

A Split Junk Rig for *Serendipity*

I have always had a liking for the Alan Wright designed 17' Monarch trailer yacht, about the smallest factory-made camper-cruiser and the only one I have seen with an open cabin top. An opportunity to buy one at a reasonable price provided an excuse for a winter diversion from the current project (a 7.5m NZScow, being built out doors.)



This little boat provided a suitable platform for a first attempt at making a sail. Some years ago I had bought an early model Sailright sewing machine, but never found the courage to try using it. The confidence to actually make a sail came after I joined the JRA and it was largely due to the writings of Arne Kverneland, a great source of practical advice and encouragement to a beginner like me. I got some good advice from Annie Hill too: "You don't need 'walking foot' and if you have never used it you will never miss it." And so it proved to be.

My machine does straight stitch and zigzag but has no walking foot. It worked beautifully for me.

Since reading about Slieve McGalliard's development of the split junk rig (and being captivated by that lovely shot of *Poppy* going down wind) I was rather inclined towards making a split junk sail. Mast position also pointed to this choice – together with the promise of greater balance of the sail with respect to the mast. (As a child, learning to sail on an over-canvassed 7-foot P-class has left me to this day with a mild aversion to the antics of a totally unbalanced cat-rigged boat when running downwind in a strong breeze.)

According to the official write-up on the Monarch (<https://www.nztya.nz/designs-k-n.html>) the sail area is 16 sq m, which seems a little high for a boat this size (just 600kg displacement) and is certainly more than this one measured up – I suspected the figure may be wrong, and also that the bermudan main sail on this one might have come off some other boat (perhaps a fflying 15 if the insignia is anything to go by). Slieve advocates strongly that there is no need to over-canvas a split junk rig, and indeed in *Amiina*'s second iteration Slieve and Edward reduced her sail area. I decided on 15.8 sq m, (a round 170 sq ft) but after I had made the commitment to build a 15.8 sq m copy of the *Amiina* Mk II rig (many thanks to Slieve for allowing me to do this) I was horrified at the size of it, and all the more when I realised *Amiina* herself (a somewhat bigger boat with a ballasted keel), is now only carrying just over 16 sq m. I began to fear that this little centreboard boat would never carry near that amount, especially with its geometric centre so high, in anything more than the slightest zephyr. The mast I built was also significantly heavier than the mast and rigging it replaced, and furthermore, later, I found it needed to be raised in height. Finally, I used wooden battens and was shocked at the weight of the bundle.

Rather like Weston Martyr who, the night before its launching, worried himself into a nervous wreck about the ballasting of the *Southseaman*, I was reasonably sure by now that *Serendipity*'s new rig would be an over-weight and over-sized failure before it was even near the water.

I tried to reassure myself with the hope that at least it would be easy to reef, and I built the bottom panel from a super lightweight cloth on the assumption that it would hardly see daylight anyway, and would probably end up being permanently dispensed with!

The mast and tabernacle.

The mast was made from three sections of aluminium tube as I found I had three short pieces, each of which fitted nicely into the other. The lower tube was an off-cut from an aluminium flagpole. The middle section (which extends right down to the heel, making the lower 1/3 of the mast double wall thickness) is one of the T6 battens off Zane's old rig from *Partisan*. The top section was cut from an



old dinghy mast which I happened to have. The heel plug (with drain hole) was quickly turned from a piece of 4"x4" timber. Where the tube sections overlap they are glued with epoxy resin then a bandage of glass/epoxy covers the joint and also enables some fairing to smooth the transition between diameters – and adds a little strength at the joint.

The resulting mast is rather heavier (and probably quite a lot stronger) than it needs to be.

I had originally intended to make a low aspect ratio sail to one of Arne's patterns, with the mast placed forward of the "cabin." The decision to go with split junk meant moving the mast back to a position on the "cabin" top, just a few cm forward of the original mast step. This was better from the point of view of weight distribution and interfered less with the fore peak. But it created other problems and required a tabernacle whose opening would have to be sunk below cabin-top level. (And later I found the split junk rig required a taller mast, for a given sail area, than Arne's sail plan.)



Marcus, who was down in the mangrove creek at the time working on his newly-acquired scow *Havoc*, suggested cutting a slot to open the cabin top further, and to just step the mast on the keel, dinghy style. It was the first of a number of useful 'whydontcha' remarks from Marcus, and I took it a stage further by also utilising the already-made tabernacle - with the opening now facing aft.

