



FIGURING SCHUMI

And that's exactly what we've done. In a world exclusive, *F1 Racing* lifts the lid on the hush-hush telemetry that explains Michael Schumacher's speed

Words Stéphane Samson

Schumacher (above) in search of the limit: "Finding a point that you know you couldn't possibly go beyond - that's what gets me buzzing"

The preparation ritual is second-nature now, an art so refined that he's barely aware of it. Overalls, balaclava, helmet, gloves. Like everyone else. But then you notice the physical routine - the series of little exercises, such as working his head from side to side to warm up his neck. This is typical Michael Schumacher: touches that heighten his readiness and set him apart from the others; a mental and physical countdown that has its pay-off in raw speed

and lap times that *F1 Racing* is now able, exclusively, to analyse and dissect using the previously confidential telemetry you'll see over the page.

Loosening-up complete, Schumacher climbs into the F2003-GA with an easy grace. The team have decided on last-minute set-up changes and fuel load, and in another couple of minutes he'll be giving his all in single-lap qualifying. But Michael Schumacher is somehow removed from the mêlée around him. The media hysteria, ►



the lenses, flashes and onlookers crowding the garage exit are simply shut out. He closes his eyes, withdraws, and before he has turned a wheel he's assessing the first bends at Silverstone, considering his braking points, visualising the line he'll take. Soon, it will just be him and the car – a devastating combination we've long been familiar with and which few rivals have found an answer for. So naturally does he take his car to the limit that he would be pushed to explain precisely what is going on. The pleasure it gives him, however – that he can explain.

"Finding the point of optimum performance, a point that you know you couldn't possibly go beyond, that's what really gets me buzzing," he says. "I just love driving. And I'll carry on racing for as long as I get that buzz when I'm behind the wheel. Winning isn't an end in itself, but it's a very nice bonus..."

In short, Michael Schumacher's driving is beyond the rational; it isn't a conscious process. As with plenty of other drivers on the grid, it's instinctive. "Every driver tries to find the limit," he says. "And then there's understeer, oversteer, wasted time and tyre degradation to think about. There's also the risk of coming off the track. On every bend, I go for the limit, I have a feel for it. But to hit the limit spot on, I go into the bend quicker than seems theoretically possible. That's the only way for me to see how far I can go."

All of which is a nice little thumb-nail of the Schumacher method: the important thing, the telling difference, is that Michael's driving concerns itself with what happens before the corner, during the approach. That's why, for him, the exit is of secondary importance – in any case, these days, it is

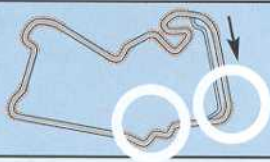
'TO HIT THE LIMIT SPOT ON, I GO INTO THE BEND QUICKER THAN SEEMS POSSIBLE'

mostly taken care of by traction control.

Yet even if the idiosyncrasies of Michael's approach appear obvious at the trackside, until now there has been no way of actually quantifying what is going on. Of course, he brakes in a distinctive way which allows him, in qualifying, to find precious tenths. Of course, he balances his car by using his left foot to limit longitudinal weight transfer and therefore steal a few extra km/h. But how exactly does he do it?

The data that *F1 Racing* publishes here for the first time, reveal many of the answers that only Ferrari engineers, deep in their motorhomes, have known until now. Our print-outs show how Michael Schumacher ▶

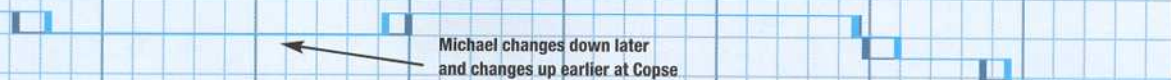
Over the edge and on the limit through the Melbourne esses; Michael has completed the right turn and corrects as he tackles the left



