

Lofting of the Clark Punt 2020

Lofting, or the plan lines, laying down lines or the taking of full size measurements from a scaled set of drawings has always had some mystique about it. However, what is required, taken step by step, is to take the scaled drawing of the boat and convert that to full sized drawings of the boat so that patterns and moulds can be made to enable the build and creation of the boat as per the plan. As mystical as the plans appear, it is best to adopt the attitude of “**Just Do It**”. The other best advice offered to us by Adrian Dean was “don’t over complicate this just keep it simple”. To achieve this Adrian does a lot of sighting by eye work and fairing as the process proceeds.

Normal boat plans contain a side elevation, a half plan (because the boat is usually symmetrical) and an end elevation showing the forward part of the boat on one side and the aft part on the other side. Accompanying these drawings are a table of offsets.

The offset measurements are taken off of a scale drawing by the draftsman. Usually, unless they have been corrected by someone else who drew the boat full size, they have errors in them because of the small scale of the plans. You have to correct these by eye. This is called "fairing" the lines.

Lofting terms;

So that you are familiar with the language and then the appropriate abbreviations of sets of lines plans hopefully the following will assist with this;

Centreline	C.L. or C/L
Waterline	W.L.
Load Waterline	L.W.L.
Designed Waterline	D.W.L.
Buttock	Butt or Butt’k.

Diagonal	Diag.
Base Line	B.L.
Station	Sta.
Frame	Fr.
Deck	Dk.
Length over all	L.O.A.
Section	Sect.
Displacement	Displ.
Salt Water	S.W.
Freshwater	F.W.
Pounds	#
Longitudinal centre of buoyancy	C.B. or L.C.B.
Centre of gravity	C.G.
Longitudinal centre of gravity	L.C.G.
Vertical Centre of gravity	V.C.G.¹

All measurements are either to the inside or the outside of planking. Check on the plans

Offsets;

¹ International Marine, McGraw Hill, Boat Building Manual, Robert M Steward- ISBN 0-07-061376-1:

A table of Offsets is very useful and with the aid of these a boat can be built with only a very sketchy set of drawings, because all of the measurements needed are shown in this table and therefore do not have to be lifted from the drawings.² All measurements generally are inside measurements.

One reason Offsets are used is that it places the measurements in one place without cluttering the drawings with all measurements. However, it is wise to scale some measurements as a cross check particularly when a lot of fairing is required.

To eliminate a multitude of fractional dimensions, it is customary to write offsets in feet – inches - eighths of inches also known as Imperial measurements. For example, 2 -5 – 3 means two feet, five inches and 3 eighths of an inch. Some designers pride themselves on the accuracy of their lines and offsets and read some dimensions to one -sixteenth of an inch; this is shown in the offset table by a plus sign or ½ after the eighth numeral, thus we get 2 – 5 – 3 + or 2 – 5 – 7/16.³

However, offsets also come in Metric measurements which will be a lot easier to calculate. However, it is unwise to attempt to convert an imperial offset to metric offset, the degree of error can become significant. So, keep it simple and whatever your offsets are use the appropriate rule of measure.

Lofting tools;

Tools for lofting are few and simple. Firstly, if you do not have a lofting floor you will need to use lofting boards say of plywood long enough for full size lines of your boat that can be stowed easily. So, for our lofting, we had to accommodate lines of 14ft long and therefore used two sheets of ply painted white and then joined temporarily whilst lofting. Other tools include;

- Sharp pencils
- A permanent marker. Used once lines are pencilled and faired. Various colours can help save confusion.
- Steel or fibreglass tape measures longer than your boat
- 3ft or metre steel rule
- An appropriate scale rule
- Large carpenters square
- Straight Edges and Battens. Battens need to be straight, true and capable of bending.
- String line although do not use this for chalk lining as it is not accurate.
- Nails.

