Designing a Johanna-style junkrig for a Hartley trailer-sailer 16.

Making use of the shortcuts provided by chapter 3 and chapter 4 of "The Cambered Panel Junk Rig" (TCPJR).

by Arne Kverneland

When a JRA member said he could use some help in designing a cambered Hasler-McLeod style sail for his Hartley TS 16, I found I would try my hands on it. Since I have the Chapter 3 and 4 around, I find it to be a fairly quick exercise.

On next page is the original specs of the TS 16, found in an old Hartley catalogue. Step one is to make a digital cut-out of the sail plan and print it to a scale I can use, that is 1:50 in this case.

Then I sketch up a possible mast or two, and use the chapter 3 procedure to position the boom. In this case I found I had to push the sail quite far aft to get the CE of the JR at the same place as that of the BM rig (The CE of the Bm rig was found by balancing the sail area on a ruler - see the photo on page 4).

The quick sketching method in Chapter 3 lets us make use of two formulas.

1. **Sail Area,** ***SA*** = boom x h x "The *Johanna* Sail Area Factor" = ***boom x h x 0.79***

2. **Aspect Ratio,** $\boldsymbol{AR = h \div chord}$ *[= h ÷ (boom x cos10°) = h ÷ (boom x 0.985)])*

These two formulas can be merged into another one (..or three, actually...):

3a. Sail Area, $\boldsymbol{SA = 0.78 \times AR \times B^2}$ ...and this can of course be twisted into...

..this, **3b:** $\boldsymbol{AR = \frac{SA}{0{,}78\, B^2}}$ and this, **3c:** $\boldsymbol{B = \sqrt{\frac{SA}{0.78\, AR}}}$

These new formula, 3a, b and c lets me get away without sketching more than the boom. After trying a bit back and forth, the formula 3b indicated that an AR=1.85 might be good:

$$\boldsymbol{AR} = {}^{SA}\!/_{0.78\, B^2} = {}^{17sqm}\!/_{0.78 \times (3.45m)^2} = \mathbf{1.83}$$

Time to move over to Chapter 4 and try one of the master sails:

I go for the master sail with AR = 1.85 has a SA=36.55m^2

By scaling it down to B=3.45 the linear scaling factor, $\mathbf{F_L}$=3.45m/5.077m=**0.679534** the sail area $\mathbf{SA_{AR=1.85}}$ = 36.55m^2 x $F_L{}^2$= **16.88m^2**. That is close enough, as the original Bermuda **SA**=180sqft= **16.72m^2**.

All I then have to do is to print out the sail in this size on a transparent and lay it over the original sail plan. See page 3.

HARTLEY TRAILER SAILER 16

PLYWOOD CABIN CENTREBOARD YACHT OR BILGE KEELER

OF T.V. FAME

LENGTH 16' 5" **BEAM 7' 4"**

Freeboard for'ard 2ft. 3in.; Aft 1ft. 9in.; Depth of Hull Amidships 2ft. 3in.; Draft with plate up 9in., and with plate down 4ft. 1in.; Length of Cockpit 6ft.; Length of Bunks 6ft.; Waterline Length 15ft. 3in. Waterline Beam 5ft. 6in.

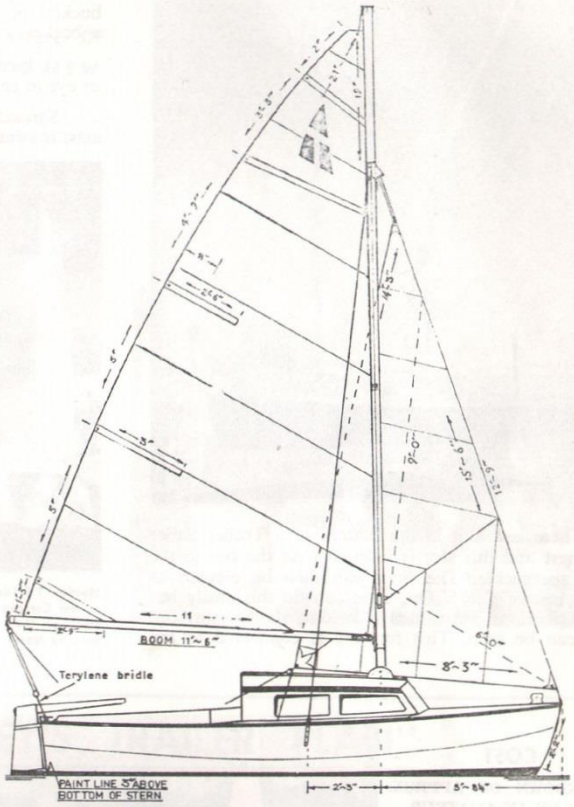
Weight: 800 lbs.

