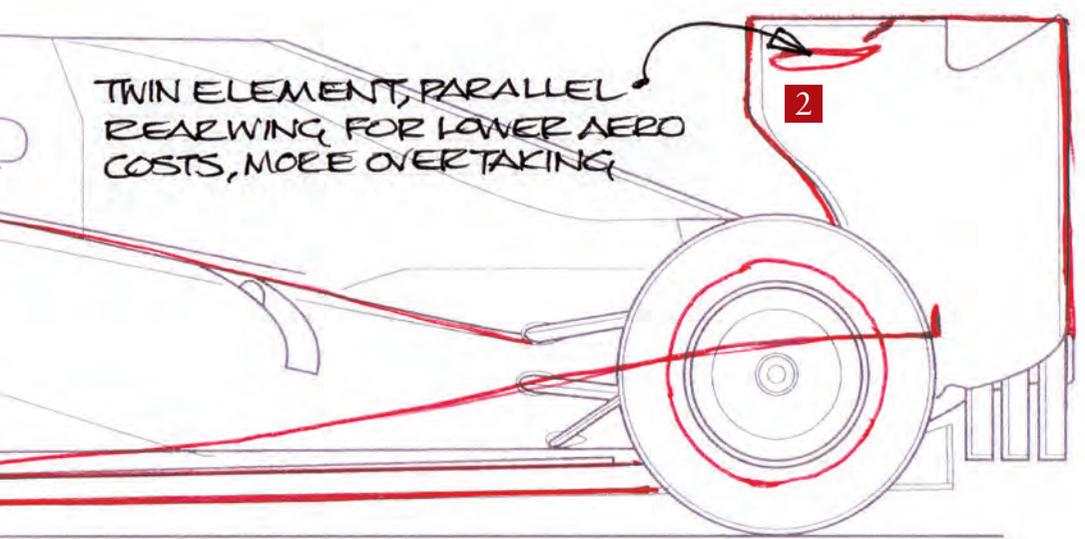


PLANK REMAINS - MORE VENTURI/DIFUSER FREEDOM (HEIGHT ABOVE PLANK) + FIXED SIDE HEIGHT (ABOVE PLANK) MORE DOWNFORCE IN CENTRE OF CAR - EASIER OVERTAKING