This is in line with a type of tabernacle documented by David Tyler some time ago on one of the forums. It has the merit that the mast can be hinged at the foot (with no actual hinge required) and simply walked up into the vertical position then locked in place at the deck partners. The mast is supported at the heel and at the deck, so strictly speaking the tabernacle itself is redundant in this case. However I can say it was definitely worth fitting the tabernacle as once the rectangular mast foot is in place the tabernacle gives lateral support (mostly moral support initially, then progressively mechanical as the mast is raised towards vertical. Such support is fairly important to me, as I am getting a little older than I care to admit and this mast is about as heavy as I can now manage.)

The photo shows the folded (weldless) top-hat-section aluminium sunk tabernacle, opening facing aft, being fitted into the slot which was cut to a loose fit. The tabernacle was given a light plywood cladding in that area, to which partners were fitted and glued, and fastened to the deck. The tabernacle was then cut to height – and a rubber roller attached to the front which carries the mast when lowered, allowing the mast to be rolled forward and lashed for towing. When the mast is raised a gate is dropped down into position behind it at the partners, locking it in the vertical position.

Making the sail panels

Being a first attempt I did make some mistakes, but in hindsight I can say a sewing machine is a most delightful tool to use and no more difficult than any other power tool, skill improving with practice just as one would expect. It was daunting at first, but soon turned into an enjoyable exercise. The challenge was to loft the shapes, cut the cloth and assemble using basting tape. After that, running the seams through the sewing machine was relatively easy and all rather fun.

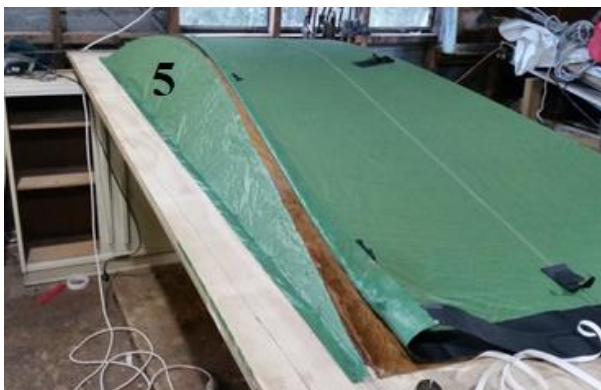
I studied Slieve's detailed description of lofting the components of a 45-degree-shelf cambered panel. I had already decided I liked the geometry of it, and had decided to make both the main and jib panels this way – and as a further learning exercise I would leave the top panel unsplit and try to make it cambered by rounding and a couple of broadseams. I did struggle to understand Slieve's instructions for the 45 degree shelf. Step by step instructions show the way but do not necessarily impart understanding, and although I am comfortable with mathematics, drafting is new to me.



The advice was to make a paper model but as I had access to a stock of very thin plywood I thought it would be easier for me to glue up a full size plywood jib panel.

This was very quick and easy to do, and required only lofting the two 45 degree side panels. The "bottom" was then fitted and faired to the "chines" rather in the manner of making a little plywood flat bottom dinghy. No need to loft that middle section. I realised immediately

that as the lower four jib panels are identical, I could use this model as a tailor's dummy – lay, cut and baste the sail cloth directly on it, with no further lofting required. Slieve said it was not necessary to do it that way, which he saw as a waste of time. But I am not as accomplished a sailmaker as he, and it worked for me. So well, in fact, that I did the same for the four identical main panels. It took less than a day to make each of the two dummies (not counting time for glue to cure) and I believe it saved much time and effort in cutting and basting the sail cloth. I found it easy to lay the cloth over the dummy, cut along the "chines" with a hot knife, then baste and stick the seams.



A "main" panel laid out, cut and folded back ready for the basting tape. Staples hold the cloth in place, but later I found cheap double-sided tape worked better. (Don't use basting tape for that! It won't release. Ask me how I know that.)

The basting tape is then easy to apply around the curve as you have two hands to do it – and you can even cut darts if you want. Two hands are then available to place and pat down the seam, also darted where the curve is tightest.

The assembled and basted panel is then removed from the dummy, or "mould", and taken to the machine for sewing. The result is four panels which I think are accurate and identical.

Three of the main panels were made from cloth taken from a surplus spinnaker (hence the seam which is visible down the middle of the panel in the illustration.) Later I regretted doing that. I found the local sail-makers were quite happy to sell me spinnaker nylon offcuts (ends of rolls) in exchange for some cash which I imagine ended up in the staff social fund. The green nylon spinnaker was a reasonably good one and a shame to cut it up, as I found later that I could probably have sold it for more than I would have paid for the cloth. It was, however, very soft and easier to use than new sail

cloth. I used new cloth (white) for the jib panels and tried to make them very accurately. In the end, the main panels made from old spinnaker cloth seemed to set the best.