Ply: 11 sheets 8 x 4 x 5/16 and 5 sheets 8 x 4 x ¼. Timber: 200 super feet.

Sail Areas: Mainsail 125 sq. ft.; Jib 55 sq. ft.; Storm Jib 25 sq. ft.; Spinnaker 117 sq. ft. Length of Mast 21ft.; Length of Boom 11ft. 6in.

Here is a clean-lined conventional sheered little yacht with a well-designed cabin top. Besides ample space for a party out day-sailing there are two permanent bunks for week-end cruising. She sails efficiently under a small, easily-handled sail area and drives cleanly under power.

For the man with limited means who wants a boat for day-sailing and fishing with the guarantee of being home on time, this is the boat. In fact she is a small motor sailer.



HARTLEY "TRAILER SAILER 16" sail plan with official sail insignia.

The crutch that carries the mast when the boat is being trailed is designed to support the boom at the correct height so a canvas cover can be spread over the cockpit like a tent. The cockpit floor is raised to form a level area where two more people could bunk down on lilos if necessary.

The side decks are at comfortable seat height and the coamings run out from the cabin to the ship's side so there is plenty of uncluttered deck to sit on. There are bins for storage down both sides of the cockpit under the side decks.

The sail area of 180 sq. ft. can be handled by one man, and the mast is short and stayed in such a way that one man can put it up. The specially designed chocks and cleats hold the mast securely in place when the boat is being trailed.

The stern is sloped to the most efficient angle for outboards and the self-draining well is the full width of the cockpit so the outboard can be used either side of the rudder.

We have used the multi-chine type of construction for this boat because it is the simplest to construct and makes the easiest driven hull shape. There are only five frames so "Trailer Sailer" can be built easily and quickly by a man or boy with no previous experience.

The plans include accurate and detailed drawings of the constructions, sail plans, centre case, rudder, etc. as well as lists of materials and FULL SIZE PATTERNS of the frames, stem, mast and mast fittings, chain plates, etc.

Price of complete plan:

$18 in New Zealand.

£12 Overseas.

$24 in Australia plus 5% Sales Tax.