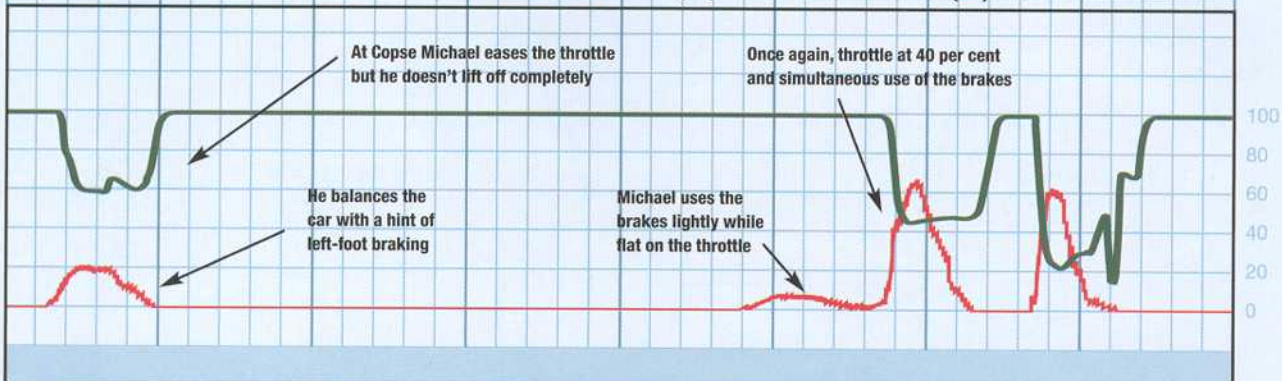
SILVERSTONE COPSE TO BECKETTS

Copse, Maggotts and Becketts are three of the keys to a quick lap of Silverstone. Momentum through them is all, but Michael and Rubens take different approaches. Who's quicker? The telemetry reveals all

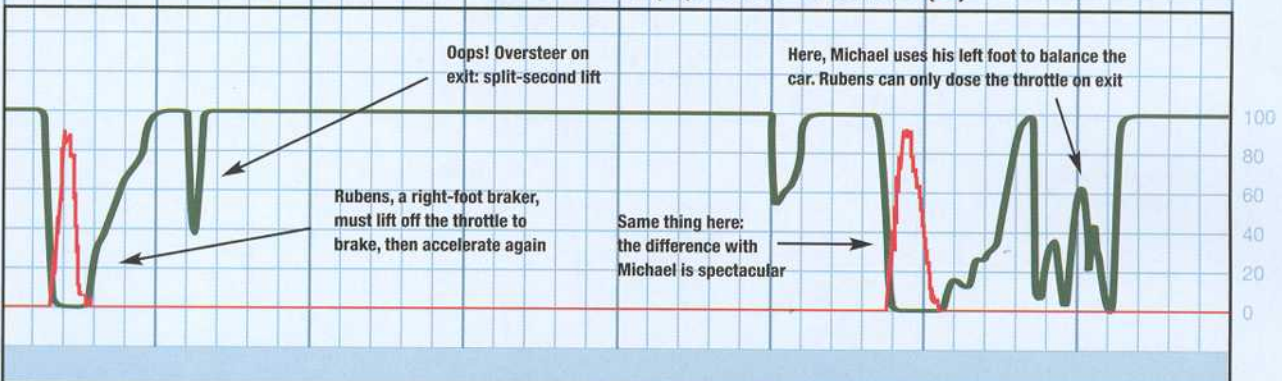
> GEAR COMPARISON : SCHUMACHER (■) BARRICHELLO (■)



> MICHAEL SCHUMACHER: THROTTLE (■) AND BRAKE (■)



> RUBENS BARRICHELLO: THROTTLE (■) AND BRAKE (■)



> SPEED COMPARISON: SCHUMACHER (■) BARRICHELLO (■)



THIS PAGE: It is impossible to take Copse without lifting. Deceleration is only slight, however, but the two Ferrari drivers use quite different techniques. Schumacher eases the throttle (from 100 per cent to 60 per cent) while pressing the brakes by 20 per cent to keep the car balanced. Barrichello uses his right foot only, so can't take the same approach: he must lift off, brake heavily if briefly, and then come back on the throttle. While traction control allows both drivers to accelerate at the same

pace, the Becketts complex illustrates once again the massive difference between Schumi's and Barrichello's styles: Michael never lifts off completely, and plays with the brake pedal at the same time in order to preserve his car's stability. Rubens brakes only once, and then uses the throttle to keep his Ferrari balanced.

Schumacher exits Copse with a 20km/h head start on Barrichello, and pulls the same trick at Becketts

