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A SPECIAL F1 PRO REPORT



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VERSTAPPEN
AS GOOD ON
THE PITCH AS
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NIGEL ROEBUCK
ON FERRARI'S
SWORDFIGHTER



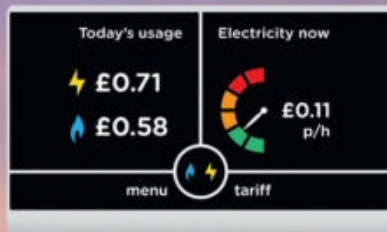
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FERRARI, F1 NEEDS YOU!

COVER: FORMULA 1 NEEDS A WINNING FERRARI

48

What the 2019 Formula 1 season so far has taught us is that even when Ferrari has a quick car, it's still eminently capable of flunking grand prix wins. Mattia Binotto, the new man in charge, has been very effective in transforming the technical department - but F1's most evocative and emotional team still has a mountain to climb.



GOAL

SHOOTING FOR F1'S ULTIMATE

MAX VERSTAPPEN AIMS FOR THE TOP

You probably know he's a FIFA fiend on PlayStation, but would it surprise you to learn that Max Verstappen has a left foot like a traction engine? F1 Racing joined Max for a (sporty) kickabout.



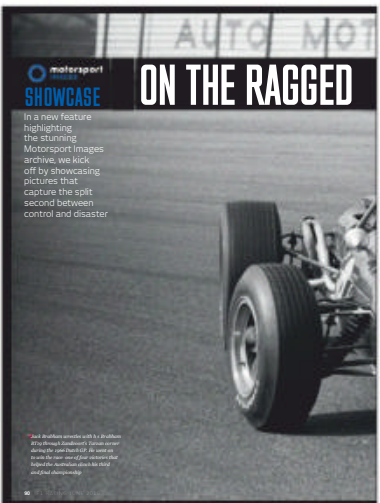
HEROES

ACT 1

INSIDE THE NEW FILM FROM THE MAN BEHIND SENNA

68

The documentary of Senna from 2010 and the award-winning book by Peter Brown and Michael J. Ross are the perfect starting point for anyone who wants to know more about the legend. But what if you're not a fan of the man himself? Well, now you can watch the new film 'Heroes' from the man behind Senna, Mattia Binotto.



ON THE RAGGED EDGE

MOTORSPORT IMAGES SHOWCASE: OVERSTEER

90

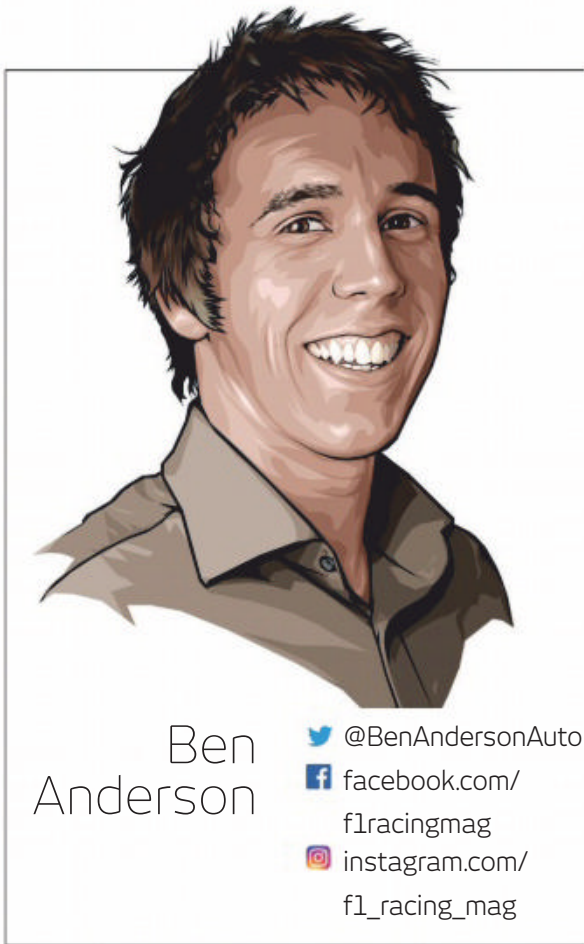
In a new feature highlighting the stunning Motorsport Images archive, we kick off by showcasing pictures that capture the split second between control and disaster.

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Ben Anderson

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F1 needs a strong and competitive Ferrari

Ferrari's capacity to flatter to deceive knows no bounds it seems. By all measures – including those made by Mercedes – Maranello produced F1's fastest car for pre-season testing. Favourite status duly followed: this would be the season in which Ferrari *finally* knocked Mercedes off its perch.

But the Scuderia is emphatically failing to convert winter promise into something tangible, travelling backwards instead of building on the foundations of the last two seasons. Given Red Bull-Honda's rate of improvement, after a slow start of its own, 2019 is looking increasingly like a Mercedes closed shop.

Ferrari should nevertheless take heart from the fact its car is fast – devastatingly so when the engineers nail the correct set-up for the prevailing conditions. But it seems that conundrum has become much more difficult this year. When Ferrari has solved its “Rubik's Cube” (Sebastian Vettel's description), Charles Leclerc especially has looked potentially unbeatable, but then poor reliability and mistakes have let the side down – and Mercedes has been picking up the pieces in metronomic fashion.

Mercedes' car is fast too – faster than expected in fact. For seven days of pre-season testing in Barcelona the W10 refused to work properly. Mercedes looked behind its own usual curve, and behind Ferrari, but then the engineers hit the sweet spot on the final day and Ferrari has been scrabbling

ever since. Now it looks as though Ferrari has replaced Mercedes as F1's pre-eminent diva-builder.

Things eventually worked out quite well for the Mercedes-built divas of 2017-18. Ferrari will hope that's a good omen. Maurizio Arrivabene said Ferrari has everything it needs to win – it just needs to conquer its own fear. New team boss Mattia Binotto – a calm, methodical engineer – is meant to be the man under whom Ferrari will finally conquer that psychological enemy from within. But as he works to rally his troops, already cracks are appearing: the SF90's design concept looks potentially flawed; accelerated development is not paying dividends; poor reliability has crept back in – plus there are prevailing questions of consistently poor strategy, team orders confusion, and the matter of Vettel, who no longer looks the clear leading driver Ferrari hoped to build a title challenge around.

Much of this is related to the superb start Leclerc has made to his career in red, creating added pressure but also providing a glimmer of hope in what has otherwise been a chastening start to 2019. F1 needs Ferrari to mount a challenge to keep this season interesting. As Scott Mitchell explains on page 48, Binotto looks to be the leader Ferrari needs – now more than ever, otherwise this potentially epic season could turn into a Mercedes blowout. For the good of F1, Binotto's people need to step up.

Contributors



JACK BENYON
Autosport's International Editor is regularly travelling the world. This month we sent Benyon to Germany to chat with Max Verstappen (p62)



STEVE ORINO
Accompanying Benyon was Steve Orino, who photographed his first British Grand Prix over 30 years ago



PAT SYMONDS
In his monthly column the former Renault and Williams engineering chief, Pat Symonds, delves into the world of material science (p26)



KEVIN WOOD
For nearly two decades Kev Wood has managed the Motorsport Images archives. See page 90 for a selection of classic motor racing pictures