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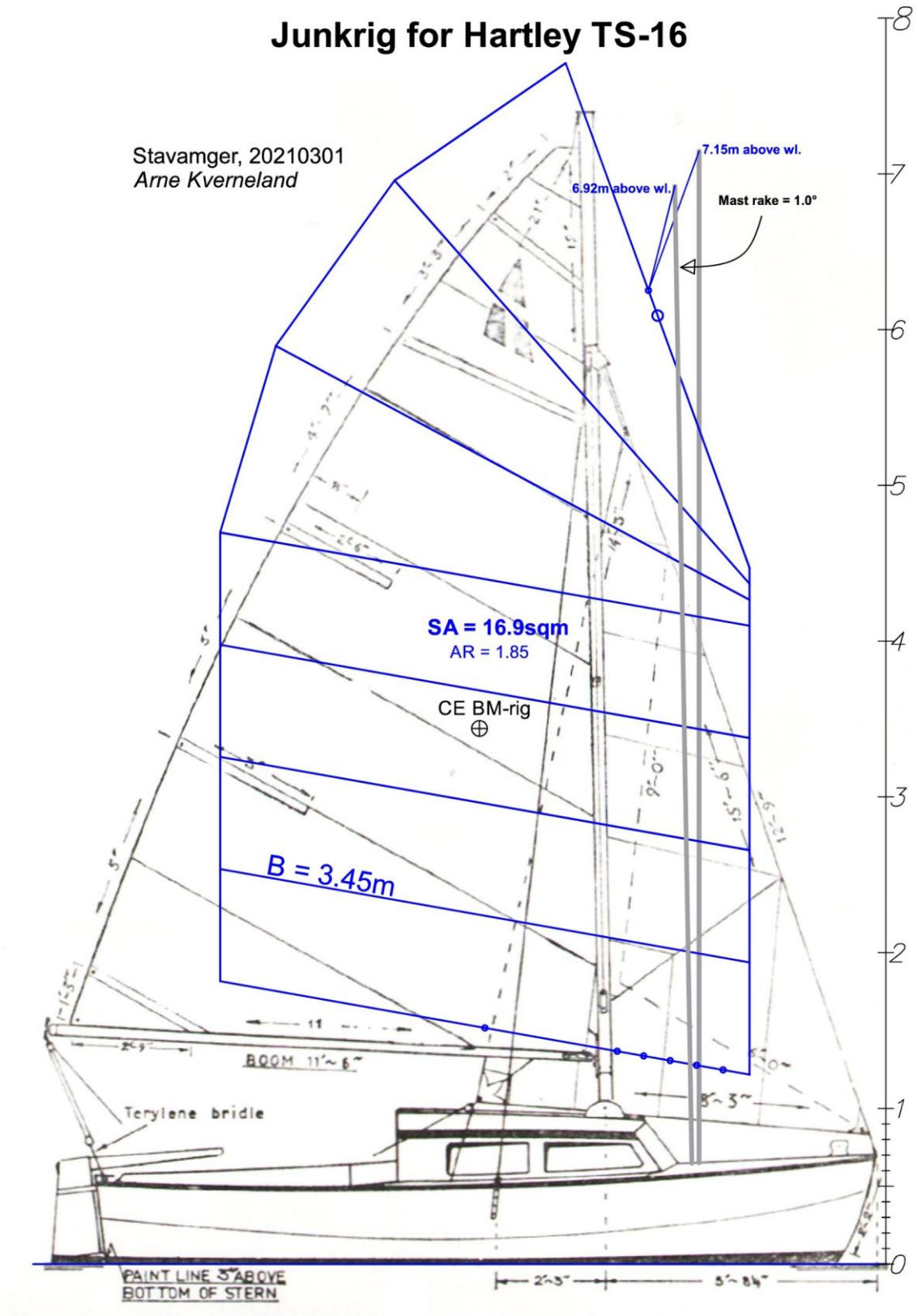
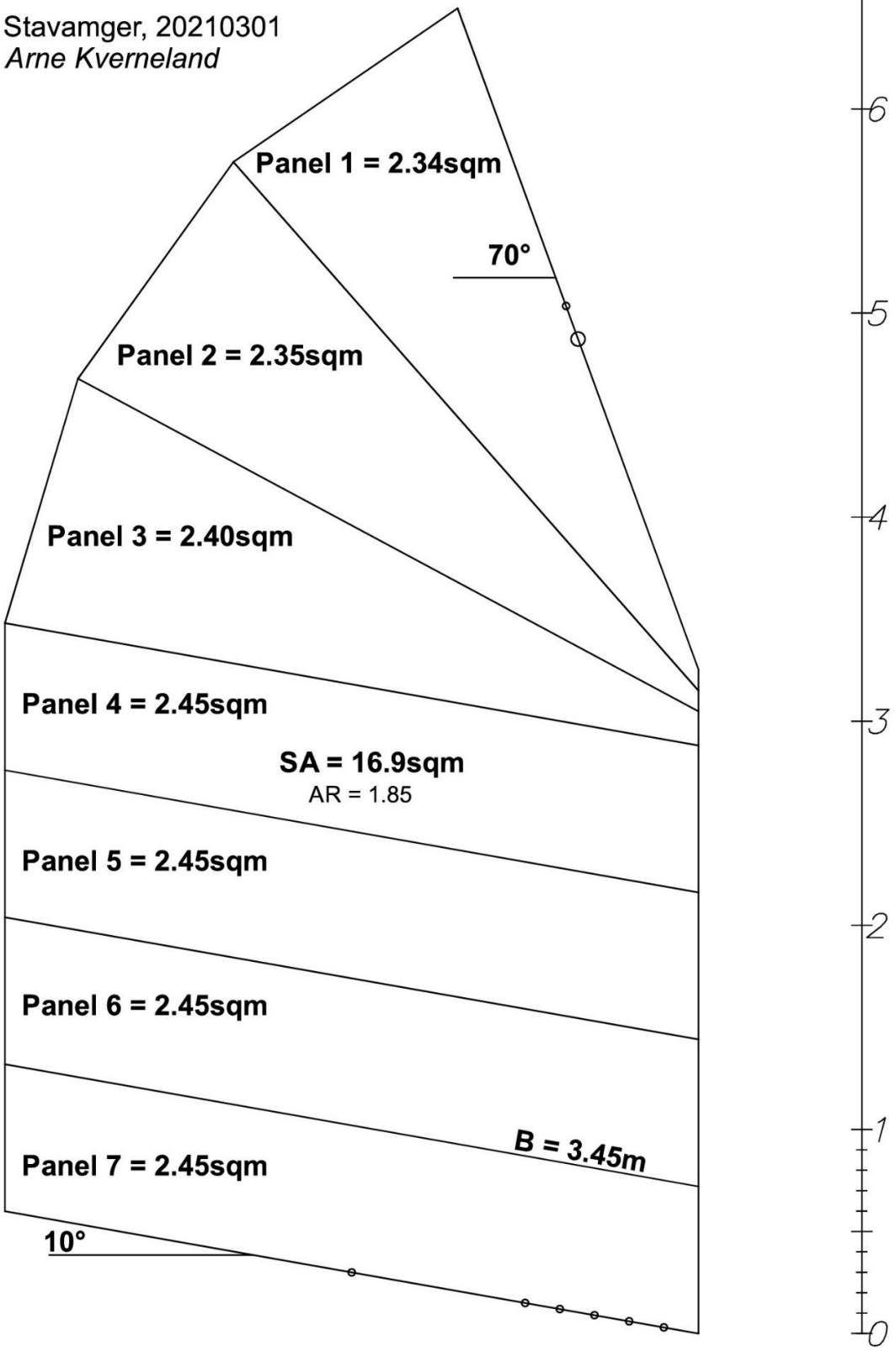
Unfortunately, the underwater body is not shown here, but I know it has a big rudder plus a centreboard. I decided to find the approx. position of the CE and use that on the JR.