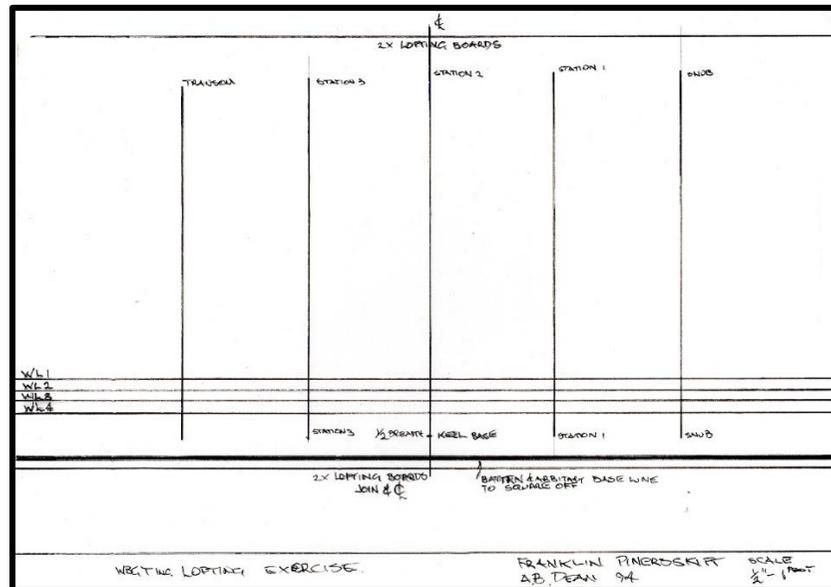
² Amateur Boat Building, Michael Verney, London

³ International Marine, McGraw Hill, Boat Building Manual, Robert M Steward- ISBN 0-07-061376-1:

Lofting Process we used;

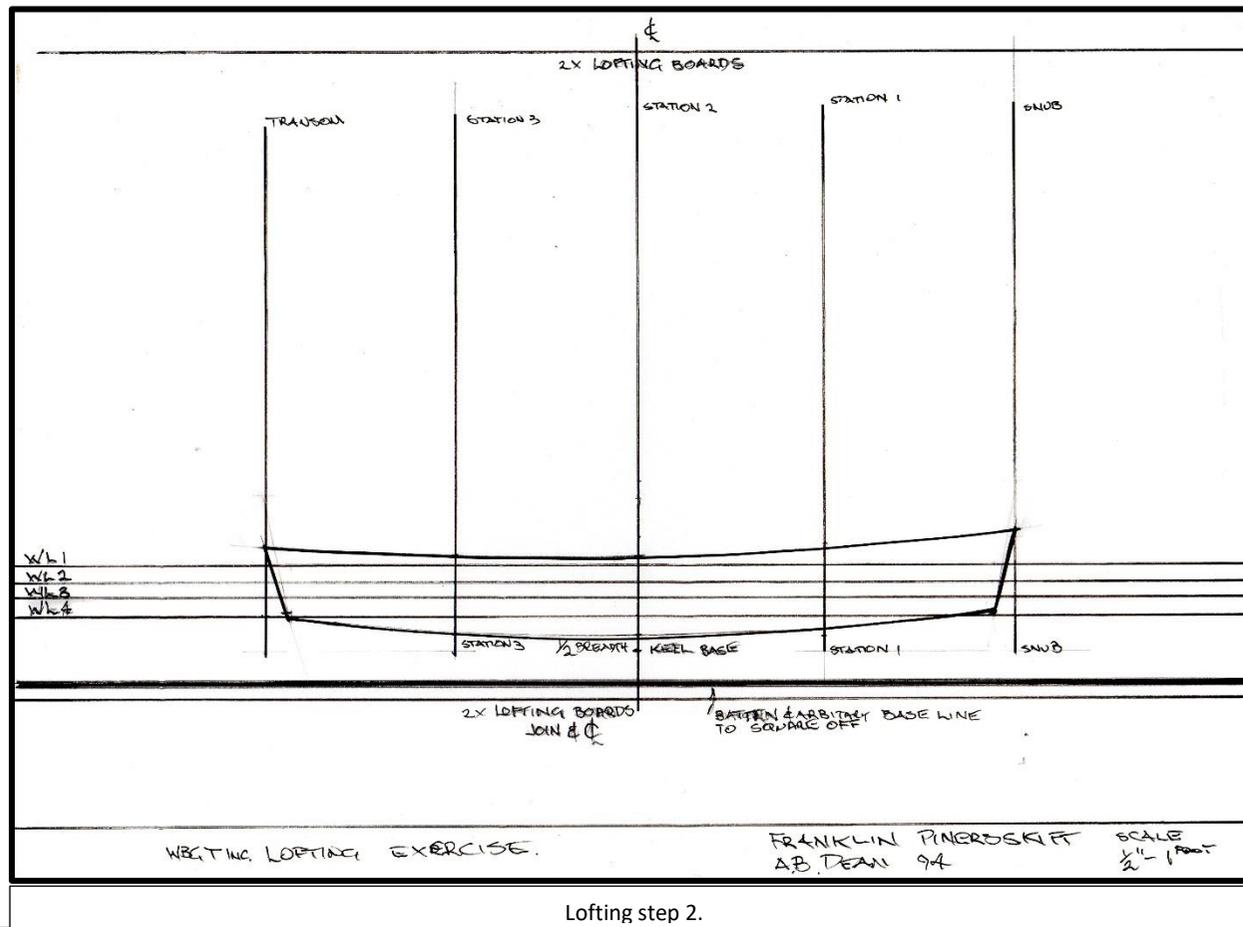
Try and imagine that the drawing below represents lofting board on the floor. The centreline is the join in two boards in this instance.

