Peaking up the junk sail

How to avoid creases and bent battens in a junk sail with cambered panels

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This write-up will mainly deal with some problems that I met when changing from flat junk sail on my 23' *Malena*, to cambered panels, back in 1992-94. It will therefore mainly be about the Hasler-McLeod style sail and the use of running and standing parrels. A fanned sail doesn't differ radically in this respect, but I have too little experience with them to say anything about them.

The basics – the flat sail

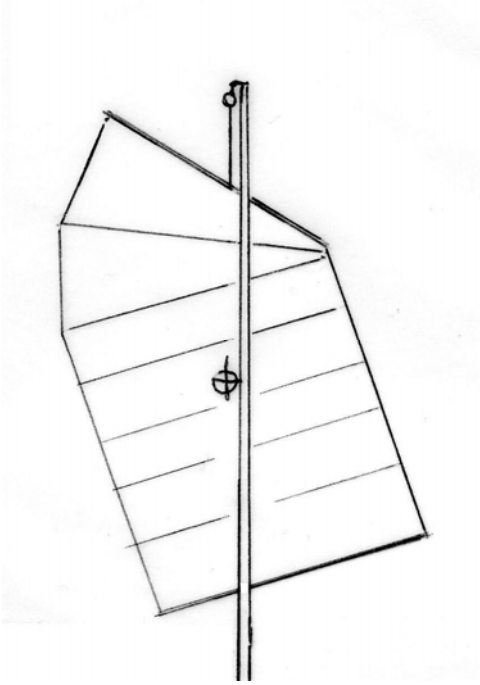


Fig 1: A flat junk sail suspended from the halyard alone.

The diagram above shows how a flat junk sail would swing forward under the force of gravity alone. Obviously, something has to be done:

- The first natural step would be to pull the tack aft into position as shown on Fig 2 (overleaf). As the yard and sail still want to swing forward, the luff will bulge a bit forward (much exaggerated on Fig 2). With sheet forces added, the problem will get worse.
- The next natural step is then to fit luff hauling parrels, LHP, to the middle of the sail (to "pull in the belly") and then finally...
- ..to lock the yard in position by adding a yard hauling parrel, YHP.

> **Note: Batten parrels have not been drawn in as their job is mainly to hold the battens close to the mast – actually transferring some of the wind forces to the mast. They are also important, of course, in keeping the sail under control when raising and reefing the sail, but that is another story.**

Thanks to the flat, strong sailcloth, the diagonal forces in the sail are almost hidden with only a few diagonal stress-wrinkles (in throat-clew direction) here and there.

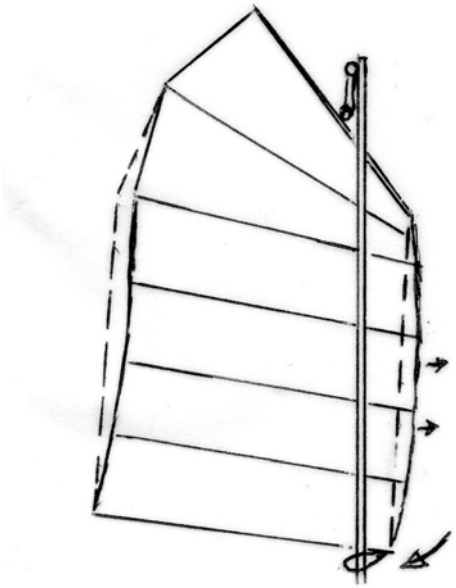


Fig 2: Tack parrel at work.

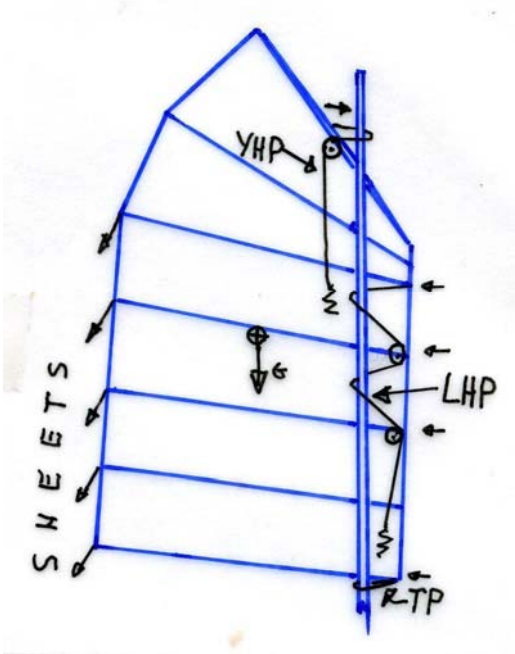


Fig 3: Complete with TP, LHP and YHP

This much-used method, as taken from *Practical Junk Rig* , PJR, worked quite well on my flat sail on *Malena* (1990). However, the performance of the flat sail wasn't good enough.

