Note 104

Relation of Season-average Lap Speed to Power and Weight, 1993 – 1994

Power relation

During 1993 informed opinion* was that the Renault RS3/4 engines in the Williams FW15C had an average of 50 HP more than the Ford-Cosworth HB5/6 units in the main rivals, the McLaren MP4/8 and the Benetton B193. All these cars had active suspension and various electronic "driver aids".

This provided an opportunity to compare Lap Speed differences with Power difference.

Over the 1993 season the Lap Speed differences at each race in Qualification were as follows, the Williams best speed being compared with the best Ford-powered figure:-

*Of the late Brian Lovell, former Managing Director of Weslake Developments.

	Lap Speed %age lower than Williams							
Race No.	1	2	3	4	5	6	7	8
McLaren	[0.1]	2.3			2.4			2.4
Benetton	2.1		2.2	2.2		0.8	2.3	
Race No.	9	10	11	12	13	14	15	16
McLaren					1.8	1.4	[0.1]	[-0.6]
Benetton	1.8	0.8	0.8	1.4				

The [bracketed] entries were discarded: Race 1 at Kyalami by Senna being "too good to be true" and the Benetton figure used; Races 15 and 16 because by then Prost driving the Williams had clinched his 4th Championship at the 14th race and announced his retirement would come at the end of the season. He simply did not need to try as hard as before. The No.2 Williams driver, Damon Hill, had not raced at either of the last 2 circuits (Suzuka and Adelaide) and spun in Qualification at both of them.

The season-long average of the 14 results judged not to be affected by the special factors mentioned was therefore:-

1.8% advantage to Renault over Ford-Cosworth.

A difference of 50 HP was 50 HP/700 HP = 7.1%.

The relation is therefore:-

7.1/1.8 = + 3.9% Power provides + 1% of Lap Speed.

Weight relation

At the 1st race of 1994 at the Interlagos circuit of Brazil, it was reported in the TV commentary that the difference between carrying 200 litres and 70 litres of fuel was worth 3 seconds per lap in 76 seconds (Pole time), i.e. -4% of speed.

The 130 litres of petrol, weighing 94 kg in a car whose weight would be then:-
505 kg empty of fuel + 70 kg for the driver + ½ of the 70 kg during Qualification running = 610 kg, represented 15% weight difference.

The relation is therefore:-

15/-4 = + 3.8% Weight produces -1% Lap Speed.

Overall

A simple rule of thumb for average effects over the 1993 – 1994 season was to take

+4% of Power or Weight gives a 1% effect on Lap speed,
Plus for Power; *Minus* for Weight.

1997 – 2008 Results

Analysing a sample of 13 computerised predictions of Weight/Lap Speed sensitivity supplied to TV commentators by the teams over the years 1997 to 2008 showed a similar relation to the above for Weight, i.e. +4% weight loses 1% of Lap Speed.