1. Identify the keel line at station 2.
2. Below that strike an arbitrary line as a base line and tack battens to that which enables measuring from and squaring off.
3. Measure up from that for your waterlines marking each one and with a straight edge line them in longer than the boat ensuring all are measured correctly and parallel. You can also use a taught stringline and nails. When you are comfortable that they are correct mark them with the permanent marker.
4. Mark out from the centre line the 3 station lines, one is the centreline, plus the Snub and Transom. Square these off the baseline batten and permanently mark them on the lofting floor.

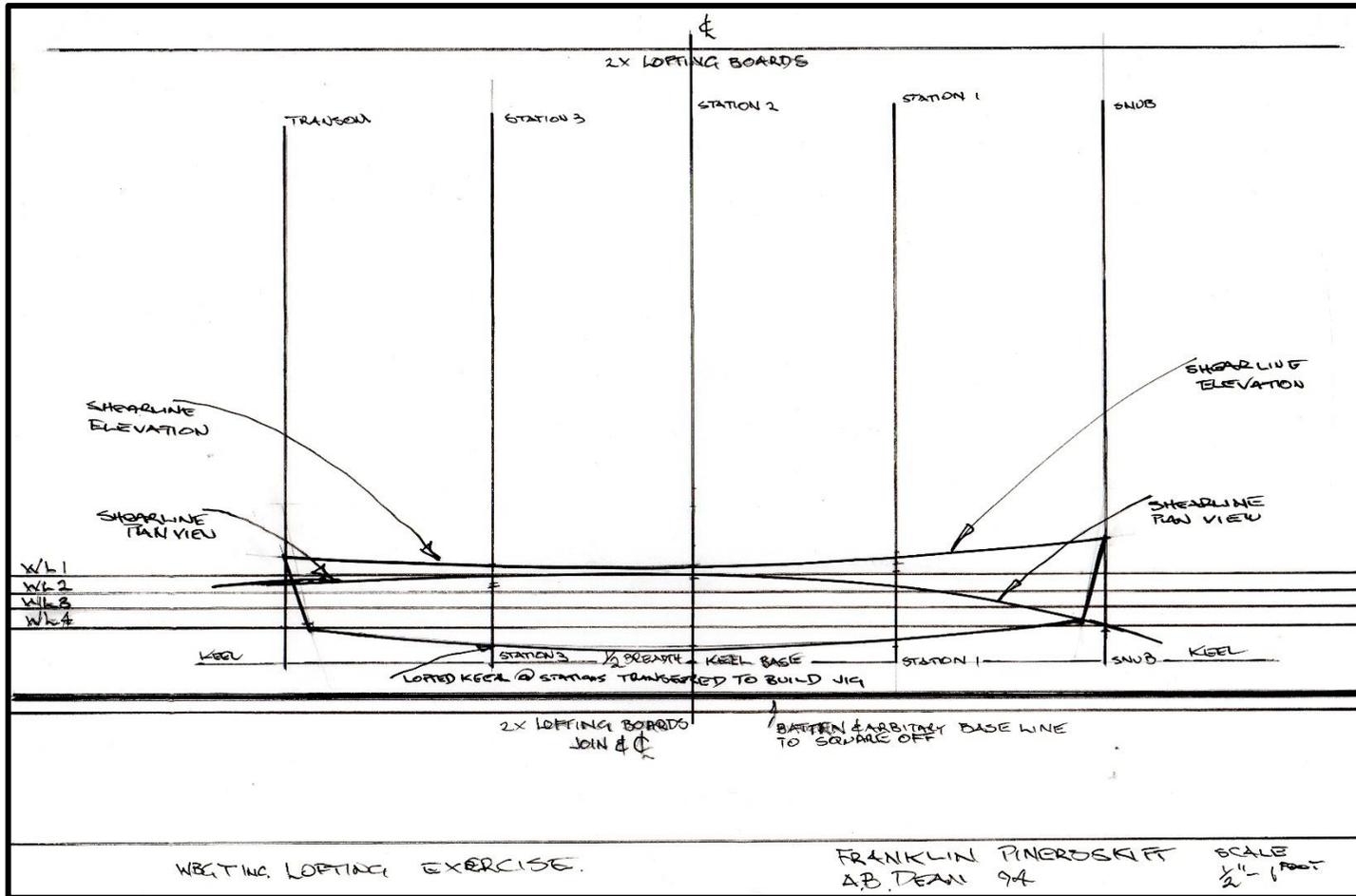


Lofting , step 1

5. Boats elevation drawing. Allowing for the baseline offset at each station, Transom and Snub, measure and mark where the sheer line intercepts the station lines.
6. Place a nail at each interception point in the loft boards. Then with a curved batten scribe the curve of the sheer line against the nails.
7. Take the measurement (given on the plan) at the keel line for the transom and snub bases. Scribe the transom and snub at their given angles.
8. Allowing for the baseline offset at each station, Transom and Snub, measure and mark where the keel line intercepts the station lines.
9. Once you are comfortable that the sheer, keel, snub and transom are all true mark then in permanently.
10. The keel line and stations can now be transferred to the build jig.

