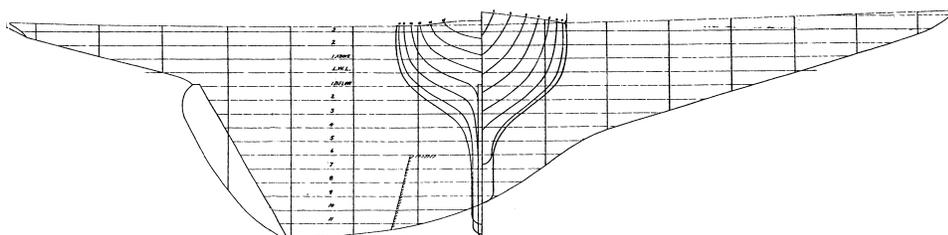


“Yachting With Models”

In early 1935, when excitement about Gerard Lambert’s upcoming sailing matches in England was high in Boston, John Black was designing and building the first of his classic *Cheerio* series of M boats. Despite this, Black found time to design, build, and write up two beginners’ boats for the *Boston Evening Transcript* newspaper. One was an 18-in beginners boat and the other was a 36-in design based on *Yankee*, done with the cooperation of her designers, which he called *Yankee Jr.* He entitled the series “Yachting With Models,” the same title he gave to his later book on building and sailing the *Cheerios*.



Black’s first task in designing a sailing model was to deal with the fact that a model can never carry proportionately as much sail as the boat being modelled. Here is his analysis of the problem:

It is a well known fact that a scaled miniature model of a large yacht will not make a good sailing model because of the great difference in size. This is especially so in Yankee, whose overall length is 126 feet, and our model is only three feet, just forty-two times smaller. The sail plan has length and width, and therefore varies as the square of the scale.

The displacement has length, width, and depth, and it varies as the cube of the scale.

The following will give an approximate comparison between the Yankee and a three-foot miniature:

	<i>Yankee</i>	<i>Miniature</i>
<i>Length over all</i>	126 ft.	36 in.
<i>Load Waterline</i>	83.75 ft.	22.93 in.
<i>Beam, extreme</i>	22.5 ft.	6.43 in.
<i>Draft</i>	15 ft.	4.3 in.
<i>Displacement</i>	150 tons	4.3 lbs.
<i>Sail Area</i>	7550 sq. ft.	616 sq. in.

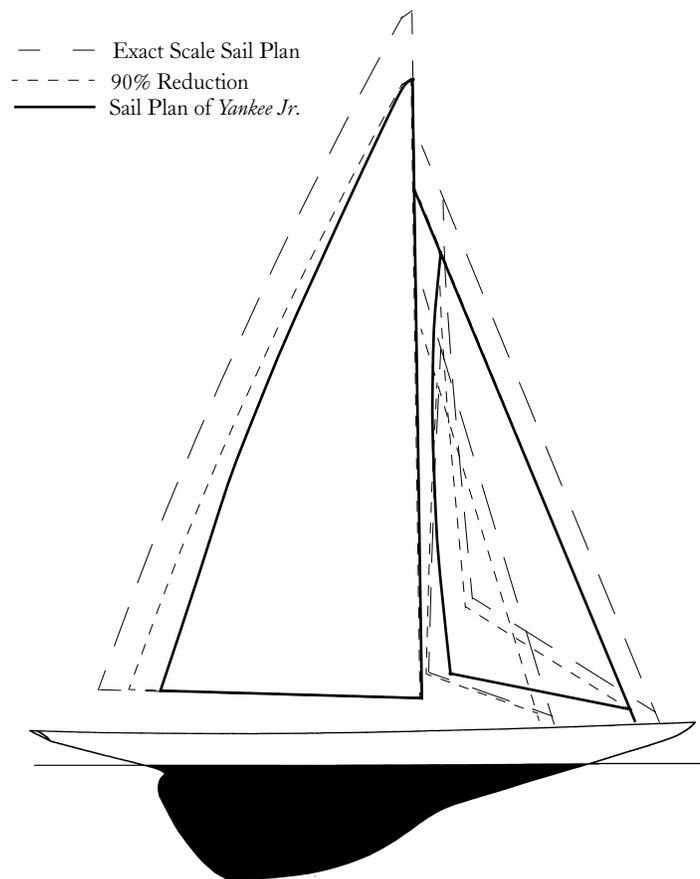
From the dimensions above it will be noticed that the miniature would carry 616 sq. in. of sail with only 4.3 lbs of displacement of which 3 lbs or less would be lead ballast. It would be impossible to carry this amount of sail except in the lightest kind of a breeze.

The “M” or “Marblehead” class was devised in 1932 by Roy Clough of Marblehead, and continues to this day. The boats are 50 in long with 800 sq in of sail.