The Hartley TS 16 with the suggested JR (redrawn 1.3.2021)

Junkrig for Hartley TS-16, Sheet 1

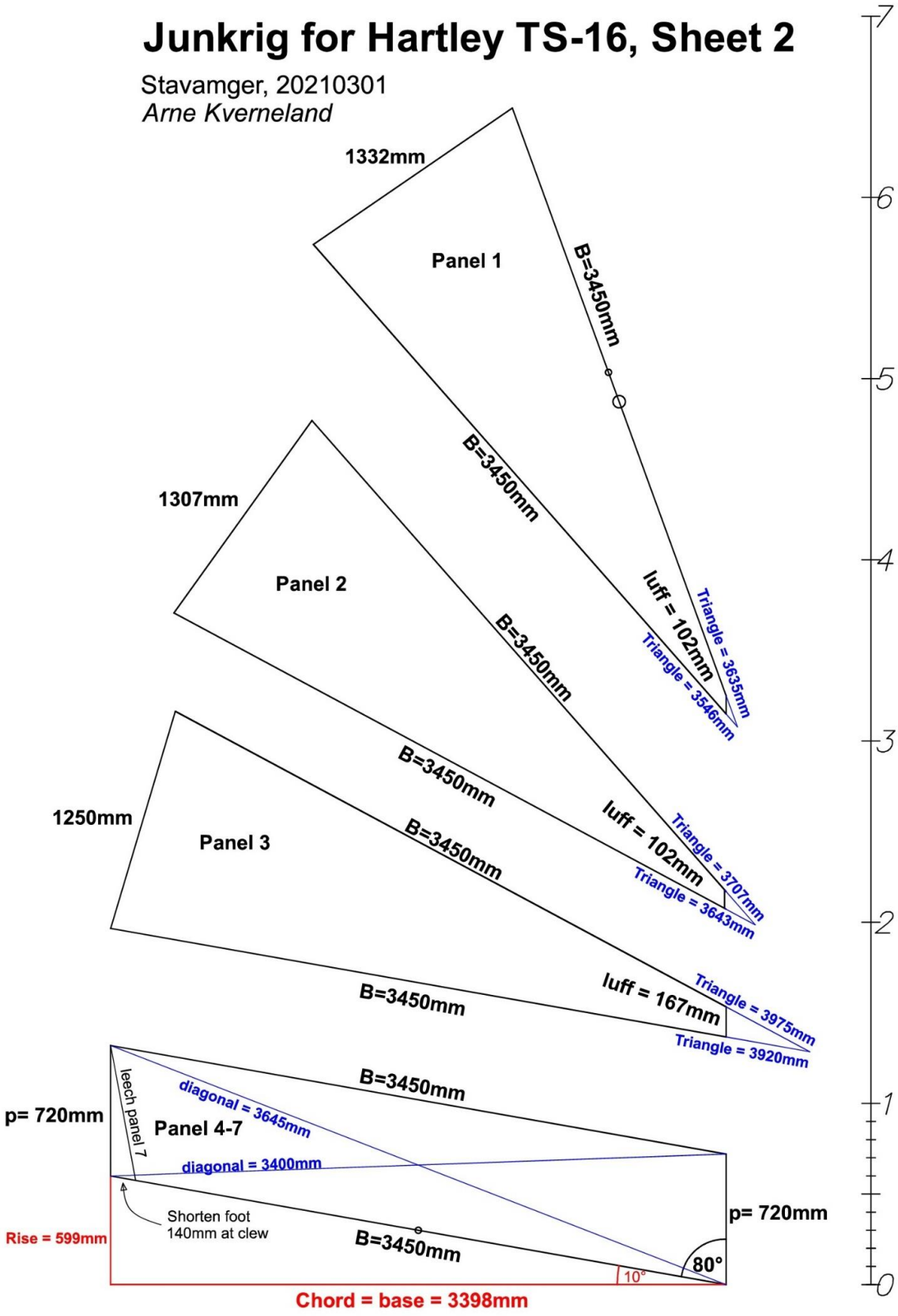
Stavamger, 20210301
Arne Kverneland