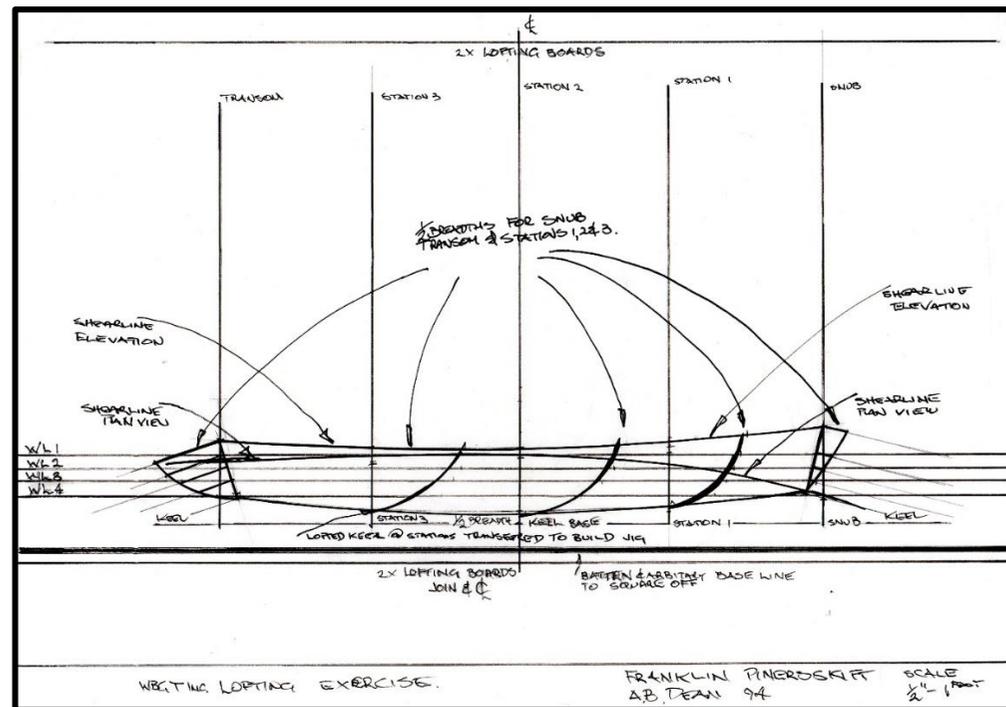


11. It is now time to measure and scribe the plan view shear line. From your stations, transom and snub plan view half measures mark these on each of the stations commencing at the snub. Place a nail in the lofting boards on the point of interception at each appropriate station, transom and snub.
12. Using a batten form the curve against the nails. If necessary, fair the curve by eye and moving a nail. Once the line is fair scribe the line in and if it appears correct mark the plan view of the shear line permanently.



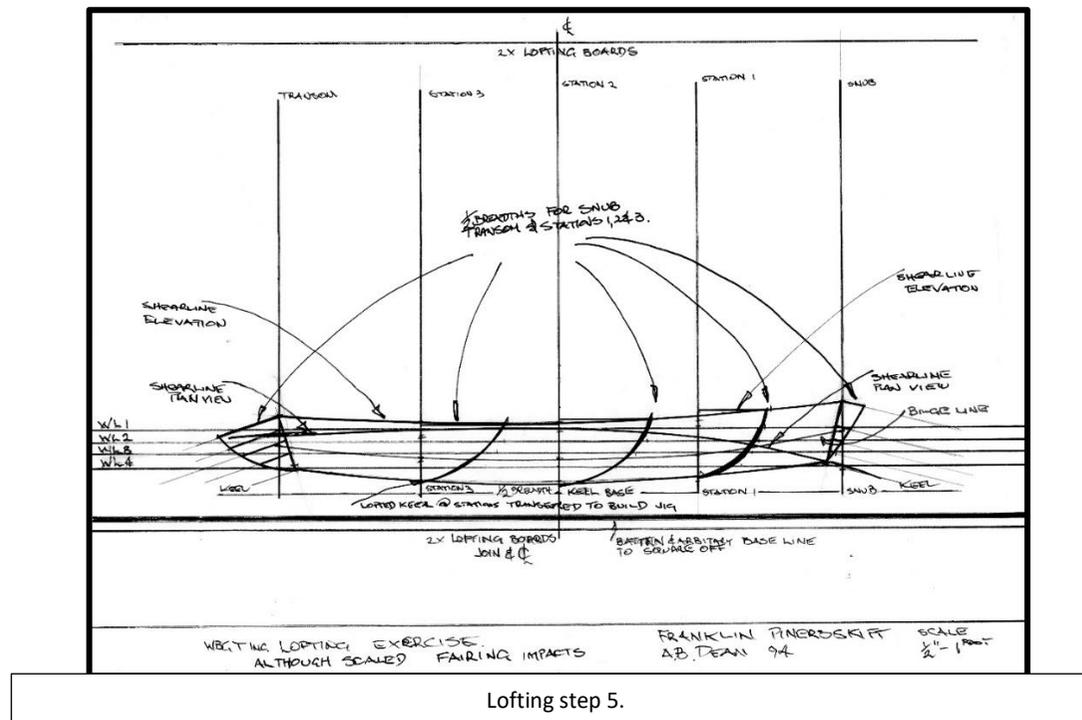
Lofting step 3

13. It is now time to draw in the half breadths of the Transom, Snub and each Station. At the Transom and Snub using a square mark the waterlines and square them off the angles of each of the Transom and Snub. The line of the transom and Snub forms the centreline of your half breadth. This gives the true shape of the transom and snub.
14. From the half breadth drawings or offsets, measure and mark with a nail each half breadth on each appropriate water line. Once the nails are in place using a batten form the curve, fairing as required and mark the curve of the Transom and Snub. You now have a 1/2 of a full size pattern for both.
15. As in 14 above do the same for each of the stations. This will result in you now having 5 half breadth full size patterns for your boat. When marking the shear make sure you measure out from the intersection of the shear line and the station line, not from a nearby waterline.



