

SAILSetc guidance

Buttock and waterline construction of hull from sections

Introduction

A common method of construction of one-off hulls and master hulls from which moulds will be taken is planking. Lines plans may present only the sections of the hull (the finished sections, the sections reduced by the plank thickness, or both). Where the builder wants to use the 'bread and butter' technique for construction it is clear that the sections alone do not give the required information in a directly useable format. Where waterlines and buttock lines are presented on the lines plan it is possible they are given at spacing that do not match the thickness of the timber that the builder plans to use.

This set of notes describes how the buttock and waterline shapes at the preferred spacing can be obtained from the section shapes.

The example used for these notes is the RG65 design ARROW taken from Charles Detriche's second catalogue of lines plans.

It is assumed the buttock or waterlines are required at 15 mm intervals and one of each is developed here to illustrate the method. Probably only buttock OR waterline shapes will be required and the required thickness will be adapted to suit the timber that is available.

There is no need to use the same thickness throughout. It is usually convenient, and certainly more accurate, to use progressively thinner layers working outwards when building on the buttock lines and thinner layers towards the bottom of the hull when building on the waterlines.

Sections

Diagram 1 below shows a photocopy of the sections. Onto it are drawn two buttock lines, B1 and B2, at 15 mm intervals from the centreline and two waterlines, WL-1 and WL-2 at 15 mm intervals below the waterline.

The centreline, the profile of the hull, is labelled B0 as it is the buttock line at zero offset from the centreline.

For the sake of clarity only two buttock and waterlines are added in Diagram 1, and only one buttock and waterline shape is developed.

The designer, Charles Detriche, has labelled his sections 0 to 10 starting at the bow. His general arrangement drawing shows the hull with the bow to the left. This differs from the conventions in naval architecture that the aft waterline ending (or transom) is the zero datum and that the bow is shown to the right. These conventions are used so that any drawing/plan can be understood correctly. The Equipment Rules of Sailing use the same convention. Please note that Diagrams 4 and 5 in these notes use the normal naval architecture conventions.

