INTERNATIONAL 'C' CLASS

EVOLUTION OF SAIL CROSS SECTION

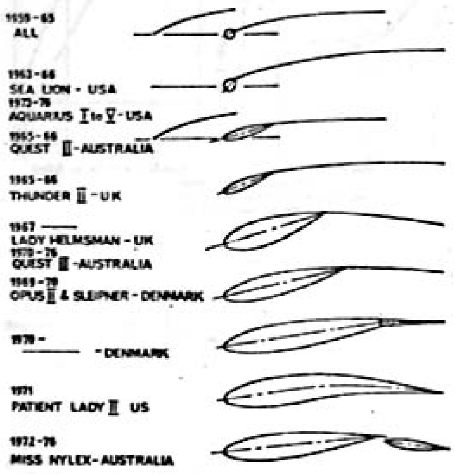

Fig. 4

for a boat sailing into a wind of 18 km/h (10 or 12 mph). Above this the lift coefficient would be lower, and below this wind speed the coefficient would be higher but when fully analyzed the data in (Fig. 2) indicates that the rig would be operating at an average lift coefficient of 0.8 for a lot of the time.

These curves clearly illustrate the fine dividing line between success and failure in the selection of the section. At an effective Reynolds number of 500,000 to 600,000 the profile drag coefficient of a section 12% thick is 50% higher than the profile drag coefficient of a section 15% thick. In simple terms one would only have to make the wing of Miss Nylex 3% thinner than it is to reduce its performance in light weather quite drastically. In the design of the wing a number of other such critical areas were discovered. These related to the positioning of the flap in relation to the main wing and various angles of attack to suit different wind strengths and in the choice of plan form and taper of the whole wing with a rig of this type. It is difficult without introducing a lot of mechanical complication to obtain the twist between the bottom of the wing and the top which is desirable for optimum performance when broad reaching, but it was found that by choosing the correct ratio of the tip chord at the very top of the mast, and the point at which the mast tapered from the bottom section, to minimise the effect of down wash which causes an apparent change in the angle of attack of the top chord. Together they reduced the effects of having no twist to a minimum. If the tip had been made much more of a point it would have suffered in three ways. The effective Reynolds number would have been reduced to a critical level, the effective angle of attack could have been changed by 5 or 6 degrees which would have caused it to stall earlier over a wide range of wind speeds, and the induced drag caused by the tip vortex would have been much higher.

After examining a number of reports in which the scale effects which give rise to varying characteristics had been researched at some length, I found that I was able to construct the curves which are illustrated in (Fig. 7). These show the maximum life coefficient and hence the maximum driving force which can be generated by the sail over the range of wind speeds which we would encounter. The lower limit of wind speed in which the race would be conducted is 4 mph. The lower curve represents fairly closely the maximum lift coefficient which a rig of the Quest III type can

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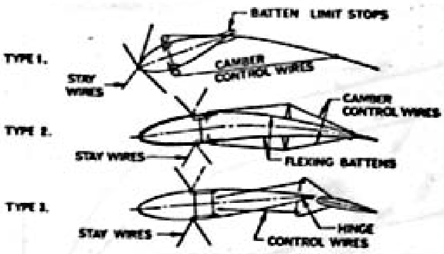

	TYPE		
	1.	2.	3.
AERODYNAMIC EFFICIENCY	MODERATE	GOOD	EXCELLENT
MAXIMUM LIFT COEFFICIENT	1.8	1.7	2.5
STALL ANGLE WITH MAX. CAMBER	16° TO 18°	16°	22° TO 25°
CAMBER OBTAINABLE	HIGH	LIMITED	HIGH
CONTROL FORCES - CAMBER CONTROL	HIGH	VERY HIGH	LOW
EASE OF MAST ROTATION	DIFFICULT	EASY WITH FOUR WIRE SYSTEM.	
EASE OF TUNING	DIFFICULT	DIFFICULT	EASY
EASE OF CONTROL IN SAILING	FAIR	FAIR	EASY
CONSTRUCTION & REPAIR	SATISFACTORY	DIFFICULT	SATISFACTORY
WEIGHT	100%	110%	100%
DIFFICULTIES IN RIGGING	COMPLEX	MORE COMPLEX	UNKNOWN

Fig. 6