The SHOCK of the OLD

Part 28: Saddle Up!

Having examined lug rig variations in recent issues, Moray MacPhail's series now studies gaffers, taking it from the top.

Traditionally gaffs lay at an angle of 45˚ to 50˚ to the mast, so the job of the gaff saddle or jaws was to deal with the thrust of the gaff on the mast and stop it falling off to one side. If you wanted to improve windward performance, you set a topsail. 'Modern' gaffers tend toward the view that if you peak the gaff up higher the boat goes better so you don't have to mess around with topsails. The logical extension of that is Bermudan rig. Though it is not the place here to argue the pros and cons of high peaked gaff rigs or Gaff vs. Bermudan rigs, as you peak up the gaff two things happen.

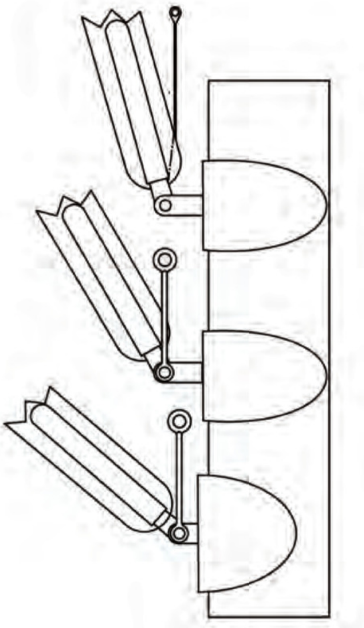
Firstly, the saddle or jaws have to contend not just with the thrust along the gaff but also a twisting force which comes from it being pressed to leeward by the sail. Imagine a gaff set at 90˚ to the mast, like the boom. There could be no twisting moment because it would simply swivel around the mast but there would be some load along the gaff into the mast. At the other extreme is a gunter yard, set parallel to the mast. There is no force along the yard into the mast but lots of sideways twisting. This explains why wooden jaws can be unsatisfactory on a high-peaked gaff since they are not good at coping with the twisting force on the gaff which tries to prise the jaws apart.

I last had a set of wooden gunter jaws break on me some years back for just this reason, on a boat submitted for review! (Actually it came as something of a relief; with fine bows, a long skeg and undersized rudder, we were headed downwind toward certain doom until the jaws broke!). So the traditional shape of gaff saddle tends to come away from the mast if used for a high-peaked gaff. It is well shaped to cope with the thrust but the rounded shape does not cope well with the twisting forces.

Which is why, some years ago, I developed a family of gaff saddles based on two shapes of saddle and two methods of attaching the throat halyard, the choice of which is depends on the peak angle. Figure 1 above shows the main options. The conventional saddle is of a traditional pattern and shape; after all, why change what works? The 'High Peak' variant is shallower but with its 'shoulders' extended further around the mast to resist twisting and – depending on the peak angle – it can be fitted with a conventional halyard attachment or a strop.

You very quickly run out of space to fit the throat halyard loop or stirrup, so tend to have to fit a strop to attach any throat blocks. That also means that the throat crane needs to be sited well clear, further up the mast. As well as that, you may have to take material away from the upper face of the gaff to allow everything to fit. Flip over the page to Figure 2 for a good example.

The saddle should be about 15% wider inside than the mast diameter



Above Figure 1: *Gaff saddle shapes. Bottom: The traditional shape for a peak angle around 45˚. Usually hoisted with a stirrup. Jaws would also work here. Middle: As the peak angle reduces, the saddle has to go further around the mast. Up to about 30˚, a stirrup is still feasible. Top: Higher peaked gaffs often use a strop rather than a stirrup. Often the upper surface of the gaff will need to be shaped for the strop.*