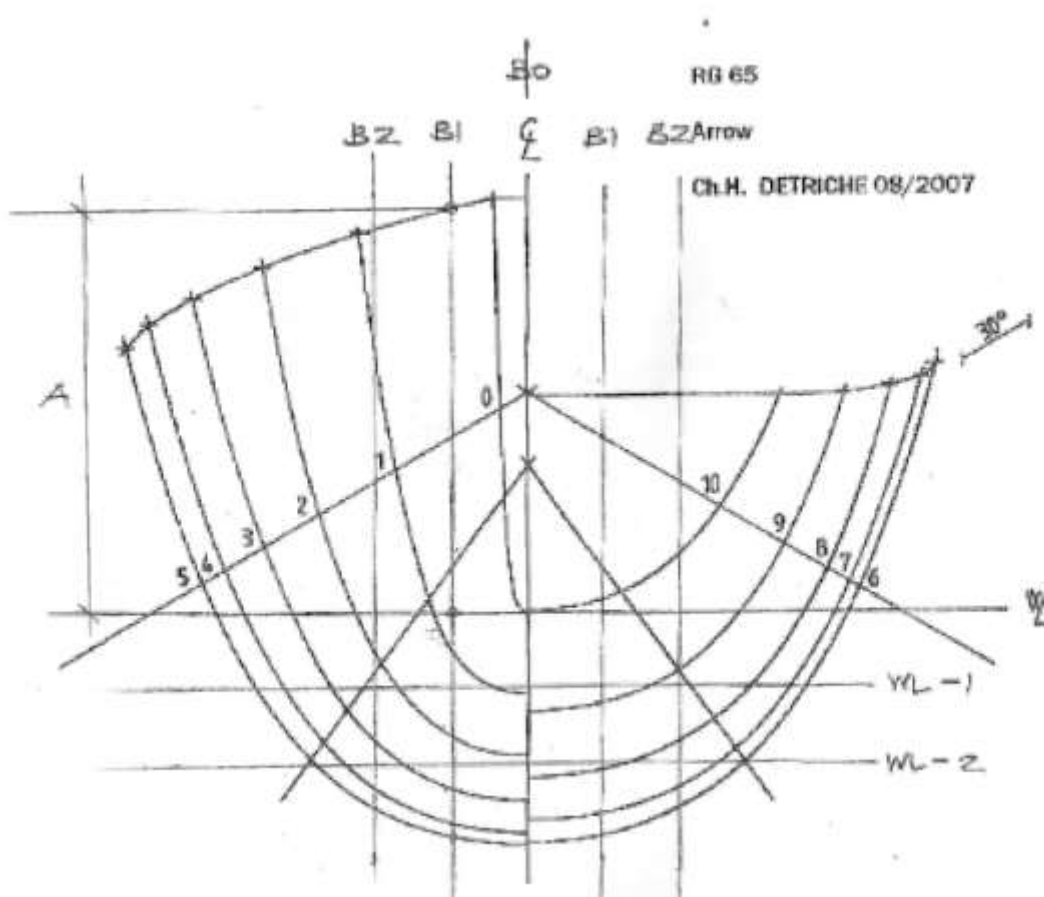


Diagram 1 – Arrow Sections

Using tick strips

Tick strips are strips of paper about 20 mm wide. Prepare as many as the number of buttock lines (on one side of the hull) or waterlines plus some spares.

Diagram 2 below shows a tick strip placed with its edge along buttock line B1. Ticks are made on the edge of the strip at the waterline (wl), at the deck edge (deck) and where each section crosses the B1 buttock line (9, 8, 7, 6 and 5). Number each tick strip as appropriate. The ticks for sections 0, 1, 2, 3 and 4 have been made with the edge of the tick strip placed along the B1 buttock line on the right hand side of the section view.

Note that the tick strip numbering uses the convention that the aft datum is zero whereas the section drawing by Charles Detriche uses the convention of zero at the bow.

This tick strip will be used to construct the B1 buttock line.