Junkrig for Hartley TS-16, Sheet 2

Stavamger, 20210301

Arne Kverneland



Junkrig for Hartley TS-16, Sheet 3

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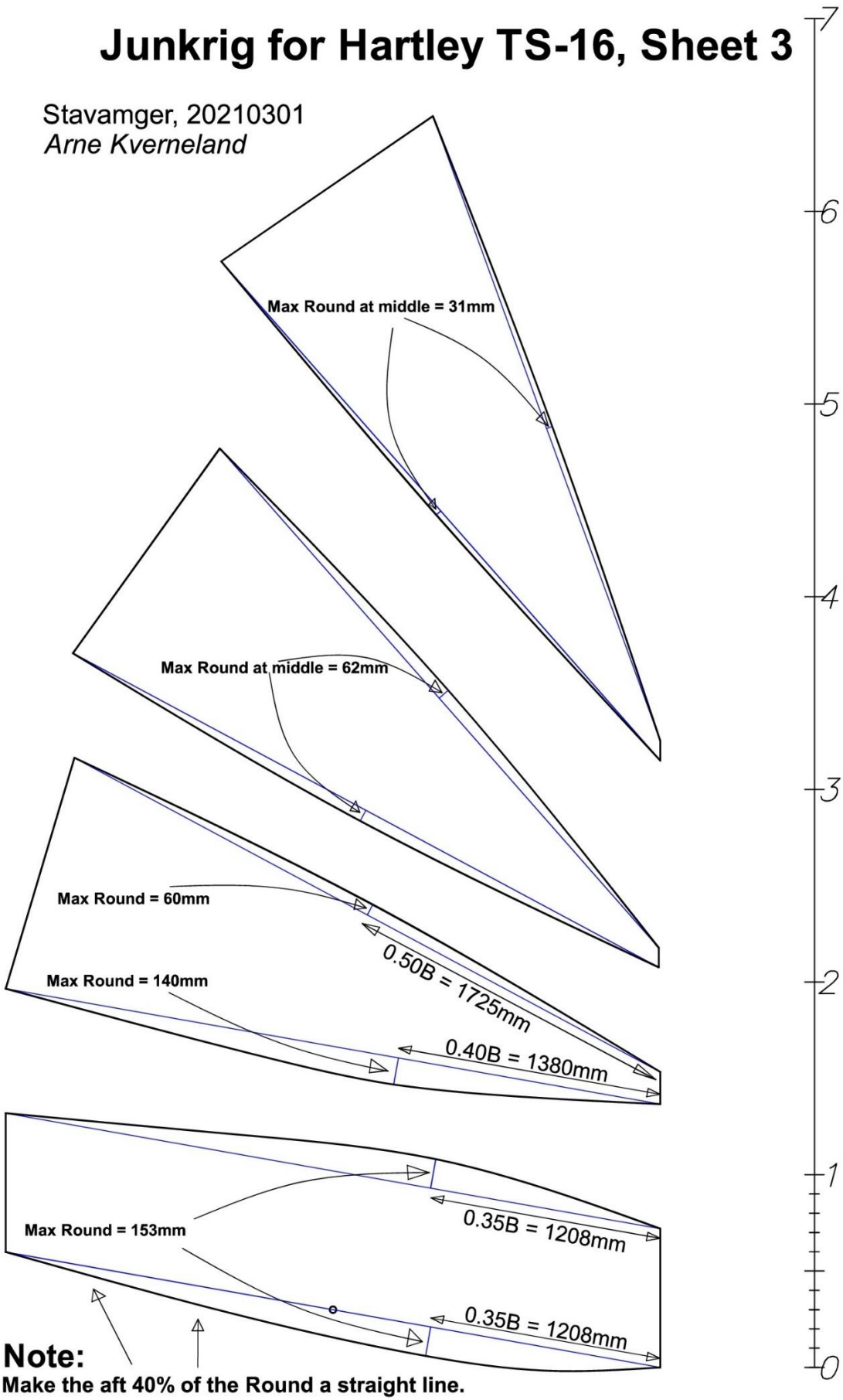

