

### *The Gallant Rig*

The Gallant rig, developed by Jack Manners-Spencer, does not have such a strong family resemblance to the junk rig, but it does share several of its characteristics. It has a fully battened sail set on an unstayed mast. This rig seeks a higher degree of aerodynamic efficiency than the junk rig by having a double-sided sail set on wishbone battens which give the sail an aerofoil shape. Like the Swing Wing, the mast is enclosed within the sail, which much reduces the drag. In profile the sails have an elliptical shape, which is a very efficient shape for a wing or sail. The traditional triangular shape of a sail is very inefficient, inasmuch as it causes considerable turbulence, which results in drag, at the tip. The elliptical shape much reduces this.

The general appearance of the sail reminds one of a Spitfire aircraft wing rather than a sail. This is not too surprising, given Jack Manners-Spencer's earlier career in the Royal Air Force.

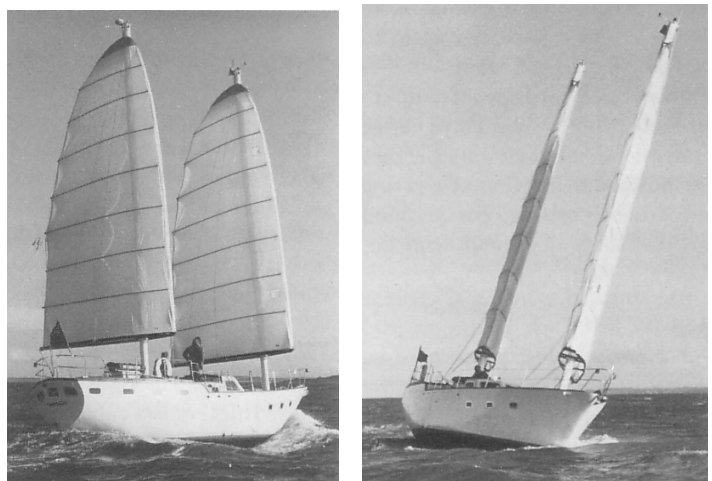


Fig. 42.and 43. Jack Manners-Spencer's Gallant rig on the Endurance 40, *Cameleon*.

The battens themselves are made from a specially extruded alloy section, which is curved to the wishbone shape. The sail is made up from a series of individual panels, each with a boltrope top and bottom, which slide into grooves in the extrusion.

This method of construction allows for easy removal and subsequent replacement of any individual panel that may get damaged. Any fully battened sail is heavy and cumbersome to remove from the mast to repair. It is certainly an advantage to be able to remove a single panel. Such a sail is probably also easier (and hence conceivably cheaper) to make, since the small individual panels are much more manageable than the whole sail to work on.

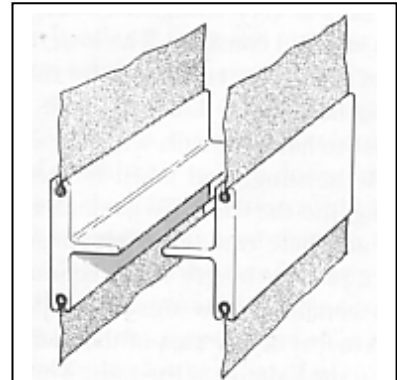


Fig 44. Section through & Gallant batten-showing sail panels fitting into batten.

One of the aims for the Gallant rig has been to keep it as simple as possible. This has been achieved to the point where there are only two items of running rigging for each sail, the halyard and the sheet.

We sailed from Lymington aboard Jack Manners-Spencer's own boat, *Cameleon*. She is an Endurance 40 which he has fitted with the Gallant rig. She is obviously a much heavier boat than the Sunbird 32, so direct comparisons are difficult.

The sail is about the same weight as the Swing Wing, or the junk, so it is quite heavy to hoist. Again, to make life easier, and to reduce compression on the mast, a multi-part halyard is used, usually a purchase of 3:1 is sufficient. On his own boat, to make life even easier, Jack Manners-Spencer uses an electric winch for the halyards. By having a stopper for each halyard, one winch can serve both halyards on his schooner rig. With the 3:1 purchase, though, it was still entirely feasible to hoist the sails by hand.

Hoisting the sails is very straightforward, with only the halyard and the sheet to consider. The lowered sails lie in a bundle on top of the boom, restrained by the topping lifts, which double as lazy jacks. Like the junk, or the Swing Wing, it is easiest to hoist the sails with the wind forward of the beam. While hoisting, and when hoisted, the sails lie quietly feathering into the wind. To get under way, the sheet is hardened in, and here came the first surprise. The sheet was a single part, just one length of line coming off the end of the boom. We wondered how this could possibly control almost 500 square feet of sail area of the mainsail.

The secret is in the balance of the sails. The mast is so positioned that about one third of the sail area is forward of the mast, and about two thirds behind it. This has the effect of dramatically reducing the load on the sheet, and it also reduces the twist of the sails to negligible proportions.

The boat tacked through about 95 degrees, and appeared to foot quite well. Tacking was similar to the junk rig, and the Swing Wing, inasmuch as the sail swings across silently, without flapping, as the head of the boat passes through the wind. Going to windward, it is quite hard to tell when the boat is sailing at her best. However, like the Swing Wing, and

for that matter the junk, the rig is very forgiving, and again, it is easy to make the rig sail quite well. Constant vigilance with the luff tell-tales is required to get the last little bit of speed.