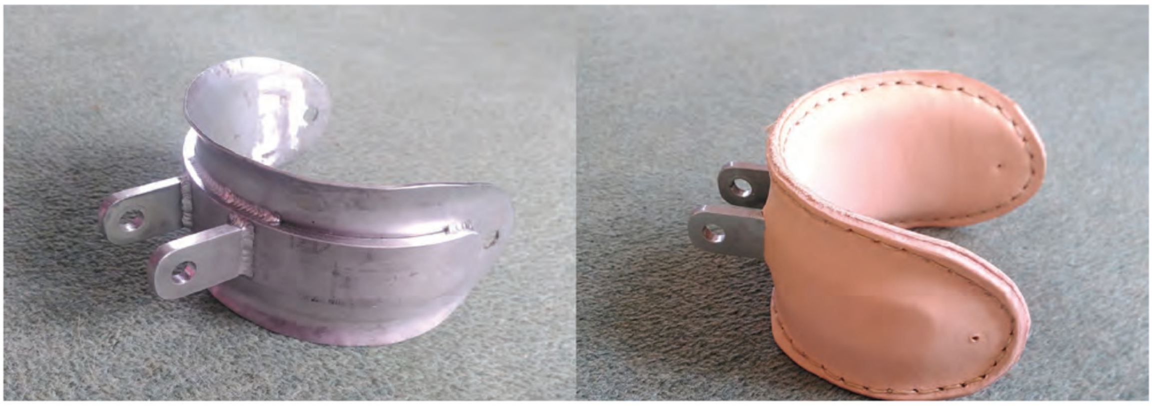
Below Figure 3: *A high peak saddle made from stainless steel. A stiff and strong rib, widely spaced lugs and a relatively lightweight but well flared front face – all hidden under the stitched leather covering.*

at the point where it operates. Ideally your mast should be parallel up to that point – if it is tapered the saddle will tend to jam when being lowered.

With regard to the construction of the saddle itself, there are two things to aim for. Firstly, a saddle should be as light as possible to reduce top-weight. Generally speaking, that implies a fabricated rather than a cast saddle and it also favours one or other type of steel, as opposed to, say, bronze. For a given weight steel is stiffer and usually stronger, depending on the alloy. The other aspect is to have reasonably widely spaced lugs joining the gaff itself to the saddle. This becomes more important the higher the peak, since there are more loads on the connection the higher you peak the gaff. The old single lug on the back of the saddle doesn't work well on modern gaffers.

Leather is still generally favourite for covering the saddle – it looks the part and works well – see Figure 3. It is a good plan to treat the leather occasionally with waterproofing compound of some sort – there are a number of types you can get from shoe shops or saddlers.

On one light weather race, the squeaking of the saddle on the mast was driving us mad, so it was lowered and greased with butter extracted from our sandwiches. The squeaking reduced but the smell for weeks later was obnoxious. For the same reasons, I'm not a great fan of tallow.



For a more modern interpretation of the idea, I hear enterprising Cornish sailors have cut a sheet of plastic from a bucket, massaged it into the saddle with a heat gun and held it there with impact adhesive.

What about jaws?

Where might you use jaws instead of a saddle? There is no doubt that it is simpler to do so and in the wonderful world of chandlery, simpler usually means cheaper. As a very rough guideline, I reckon you can use jaws on any type of yard on craft up to, say, 16-20' (4-6m) long and on any size of traditional gaff rig where the mast to gaff angle is about 45˚.

On larger craft jaws are fine for low peak angles, so long as they are made from properly grained or laminated wood. Straight grained wood or plywood tend not to last very long. And as mentioned above, as gaffs peak up, wooden jaws become increasingly unsatisfactory, so metal works better.

And the gaff?

You may be relieved – like the editor – or disappointed that I do not have a load of equations to offer on the sizing of the gaff and must rely on experience and precedence. Which leads me to say that the gaff diameter should be somewhere between 35 and 50% of the diameter of the mast.

The gaff end fitting doesn't need much explanation, the usual scheme being a strap type of thing with two lugs to fit the saddle. The proportions of the straps can be something like 40% of the gaff diameter for the width and 3-4 times the diameter for length as a fair start point. As for fixing it, bolts are effective but protrude - at least at the nut end. Copper rivets look well – and also work fine for galvanised end fittings despite the theoretical risk of galvanic action. But for those like me whose chances of drilling a hole clean through a gaff to match the holes in the fitting are close to zero, offset screws are probably the safest option. Figure 4 shows the options.