Lofting step 4.

16. The next step is a bit tricky. We found Adrian did this mainly by eye to mark in the bilge line. He described it as being the widest point of the boat at the bilge
17. From the half breadth drawings we measured and marked the bilge line points at each station, Transom and Snub, with a nail in the lofting boards. We then using a batten marked and faired the bilge line to Adrian's instructions. The bilge line is used as a check on your lofting and should be a fair curve. In some boat plans "diagonals" are used to perform the same function.
18. At this point it is now possible for us to construct full size patterns of the keel and keel batten. We can also loft full size planks at each of the Transom, Snub and Stations. Although we have not completed these they will not show up on these small drawings but they will appear on our lofting boards.



References;

- International Marine, McGraw Hill, Boat Building Manual, Robert M Steward- ISBN 0-07-061376-1:
- Amateur Boat Building, Michael Verney, London
- Sydney Wooden Boat School, Lofting 1 and 2; <http://sydneywoodenboatschool.com.au/traditional-clinker-construction-episode-1-lofting/>
- From the Wooden Boat Magazine – the title is in quotes and the first numeral is the edition and the second numeral is the page number.
- **Lofting:**
- by projection, letters on, 52:10, 52:12
- **Lofting:**
- by projection/Paul Haist, 51:94
- **Lofting:**
- commentary by Greg Rossel, 110:66,
- 111:35, 187:25
- **Lofting:**
- commentary by Karen E. Wales,
- 210:0
- **Lofting:**
- comments by Arch Davis, 94:29
- **Lofting:**
- comments by Greg Rossel, 203:33
- **Lofting:**
- comments by Jack Ehrhorn, 12:43
- **Lofting:**
- comments by Pete Culler, 4:4
- **Lofting:**
- comments by Sam Manning, 11:43
- **Lofting:**
- for Colonial schooner replica
- SULTANA, 151:84
- **Lofting:**
- for converting plywood-on-frame to
- stitch-and-glue construction, 106:80
- **Lofting:**
- for deck camber/Andy Davis, 165:40
- **Lofting:**
- for deck camber/letters from various
- readers, 166:8

- **Lofting:**
- for Handy Billy (21' outboard launch), 159:66
- **Lofting:**
- for Ladybug (wheeled dinghy), 209:48
- **Lofting:**
- for Lightning class sloop, 153:60
- **Lofting:**
- for Martin Skiff, 150:87
- **Lofting:**
- for railbird skiff, 120:78
- **Lofting:**
- for Riverside sailing dinghy, 166:80
- **Lofting:**
- for Rybovich's power craft, 107:58
- **Lofting:**
- for sailing dinghy RIFF, 189:32
- **Lofting:**
- picking up for patterns/Dave Porter, 31:64
- **Lofting:**
- picking up for patterns/Richard Lagner, 31:66
- **Lofting:**
- picking up for patterns/Ed and Dave Minch, 35:95
- **Lofting:**
- reducing offsets for inside of plank/Ralph Morris, 52:69
- **Lofting:**
- technique at quarter scale/Harry Bryan, 196:39
- **Lofting:**
- technique for classic yacht restoration/Ed McClave, 185:44
- **Lofting:**
- technique for transom/Arno Day, 98:41

- **Lofting:**
- technique/Bud McIntosh, 11:48
- **Lofting:**
- technique/James L. Meriam, 63:106
- **Lofting:**
- technique/Kenneth C. Moberg, 43:44
- **Lofting:**
- technique/Sam Manning, 12:44
- **Lofting:**
- technique/Thomas MacNaughton,
- 23:53, 24:68
- **Lofting:**
- tools for, 11:48, 20:68, 31:66
- **Logan, Arch, designer:**
- 10-Rater THELMA, 154:168
- **Logan Brothers, builders (New**
- **Zealand):**