We noticed that the aerofoil sails kept generating some lift even when we pinched up almost head to wind, so this could be the best rig yet for motor-sailing, which is a good way for any cruising boat to make to windward.

So far as reefing is concerned, Jack Manners-Spencer has opted for simplicity, rather than complete control from the cockpit. The basic reefing system is like the junk rig in that as you slacken away the halyard, the sail lowers itself panel by panel, to lie on top of the boom. Here Jack departs from the junk concept, because at this point he goes forward to cleat four little pendants from the topmost reefed batten to the boom. These pendants are permanently attached to each batten, one at each end, and one amidships on either side. His feeling is that this is easier than resorting to a complicated system of downhauls to hold down the battens. There is no doubt that a downhaul system could be rigged, but it would be much more complicated than on the Swing Wing or the junk rig, where in both cases the after end of the sail is held down by the multi-part sheet. The fastening off of the pendants is certainly much easier and safer than fighting on the foredeck, trying to change a headsail.

For light-weather reaching conditions, there have been experiments done on the Gallant rig with an additional 'flap sail'. This additional sail is hoisted on a halyard attached to usually the sixth batten, and it is tacked down part-way along the windward side of the boom. The clew is fastened to a short pole which is attached to the end of the boom. The idea of this sail is not to increase the area, but to improve the shape of the aerofoil. The flap sail is sheeted at about sixty degrees to the axis of the boom, and it works rather like the flaps on an aircraft wing when it is landing. It distorts the airflow over the aerofoil, and increases the lift. This is the same thing they are trying to achieve with the Swing Wing, but in the case of the Gallant, this extra sail must be taken down and reset on each tack.

### *Conclusions*

Compared with a Bermudan boat, the pros and cons are similar to those put forward for the Swing Wing rig. So let's look at the differences between the Gallant and the Swing Wing.

Jack Manners-Spencer's approach to the Gallant rig has been rather more theoretical than Sunbird's with the Swing Wing, which is not to say that the Gallant has not been well proven at sea, because it has. The Gallant rig is designed to the NACA section 0015, which has been calculated to give a coefficient of lift some seventy per cent greater than that developed by the junk sail. No such figures were available for the Swing Wing, but in practice it would appear that both rigs seem to develop similar lift, with perhaps a slight edge to the Swing Wing in lighter conditions, and when reaching.

The Gallant rig has a very rounded leading edge to the sail, and this perhaps makes the sail less susceptible to stalling than the Swing Wing sail. Development on both rigs is still continuing, so by now, the Swing Wing could well have an improved leading edge. The section

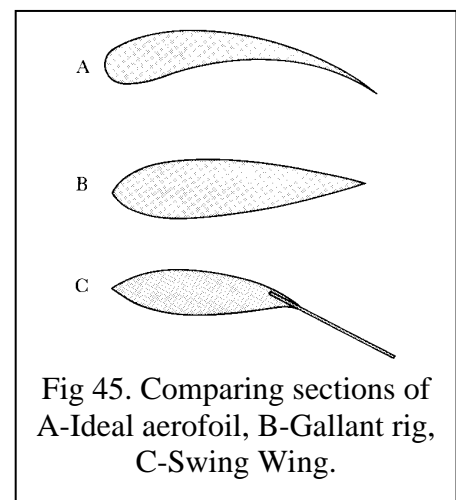


Fig 45. Comparing sections of A-Ideal aerofoil, B-Gallant rig, C-Swing Wing.

## Easier Rigs for Safer Cruising

of the Gallant sail is symmetrical, which, whilst undoubtedly better than the flat sail of the junk, is far from ideal. By being able to articulate, the Swing Wing comes closer to approximating the ideal section.

As previously discussed, the Gallant can set the flap sail to improve the lift under reaching conditions, but for most people I feel that this will prove to be more trouble than it is worth.

The Gallant is apparently simpler than the Swing Wing, until one considers use of the flap sails. The Swing Wing, as conceived, lets one do all sail handling from the cockpit, whereas the Gallant does require short forays on deck when reefing.

Both rigs show a considerable improvement over the junk when going to windward. Whether this increase in performance is worth the extra cost and complication rather depends on the depth of one's purse, and the type of sailing one proposes to do.

The Swing Wing is aimed purely at the yacht market. Safety with reasonable performance is what they are looking for. The Gallant rig is being aimed at wider markets. As well as yachts, it is thought to be useful for work boats of various sorts, including fishing boats. With this in mind, simplicity is the keynote, since some of the potential users will have little interest in the finer points of sailing.

My choice for a small cruising boat, say up to about forty feet, would be the Swing Wing. The rig would be more expensive to build than the junk rig, but I think that the increase in performance probably warrants it. Sunbird is prepared to supply a kit of parts for the home-builder who wishes to make his own rig.

The Gallant rig would perhaps be better for larger boats, since it is easier to build it stronger, with the rigid battens. This is one of the best rigs that we have seen for work-boats, and perhaps one day soon we will see Gallant-rigged fishing boats. The simplicity of the rig, together with reasonable efficiency and the ability to lie feathered into the wind all would be useful to such a vessel. Both rigs are still developing, and I feel that the ultimate cruising rig will perhaps be a hybrid of these two.

In the United States, development of a rather different type of rig has been going on. This is similar to these rigs in that a single sail is set on each mast, and the masts are usually unstayed. The rig is the catboat rig, which at first glance looks somewhat like a conventional Bermudan rig, without the headsail. Let's now take a look at the history and development of this rig, and see how these boats fare without a headsail.