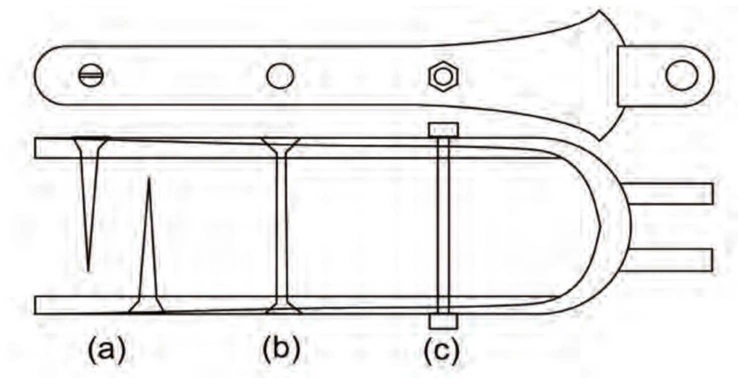
Sometimes it is reckoned to be a good wheeze to lead the topsail sheet along a hollow gaff and out through the end at the saddle. This is undoubtedly neat but has the drawback that you can't through-fasten the gaff end fitting, being forced instead to use fairly short screws. I have known these fail, particularly on a gybe. So if you have a hollow gaff – and there are plenty of good reasons why you should – then the end fitting will need to incorporate a band or cap to ensure a good connection to the saddle.

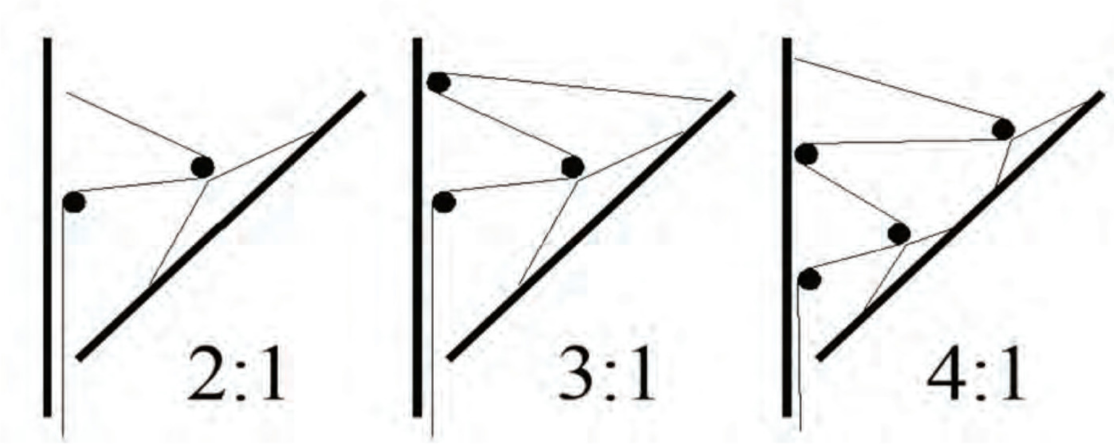
Spans

Moving up the gaff, all that stuff about avoiding bending and keeping pure compression in the spars really counts for nothing here, because the gaff is always being loaded laterally. The task then is to manage the bending which results from this by distributing the load from or into the

Above – Figure 2: *An example of a high-peaked gaff. The longer strop is used for the throat halyard, a shorter one for the end of the span. In both cases the gaff had to be modified to accommodate them.*

Below – Figure 4: *Gaff end attachment showing alternative ways of fastening it securely to the spar; a) offset screws; b) rivets; c) through bolts.*





Above – Figure 5: *Typical peak halyard and span arrangements.*
Below: *A very effective high peak gaff rig on designer Francois Vivier's own boat.*

peak halyards along the gaff using spans. I was going to advise how to place these for maximum effect but a quick review of pictures of gaff rigged boats will show that the arrangements adopted – which all work – are so varied as to defy analysis.

However there are a few things we want the spans to do. Their most important function is to enable the peak angle to be adjusted. Control of the peak halyard is the key to using gaff rig; we want to peak up hard when going to windward and to ease a bit off the wind. If it all threatens to get too exciting – perhaps a squall or in a crowded channel or when coming to a mooring – we can depower the rig by 'scandalising', lowering the peak so the only part of the sail actually doing any driving is the lower triangle from tack to throat to clew. Figure 5 shows some typical arrangements.

To achieve the desired control, it is well worth arranging and sizing the blocks and halyard to reduce the friction in the works – see W165 and W166. In terms of purchase power, something like one part to around 80 square feet (7.4m²) of sail seems to work, so a 240 sq.ft (22.3m²) main would use a 3:1 arrangement. Where problems can arise in this rig is when the saddle refuses to behave.

The next article will explain why this is due to the setup rather than some inherent malevolence.

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