Enter cambered panels

When I first made cambered panels, by modifying the flat sail with tucks, I kept the same setup of LHP etc. as in Fig 3. This resulted in some big diagonal creases in each panel – worst in panel 3 (Photo 1, overleaf). Luckily PJR had a cure for it; the *Hong Kong parrels* (HKP).

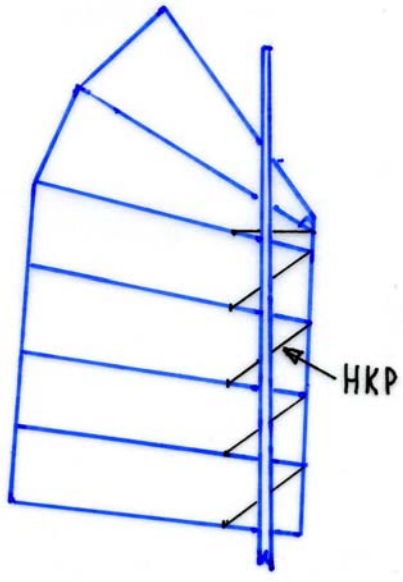


Fig 4: Hong Kong parrels, passed between the mast and the sail.

With the Hong Kong parrels on Fig 4 added to the parrels in Fig 3, *Malena*'s first cambered panel sail started to look like something.

Photo 1. December 1992

Photo 2, spring 1993

Photo 1 shows first test with only one (too slack) HK parrel in use: Big diagonal creases. On Photo 2 everything looks quite promising. HK parrels have been fitted to all the lower panels. With just a light wind blowing, there were not enough sheet forces to cause any problems with the HK parrels bending any battens. That came later:

(.. the battens of *Malena* are 25mm with 3mm walls so are not that stiff, but at least they can bend a lot before taking a permanent bend...)

When studying Photo 3 and 4 (overleaf), one will see how batten no. 3 is bent upwards. I never worried too much about this because the bending and diagonal creases only became visible from F4 and upwards. Losing some camber then was no problem. I sold *Malena* in 1999 and the present owner hasn't done anything to fix it.

(.. the fact is that the performance with the cambered sail was so good that I felt no reason for more fiddling for a while. For the period of 1994 to 1999 I just sailed ...)

Photo 3, summer 1994: Brand new sail - and already a moderate bend visible in batten no. 3
Photo: Reidar B Kalvig

Photo 4: August 2010. Batten no. 3 clearly being bent upwards by the HK parrel in a good breeze.
(Photo: Andrew Bailey)

Malena's sail may look a sorry sight here, but remember; even at this state she would sail rings around the flat-sail brigade.

The quick fix

The quick fix is, of course, is to fit *Malena* with stouter battens, now that she is to receive a new sail. The other "old" Stavanger junks; *Samson*, *Johanna* and *Edmond Dantes* get away with using HK parrels without bending the battens, simply by making them strong enough.

Photo 5. Johanna in 2005, still with LHP on batten 2-3-4
Photo: Magne Drangeid

Photo 6: ED in 2006. HK parrel but no LHP (?)
Photo: Arne

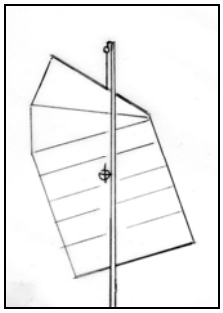
Photo 7: *Samson* in 2008. No LHP in the fore sail at least
Photo: Peter Manning

As can be seen on the Stavanger boats, they use different parrels, but all use HK parrels. No diagonal creases. I have "tons" of photos of these boats and these are not just lucky shots.

Still, with this method the upper HK parrels are under hard load: They are actually used to keep the yard peaked up against the sheet forces. Not surprising that the battens are struggleing!

Luckily, there is a better way, so back to square one (overleaf):

Better peak up the yard ***first*...**



..square one...

Let's start again with the free sail. Instead of pulling it back into position with the tack parrel, we fit a new *upper luff hauling parrel*, a ***throat hauling parrel*** (THP), in fact.