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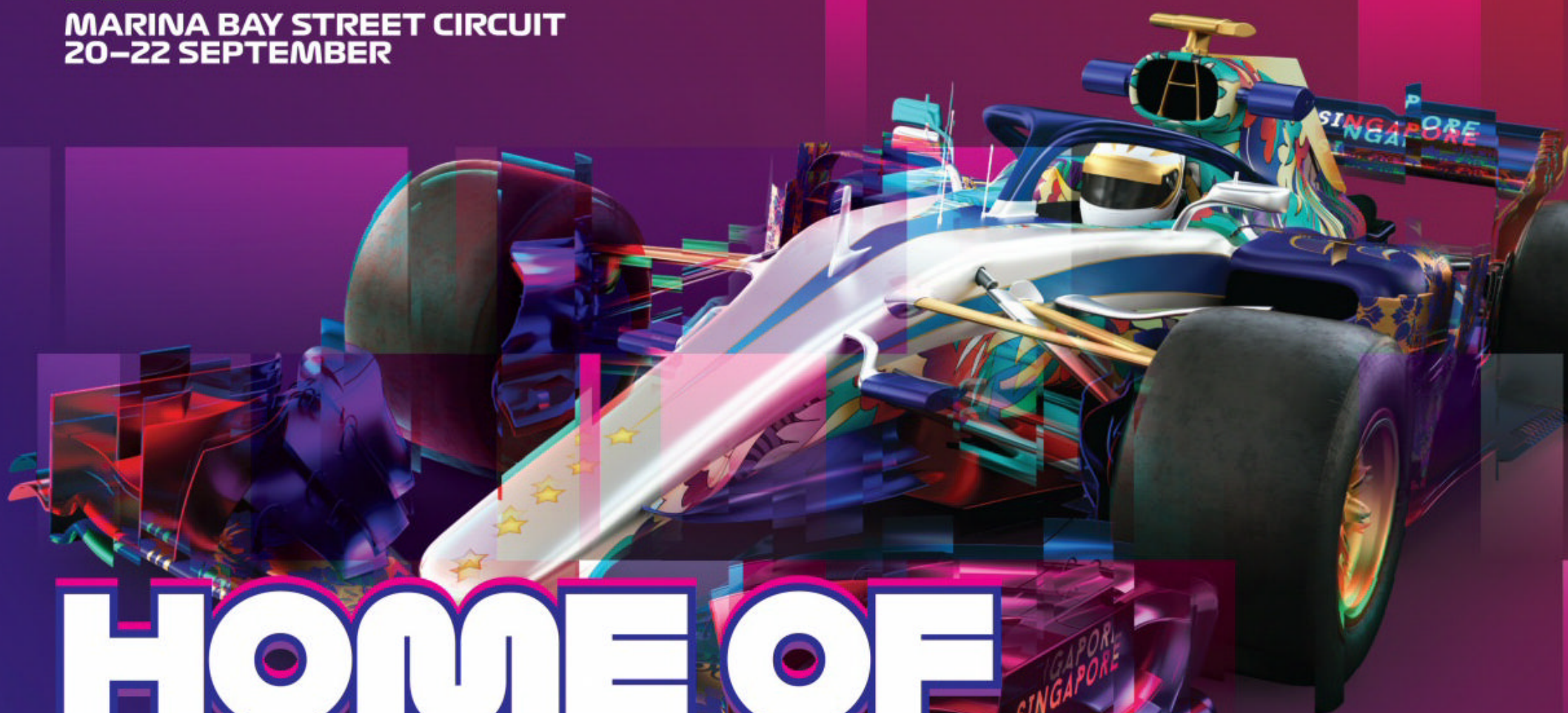
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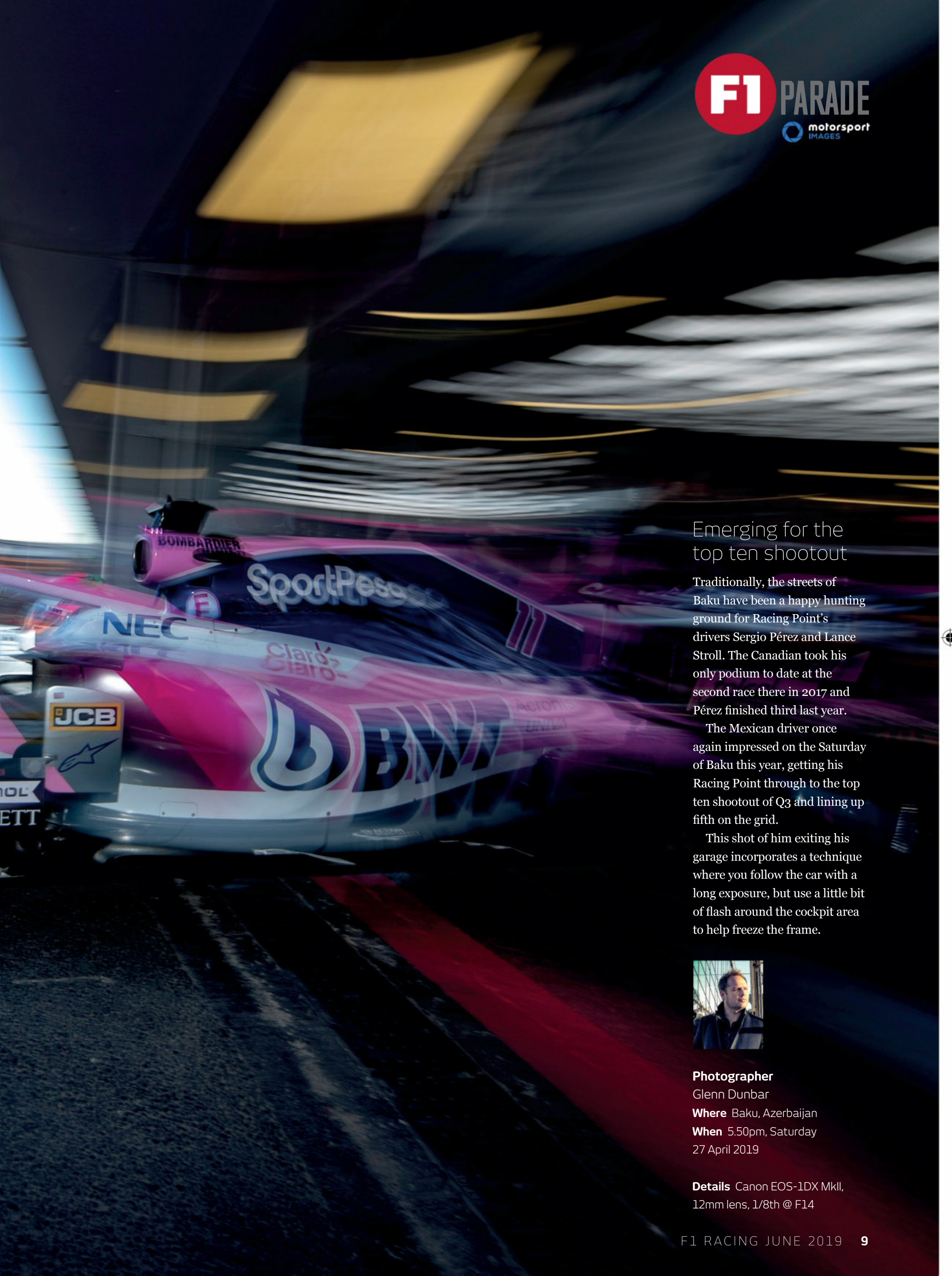
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Emerging for the top ten shootout

Traditionally, the streets of Baku have been a happy hunting ground for Racing Point's drivers Sergio Pérez and Lance Stroll. The Canadian took his only podium to date at the second race there in 2017 and Pérez finished third last year.

The Mexican driver once again impressed on the Saturday of Baku this year, getting his Racing Point through to the top ten shootout of Q3 and lining up fifth on the grid.

This shot of him exiting his garage incorporates a technique where you follow the car with a long exposure, but use a little bit of flash around the cockpit area to help freeze the frame.



Photographer

Glenn Dunbar

Where Baku, Azerbaijan

When 5.50pm, Saturday
27 April 2019

Details Canon EOS-1DX MkII,
12mm lens, 1/8th @ F14



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ARBON

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PETRONAS
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TWEET
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Hamilton regains his grip on glory

After losing out to team-mate Valtteri Bottas in Baku, Lewis Hamilton re-established his lead of the drivers' world championship in Spain.

The British driver was over sixth tenths down on Bottas after qualifying in Barcelona, a margin that was attributed to a poorly-charged battery.

But he made amends at the start to lead the Finn into Turn 1 before dominating the remainder of the race.

Shooting up to the podium on a long, 500mm lens, this shot neatly frames Hamilton's left-hand around the neck of the champagne bottle. I also like the details such as the Spanish flag on his winner's cap and also on the bottle of champagne too.



Photographer

Andy Hone

Where Barcelona, Spain

When 5.01pm, Sunday
12 May 2019

Details Canon EOS-1DX MkII,
500mm lens, 1000th @ F5.0



Barcelona's fifty shades of orange

After a strong start to his rookie season, McLaren's Lando Norris struggled as the championship arrived in Spain. Despite qualifying in tenth – thanks to Daniel Ricciardo's penalty - he fell to 16th on the opening lap after running wide at Turn 3.

Norris's Spanish Grand Prix then ended unsatisfactory when he attempted to pass Racing Point's Lance Stroll around the outside of Turn 1. The pair made contact, forcing both of them to retire from the race.

This was taken on the exit of Turn 12 as I noticed a few Dutch fans in their trademark orange. While they weren't there to support Norris, it provided a fitting backdrop for his car.



Photographer
Joe Portlock

Where Barcelona, Spain
When 3.52pm, Sunday
12 May 2019

Details Canon EOS-1DX MkII,
140mm lens, 1/15th @ F20





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Pérez's moment of quiet reflection

It's a place that the TV cameras rarely visit. A drivers' private room is where they change into their overalls and compose their thoughts before getting into their race cars.

The temporary driver rooms in the Baku paddock have large frosted windows which offer a really bright, yet soft light, which is different to many other rooms that have dull artificial lighting.

This was Sergio Pérez, just 11 minutes before the start of free practice on Friday in Baku. He was actually running a little late, but still allowed me the chance to do some reflective, behind-the-scenes portraits before getting into the car for the first time that weekend.