TWIN ELEMENT, PARALLEL REARWING FOR LOWER AERO COSTS, MORE OVERTAKING

- NO TELEMETRY
- NO DRIVER TO PIT COMMUNICATION
- REDUCE DOWNFORCE

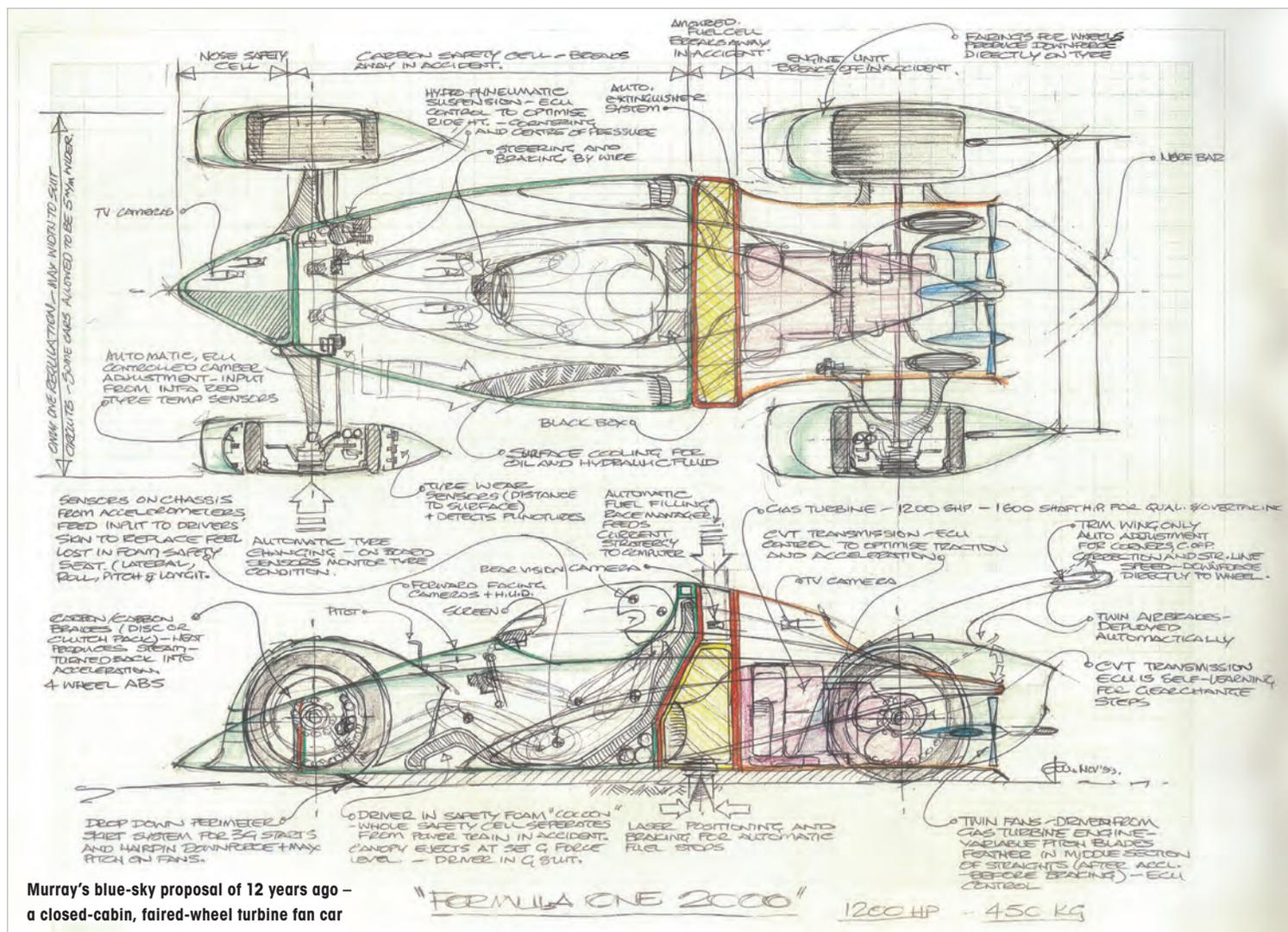


GORDON MURRAY'S F1 BRIEF:

# SIMPLER, CHEAPER, BETTER

Gordon Murray may have retired from Formula 1 over 20 years ago, but he has plenty of ideas on how to answer the sport's big questions - such as how to boost overtaking and reduce costs

BY ED FOSTER



Murray's blue-sky proposal of 12 years ago – a closed-cabin, faired-wheel turbine fan car

Morning has only recently broken at Gordon Murray Design in Surrey and the only sound, other than the birds, is a very trick, carburetted four-cylinder engine approaching. It's not something you expect to hear at 7am in a leafy suburb of Shalford. "The Green Meanie only has 130bhp," Gordon Murray says about his Lotus Cortina as we sit down in the boardroom a few moments later, "which in today's money for a road car isn't huge. But it only weighs 830kg and it goes like hell!"

The ex-Formula 1 designer is looking fresh and colourful – his shirt is a trademark floral number – and he's managed to find time to talk to us before blasting up to London to launch his new city cars, the T.25 and T.27.

Back in the January 2000 issue of *Motor Sport* we delved into what Formula 1 might look like in the future. Stirling Moss, Max

Mosley, Jacques Villeneuve, Frank Williams, Ken Tyrrell and Nigel Roebuck all offered their views – "one envisages that the World Championship will become ever more global," predicted our editor-in-chief all those years ago. The big scoop, though, was a drawing by Murray of what he thought would be the fastest

"If you want to keep the roundabout going you have to keep the show element"

F1 car if there were no rules or restrictions beyond its size. A 450kg, 1200bhp gas turbine monster was the end product. OK, we won't be seeing Fernando Alonso pilot anything like that in the near future, but what would Murray think about the drawing 12 years later? What would he change? We're back to find out.

"I looked through it," he says after taking a sip of coffee from a mug with 'Professor' written on the side, "and I tried to make a list of the things that I'd change. I got zero, I actually got zero. I wouldn't change anything because you couldn't improve on that in terms of cornering speed, lap speed and race speed."

Twelve years later, it seems we'll be returning to London without a follow-up story. Until talk turns to the state of Formula 1 in 2012. The Pirelli tyres have mixed things up, but we still need a gimmick such as DRS to promote overtaking. The rules are so restrictive that design has become an exercise in tiny aerodynamic adjustments, which are so expensive that only three teams have a realistic chance of winning a championship. We can't un-invent half a century of aerodynamics, so what's the cure without resorting to a falsity like DRS?

"That's fairly straightforward, actually," Murray says. And so begins an hour of re-inventing F1, solving the overtaking issue,

while increasing the freedom for designers to work. How about reducing the costs and trying to make the cars look different from each other? Murray has some thoughts on that too.

Of course, our talk wouldn't be complete without the designer putting pen to paper. A line drawing of a current racer is produced and Murray gets to work, redesigning the car.

"You always have to look at Formula 1 from two sides," he says. "The purist, like me, looks at it from a technical point of view, and from a racing perspective because I like to see people racing. But these days you have to look, more than 50 per cent of the time, at the show. That's very important because if you want to keep F1 with top viewing figures, keep the sponsors there and keep the roundabout going then you have to keep the show element.