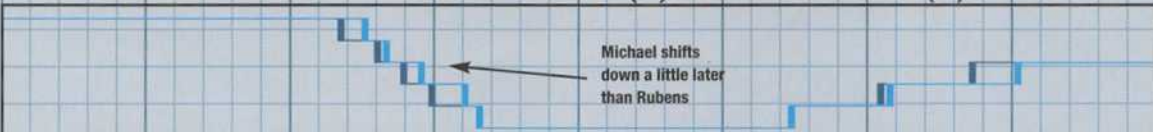




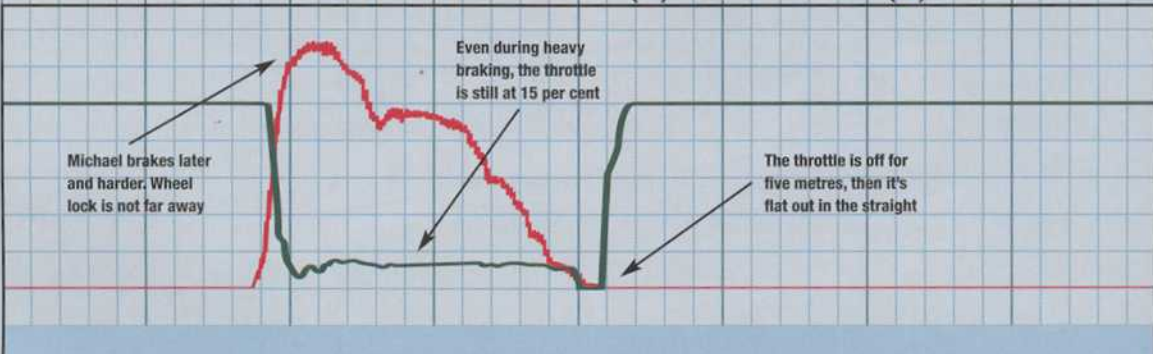
MONTREAL HAIRPIN

The charge down to turn 10 at Montreal highlighted Schumacher's adaptability as well as his speed in 2003. Although failure of his overheating brakes was predicted, he was able to nurse them – and win

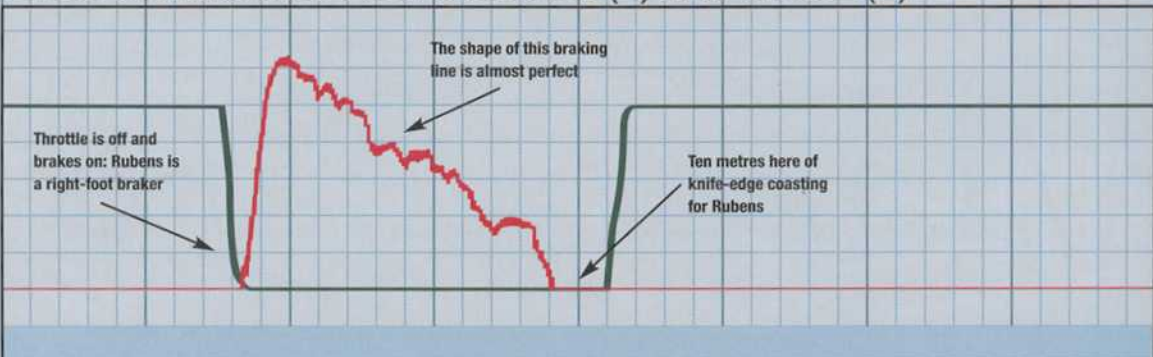
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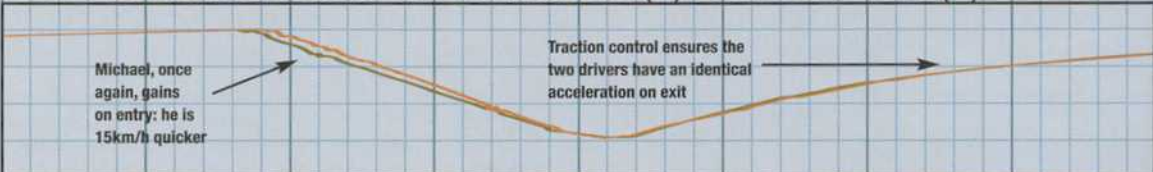
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THIS PAGE: Another type of corner which demonstrates the extraordinary efficiency of Schumacher's method. He brakes nine metres later than Rubens, but is close to locking his wheels. He then eases off the pedal, and then presses it strongly again in order to find grip: this action explains the shape of his braking graph. Rubens' line, on the contrary, is almost perfect. The main difference between the two men? Michael lifts off completely only at the very end

of his braking, for five metres. All the way through his heavy braking zone, he keeps his right foot on the throttle (about 15 to 18 per cent). The reason is to limit longitudinal weight transfer which would cause understeer on entry. Rubens is as quick as Michael from the mid-braking zone onwards, but by then it is too late.

Technique triumphed at Montreal in '03 as Schumi rose above a falling car to keep his faster rivals behind him





'PUSHING BACK THE LIMITS IS WHAT MAKES THIS SPORT INTERESTING'

Talent and technique get Schumacher a long way, but not quite all the way. There's a brilliant team around him, hand-picked – and led – by Jean Todt

takes four of the most important bends in the F1 calendar, four sections of track which have a big impact on lap times: Copse and Becketts at Silverstone; the hairpin in Montreal; and Turn One at Suzuka. These four bends illustrate the Schumacher method with crystalline clarity.