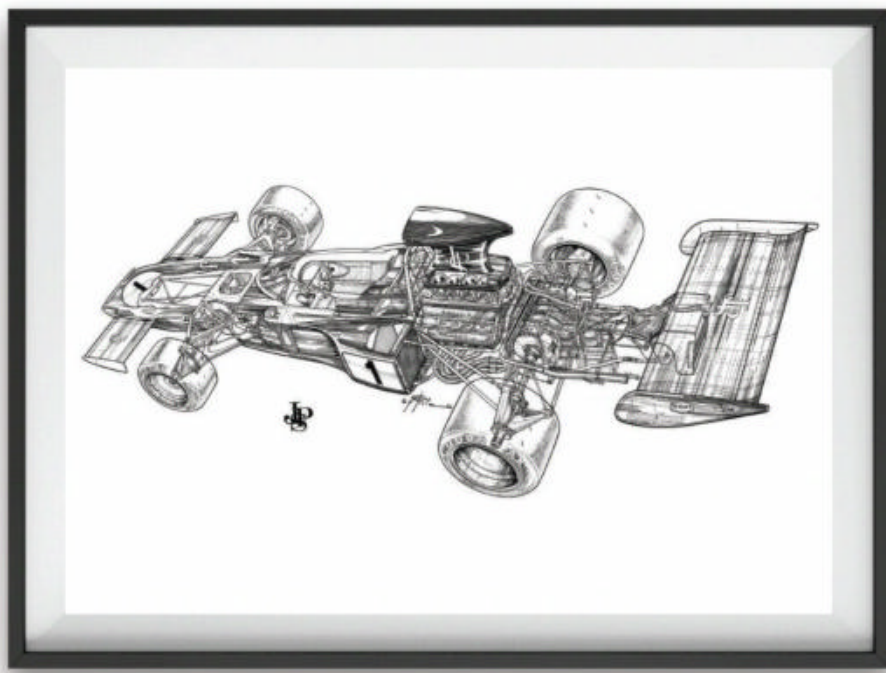


Photographer
Glenn Dunbar

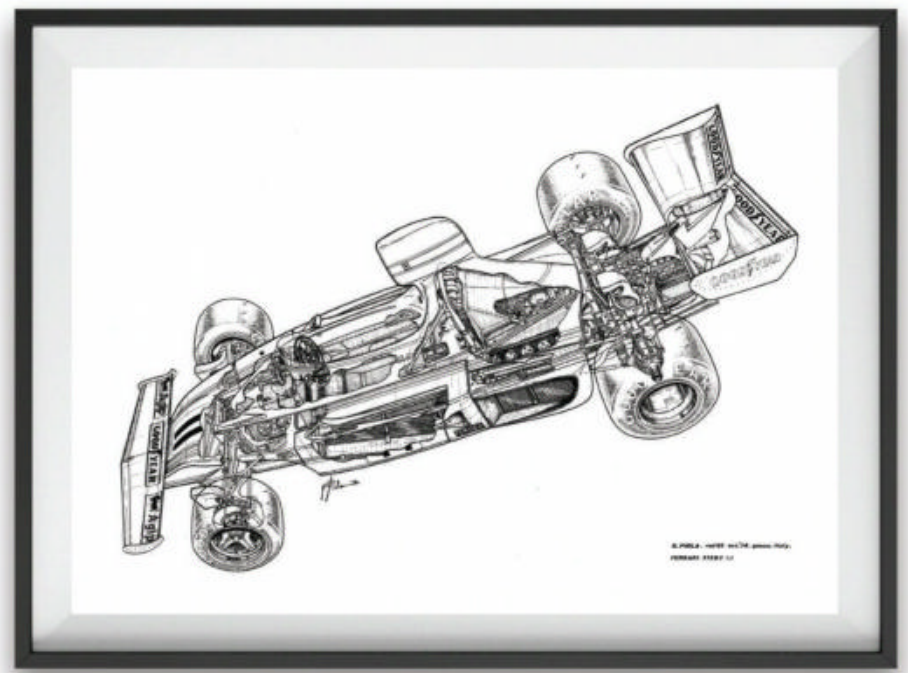
Where Baku, Azerbaijan

When 12.49pm, Friday
26 April 2019

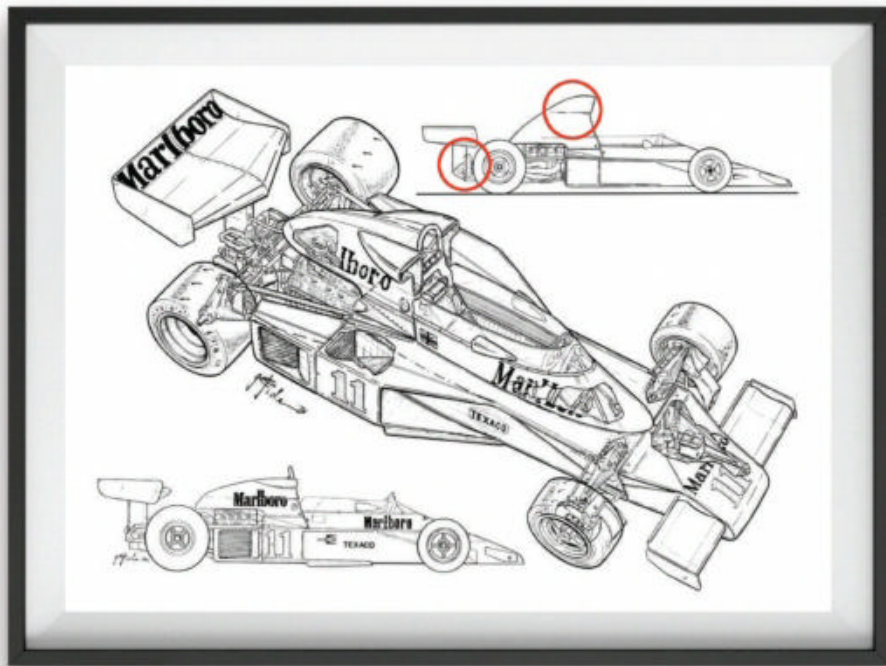
Details Canon EOS-1DX MkII,
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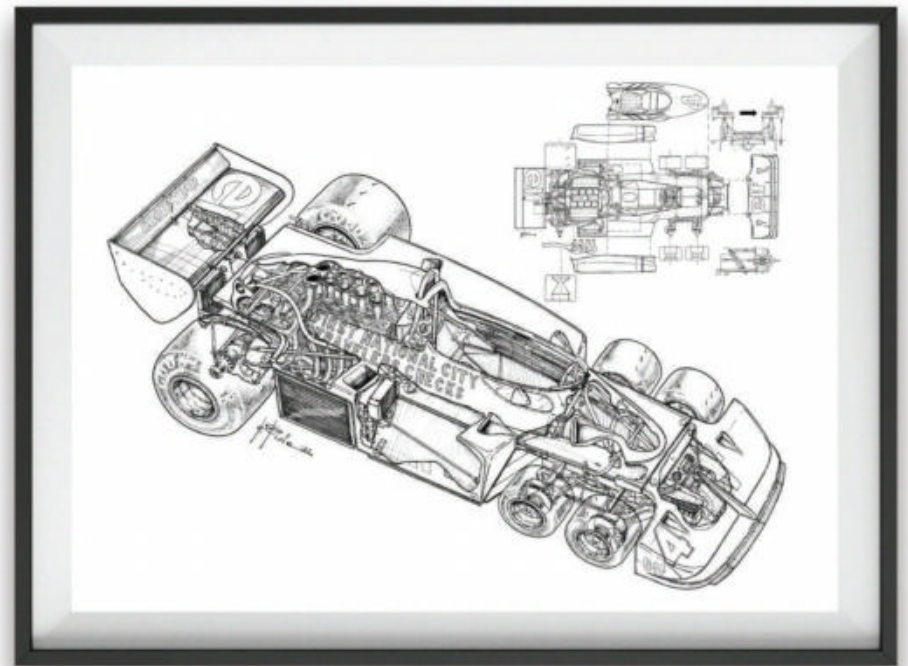
LOTUS 72 - 1971