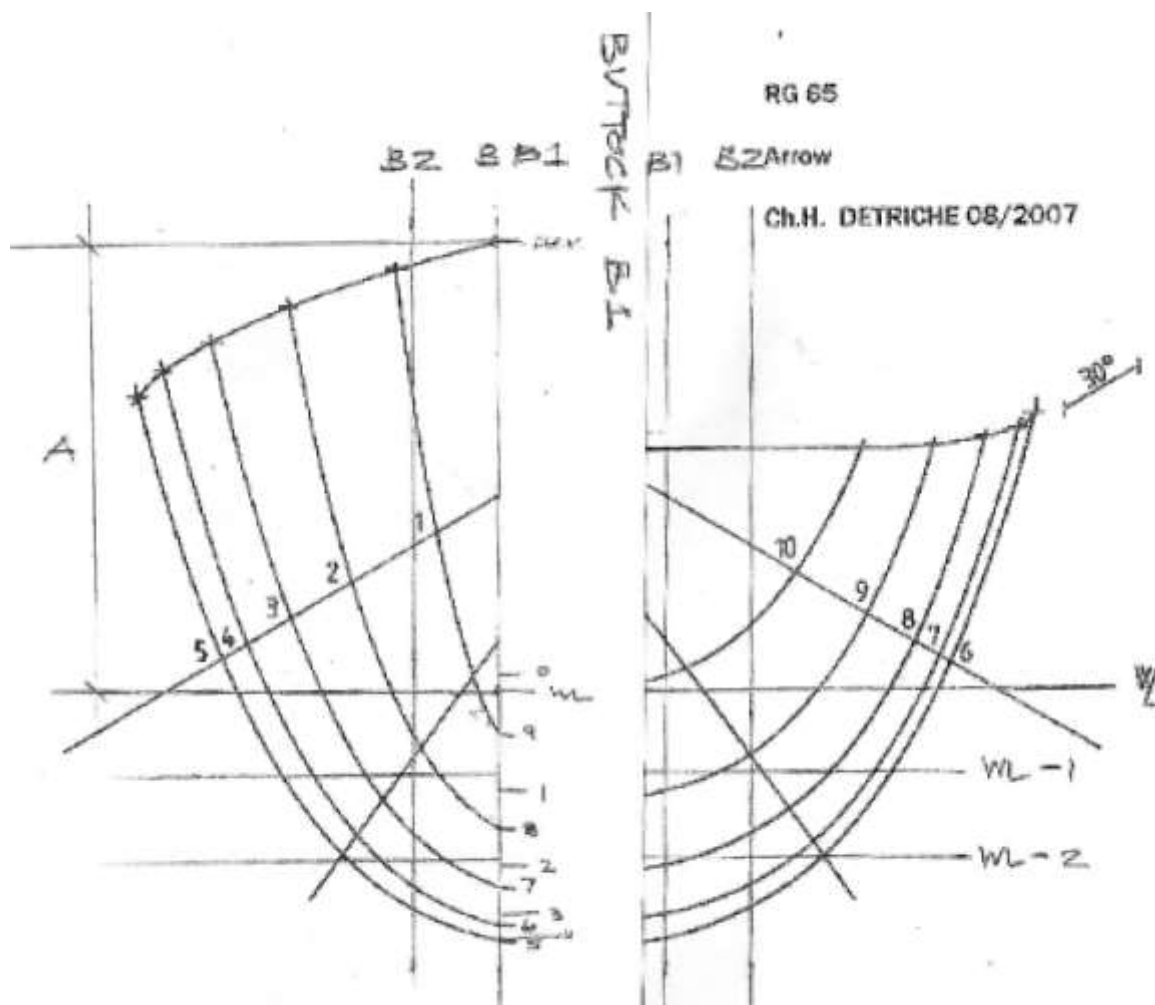


Diagram 2 – Arrow Sections with tick strip

Diagram 3 below shows the same tick strip (centre) and two others.

The one on the left has been made with the edge of the strip along the centreline to note the height of the deck edge at each section – the upper part of the B0 buttock line. This is used to construct the profile of the deck edge of the hull.

The one on the right has been made with the edge of the strip along waterline WL-1.

