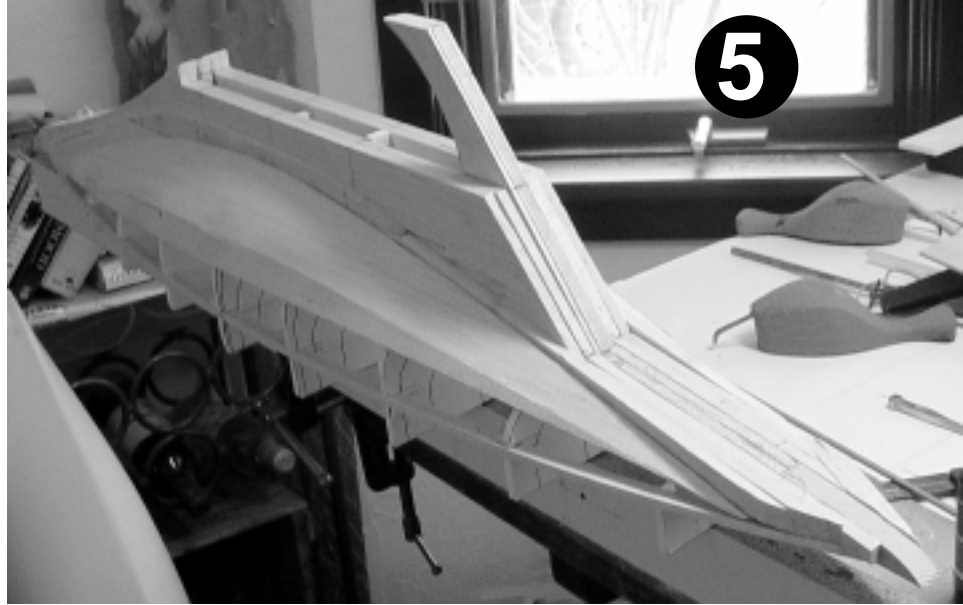
2. Lay a balsa board that is wider than the maximum width of the garboard plank along those marks. Set a calipers or divider to the widest distance between the edge of the keel and the edge of the plank. This may not always be at a shadow.



3. Now lay out and mark this distance from the keel onto the board at each station point. By doing this you are “sampling” the curve that must be put into the garboard plank for it to nestle tightly against the keel.



4. The next step is to lay this curve out on the board with a thin batten and pins. Trace with a soft-tip pen, being careful not to distort the curve shape when doing so. Cut carefully and lay against the keel. It should fit very accurately, requiring just a little sanding and bevelling here and there to get tight. Then (not shown) copy the width of the plank at each station from the marks you made when you first laid the batten on the hull. In the case of *Whirlwind* this will be very close to a straight line.



5. Subsequent layers, or “courses” of planks are done the same way: batten, distances, plot curve, cut and fit. This shows the second course. I got lazy and did the hull in three courses; it would have been better to have done it in four.

Finishing the Hull

The fin is carved from foam off the hull and given one layer of 2 oz glass before assembly. I used scrap foam left over from one of the Yankee III prototypes, but any insulating or any foam will do.



The fore and aft ends of the fin are hollowed out to fit the mounts on the hull. The fore mount is rounded to accept the shape of the fin, and the aft is tapered. The fin is then mounted to the hull with CA glue. This method makes it easy to align the fin properly.



The hull has been roughly faired and covered with Micro-Fill in preparation for final fairing and glassing. The Micro-Fill will go on easier if you dampen the hull before rubbing it in. Wearing rubber gloves will shorten cleanup. Rub the filler into all the cracks, let harden well, then final fair with a *hard* block and 400 grit sandpaper. Long sweeping strokes, and as always sand diagonally and not directly fore and aft.