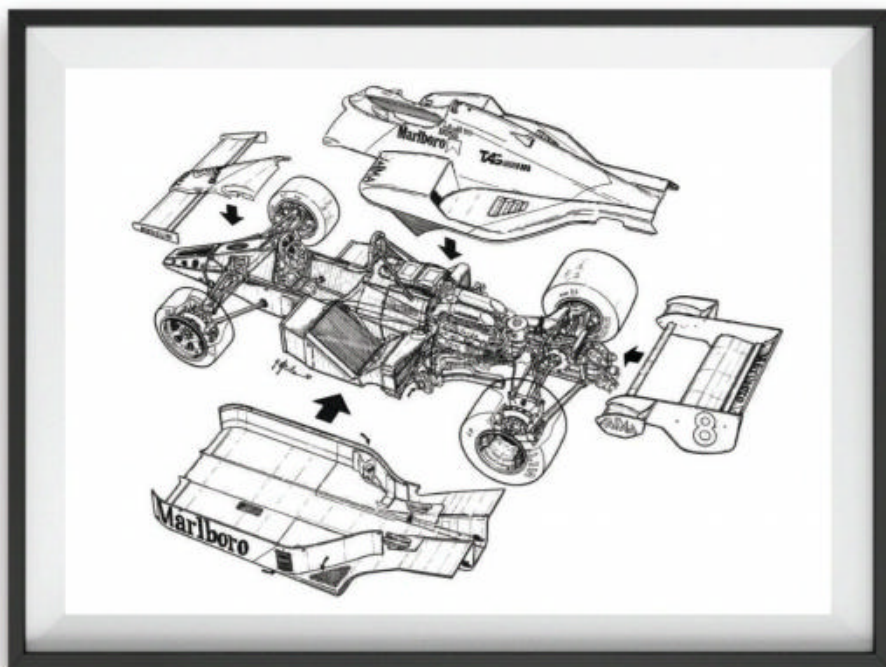
FERRARI 312B3 - 1974



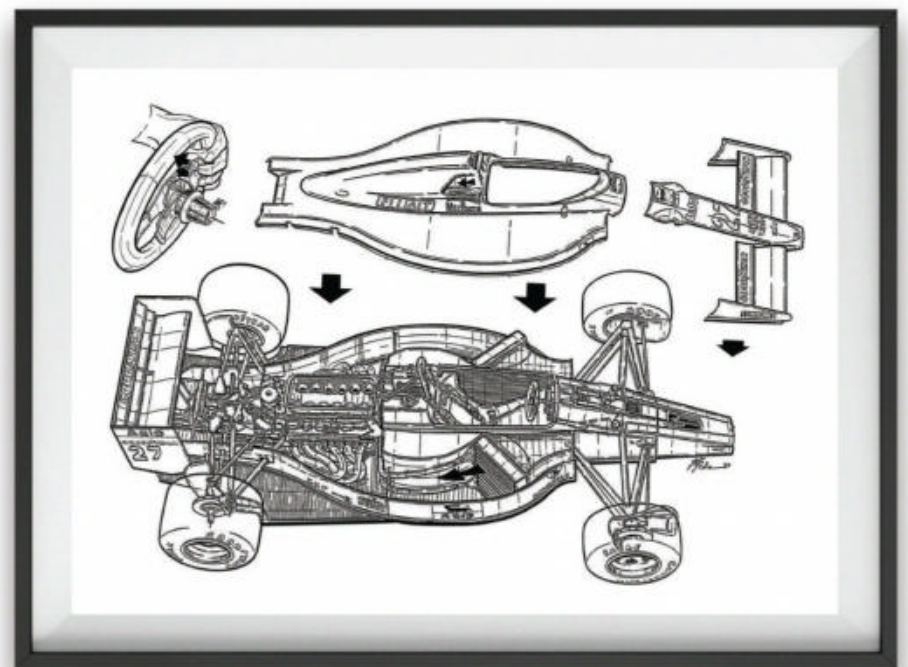
McLAREN M23 - 1976



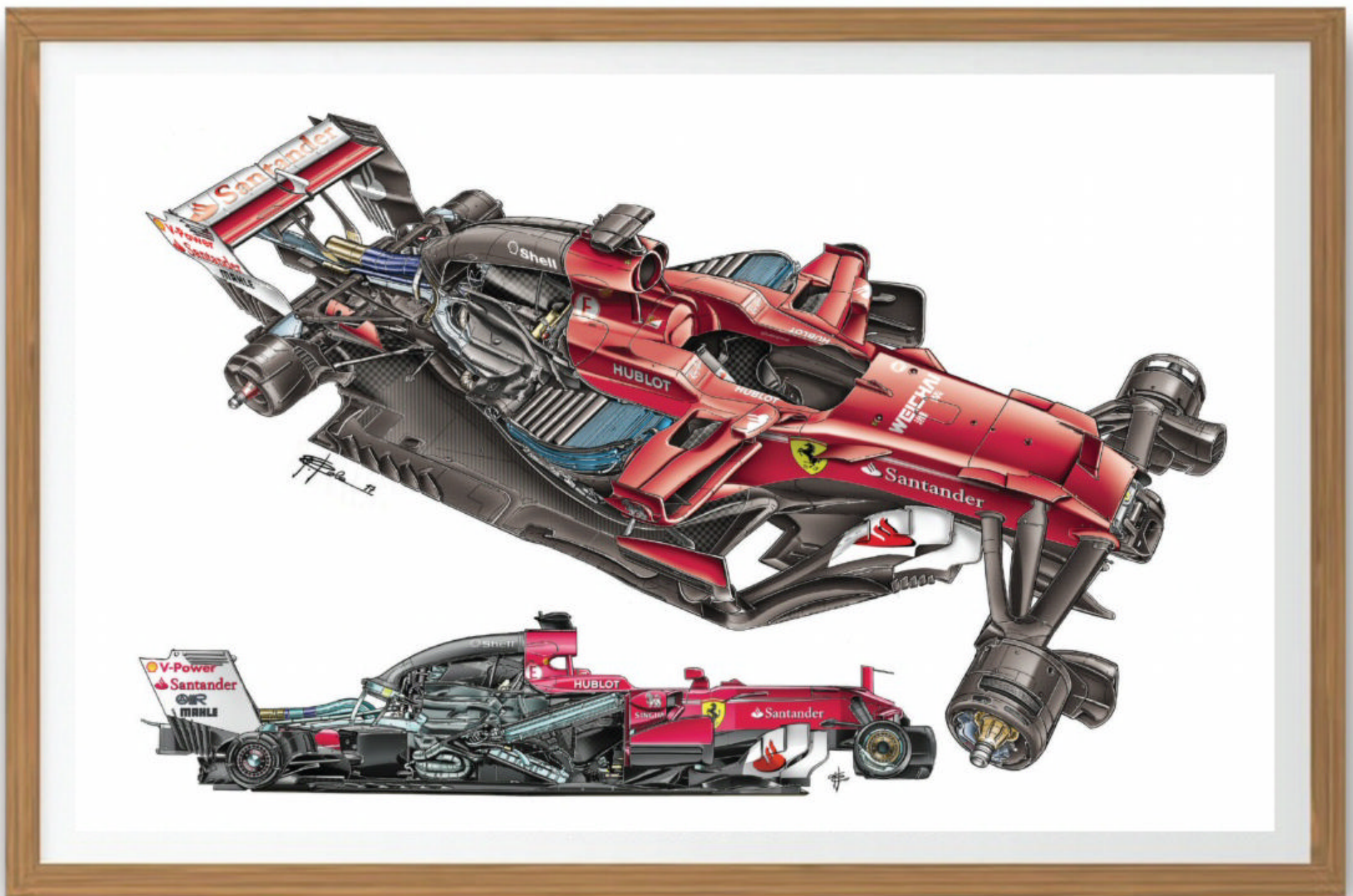
TYRRELL P34 - 1977



McLAREN MP4/2 - 1984



FERRARI 640 - 1989



FERRARI SF70H

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ZANDVOORT RETURNS

01 Following a 35-year break, the Dutch Grand Prix will return to the Formula 1 calendar from 2020, at its previous home of Zandvoort, as the sport bids to capitalise on the popularity of Max Verstappen.

While F1 owner Liberty Media is eager to demonstrate that it, like the previous commercial rights holder, is eminently capable of making things happen, a three-year deal for a race at Zandvoort will bring with it some logistical challenges. The demands F1 exerts on circuit facilities and local infrastructure have changed greatly since this venue last hosted F1 in 1985, but Verstappen's popularity might make some short-term pain worthwhile.

Speaking at the Spanish Grand Prix weekend when the news was announced, Red Bull boss Christian Horner reckoned crowds at the revitalised Dutch Grand Prix could compare with those at Barcelona when Fernando Alonso

Zandvoort will be a sea of orange for Max Verstappen with the return of the Dutch Grand Prix for 2020



was in his pomp. These are now a fading memory; there were plenty of empty seats during this year's race.

"We saw it here in Spain with [Fernando] Alonso when he was at his peak, and we see the amount of Dutch fans around the world, it just seems to be growing and growing," said Horner. "I think a Dutch Grand Prix, with the popularity of Verstappen, is going to be immense. I think that's positive for Formula 1."

It remains to be seen how difficult access will be when tens of thousands of fans try to get into the circuit, and the layout itself is widely known to be not great for overtaking.

Asked if there were any concerns about the track being too tight for good racing, Horner said: "Monaco's not exactly flush with overtaking opportunities."

Changes are to be made to the circuit layout, though, to try to make it more suitable for F1. The start line will be moved towards Tarzan, and tweaks will be made to some corners, including the Gerlach curve and Hugenholtz.

Zandvoort's deal follows the announcement of Vietnam as an addition to the 2020 calendar, and two extra events means that some current venues may fall by the wayside. F1 CEO Chase Carey told investors last month he expects the calendar to remain at 21 races for now.

Five events are out of contract this year – Britain, Spain, Italy, Germany and Mexico – but Carey has said that agreements in principle have been made with two. Italy is confident a deal is close after agreeing financial terms with Liberty, while the British Grand Prix promoter is understood to be on the verge of settling its differences and signing a fresh contract. Mexico's hopes are fading since the government appears less willing to bankroll the event, while both Hockenheim and Spain are still in discussions. Questions also remain over where the Brazilian Grand Prix will take place, after the country's president Jair Bolsonaro announced that the event would be moving to a new circuit in Rio de Janeiro.

Catching the F1 world by surprise, Bolsonaro said a deal had been signed with Rio's governor Wilson Witzel and mayor Marcelo Crivella for the construction of a new track in the Deodoro district.

The plan is for the circuit's construction to be finished before the end of this year, and it will be financed entirely with private money. That would be a stretch for any venue, not least one in a country with an undistinguished track record in assembling such facilities on time.

CHANGES ARE TO BE MADE TO TRY TO MAKE IT MORE SUITABLE FOR F1. THE START LINE WILL BE MOVED TOWARDS TARZAN AND TWEAKS WILL BE MADE TO SOME CORNERS

MAX IS GOING NOWHERE



02

PICTURES: JERRY ANDRE; ZAK MAUGUER

It is almost hard to believe that 12 months ago some critics were suggesting Red Bull should consider firing Max Verstappen, or at least step up efforts to find a replacement.

A torrid start to the 2018 campaign – which included incidents and accidents – culminated in a Monaco Grand Prix weekend where he threw away his chance of fighting for a win by binning his car in final practice. That low point provided the catalyst for a turnaround, and right now it is Verstappen that looks to be the man who could most likely threaten the dominant Mercedes team most.