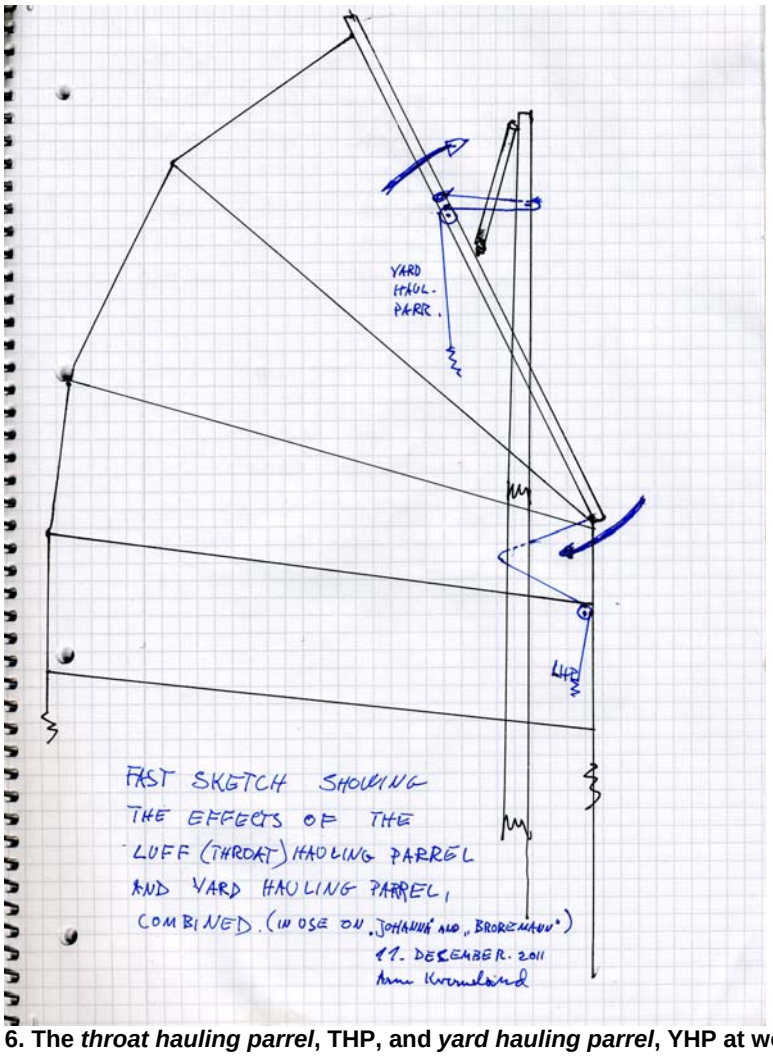


Fig 6. The *throat hauling parrel*, THP, and *yard hauling parrel*, YHP at work

By peaking up the yard with the THP an YHP before sheeting in the sail, the rest of the sail will fall into position without big forces involved. One will then find that the tack parrel is lightly loaded as well as any lower luff hauling parrels or HK parrels (if used). They mainly are there to support the sail when the boat pitches in a head sea.
Since 2008 *Johanna* has had the LHP moved up to be an "almost THP" by just working on the yard and batten no. 3. On my newest boat, *Broremann*, the LHP acts on the yard and batten no. 2, so is in practice a true throat hauling parrel. There is only a gentle pull from the HK parrels on her light 16mm (by 1.5mm) aluminium battens.

Photo 8: *Johanna* in 2008. LHP on yard and b. 3
Photo: Nils Myklebust

Photo 9: *Broremann* in 2011. THP on yard and b. 2
Photo: Magne Drangeid

Conclusion

The problems with bending or breaking battens when sailing with cambered panels and HK parrels can be fixed in two ways; either...

- .. by beefing up the battens and using stout HK parrels...
- .. or (better) by adding a throat hauling parrel to peak up the yard without stressing the sail below. With the yard firmly peaked up by the combined forces of the THP and YHP, any lower luff hauling parrels or HK parrels will see much reduced load.

What next?

Next summer I'll try *Broremann* and *Johanna* with the HK parrels disconnected to see what happens. If the sails turn out OK without them, then fine! Still, my hunch is that the HK parrels still play a role as light trimming lines in shifting winds and with the boats pitching. Time will show – stay tuned!

Stavanger, 14.12.2011,

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PS: (.. it is depressing to think of how long it took me to realise this...)