"It's a very fine balance because without the razzamatazz and the huge fortune that's spent on entertaining you wouldn't get the sponsors and you couldn't afford the technical side. And you've got to have a technical element in order to maintain it as the premier formula technically. That's your balance.

"With modern F1 there are so many simple things that you could change that would make

an enormous difference to the cost, to spectators and to overtaking, without using any gimmicks."

Here's what Murray suggests.

## WINGS AND DOWNFORCE

"The big problem with F1 is that almost always there's a medium-speed corner leading onto a straight. With the current cars you lose balance and downforce when you're following another car so you're never close enough to overtake. If you look back at old films you'll see that you could tailgate someone through the last corner and onto the straight. Halfway down the straight you could slipstream and pull out.

"With modern cars the front and rear wings [1 and 2 on Murray's new drawing] create a big percentage of the downforce. I'm picking numbers out of the sky, but if you've got 25 or 30 per cent of the downforce on the front wing, and you're in the dirty wash of the car in front, you're going to spoil the downforce and the balance. The more downforce you have on a car the more balance is critical. Now losing a bit of downforce behind a car is one thing, but losing the balance is a disaster because you start getting understeer coming onto the straight when the front wing isn't working. You're never going to be close enough to overtake.

"The easy way to sort that is to give designers a lot more freedom in the middle of the car [3 and 4] – let's call it the venturi section. OK, I'm not advocating sliding skirts because they were dangerous

if they stuck – I had a crash with Nelson Piquet at 140mph when the skirts stuck up in Austria... However, if you had a controlled gap and a bigger venturi section allowed, you would be able to make 80 or 90 per cent of the downforce in the middle of the car. Then you could dramatically reduce the front wing size and reduce the rear wing so that it was a trim flap.

"That does a lot of things. The first and most important point is that you're unlikely to lose as much balance in the corner as you do currently. Also the number of times that you try and get close to the car in front and end up touching with the huge front wing is ridiculous. With the amount of overhang and width it's almost inevitable. When the front wing gets involved they're not likely to bang wheels or anything – and that's half the fun of racing. With a smaller front wing you'd have far fewer interruptions caused by people having to come in and change the nose cones. You'd also have much closer racing."

## TYRES

"You'd have to look at the tyres [5], a factor which is much easier now that they're the same for everyone. If you had harder tyre compounds and made them slightly smaller it would make a big difference to overtaking.

"It would increase the braking distance and there would be much more chance of somebody locking a wheel. When you've got a lot of downforce and very sticky tyres the difference between a car that brakes really well and one that doesn't is tiny. The difference – between the good brakings and the bad – could be as much as 10 metres instead of three or four.

"The smaller the contact patch gets, the harder the compound you've got to run because otherwise it would overheat. Also the car would be going much quicker coming into a corner because about 50 per cent of the drag on an F1 car is down to its open wheels. If you make the wheels smaller you'll go quicker in a straight line.

"Let's pick some numbers here. At the moment you'll be doing 200mph on the straight and then have to brake to 100mph for the corner. With smaller tyres you'd be arriving at 210mph and you'd have to brake to 80mph. A side effect of changing the tyre compound is that you'll get slip angles again for the spectators. It's one thing I really miss in F1, I really do. The Villeneuves would really have to look after their tyres and the Laudas and Sennas would manage a lot better – you'd be putting the driver into it a bit more.

"It doesn't need to be a huge change. It's amazing – you can reduce the contact patch by 15 or 20 per cent and it makes a massive difference to the performance of the car.

"The tyre and wing changes would help the overtaking, but there is another issue >>>



Murray proposes narrow wings to reduce collision damage (left) and promote drafting without need for DRS (below)



altogether which I think is quite ridiculous. When anyone tries an overtaking manoeuvre they get a penalty. It's beyond my comprehension, it really is. And it gets worse and worse! I don't watch every race, but when I do there just seems to be more and more penalties. They need to watch MotoGP... If it's a *really* dangerous move then OK, that's fair enough, but there's a limit."

## GOING GREEN

"I think the green element is rubbish. I'm absolutely in line with Bernie [Ecclestone] – I just don't see any point.

"If you want F1 to remain the top technical formula in the world I don't think the way to do that is to go green. The place to test technology like that is at Le Mans, in endurance racing. Formula 1 is a show, it's a sprint, it's nothing to do with endurance. At the moment you can only rev to a certain amount and you've got to do a certain number of races with the engine to keep costs down. If you didn't have those regulations then you can say 'OK, you can take a chance on a green technology' and open it up to alternative green options.

"If you're going to have very, very tight regulations with KERS then everyone will have the same system. That's not pushing green technology – that's just waving a flag and saying 'we're a green formula'. And it's extremely expensive as well."