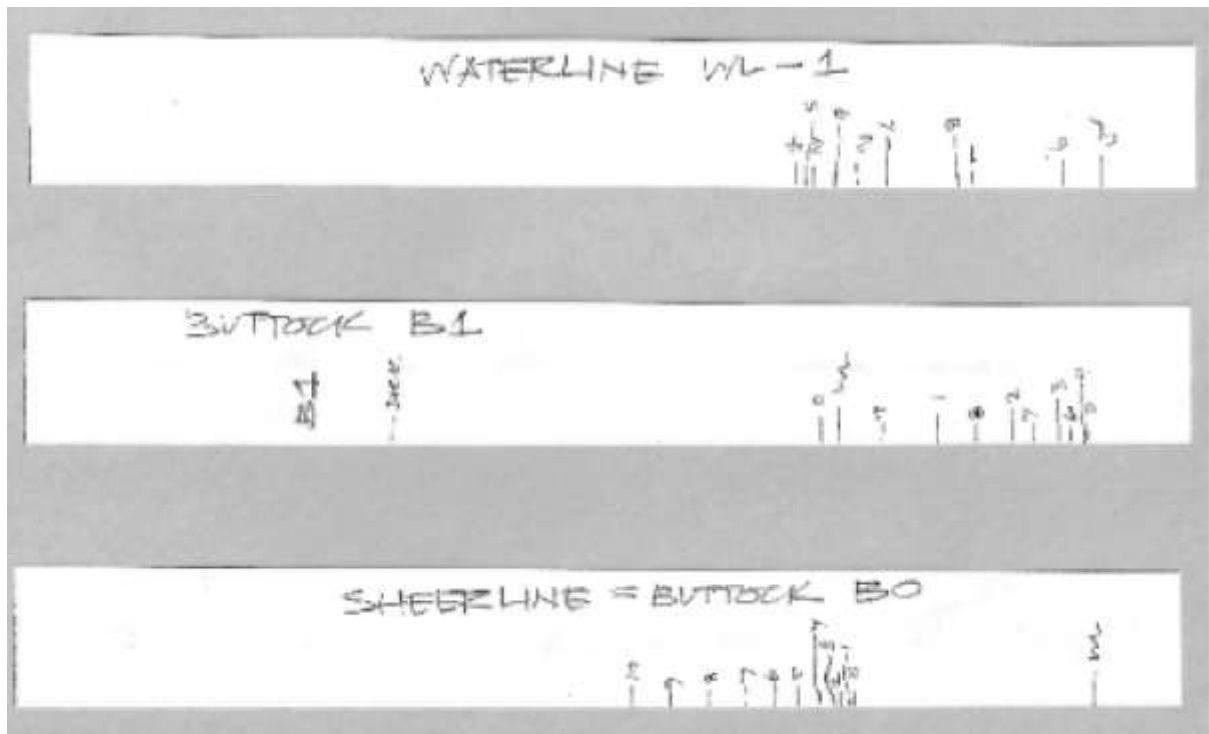


Diagram 3 – Tick strips

Setting out the buttocks and waterlines

On a fresh sheet of paper construct a full size grid showing the waterline or centreline (as appropriate depending on whether you are creating buttock lines or waterlines) and the sections at the required spacing.

Diagram 4 uses a compressed longitudinal scale for the sake of clarity but the process is the same.

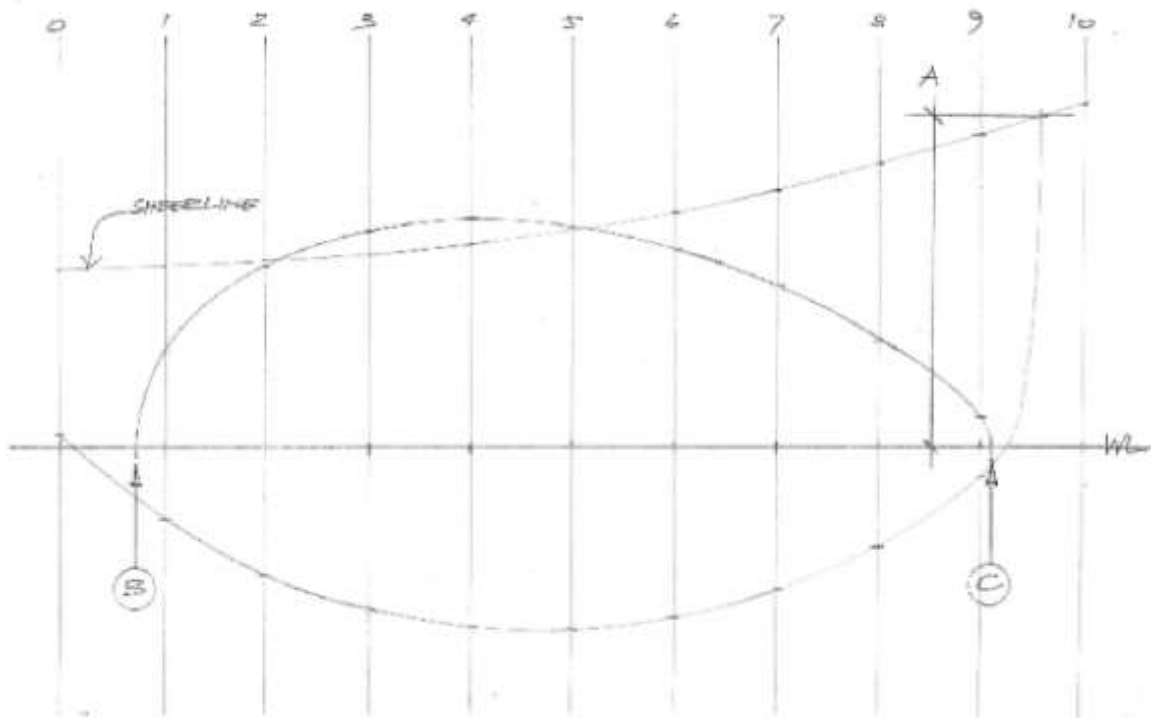


Diagram 4 – buttock and waterline construction

The tick strips have been used to transfer the data points for each section (these can be seen as short dashes on the grid lines).