While Ferrari's campaign has been stymied by its inability to maximise the potential of its car, Red Bull has put to bed some early season headaches with its own design to deliver valuable podium finishes. But the ace up its sleeve is Verstappen, who has become a thorn in Ferrari's side and looks to have a pretty decent shout of third place in the drivers' championship – the best anyone not driving a Mercedes can probably hope for.

For Red Bull advisor Helmut Marko, the change in Verstappen has been helped a great deal by the youngster 'cutting the cord' from his father Jos in the wake of last year's Monaco meltdown. Verstappen Sr, previously a perma-fixtured at Max's shoulder in the Red Bull garage, did not attend the Canadian GP that followed. Jos has now stepped away a little; he doesn't attend every race and seems happy to let his son do things for himself.

Marko said: "Jos got married again and had another ▶

“MAX HAS A CONTRACT AND IT’S VERY CLEAR WHAT THAT POSITION IS. I’M TOTALLY CONFIDENT THAT HE’LL BE HERE NEXT YEAR” CHRISTIAN HORNER

child. He also takes a step back. And he understands that Max no longer needs him to the extent it was necessary before. That’s an overall development.

“His [Max’s] incredible maturity and determination is still an exception. But the boy must have been with his father day and night for ten years. They travelled the world with a kart and a van. It was clear that there would have to be a cutting of the cord at some point. We have already seen that he is more on his own now and doesn’t get any additional pressure, no counterproductive pressure.

“You shouldn’t underestimate the need to cut the cord from his environment. Jos is not at every race anyway. But there were other things as well. For example: the race engineer was pretty strict with him. It’s not like he delivered a performance immediately only because Jos wasn’t there.”

Most importantly for Red Bull, the momentum the team is gathering now – allied to the fact that Valtteri Bottas’s performance means it’s likely that either he or Esteban Ocon will be in the seat alongside Lewis Hamilton next season – indicates that it has fewer worries that rivals may come knocking for its star man.

Earlier this year stories circulated that Mercedes boss Toto Wolff had been in regular contact with Verstappen in a bid to lure him Brackley’s way. Wolff himself said Max and Jos found the stories funny, especially because Jos and Toto are friends.

“We had quite a laugh about it, all three of us,” Wolff said. “I haven’t got Max’s number and I’ve never spoken to him on the phone. As Max rightly said, I’ve known Jos for a long time



Max has benefitted from father Jos not being at every race, according to Red Bull advisor Helmut Marko

and I would consider him a friend.

“We talk about babies and go-karting and when do we put our babies in a go-kart together and which team are we going to set up. There is no talking about Max or his contract. For the right reasons, Max is very committed to the Honda/Red Bull situation.”

Red Bull’s own stance is very clear too: it’s keep your hands off.

“Max has a contract and it’s very clear what that position is,” said Red Bull boss Christian Horner. “I’m totally confident that he’ll be here next year.”

Right now Verstappen is not Mercedes’ immediate future. He is its biggest long term threat. ▶

F1 DIGEST THE MONTH’S BIG STORIES AT A GLANCE

16.04.19 F1 commercial chiefs discuss second Chinese race

24.04.19 Honda introduces new engine for Azerbaijan Grand Prix

25.04.19 Formula 2 racer Louis Delétraz gets Haas simulator role



26.04.19 FIA appoints its first head of research, former Red Bull engineer Tim Malyon

03.05.19 Williams to be reimbursed after drain cover damage in Baku

09.05.19 F1 CEO Chase Carey suggests two grands prix will lose calendar slots

14.05.19 Ferrari admits its F1 car design concept may be wrong



14.05.19 Haas sponsor Rich Energy loses copyright case over stag logo

15.05.19 Dutch GP venue to get steeper banking and reprofiled corners



PICTURES: JERRY ANDRE; ANDY HONE; STEVE ETHERINGTON

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VITABIOTICS

NIKI LAUDA DIES, AGED 70

03 Formula 1 is mourning the passing of another paddock legend, following the death of three-time world champion Niki Lauda in the build-up to the Monaco Grand Prix.

The Austrian had battled ill health since the middle of 2018. He received a lung transplant last August that required a two-month stay in hospital, then contracted a flu infection while on holiday in Ibiza over Christmas that hospitalised him again.

Lauda was released in mid-January, but remained absent from the F1 paddock and reports in Austria suggested he was receiving kidney dialysis in Switzerland shortly before his death, aged 70. He sadly succumbed to his ill health on 20 May, surrounded by his family.

“With deep sadness, we announce that our beloved Niki has peacefully passed away with his family,” the Lauda family said in a statement issued to Austrian media. “His unique achievements as an athlete and entrepreneur are and will remain unforgettable, his tireless zest for action, his straightforwardness and his courage remain.

“A role model and a benchmark for all of us, he was a loving and caring husband, father and grandfather away from the public, and he will be missed.”

Lauda was a giant of the F1 paddock for well over four decades, both on and off the circuit. He made his F1 debut with March in 1971, having famously defied the wishes of his family by taking up a career in motor racing, and claimed the first of his 25 F1 victories in 1974 after joining Ferrari.

A maiden title followed in 1975, before Lauda was gravely injured in a fiery crash at the Nürburgring that left him badly burned. Remarkably, he missed only two races and lost the championship by a point to McLaren’s James Hunt, a story immortalised in the 2013 film *Rush*.

Lauda earned a second title with Ferrari in 1977 before moving to Brabham, but retired midway through practice for the 1979 Canadian GP. He switched focus to his airline business before making an unlikely F1 comeback with McLaren in 1982, winning his third championship in 1984.

Lauda retired again in 1985 and took up a consultancy role with Ferrari in the 1990s, before a stint as Jaguar team principal in 2001. In 2012,

Lauda became non-executive chairman of Mercedes’ F1 team, playing a key role at its helm until falling ill.

We at *F1 Racing* send our deepest condolences to Niki’s family and friends.

This news came as we went to press. A full tribute will appear in next month’s issue, on sale 4 July.

“A ROLE MODEL AND A BENCHMARK FOR ALL OF US. HE WILL BE MISSED”
THE LAUDA FAMILY



F1 MASTERMIND

Your chosen specialised subject: the world’s greatest sport

- Q1** Brian Henton and Derek Warwick drove for Toleman in its debut season, 1981, but only qualified for one race each. Which GPs were they?
- Q2** Which current driver has the most podiums without a win: Romain Grosjean or Sergio Pérez?
- Q3** Which was the first season that the F1 calendar expanded to 20 races?
- Q4** True or false: Jenson Button never managed to score a podium finish at the British Grand Prix?
- Q5** What is the significance of 5 years, 7 months and 18 days in the F1 career of Mario Andretti?
- Q6** Who is the only driver to have led laps in three of the first four races so far this season?
- Q7** Who lies second on the races started list of Spaniards, after Fernando Alonso?
- Q8** How many world championship Formula 1 races have been won by cars powered by BMW engines: 15, 20 or 25?
- Q9** Of his 11 F1 victories, at which two different circuits did James Hunt win twice?
- Q10** Who has not been a team-mate to Daniil Kvyat: Jean Eric Vergne, Daniel Ricciardo, Max Verstappen, Carlos Sainz or Brendon Hartley?



1 Italy (Henton) and Caesars Palace (Warwick) 2 Grosjean (10 to 8) 3 2012 4 True 5 It is the time between his first and second wins Lewis Hamilton 7 Pedro de la Rosa 8 20 9 Zandvoort and Watkins Glen 10 Max Verstappen

PICTURES: MARK SUTTON



TOM HARTLEY JNR

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THE F1 ANALYST

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was just that. Particularly eye-catching was his charge from a pitlane start in the Chinese Grand Prix to 10th, with a car built up around a spare monocoque following a big accident during Saturday practice when he ran wide exiting the final corner and kept his foot in a little too long. Albon has looked confident behind the wheel and isn't afraid to have the car moving around mid-corner. On that occasion he was over-confident, but to race so well the next day required tremendous mental strength under pressure that would crush many.

The Toro Rosso is a brisk midfield car, but never looks the easiest to drive from trackside. Both Albon and, to a lesser extent Kvyat, usually have the rear moving around as the Toro Rosso allows them to carry good speed into the corners without ever looking entirely planted. That also caught Albon out when he had a less serious crash during FP1 in Melbourne. For several laps, the rear was coming round in the final part of the Turn 1/2 right-left flick and eventually it went too far, pitching him into the wall.

Asking him about this later that weekend, Albon's honesty was refreshing as he explained that he was gaining more and more confidence and began to believe the rear would come back to him no matter what – until it didn't. His willingness to talk about it in depth, showing he had confronted the error and understood it without letting it drag him down, was striking. Albon describes himself as “historically a smooth driver”, and while like most drivers he benefits from a strong front end and planted rear on entry, he has realised the best way to get the Toro Rosso to carry the speed is to work it hard mid-corner.

Albon's resilience and very deliberate ability to cut out the unnecessary distractions and focus on the simple process of driving is a potent weapon. In elite sport, many athletes have to work hard to place themselves into the more relaxed mindset required to get the best out of themselves. Mistakes, after all, clash with the ego that says they are the best so can be hard to put behind you. Albon is not, as he puts it, “sipping a gin and tonic before I drive”, but he's also not putting undue pressure on himself. Perhaps this has been baked into his psyche through cold, hard experience.

After all, his big chance came from the man who dropped him from the Red Bull young driver scheme after a disappointing first season of car racing in Formula Renault in 2012, which almost resulted in Albon quitting – Dr Helmut Marko. Albon knows his only chance now is to impress a hard taskmaster who has already given up on him once.