I used new spinnaker nylon for the top panel and as there was no more white offcuts, I was given black instead. I started the job with that, and it gave a most wonderful exposure of my beginner-wandering rows of machine stitching, dazzling in snow white polyester thread! As a good measure, I decided to do a little experiment with the bottom panel. Pete Hill had suggested (at a previous junket) that tyvek might be worth looking at, so I decided to order some and make the bottom panels out of this rather strange cloth. It is not woven – it is a sort of papery fabric made with randomly disposed fibres. It does not rupture easily, does not rip and is extremely light. It is not intended to be exposed to UV for long periods of time – the so-called UV-resistant version seems to be unavailable in New Zealand. It is incredibly light and probably a bit stretchy. It seems hardly worth adding stitching to the basted seams. It also melts and vanishes at the first touch of a hot knife. Still, I thought it would be fun to add to the mix, and by this time I was sure that the bottom panel would hardly ever be used anyway.

Just to complete the description: I reinforced the luffs with a thin dyneema bolt rope, inside the hem, (but not attached with stitching, which was a mistake). I made the leeches with tabling in the approved way – and then decided to add some light reinforcing tape as well (a good idea, I think.) For the technical minded: the foil shape is fairly standard with the biggest entry angle I could draw, maximum camber at about 36% of chord. The top panel has 6% camber. The mains have 8% and the jibs 10% as I recall – and the sheeting angle for the jibs is 12 degrees. These numbers are close to those used on *Amiina's* MkII sail, whose plan I copied (scaled down by a lineal factor of .9893, which means the area is scaled down by a factor of about .9787.)

Assembling the panels and setting up the rig

Here is where I began to run into problems, some of them self-created.

I decided not to sew the panels together, but to join them by way of sandwiching between the two halves of wooden battens. I followed the dimensions and approximately the method used by James Gray (*River Rat*). The batten halves were 18x28mm and the yard, also made in halves, is 70mm wide. Each sail panel and its adjacent panel were overlapped at the “seam” and stapled to the appropriate batten half with stainless steel staples. Then the other half of the batten was placed over the top and screwed down, through the sail and into the other batten half. It was quick and easy with the drill driver, but after some hard usage the sail is showing signs of coming apart and I intend now to take it apart and sew it together in the normal way, and incorporate conventional batten pockets to be used with lighter, tubular battens.

The most serious mistake was that the mast was not tall enough for the split junk sail I finally decided on: there was insufficient halyard drift at the top, and not enough room at the bottom, between the boom and the cabin top, to allow sufficient span for the running parrel/downhauls when reefing. Oversights due to inexperience, greed for sail area and over-economy on mast length. Very luckily for me there was a way out - an unintended fortunate (serendipitous?) consequence of using a tabernacle and placing it with the opening facing aft. It meant first that I could raise up the mast about half a metre by simply by packing under the heel (there is still plenty of bury in the tabernacle) – and secondly that the turning blocks for the parrel/downhauls were able to be mounted below deck level, thus giving their spans enough drift to be able to reef. You need at least half a panel width for that – and I think more might be better.

I had no idea how to set up a mainsheet system and could not understand the arrangement necessary. As a result I made it in two parts and simply guessed the lengths of the spans. It was a good guess and the result is a two-part mainsheet which worked very well right from the outset.

Serendipity's first sea trial



Marcus towed me out of the mangroves and into the main creek, and followed with a camera. Conditions were gusty and I kept the lower (tyvek) panel reefed. The photographs say it all. Due to the way the sail was fastened together it seems evident that the jib panels were not stretched out evenly on the battens, and two of them did not set well. Also the centreboard was not going down fully and this gave rise to a little lee helm in the lulls.

Apart from, and despite that, I would describe the performance as sparkling. The boat was lively, quick to accelerate, and to my surprise, on the wind she stood up to her sail area and to the weight of the heavy spars in all but the worst of the gusts.



On a reach she just went like a Bondi tram – look at that bow wave!
(And don't look at that severe crease in the No. 2 jib panel.)



Down wind: with no standing rigging to interfere, what a pleasure to square away fully, spread those wings and fly!

Many thanks to Marcus for the photographs and to Slieve for a wonderful sail design.

Subsequent trials have proved that the lightweight tyvek lower panel works quite well, and I would say that this seemingly (at first sight and feel) flimsy material is actually quite strong and worthy of consideration for lightweight sails.

