Rx for the Swan 44

Modifying a seven-year-old Swan for present-day competition

By SCOTT KAUFMAN

OVER THE LAST five years offshore racing yachts have changed radically. Because of the intense competition in the level rating classes designers have explored the IOR fully and developed faster shapes for hulls, keels and rudders. They have also succeeded in optimizing their designs to fit the IOR exactly, thus producing boats with the maximum amount of sail area and hull volume for a given rating.

Spars, sails, hull construction, scantlings and the acceptable amount of interior accommodation have similarly been changing each year to such an extent that obsolescence is now a primary concern to every owner.

In an attempt to extend the competitive life and protect the resale value of an existing production boat, the Swan 44, a series of modifications have been made to the original design. The Swan 44 was designed late in 1971 and has a history as a race winner and successful dual-purpose boat with extensive interior accommodation. In the fall of 1976 I was given the opportunity by Jim Mattingly of Derecktor's to make recommendations and then produce a design to improve the performance and rating of several Swan 44s and extend their competitive life.

I felt that performance would be improved by making two major hull changes: one with the keel and one with the stern. The keel appeared to be lacking in area or lateral plane and to be of excessive sectional thickness.

I calculated the area as 31.9 square feet and by comparison to my own designs and other contemporary designs I decided that it should be increased to 36.0 sq. ft.

By increasing the area it was possible to make the keel much thinner.

The existing keel has some sections with 18-percent thickness-to-chord length ratios. The new design made it possible to reduce the thickness substantially and yet still retain the same center of gravity and total ballast. (See table for comparison of thickness.)

The new keel has a standard thickness-to-chord length ratio of 10.4 percent and a standard NACA section that is quite different from the original keel (see drawing).

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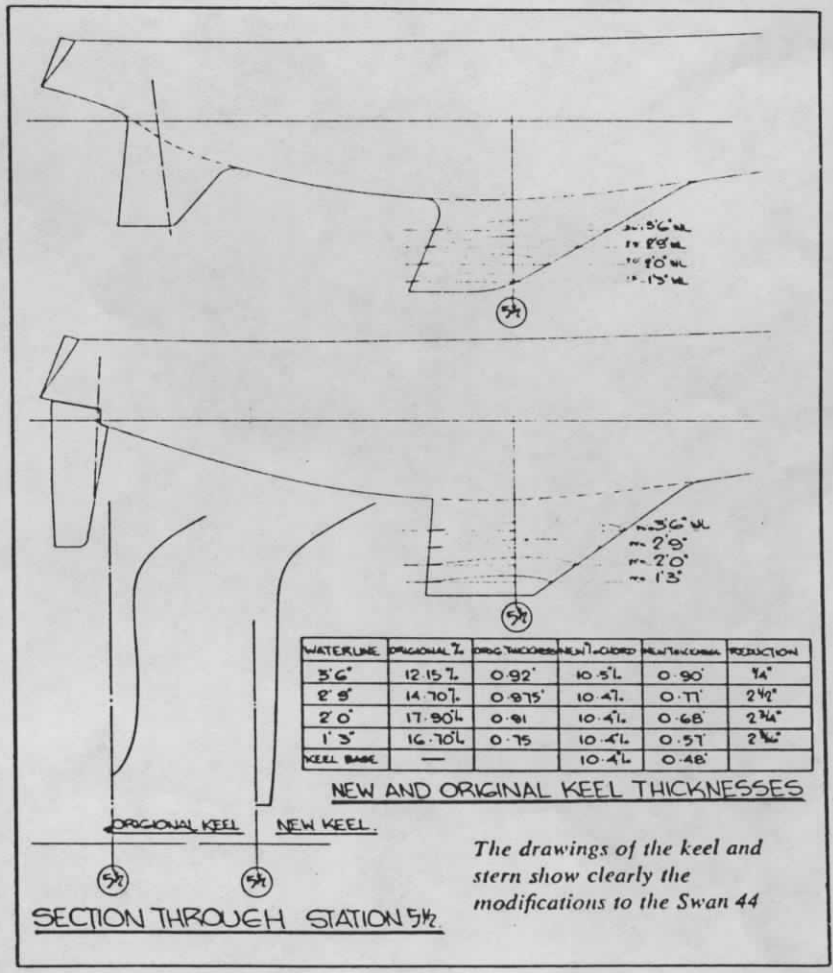

WATERLINE	ORIGINAL %	ORIG THICKNESS	NEW T-CHORD	NEW T-CHORD	REDUCTION
5'6"	12.15%	0.92'	10.5%	0.90'	¼"
2'9"	14.70%	0.875'	10.4%	0.77'	2½"
2'0"	17.90%	0.81	10.4%	0.68'	2¾"
1'3"	16.70%	0.75	10.4%	0.57'	2⅝"
KEEL BASE	—		10.4%	0.48'	

The drawings of the keel and stern show clearly the modifications to the Swan 44

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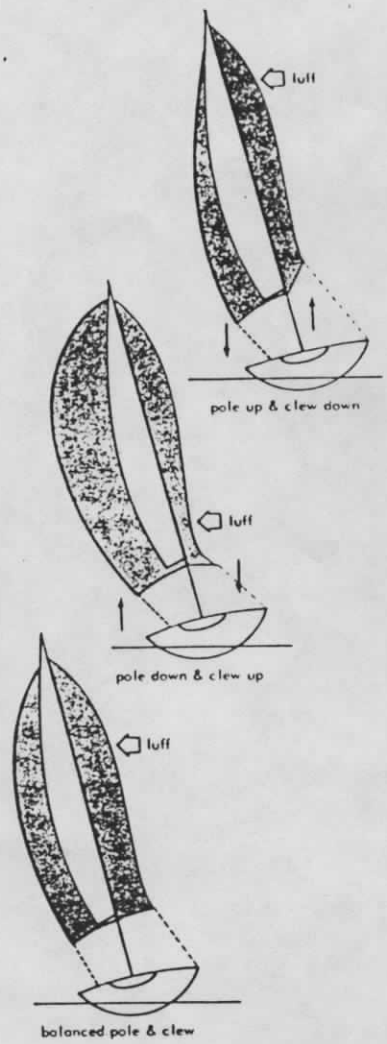