## THE SIMILARITY OF THE CARS

"The technical side of F1 has been really castrated now because there are limits on the engines, and the regulations are so tight that without the finer bits of aerodynamics the cars are all the same.

"What determines the shape of a Formula 1 car, its centre of gravity, its centre of pressure, is the layout of its major masses – that's to say the driver, the fuel and the power train. The rest – the chassis, suspension, fuel system etc – weighs nothing. What you used to do in the olden days was to move those major masses around to get an advantage and then you got different-shaped cars.

"The problem now is that the rules are so strict you have to have a single tank behind the driver, and the engines and gearboxes are the same shape and size, so basically what you have

is a kit car. Everybody wants to go out to the maximum width and overhangs because that's the nature of aerodynamics. All the designers are left with is fiddling with minute changes in CFD and the wind tunnel.

"I do think the current F1 cars are bloody ugly, they're not items of art anymore, are they? It's just the way things have gone. It's where all the money has gone, into the detail stuff.

"I'm not saying there's an easy solution for this one, but if you painted all the cars the same colour they'd all look much the same. One way to solve this would be to allow the designers more freedom to look for downforce in the middle of the car [3 and 4], as I mentioned earlier. Then you'd get different lengths and shapes in the sidepods. The only other way is to go back to fuel stops and then you'd have more freedom with a smaller tank. But then you'd have the problem of four sprints again..."



"I think the green element is rubbish I just don't see any point"

## REDUCING COSTS

"In the 1970s you could have normally aspirated, supercharged or turbocharged engines. You could have gas turbines, two-strokes, four-strokes and the huge danger of that – which we saw when the turbos arrived – is that when one technology wins everyone has to have it. You dump the budget you've already spent and you call up a new one to do the new power train.

"There are lots of ways to save costs in F1 that the spectators would never know about. The purist designers will hate me for saying this, but one of the big expenses is the use of carbon fibre material in the suspension arms [6].

"Now that's great for the aerodynamicist because you can make shapes and spend hundreds of thousands of pounds in the wind tunnel

on a new wishbone with a tiny new flip and curve. Strictly speaking something that isn't part of the sprung mass of the car can't have an aerodynamic influence – it's the fan car rule all over again! If you had a rule that all the wishbones had to be symmetrical section and ferrous material, again you'd save a fortune. You'd not only save money, but also you wouldn't have bits of carbon all over the track every time someone bumps into someone. People would then start racing again because you could have a bump. You might tweak one arm slightly, but you could keep on racing.

"There's an awful lot of rubbish talked about Formula 1 technology going into road cars. There is some crossover, but the tyre sizes are way off and 13-inch diameter wheels... ridiculous! Trying to package brakes into a 13-inch wheel for a 200mph car is so costly. It's stupid – it should have gone to 18 inches ages ago [7] along with low-profile tyres. Then the technology is a lot more in line with current high-performance road cars.

"The other way to reduce costs would be to make the body completely smooth, without all these bargeboards and flip ups. They can have shapes, but they've got to be a smooth surface. That would save a fortune, but then you're limiting people again. It's a very fine balance, a difficult balance.

"If you gave the designer more freedom on the venturi then that's where you'd spend the money. However, if you made the front and rear wings straight – and only two or three elements [1 and 2] – then you'd save a huge amount of money. You spend thousands of hours in the wind tunnel creating three-dimensional shapes because you now can. God knows how much some teams spend on making a front wing – they make loads of them every year and then the 10 they have in stock are out of date. It's costing a fortune.

"The truth is that aerodynamics don't feed into road cars. It did on the McLaren F1, but that was for 100 people. Other sports cars use F1 aerodynamics, but again, that's for a few thousand people. All you can hope to do as an F1 designer with things like aerodynamics is to inspire road car designers to push a bit harder. But really, there's no relationship at all."

What becomes clear after an hour of talking to Gordon Murray is that his proposed changes would make a big difference. The word 'freedom' to designers tends to mean 'expensive' to the accountants, but if F1 was to cut back on the cost of the wings, KERS and suspension, could teams then afford to have more freedom in the middle of the car? It would need some well-written rules from the FIA, that's for certain.

Murray has always looked for the next challenge. It was the McLaren F1 road car 20 years ago, then his T.25 and T.27 city cars and their radical iStream build process. Maybe his next hurdle could be re-writing the F1 rulebook and sending it over to FIA president Jean Todt? He's sadly moved on from F1 nowadays, though. Would he ever be tempted back? "No – I've been there, done that," comes the reply.

Unless the commercial rights holders, the FIA and the teams have a sudden change of heart, it looks like Murray's ideas will remain, much like his drawing in January 2000, as a pipe dream – much to the disappointment of us purists. **M**