Note:
Make the aft 40% of the Round a straight line.

Junkrig for Hartley TS-16, Sheet 4

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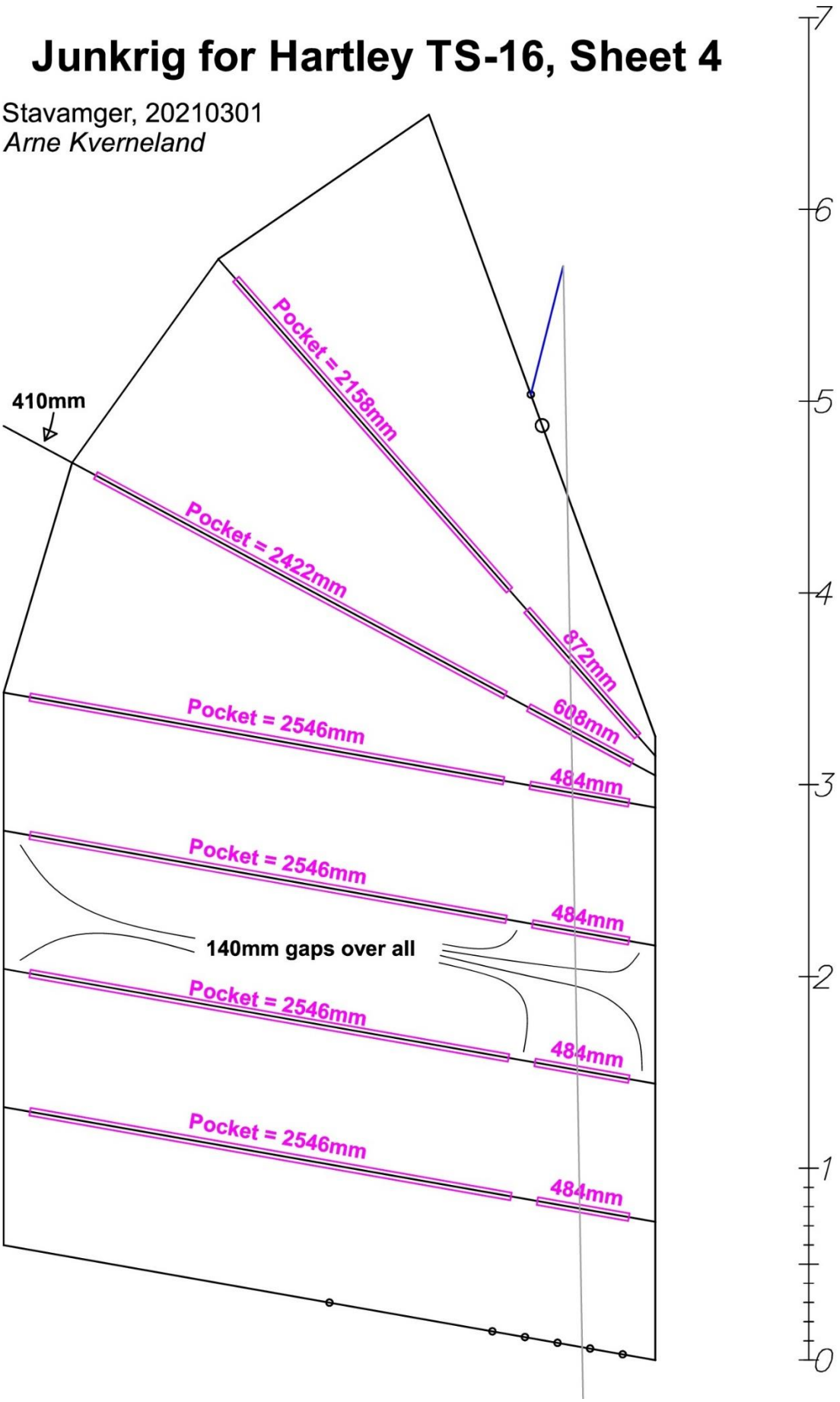