Conversely, in heavy-air reaching (over 20 m.p.h.), your thinking should concentrate on the leach area of your spinnaker. As a general rule, the pole should be slightly lower here than in medium air. This lower spinnaker height will make your clew fly higher, thereby opening the spinnaker leach. The good, non-porous qualities of modern spinnaker cloth also tend to lift the chute more. With this lifting of the clew, the sheet should be angled farther forward. Consequently, the spinnaker lead should go to its farthest aft position. The lowered pole, greater lift and altered sheet angle all combine to open the leach and prevent excessive healing and broaching. Your speed through the water will be better overall, and you'll retain the ability to maneuver quickly in response to gusts and lulls. □

I felt that the stern could be improved in three ways. First, by removing the full-length skeg in front of the existing rudder and replacing it with a new free-standing rudder 3.5-ft. farther aft I thought that the boat would tack faster, steer better and be more manageable.

Second, it was apparent that the waterlines aft could be straightened and lengthened. In fact the load waterline was lengthened by over 3.5 ft., from 35.76 to 39.27.

To make this possible, substantial volume had to be added aft, but to my eye this was an improvement as it allowed a more uniform end to the boat which improved the water flow aft.

In fact, in the altered boats the stern wave is minimal.

The third area of change in the stern was one of optimizing the rating and increasing the above-waterline volume. By working as closely to the limits that the IOR permits it was possible to lose only slightly on the rated length (L) dimension and yet drop the transom more than six inches. This straightened the buttock lines aft substantially and made a much more powerful stern for reaching and running.

Although these changes mean that the boat would forfeit a favorable Mk IIIa rating, five owners decided to make the modifications. Three more owners decided to alter only the keel.

Because of the loss of the Mk IIIa rating it was decided to reduce the rating as much as possible. A larger 22-in. diameter propeller was fitted to replace the existing 18-in. propeller. Some owners have changed the folding propellers for feathering propellers, which lowers the rating more.

The beam waterline dimension was increased with microballoons locally to lower the center of gravity factor in the IOR computations. When the new keel was being designed special attention was paid to the final location of its longitudinal center of gravity. The final design has the center of gravity moved

farther forward to increase the amount of trim by the bow which helps the rating. The weight of the new rudder and rudderstock was kept to a minimum to keep the stern as light as possible insuring that the boat floated with the stern as high as possible.

The 'vee' shape on the bottom of the original keel was replaced with a squared-off bottom shape that appears to be better for both performance and rating. With careful preparation and the above changes it has been possible to reduce the rating by 0.6 ft. even though the rated length is longer by 0.4 ft. One of the boats, *Surge*, has a rating of 33.2 ft. which is a drop of 0.9 ft.

All the work has been carried out by Derecktor's yard in Mamaroneck, N.Y. The new keel shape required up to three in. of lead to be removed from the sides of the existing keel. This was removed with electric planing machines. A steel mold was then fabricated and fitted to the front and bottom of the keel. The new shape was cast in situ and required minimal fairing and filling after the mold was removed.

To modify the stern it was first necessary to cut away the existing rudder and skeg.

Next the new stern rudder bearing was installed and, with the help of templates, foam was used to build the hull up to the designed shape. This was covered with fiberglass after it had been faired.

Possibly further improvements could be made by replacing the existing standard spar with a smaller sectioned multiple spreader rig.

The existing single spreader mast has a section with dimensions: 11.625" x 7.25". I believe that a very simple and safe double-spreader rig would use a section with dimensions: 9.2" x 5.6". Savings in weight and windage could also be made in the rigging, fittings and cross trees.

Results so far indicate that the boat has been improved sufficiently to win its class or overall in several major races.

Because of the rising costs of building a new boat, most owners considered very worthwhile the additional investment in their present boats—which were satisfactory in every way except in racing performance against new competition. Some older custom boats such as *Carina* (pre-IOR) have undergone similar stern and rig modifications with substantial improvement in performance.

Here is a chance for a return to the winning lists for much less than the cost of a new boat. ☐

PROPULSION QUESTION

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rig—Here is a technique that is fairly new and one that probably would be prohibited if rule makers knew about it.

In a Laser race a couple of years ago I was hiking easily after a start, dead even with boats on both sides of me. I reached to tuck my stopwatch down inside my life jacket and in so doing made several small random movements. Noticing that I had moved ahead a few feet, I continued wriggling or scrunching and moved ahead a few more feet. When I lay quietly in the straps, I no longer gained. I have since seen others use this technique on weather legs.

When done with a rhythmic port-to-starboard rocking of the body it is called pumping the rig because the tip of the rig can be seen to move abruptly through the air even when the helmsman's motions are so small that the hull is not seen to rock. Is such a technique prohibited by the ban on rocking? The hull does not move appreciably because it is heavier than the rig, is in contact with the water, and is not as easily levered by the helmsman's motions as the top sections of the mast and sail. The top section of the sail does move, and this motion seems to be beneficial, probably for the same reasons that pumping the mainsail off the wind helps.

Any game is defined by its rules, and sailboat racing is no exception. A game ceases to be fun when two people cannot agree on the rules. For me, the problems listed above in defining permitted dinghy-sailing techniques have robbed my fav-