



## CENTREBOARD DEVELOPMENT IN THE PAPER TIGER

# Centre of attention

by Ian Marcovitch

***When I first planned “MOJO” I wanted maximum mast rake. Other catamaran and dinghy classes I was involved with responded well to heavy rake, which improved upwind speed and gave superior driveability on the reaches. Performance square downwind was always going to be questionable, but should be compensated for by the gains on other legs.***

*At the time, Ben Deed was carrying the most mast rake, measured using the halyard arc method (Diagram B) at around 60mm off the back beam. This seemed to be the maximum rake that was feasible within the normal design parameters of the Paper Tiger whilst still having balanced helm. To achieve more rake, the centre of lateral resistance offered by the centreboards and rudders would have to be moved aft.*

*The elliptical Fay boards (diagram B) had a wedge cut out at the front so that they could be raked aft. Peter Anderson’s Larry Fay carbon boat, set up by Bruce Rose, used an extended rudder mould to create narrower centreboards which seemed to work well enough, so I designed my new boards at 200mm wide.*

*This alone moved the leading edge back 75mm compared to the normal boards. As Peter was not carrying any more rake than Ben Deed, I decided to rake my new 200mm wide boards further aft.*

*When setting the centrecases in the hulls, I put the aft edge of the case 1400mm forward from the transom measuring point (min. allowable 1390) but the top rear of the centrecase I put 164mm further forward than shown on the plans. The plans show the rear of the case at deck level as 1451 mm along the measurement jig from the bottom tuck point.*

*Another way to quantify the rake is to measure the distance from a point 500mm down the trailing edge of the board to the tuck point. The distance by the plans is 1448mm. This measurement, when “MOJO” was launched was 1260mm. “MOJO’s” current measurement is 1455mm.*

*When my son Kim’s boat was built, we made the centrecases to suit the 150mm wide MacKenzie centreboards. Because the boards were so narrow, we only moved the rear of the case at the deck about 100mm forward from standard. As his boat was faster than mine, with all other factors as close to identical as possible, I felt that it had to be the efficiency of the narrower MacKenzie centreboards. With the new*

The Paper Tiger is more a “restricted development” class rather than a true “one design” class. While the hull platform and rig are controlled, there are opportunities for the adventurous to fiddle in search of that elusive “edge”. One area that has seen significant experimentation over the years is the centreboards.

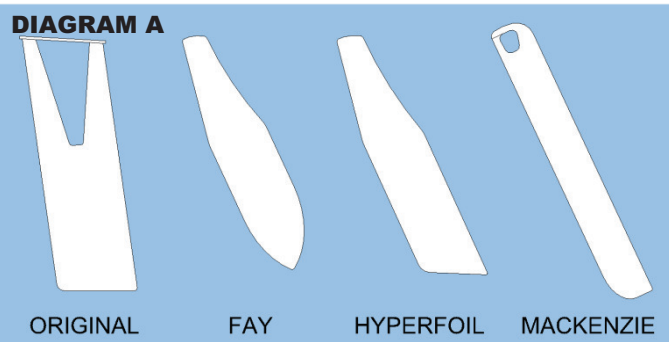
The only centreboard rule restrictions are a minimum distance from the transom to the back edge of the centrecase, some maximum slot dimensions, a requirement that cases align along the centrelines of the hulls, and a requirement that the boards are not able to be tilted to either side.

Diagram A shows a comparison between the original centreboards, by the 1968 plans, and some production boards that are currently in use. Other variations have been produced over the years by class enthusiasts.

Ian Marcovitch, of Redhead Sails fame, has a long history of pushing the rule boundaries within the PT class. This is the story of his search for the ideal centreboard configuration.

Editor

**DIAGRAM A**



boards fitted to “MOJO”, we seemed more equal. The actual board rake was now greater than when “MOJO” was launched because the narrower board was sitting forward in the case at the top, while I had blocked in the front of the case at the bottom. The rake measurement was now about 1220mm. However, the depth of the board was now less, and the effective section of the board was finer, due to the angle of the water across the section being further from square. Both Kim and I used up to minus 200mm of mast rake in regattas and trials with each other (Dia. C). Reaching was nice but there was no quantum leap in speed with the extra rake, and tacking the boat was tricky. Sitting on the start line was not really an option anymore; we had to keep moving, as once the boat stopped it stalled. For a while I used minus 100mm rake and I put a block

in the top front of the centre case so that the trailing edge of the narrower board rested against the rear of the case. The rake measurement was about 1290. (Diagram D).

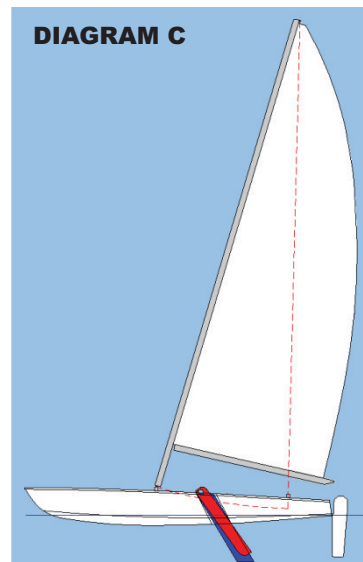
Before the Napier Internationals I modified my boards so that they were not so raked. I cut an angle on the rear of the boards to take some of the rake out of them so that the measurement was around 1455mm (the current measurement mentioned earlier). The piece of carbon I removed from the rear of the board I then added to the front top of the board so that it effectively wedged the board in the case once it was down. My current mast rake is close to zero (Dia. E).

My conclusion from all this experimentation is that increasing the rake of the boards to allow more mast rake is counterproductive. The boat as a whole gets more benefit from having the leading edge of the board further aft (via a narrow board) rather than by raking the board aft. Aft board rake increases the fore and aft width of the board which:

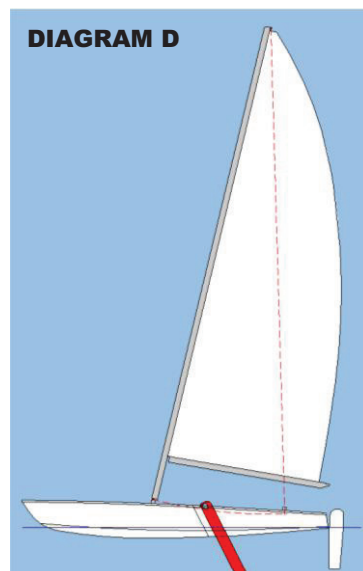
- Increases the wetted surface at the cost of lift.
- Makes the boat harder to turn because it creates a longer keel that has to be rotated.

At this point I am considering lessening the board rake further....

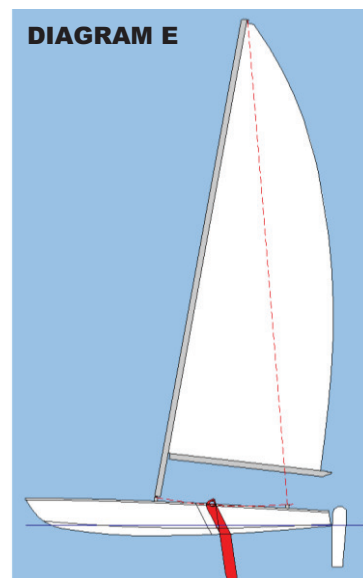
**DIAGRAM C**



**DIAGRAM D**



**DIAGRAM E**



**DIAGRAM B**