My worst fears were not necessary.

The sail area has since been found to be about right, and she scoots along very well under full sail in a light to moderate breeze.

***Serendipity's* first junket**

There had been talk of a winter junket for some time, and considerable discussion about venue and date. When it was finally nailed down, it was a race for Marcus to get his newly acquired NZScow seaworthy, out of the creek and up the coast to her new home at Norsand Boatyard, Whangarei – known to certain junk rig enthusiasts as “Party Central.” He had renamed this boat *Havoc* after one of the old New Zealand scows from the late 1800s.

A certain amount of havoc was indeed wreaked during those final, hectic weeks.



Down in the mangrove creek it was a hive of activity. *Serendipity* needed some attention too. A fabric cabin top needed to be sewed. Here she is, hove down from the mast-head to fit a new centreboard tackle. Meanwhile *Havoc* in the background is being given a deck house, new pin rails, rigging checked and various other sundry details attended to.

Marcus was to sail *Havoc* single-handed to Whangarei and all set to arrive at the last minute (as normal) but the date was

postponed for a week so he surprised the rest of the crew by arriving with a couple of days to spare. *Serendipity* arrived the evening before the junket, and spent the night on her trailer.



The next couple of days for *Serendipity* were memorable, rafted up to *Havoc* between burls up and down the channel in company with *Freebie*, a time of tall stories and much laughter; cosy evenings warmed by good company, *Havoc's* wood stove and slightly more than sufficient liquid refreshment.

Despite the continual gusty weather and rain, there was an opportunity now for a couple of days of coastal cruising – just within the confines of the harbour of course, as befits such a little cruiser on her first junket.



So *Serendipity* set out for Portland Creek, escorted down the first reach of the Whangarei harbour by *Freebie*.



The wind picked up and the tide turned and there was no choice but to run back to shelter under the ruins of the old deserted cement factory on Limestone Island.

Here *Serendipity* spent her first night at anchor, swinging to the occasional gust, startled by sudden rain squalls during the dark hours and surprised by the picture of calm the following morning.



The outgoing tide was good for a run down-harbour in the light conditions, all the way to McLeods Bay. The tyvek panel inflated in the lightest puff, and the extra sail area now paid off. Channel markers were found to mean pretty much what they say. Many sand banks can be found here, but no matter for a little cruiser with a swinging centreboard.

McLeod's Bay is where Rob and Maren have made their home. Look at that dramatic, rocky hilltop backdrop.

But conditions deteriorated again and it was soon time to shift from a potential lee shore and find a better place for the night.

The day before, Annie had insisted on lending me her chart of Whangarei Harbour and, in passing, had mentioned a little island in Parua Bay which she thought would make a good, sheltered anchorage. It seemed a good idea. (As an aside, Motukiore translates as "Rat Island" – the kiore being a harmless and now endangered tree dwelling rat. It is one of New Zealand's very few "indigenous" mammals (the other two being the kuri (dog) also brought to New Zealand by the first Polynesian settlers, and a tiny native bat which was probably self-introduced, as the islands of New Zealand had become separated from the main southern continent well before mammals evolved.)



“Rat Island” it may be, but to me Motukiore will be remembered as “Annie’s Little Island” – a magical miniature cross section of New Zealand history: the remains of the ramparts of a tiny Maori pa at one end, and a grove of exotic trees and shrubs at the other, which bespeak the site of an early European settler homestead. Indeed, the first white settlers to land here were a couple of sawyers who were dropped off in 1835 to start felling and milling the timber. The story goes that the first absconded immediately and the other then filled the following six months beachcombing in leisurely fashion until the owner returned and promptly wound up his unsuccessful timber enterprise. This rather shallow bay, inside the protection of the island and its low-tide causeway, provides perfect shelter for the little cruiser while wind continues to whistle outside in the main harbour.

Next morning began as a tedious beat back to Party Central, taking most of the day in gusty and squally conditions, against a fast-running outgoing tide. I doubt if a conventional trailer yacht would have ventured to do it. What a joy the junk rig is, to be able to instantly and repeatedly change sail area to meet the ever-changing wind conditions. *Serendipity* may well have reefed and unreefed more times during that day than I have done in most of my previous pointy-rigged life.



Arrived back at the beginning of the final reach just as the tide turned in our favour – to be met and escorted the rest of the way by *Freebie*, a delightful evening sail up the last reach to raft once again alongside *Havoc*.....



..... and then to enjoy the warmth of a wood stove and a hot, hearty meal cooked by Marcus.

A suitable end to a most enjoyable winter junket.