As our examples show, the world champion finds his edge in the way he enters a bend: he brakes late, sure, but

a wide range of other options also come into play. For instance, at the first bend at Silverstone, Copse, he eases off the throttle by just 40 per cent while simultaneously and gently applying the brakes. The goal is not so much to wipe off speed as to keep loss of momentum to an absolute minimum. To achieve that the car's balance must be disturbed as little as possible, and that is why the delicate play-off of throttle against brake, the limiting of longitudinal weight transfer, is so vital.

The same is true of the first bend at Suzuka where, once again, Schumacher does not fully lift off the throttle, even during heavy braking. A similar approach is taken to the hairpin at Montreal; Michael lifts completely for only about five metres, right at

the end of the zone. The pedal action itself, though the braking effort is applied very late in the cycle, can justifiably be compared to that of other drivers – about 18 of the current crop of 20 do left-foot brake – but the subtlety and stability of Schumacher's control can still surprise his team, even now.

"Pushing back the limits is what makes this sport interesting," he says. "Qualifying at Suzuka in 2002 was a good example. Pulling off a good lap there gives you such an indescribable feeling. You have to go beyond yourself, and at times like that you feel... alive. Last season I gave it everything I had and when I crossed the line the clock said 1 min 32.484sec. It was eight-tenths better than in our simulations. That's the sort of emotion that really gives you a lift." ►



'WHAT MAKES MICHAEL UNIQUE ISN'T JUST HIS DRIVING OVER ANY ONE LAP'

To achieve such an undreamt of result, Michael's car has to be set up exactly as he wants it. And, for him, the most important thing about his F2003-GA is the precision and efficiency of its front end. "I can cope with a car that oversteers slightly going into a bend," he says, "but I need to know that the moment I touch the brakes, the car will take exactly the trajectory I want, without the slightest deviation."

So the predictability and grip of the front wheels are of paramount importance. To achieve this the front dampers and torsion bars are normally more softly set on Schumacher's car than they are on his team-mate's. Indeed, Rubens Barrichello prefers quite a different set-up: a car that

No driver works harder or debriefs longer than Michael (above with his race engineer Chris Dyer) to ensure every glitch is sorted

will be stable and neutral in its braking. He doesn't mind understeer going into a bend but he wants it gone by the middle of the corner. All of which means that Michael, with his car's more incisive front end, can get on the brakes a little later. It's the sort of driving you see in a good many drivers of the younger generation: Fernando Alonso, Kimi Räikkönen, Juan Pablo Montoya and Felipe Massa all prefer subtle oversteer, unlike David Coulthard or Olivier Panis.

There's a downside to the world champion driving on the limit, however: he is tough on tyres. Michael suffers more in this regard than Rubens and his tyres degrade more quickly simply because he comes into a bend faster and harder.

"Overall what makes Michael unique isn't just his driving over any one lap," says Ferrari's technical director, Ross Brawn. "You've got to associate two other essential features with his speed: consistency and an ability to adapt." The first has often been quoted as a prime example of his qualities. "From the very first time Michael gets

behind the wheel of a new car, he'll quickly find its limits," says Brawn. "But that's not the only thing. He'll be able to keep the rhythm up from the first lap to the last, without fault or flagging. That's essential for working out tyre degradation over a race, or working out daring strategies."

The ability to adapt is one of Schumi's greatest qualities. Whatever the track conditions or mechanical problems, he will always extract 100 per cent from his car. That was particularly noticeable at Magny-Cours this year, where the Bridgestone tyres caused problems. Or at Montreal, where the Ferrari's brakes got so hot that for a while the team didn't believe Schumacher would be able to finish the race.

As for weaknesses in the world champion's driving, there's probably only one: he can sometimes lose concentration when he's out on his own. "When he's dominating a race and has a big lead, Michael never stops using the radio to ask questions or just to talk to me," says Ross with a smile. "How many laps are left? Where's his brother? Sometimes I have to reason with him and ask him to concentrate on what he's doing. I'll remember for a long time the little radio silence that came when he spun off at Indianapolis in 2000. 'Everything okay, Michael?' I asked. 'Yep,' he replied. Pause. 'I think you're right, Ross. I'll start concentrating again.'"