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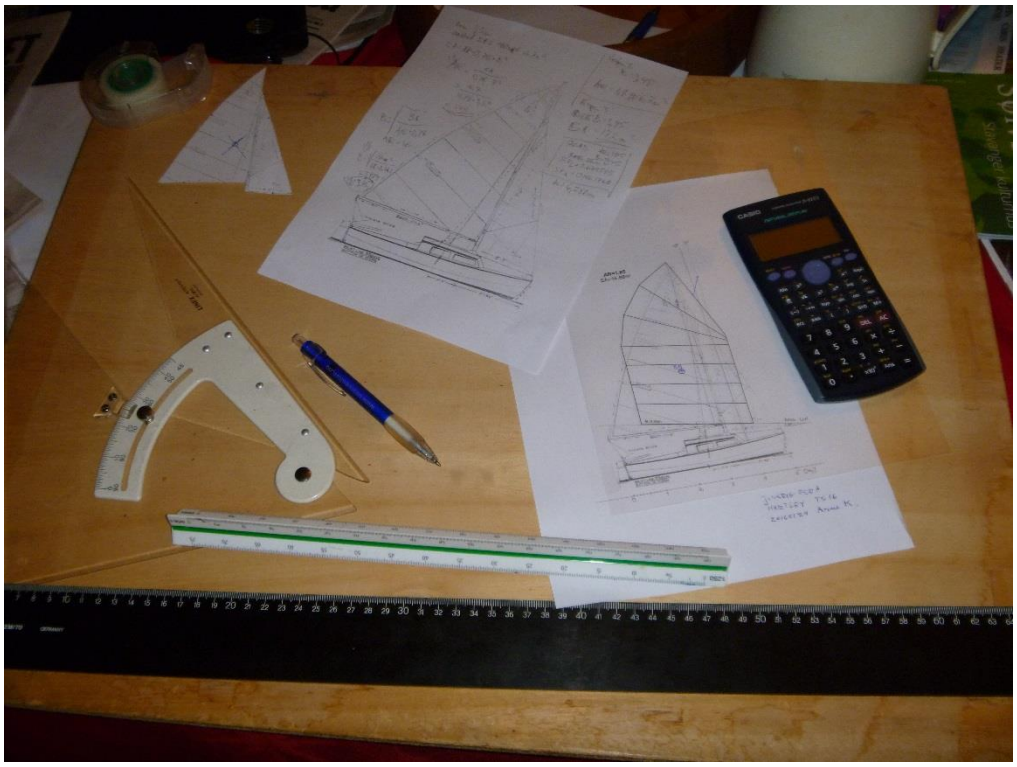

A glimpse of my little drawing board, revealing my semi-manual method of drawing. Note the cut out Bermuda sail area, up to the left, used for finding the CE.

PS, 1.3.2021.
Now I went through that drawing from 2016 and drew up four sheets to help lofting the sail on painter's paper, and then make the sail. Sheet 2 and 3 are the main drawings for lofting the sail, while sheet 4 shows the batten pockets.