Albon's season has been streaky, but you'd expect that from a rookie. Small errors,

AN UNEXPECTED SECOND CHANCE TO SHINE

Most aspiring Formula 1 drivers eventually reach a fork in the road where they realise their desired path leads to oblivion, so they plunge into the wider motorsport world to make their careers. Alex Albon was there last year despite challenging for the Formula 2 title, so signed a deal to race in Formula E with the e.dams Nissan squad. Two months and six days after that deal was announced, Scuderia Toro Rosso confirmed him as Daniil Kvyat's 2019 Formula 1 team-mate.

It was an unlikely reprieve, but a merited one. Albon may have come into this season as the lowest-profile driver, but he's highly-regarded by his contemporaries. Lando Norris once had a poster of karting star Albon on his wall, while both George Russell and Charles Leclerc talked up the London-born Thai as arguably the best young driver outside of F1. The respect among his near-contemporaries (at 23 he's a little older) is out of kilter with the lack of buzz surrounding Albon for much of his career.

“I'm the driver's driver,” jokes Albon when asked about the respect they have for him. “I get on with everyone, so maybe they are just being nice. In the



Albon looked set for Formula E before the Toro Rosso chance arose and he intends to make the best of the opportunity

public eye, at least, I didn't look very strong when I was in Formula Renault and Formula 3, I came out of nowhere in GP3, but that's stuck with me – people not really knowing about me.

“When you look at Charles, George and Lando, they won everything and I didn't. I'm definitely not putting it on the teams, but maybe it took me longer to get up to speed in single-seaters so I didn't come in with a bang. But I always felt that if I got the opportunity I could showcase what I can do, and it's been a good start to the season.”

Scoring a point in two of his first three races

notably in qualifying, have compromised his weekends, but the underlying pace has been good. In a driver's first season, you look for the peaks of performance and then, as experience builds, expect them to be achieved more consistently. That is what Albon needs to do if he is to have a case for promotion to Red Bull's main team. That he's in a small minority among the 20 drivers on the grid in not having strung together a title-winning campaign in junior single-seaters suggests this is the challenge that could make or break his F1 career.

The 2016 season, when Albon was teammate to Charles Leclerc in GP3, supports this. Leclerc won the title with Albon second. There, consistency made the difference.

"That was one of the coolest seasons I've

ever had," he says. "I had three incredibly quick team-mates and every corner someone else was quicker than the other. Our theoretical best lap times were off the chart! Charles was the most consistent, but it was always about tenths.

"His race pace was strong, which always

“ALBON KNOWS HIS ONLY CHANCE NOW IS TO IMPRESS A HARD TASKMASTER WHO HAS ALREADY GIVEN UP ON HIM ONCE”

surprised me because he is aggressive and uses a lot of brake to rotate the car, so it's always moving. He has incredible feeling on the brakes. You couldn't be quicker than him in a corner by even half-a-tenth and sometimes he'd do laps where he braked incredibly late, the car moves around like crazy and it's like 'wow' as he would always come out quick. We all had our different styles, I was the smoother guy, about minimum speed and exits, but he would be more about entry."

It remains to be seen whether Albon can find that last fraction needed to go from what he has already proved himself to be – a very capable midfield F1 driver – into something more. But the raw material appears to be there. Now, it's a question of if he can find the cutting edge needed to deliver the consistency that will be the key to him fulfilling his prodigious potential.



After his Saturday morning crash in China (above) Albon recovered well to claim 10th (below)





UNDER THE HOOD

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which is polyacrylonitrile or PAN for short. It's an organic polymer resin which, although a thermoplastic, doesn't melt under normal heating. To make the fibres PAN is first heated in air at 230°C to form an oxidised PAN fibre, and then carbonised above 1000°C in an inert atmosphere to make carbon fibres. The single continuous fibres, which have a diameter around one tenth of that of a human hair, are wound on to a reel and the many thousands of them form a bunch known as a tow.

The strength of these fibres is largely a function of the size of the defects in their crystalline structure. The smaller the defects the higher the strength, and improved manufacturing processes

are continually providing us with stronger materials. The latest fibre from Toray, T1100, is twice the strength of an early fibre such as T300, which was used in the first composite monocoque I was involved with at Toleman.

Sometimes it is stiffness that is more at a premium than strength and again there are many different types of fibre to satisfy this requirement. Stiffness is a function of the alignment of the crystal structure of the fibre. The closer the alignment is to the long axis of the fibre, the stiffer the finished fibre will be. Again, modern fibres are available that have twice the stiffness of early fibres although this comes at the expense of some strength and some additional brittleness.

The difference in composite materials ▶

PULLING ON THE (CARBON) THREADS

To many people the words 'carbon fibre' describe a single material, but it is as generic a term as the word 'metal'. In the same way metal covers a range of elements from aluminium to zinc, so too does carbon fibre describe a plethora of different combinations of fibre and resin, each with unique and exploitable properties.

In general engineering carbon fibre is still thought of as a relatively new material, but the fibres as we know them today were first made by Swan for use in lightbulbs in 1860. In the mid twentieth century small samples of high-performance fibres were being made in laboratories, but it wasn't until 1963, when researchers at the Royal Aircraft Establishment in Farnborough developed a method many companies went on to commercialise, that the material became viable.

I remember as a child my father bringing home a sample from Farnborough and telling me it was the material of the future. How right he was, but neither of us could have guessed how much it

would play a part in my professional life.

It's difficult to pin down carbon fibre's first use in motorsport, but it could have been in the Ford GT40 that won Le Mans in 1968. It had bunches of fibres wet-laminated to the inner surfaces of the bodywork to provide additional stiffness.

The vast majority of fibres used in F1 and elsewhere are called PAN fibres. They take this name from the material the fibres are made from,

McLaren's MP4/1 was F1's first monocoque chassis made completely from carbon fibre

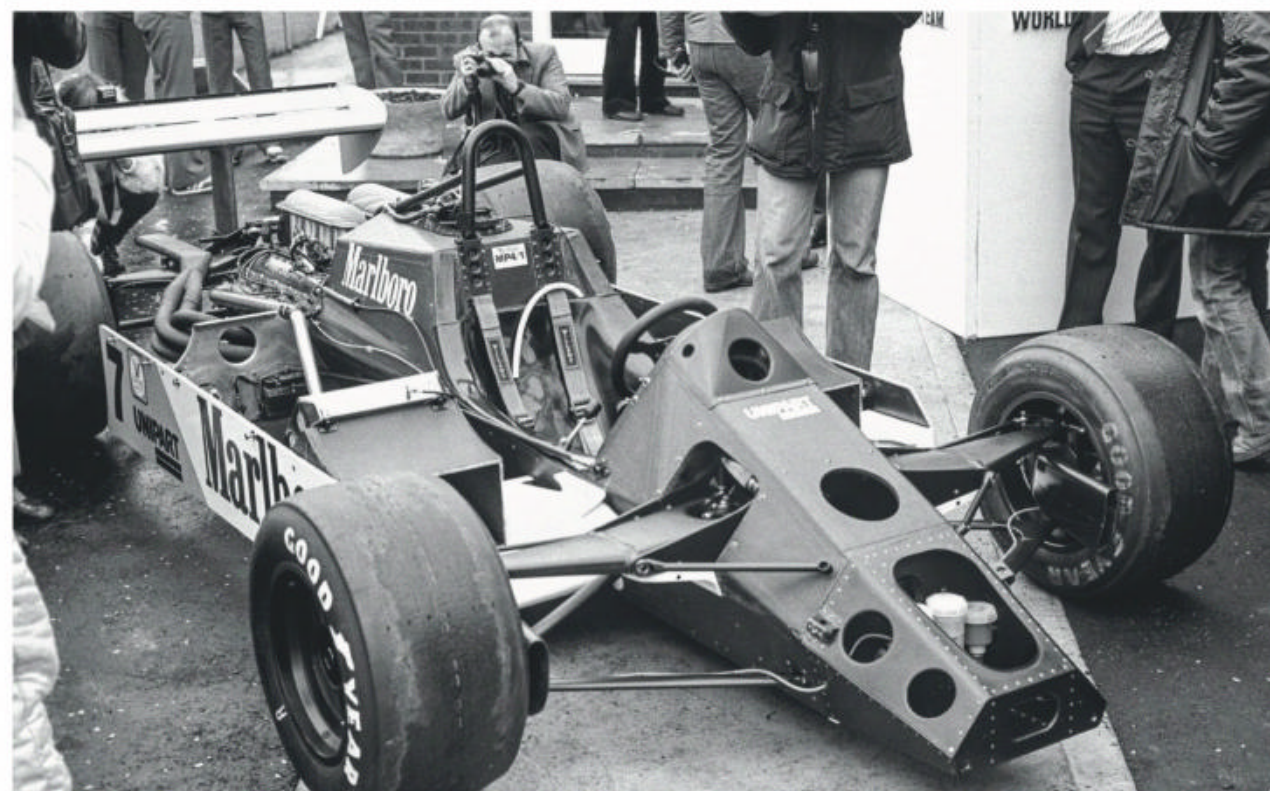


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2018 Porsche GT2 RS
Porsche's most powerful flat six street car. Over \$48,000 in factory options including Weissach package and magnesium wheels. 2,898 miles since new. Has original window sticker, books and tools.