And, as ever, he still carried the day. **1**





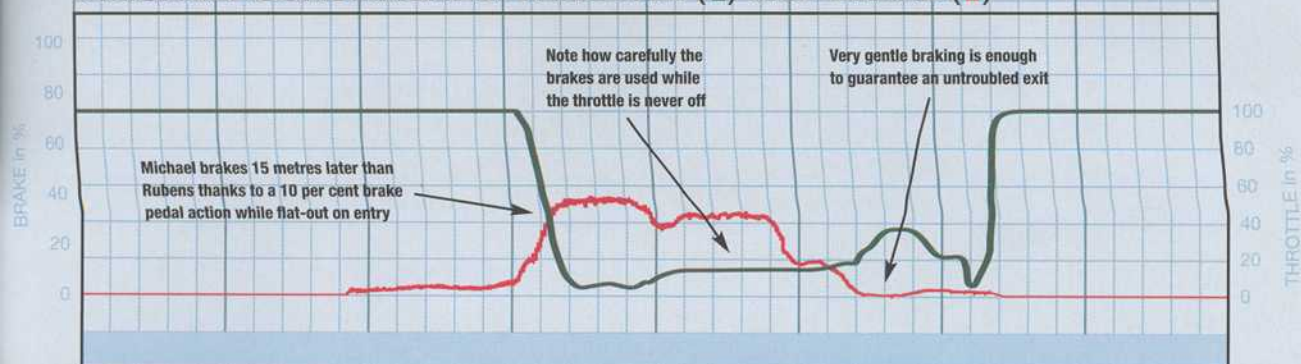
SUZUKA TURN ONE

The long 180-degree Turn One is an exercise in both patience and smoothness. Schumacher's ability to balance and steady the car on both throttle and brake helps him find more speed than Barrichello.

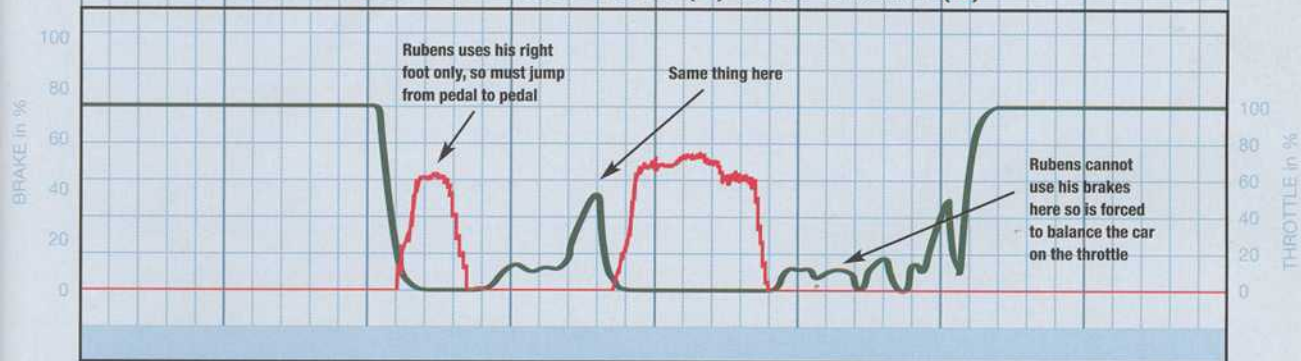
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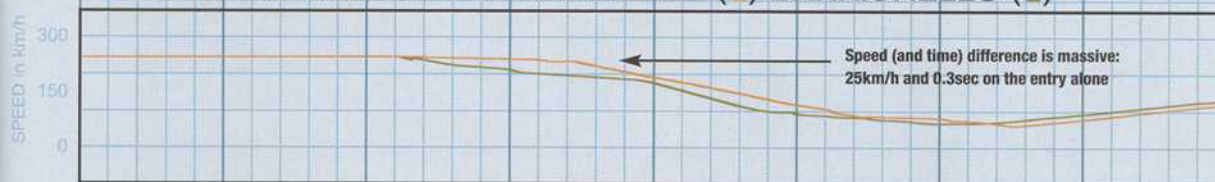
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THIS PAGE: This is the most spectacular example of Michael's unique driving style. He brakes 15 metres later than Rubens, but this is just a detail. While the Brazilian keeps switching from the throttle to brakes and from brakes to throttle, Michael is working both pedals together. He starts his braking action long before Rubens (five per cent on the pedal) but is still flat out; he then slows using less brake-pedal pressure than his teammate. Then, through the corner, Schumacher never

releases the throttle completely. He accelerates a little more on the exit, but keeps his foot on the brakes (2-3 per cent). Rubens, however, must use his brakes and throttle alternately. He is much slower on entry and through the majority of the corner, but is back on the throttle fractionally earlier for a quicker exit, but by now is playing catch-up.

Earlier and lighter braking and a complementary throttle ensure weight transfer is minimised on Michael's car