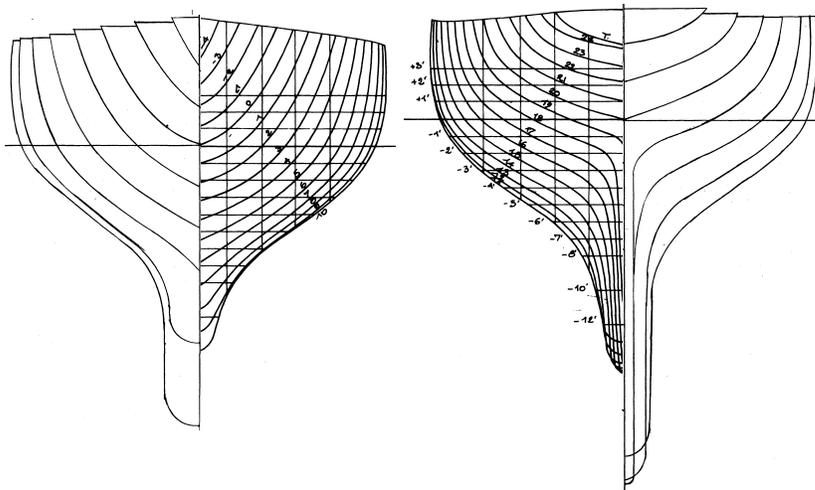
The Boston Evening Transcript plans, as I received them. As with most old and copied drawings, they were badly distorted. I am also sure that these were traced by a draftsman inferior to John Black.

To have a miniature therefore that will actually sail, it will be necessary to increase the draft and reduce the sail area. The writer has spent much time in making these changes and it was not desired to change the original lines of the body plan. To this end the lead keel was lowered 1 3/4 inches, making a total draft of six inches. This required the rake of the rudder post to be changed, helping the sailing qualities greatly. The sail plan was reduced to 450 square inches. This may seem a small rig, but a narrow, easily driven hull with a small amount of lead ballast should not require much sail to drive her. Most sailing models are over canvassed. Many races are lost by carrying too much sail.

Adjusting the Sail Plan



The diagram above shows how cleverly John Black adjusted the sail plan to accommodate the requirements of a small sailing model. First, he took the scale sail plan and multiplied its dimensions by 0.9, which reduced it to 81% of the scale plan, or a hair under 500 sq in. Then he trimmed the width of the mainsail but left the height the same size. This increases the aspect ratio of the sail, which has the effect of fooling the eye into thinking the sail is taller than it really is. The process he used can be applied profitably to any scale sailing model with a marconi rig.



Balancing the Hull

A balanced hull is one that does not require an adjustment of helm when the boat heels. For centuries designers knew the advantages of balanced hulls, treasured the designs that exhibited the characteristic, and didn't have the foggiest idea how to achieve it. That is, until 1905, when a British model yachtsman and designer named William J. Daniels showed how balance could be calculated as part of the design process. His method was taken very seriously by designers of free sailing model yachts, which sail with a fixed sail setting. As a consequence, the boats can heel sharply in "slams," or sudden gusts. John Black adjusted the original *Yankee* design so that balance of the *Yankee Jr.* was theoretically perfect, a fact you will appreciate every time you sail your *Yankee III* in uneven conditions

What About the Other J's?

An interesting, and crowd-pleasing, exercise would be to have several J Class models of proportionate size race against each other — including re-enactments of the classic America's Cup match races of the 1930s. Since the J's were of such similar size, the scaling process used by John Black is certain to work for any of them. This process consists of the following steps:

- Scale the hull and sail plan to 1/42 size. Although this is an oddball scale, it is not really a problem in this day of the reducing/enlarging photocopier.
- Deepen the draft to 6 inches, and fair the profile accordingly.
- Widen the fin to one inch so that batteries will fit.
- Further reduce the 1/42 sail plan to 90% of that size, and use the resulting dimensions for mast height, fore triangle, etc.
- Shorten the main boom to 16 1/2 inches.
- Use the double-headed rig like *Yankee III*.

The sections of Yankee compared to those of Yankee Jr. Yankee sections copyright Francois Chevalier and used by permission. The difference in the fore sections is probably due to the fact that Chevalier and Black were working off drawings made before and after the 1934 modifications. Black's afterbody is just slightly more full, to balance the hull as described in Appendix II.

All of the construction methods, radio layout, etc., described for *Yankee III* can be applied. The result should be a boat that relates to *Yankee III* much as the original related to *Yankee*, and result in good, close racing. To give you an idea of relative sizes, the following table gives the length over all of the J boats to 1/42 scale:

Name	LOA
<i>Enterprise</i>	34.6
<i>Shamrock V</i>	34.0
<i>Weetamoe</i>	36.0
<i>Yankee</i>	36.0
<i>Rainbow</i>	36.2
<i>Velsheda</i>	36.4
<i>Whirlwind</i>	37.4
<i>Endeavour I</i>	37.4
<i>Ranger</i>	38.5
<i>Endeavour II</i>	38.8