2016 Porsche Cayman GT4 Clubsport
Porsche's track-only Cayman race car. Upgraded to Manthey Racing specifications at Porsche factory. 6-speed dual clutch transmission, with a 385 horsepower 3.8-liter flat six engine.



1973 Porsche 911T Targa
A preservation 911 dream. 34,681 original miles, original paint, original interior, and matching numbers engine and transmission. Preservation restoration carried out by Canepa.



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The strength and stiffness of carbon fibre have been well tested over the years

doesn't stop at the fibre properties, though. Each bundle or tow of fibres can be woven in many different ways, each having different properties. The simplest of these is unidirectional fibre which, as its name suggests, consists of the bundle being aligned lengthwise. This gives immensely good properties in one direction but no strength at ninety degrees to the bundle. If, however, the load path in a component is known and is simple this can be the most efficient use of carbon fibre.

More generally a component, such as a monocoque, needs to handle multiple load paths in various directions and it's here that woven mat comes into its own. The weave is defined by the arrangement of the warp (0 degree) fibres and the weft (90 degree) fibres. In a plain weave the warp fibres pass alternately under and over the weft fibres. A twill weave is one where one or more warp fibres alternately weave over and under two or more weft fibres but there are many more varieties, each with different integrity and different abilities to be draped in a complex three-dimensional mould shape.

The final component that makes carbon fibre such a versatile engineering material is the resin that encases the carbon and gives rise to the true name of the material, carbon fibre reinforced plastic or CFRP. Just as in

“ IT'S DIFFICULT TO PIN DOWN CARBON FIBRE'S FIRST USE IN MOTORSPORT, BUT IT COULD HAVE BEEN IN THE FORD GT40 THAT WON LE MANS IN 1968 ”

old-fashioned fibreglass laminating, it's the resin that bonds the fibres together and, once cured by heating, gives rise to the solid nature of the CFRP. In F1 manufacturing the resins are impregnated into the woven carbon fibre mat as part of the manufacturing stage, giving rise to the term pre-preg or pre-impregnated fibre.

Once again there are a variety of resins available, each with different properties that allow tuning of the finished material. By a large margin the majority of resins are of the epoxy family but even within this group different types of resins are used for different applications. The uncured resin in the pre-preg holds the fibres together in a tacky state, allowing the laminate to be draped into the moulds. But once heated and cured it contributes some mechanical properties to the finished product, particularly in the plane at ninety degrees to the woven laminate.

Finally a carbon fibre component will often be

stabilised by sandwiching a core material between two sheets of carbon fibre to further enhance the out-of-plane properties of the finished article. As you may by now have guessed, the core materials are also numerous. The first core material I used in a design was end-grain balsa wood in the late 1970s. Today cores are generally a honeycomb material made of either very thin aluminium foil or a paper-like honeycomb of Nomex. For complex shapes a machined syntactic core is often used. This is a foam-like material that combines very light weight with easy machining to allow shaping to complex curvatures. The purpose of the core isn't to add strength as such but to stabilise the carbon skins and provide the separation needed for enhanced structural properties.

That just about sums up the basic materials and terminology of modern carbon composites – next month we'll look at the production process that allows these materials to be so well exploited in F1.

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STRAIGHT TALK

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ENOUGH WITH THE WILLIAMS BASHING

The week after Nico Hülkenberg stuck his Cosworth-powered Williams on pole in Brazil, 2010, Patrick Head held up his Blackberry and showed me hundreds of congratulatory emails.

“There are people here who Frank and I haven’t heard from in years,” he said.

“Nice they got in touch,” I suggested.

“No,” he replied. “Everyone’s your friend when you are winning, otherwise there’s nothing.”

I thought about that recently. Kicking Williams has become a new pastime as assorted analysts and social media jockeys have trashed the team for tugging around, three to four seconds off the pace in qualifying.

Claire Williams told F1’s official podcast: “It has been an enormous shock. I fully expected to come into this year in a much better place...with a much quicker race car. After testing we didn’t even have to wait until Australia to realise that wasn’t

The last thing Williams needed was a race like Azerbaijan, but it is working hard to find solutions for its current woes

the case. I couldn’t quite believe that Williams was finding itself repeatedly down at the bottom of the grid.”

That quote was given in November and referred to last season. The realisation within the team that things have gone from bad to worse this year can only be imagined. No wonder Paddy Lowe slipped away.

Problems with leadership, technology, structure and culture can never be second-guessed by outsiders. Only those inside Grove really know where the problems lie. If they don’t, the solutions will come from having tough conversations.

In his book, *How to Build a Car*, Adrian Newey describes how he identified a negative sub-culture that had existed within Jaguar Racing and continued under Red Bull. He realised it was holding the team back, took the difficult decision to sack three key figures who appeared to have their own agenda, and witnessed a remarkable change. Almost overnight, he said.

For all that we focus on the technology, F1 remains a people sport.

So, when you have people problems, it can make already complex technical issues almost impossible to resolve.

Modern F1 cars which don’t work are a nightmare. When you get it wrong the issues are not easily identified. Throw in a big regulation change from one season to the next and, when the next car is even worse, you not only don’t know where you are, you don’t even know where you were! You may as well try to un-bake a cake.

Williams has much to hold on to, however. And I don’t mean past glories. Financially it’s a tight ship, still controlled by Frank. Former CEO Adam Parr, along with then-shareholder Toto Wolff, identified Claire as the future, and it was Bernie Ecclestone who told her in December 2012 what that future held as team leader.

The naysayers forget that, under Claire, Williams finished third in the constructors’ championship in 2014 and ’15. The early advantage of a Mercedes hybrid powertrain played a part, and fifth in ’16 and ’17 showed that competitiveness was being blunted, but no one was prepared for the past 18 months.

Tough conversations will have occurred, and likely continue. If there are factions, they need eradicating. If it’s a complex engineering issue, authoritative and credible technical leadership is required. No wonder Patrick is being consulted.

None of this is easy, but then F1 has always been full of technical folk happy to tell you how good they are. For Frank, Claire and Williams, the solution will emerge from the way in which their people work together.



THIS MONTH

Michael Resl

Director Motorsports,
Marketing & Lead
Development,
AVL Racing

For over 50 years, Austrian-based company AVL has been at the forefront of automotive research and high-precision manufacturing. Working in Formula 1, AVL is one the leading purveyors of test bed simulations analysing all aspects of car performance. The company's director of motorsports, Michael Resl, spoke to *F1 Racing* about the complex and sometimes secretive work which AVL conducts in F1

CV

2012-18

Managing director of
AVL High Precision
Manufacturing

2005-12

Director, Global Test
Operations,
AVL

2003-05

Business unit leader,
Commercial Sales
Cosworth Racing

2000-03

Manager Sales &
Marketing
Pankl Racing

F1 Racing: Tell us a bit about the history of AVL.

Michael Resl: AVL was founded in the 1940s by Hans List and he grew it from nothing to 200 people, working on various engineering projects in the automotive industry based in Graz, Austria. Today the company has grown to become multi-national with 48 affiliates worldwide employing 10,000 people. There are five key areas of the business: simulation, engineering, manufacturing, testing and racing.

F1R: What simulation and engineering work does the company engage in?

MR: While we can analyse airflow around front wings or the thermal behaviour around brake ducts, we specialise in developing simulation code for aspects of the car which are difficult to access. For example, we develop tools for the flame propagation in a combustion chamber or analyse the behaviour of a droplet in the fuel injection system.

From an engineering perspective we focus on propulsion systems and in F1's case that can be anything from the internal combustion engine (ICE), the MGU-H or the battery. We build everything from the chamber to the crankshaft, conrod, piston or crown. We could produce everything to build our own F1 engine – but have no plans to.

F1R: What else do you manufacture?

MR: At our base in Germany we have over 50 CNC (Computer Numerically Controlled) machines that can manufacture anything that goes into an engine, gearbox or suspension – everything apart from carbon parts. So we use titanium, high-strength steel, aluminium, magnesium, even gold. Our machines are capable of turning, milling and grinding, and we work on complex geometries supplying OEMs (Original Equipment Manufacturers) with camshafts, crankshafts, heads and blocks. We do supply some F1 teams with parts, usually when they have multiple development programmes and are at capacity with their own manufacturing.

INTERVIEW
JAMES
ROBERTS

F1R: Can you explain how you work with the F1 teams in research and development?

MR: We create a laboratory that accurately recreates the environmental conditions of the track where an

F1 team wants to test. For example we can put an MGU-H or an ICE in combination with the gearbox or entire car and the temperature and humidity of Bahrain, or immediately switch to conditions more typical of Silverstone. We can also introduce side winds – which might be important to test an airbox. Our advanced dynamic model understands aspects such as tyre degradation, fuel consumption and the interaction between suspension and kerbs.

F1R: How exactly does it work?

MR: We take a full chassis, remove the front and rear wings and attach the wheels to electric motors. Our dynamic vehicle model then steers the control system to accurately simulate a lap of a given circuit. If, for example, that track is Spa, then the wheels spin when they drive over the kerbs on the exit of La Source. The G-Forces and elevation changes of Eau Rouge are also simulated. This is important because spinning wheels might influence the rev limit. The process is to test reliability and improve performance.

F1R: While you can simulate multiple laps around a circuit, one aspect surely missing is the role of the driver?