The data from the Sheerline Buttock BO tick strip has been used to plot the data points for the sheerline/deck edge profile – these data points have been joined to create a fair line using splines/curves - the upper curve.

The data from the Waterline WL-1 tick strip has been used to plot the data points for Waterline WL-1 – these data points have been joined to create a fair line using splines/curves - the centre curve. Note that the points B and C on the centreline are data points that are not available from the tick strip. The positions of these have to be found from the general arrangement view of the hull. See the next section – Points B and C.

The data from the Buttock B1 tick strip has been used to plot the data points for the Buttock B1 profile – these data points have been joined to create a fair line using splines/curves - the lower curve. Note the point where the buttock line meets the deck edge at the bow (marked by the dimension A). This is a data point that is on the tick strip (marked 'deck') but it is not marked onto a section – instead it is marked onto the sheerline/deck edge profile.

Points B and C

Points B and C have to be found from the general arrangement of the hull.

On the general arrangement of the hull draw waterlines as appropriate. Waterline WL-1 crosses the underwater centreline at points B and C. Measure the distances of these points from the nearest station or the ends of the hull (as convenient) and mark those points on the centreline of the buttock line plan.

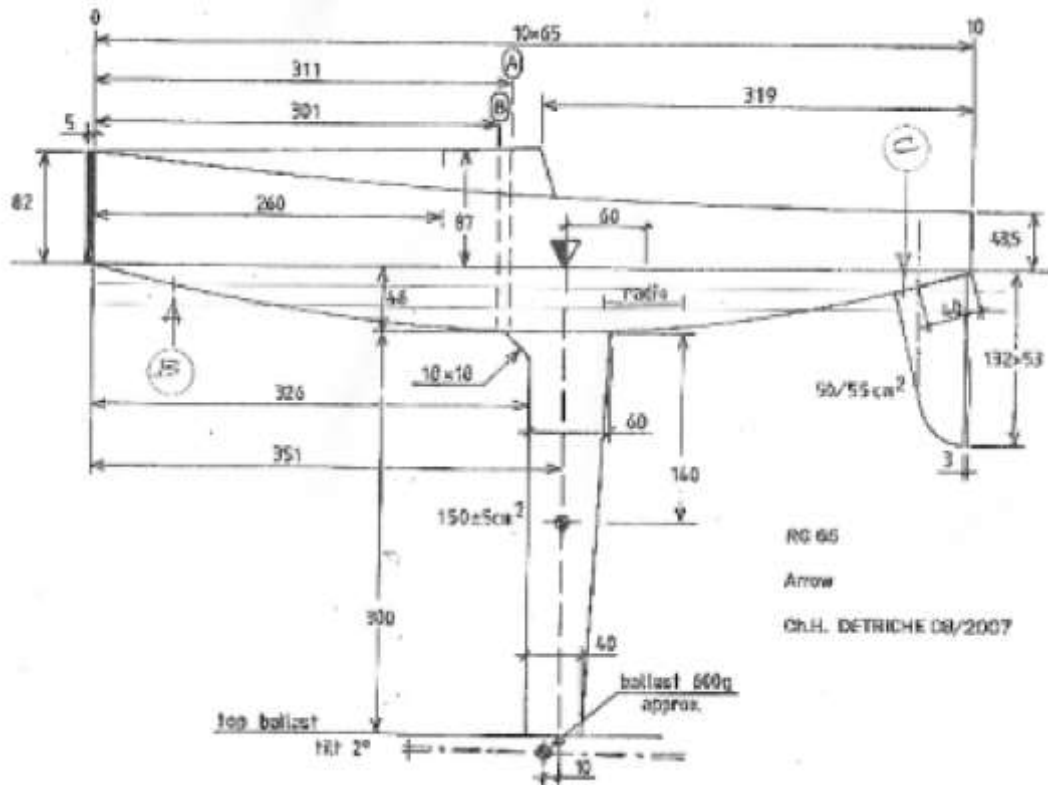


Diagram 5 – general arrangement

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