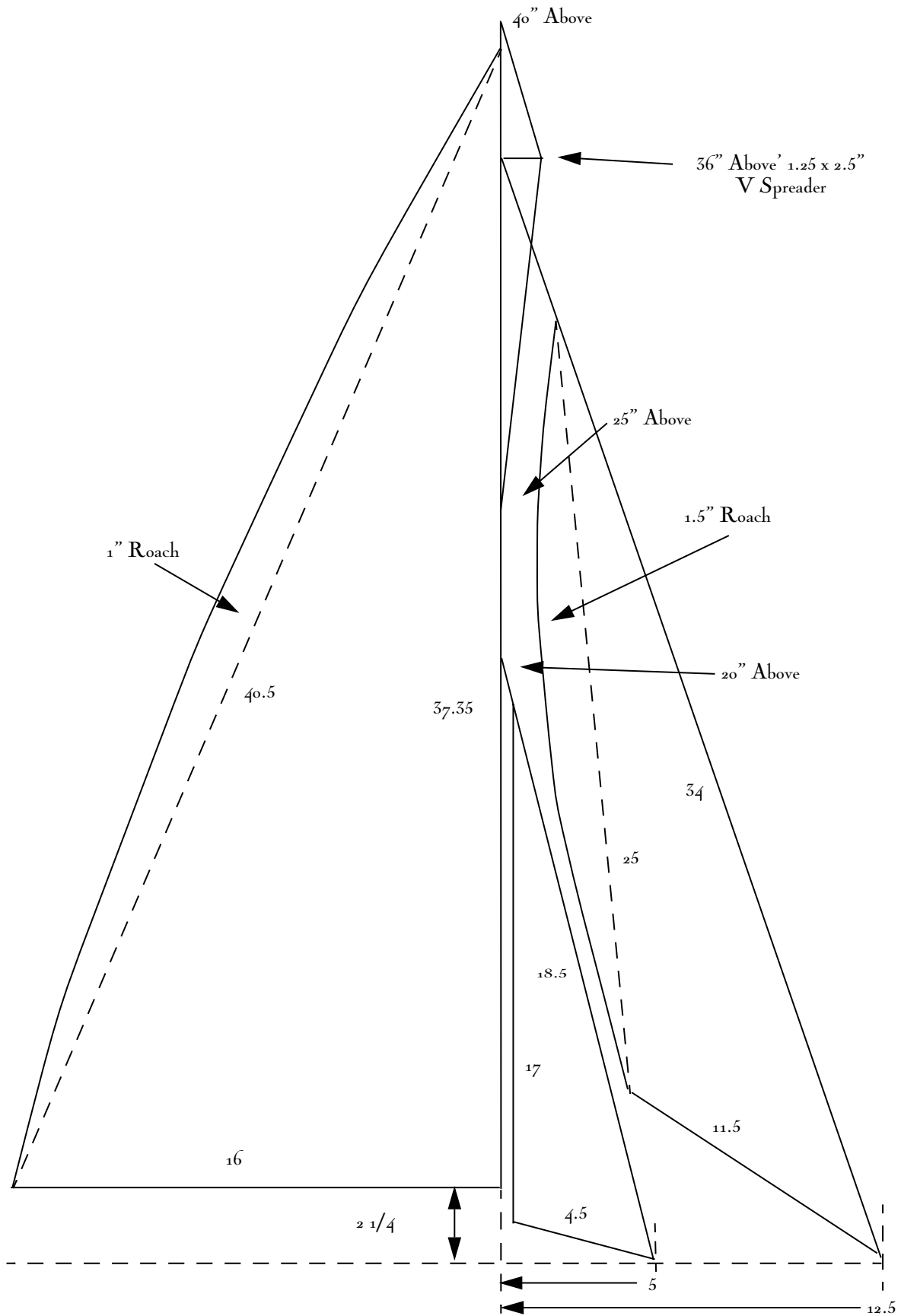
The final hull, faired, glassed and with the sheer cut. All the mechanical details, etc., are the same as for *Yankee III*.

Rig

All rig fittings, materials, are as described in the book. The sailplan is as shown. The only difference is the jumper stay, which is a “V” stay instead of the single strut on *Yankee III*.

Deck

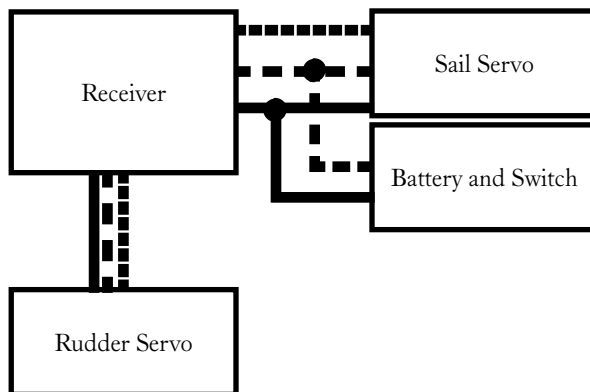
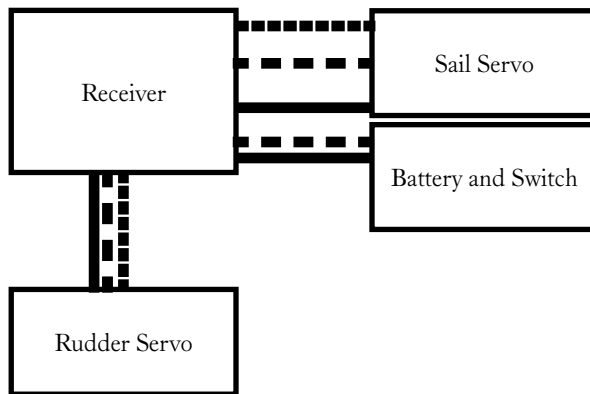
Whirlwind had a narrow waterway, which scales out to just a bit under 1/4” wide at the point of maximum beam. Her deck was raised, so the toe rail is placed underneath rather than above as on *Yankee III*.



Appendix B: Radio Wiring

Most receivers have a “Battery Elimination Circuit” or BEC installed in them. The BEC is there to prevent damage from electrical overload, and cuts power when it thinks too much current is being drawn. The result, for a high-load servo like your sail servo, is stuttering, cutting out, and generally anemic behavior when the going gets heavy. The cure is a “Y Harness,” which bypasses the BEC and allows full battery power to be drawn by the sail servo. The top diagram shows the conventional hookup. The solid line is the black wire, the dashed line is the red wire, and the dotted line is the “other color,” usually white, yellow, or orange. In this diagram all the power goes through the receiver.

The lower diagram shows the “Y Harness,” where the battery power is spliced into the line connecting the sail servo to the receiver. Power is then provided to receiver, through it to the rudder servo, and directly to the sail servo.



Appendix C: Rig Modifications

After sailing the prototype for a couple of years, I came to the same conclusion as the designers of the original J boats did: a permanent forestay, with a separate jib-stay is best.

This requires modification to the standing rigging and the jib. The rig modification is a forestay which does not have a sail attached to it, and which runs from S1 to the jumper strut, as the jib stay previously did. The sail modification is to make the jib exactly like the staysail, with a Spectra jib stay, tensioned with a bowser, and going to a hook which runs between the jumpers and attaches to the jumper strut clamp. This will require making six instead of five bowsers. Now you can remove either the jib or the staysail to shorten sail for heavy winds.