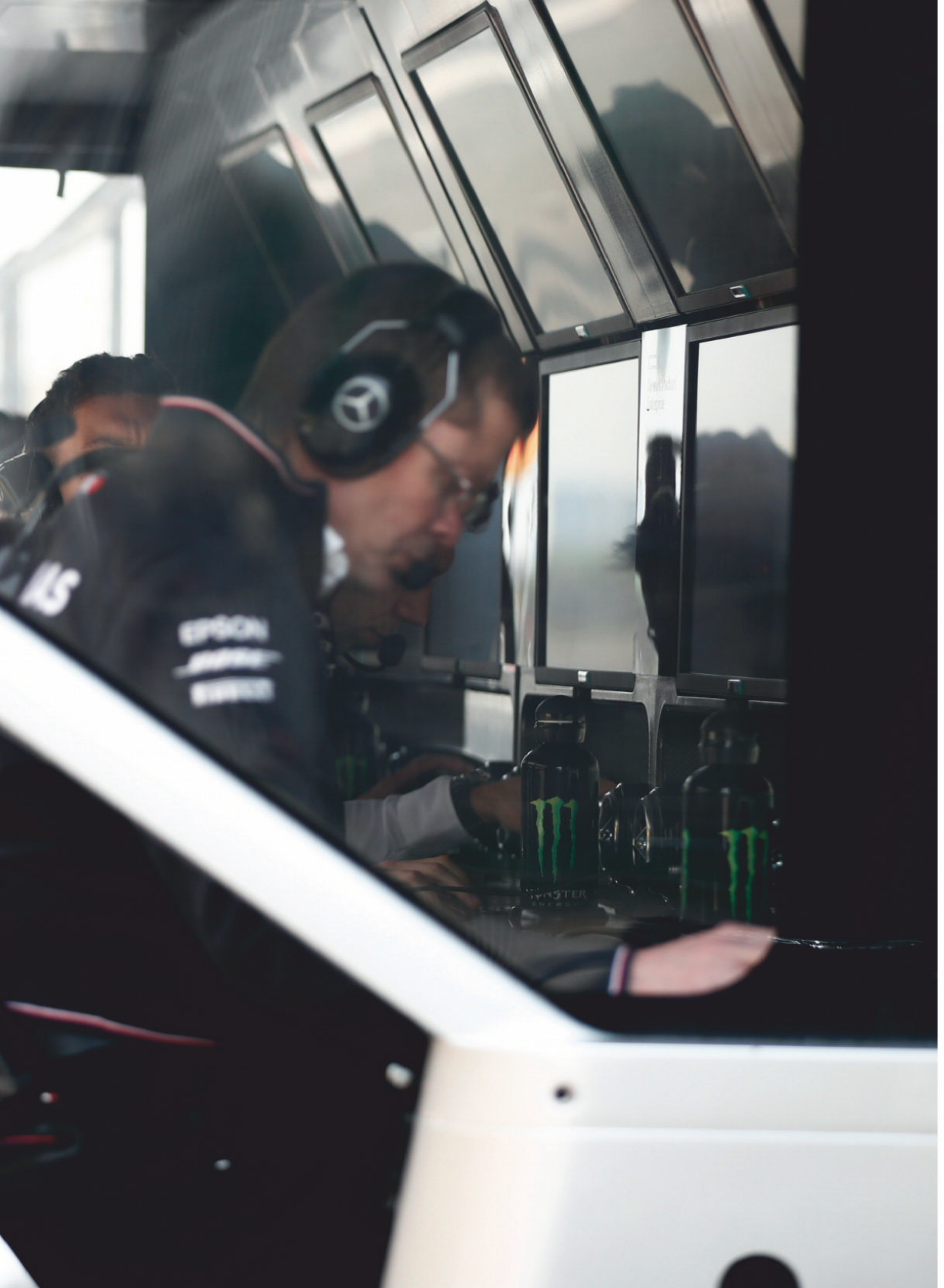
MR: This was the missing link, so a few years ago we connected the two systems. Now we have a driver-in-the-loop simulator on one floor and on the level below is the car which he is controlling. Now he gives the commands to the car, with all his mistakes and imperfections. We even use techniques to replicate the stress levels a driver would experience. Nothing is left to chance, from the levels of shadow on the track to the level of tyre degradation. Teams come to us in full confidentiality. We have a secret location in Austria and F1 cars arrive in an unbranded truck. We spend a lot of money on full confidentiality only for a driver to say on social media that he's on a flight to Graz...



IS TOO MUCH DATA RUINING F1?

Telemetry has been developed over the years to allow F1 drivers and engineers access to thousands of channels of data, covering every aspect of the car. But should its usage be limited to improve the spectacle?







During Friday morning practice for the Chinese Grand Prix, there was an intriguing piece of radio traffic between driver and pitwall. Reigning world champion Lewis Hamilton's Mercedes engineer Peter Bonnington came over the airwaves.

"Suggest a slower entry into Turn 12 for a better exit." Hamilton's response was rather telling: "I don't need coaching, Bono..."

Five years ago, the FIA banned radio communications from engineers advising drivers on how to maximise the tools at their disposal, enforcing the regulation that states: 'The driver must drive the car alone and unaided.'

But after coded messages were used and on account of safety, the regulations were subsequently relaxed. However, there continues a thought that too much data – real-time monitoring of driver and car – is having a detrimental effect on the sport. Would less information bring greater control back to the driver? And could it make Formula 1 a fairer or less predictable competition?

Hamilton's curt reply to his engineer during that practice session in Shanghai was clear. In the pursuit of perfection, computers can't always be an improvement on how the human brain controls the feet and hands. There can be no accounting for the prevailing conditions at that particular corner, on that particular lap.

Was there a tail wind where previously there hadn't been? Was there something on the track surface or was Hamilton momentarily distracted? Or did he feel it rather unnecessary to be offered go-faster feedback given his five world championships and more pole positions earned than any other driver in the history of the sport...

"Lewis is right at his peak at the moment and it's lovely to watch him on track," says former grand prix winner Johnny Herbert. "He can feel and adapt to what's around him and

doesn't need someone telling him on the radio to do this or that, back off, save brakes, change this setting or that. The skill in driving is being able to manage all aspects of the car. That's what all the great champions in the past did. The driver should be the most important aspect of the team."

When Nico Rosberg was team-mate to Hamilton, he would pore through the telemetry, overlapping traces to look for any advantage he could find. With every millimetre of a driver's input from each lap recorded – steering, throttle, braking, gear changes – data can offer clues as to how you can improve your own performance and understand



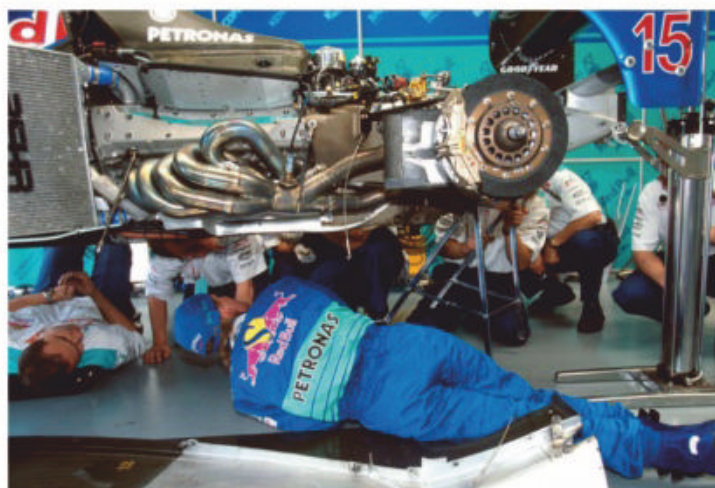
THE SKILL IN DRIVING IS BEING ABLE TO MANAGE ALL ASPECTS OF THE CAR. THE DRIVER SHOULD BE THE MOST IMPORTANT ASPECT OF THE TEAM

where a team-mate is quicker.

"I don't really look over tonnes of data," counters Williams rookie George Russell. "I have the opinion that every time I'm on track, the circuit conditions are different. Different wind speeds, different temperatures, different tyres – so you have to adapt in the moment. Perhaps if I was losing 0.15secs in one corner I would have a look at what my team-mate was doing to compare, but you can't put a car on the track two sessions in a row and expect it to be exactly the same because so many other factors can affect the balance."

The art of engineering a driver is to ensure both elements are in harmony. A good race engineer will analyse the data but will also listen carefully to feedback from the man in the cockpit, and then make an informed decision on which direction to take the car.

"If an engineer doesn't have a good understanding of his driver or fails to listen to his comments and just looks at the data, then he can easily go in the wrong direction," says Haas's chief race engineer Ayao Komatsu. "For example



Today's data collection and interrogation is so different from the days when paper, single screens and visual inspections were the only ways to analyse performance

a driver might say he has understeer in a particular corner, but if the data doesn't back that up it might be because a driver has countered it by lifting and applied more steering lock. The engineer needs to be aware the driver could go quicker in that corner if they dial understeer out of the car. It's where experience comes in

and it's important to have that human relationship. By combining the data with listening to the driver, an engineer should come to an optimum configuration."

Whereas data can be useful for driving, it is in engineering where it really comes to the fore, particularly with regards to extracting the maximum from every ▶

aspect of the car's performance – such as ride height settings, tyre management and power unit energy deployment.

But is there too much data in the sport? In Formula 1 terms, data acquisition is rising significantly. Long gone are the days when drivers were handed a scrap of paper with the air pressures of each tyre scrawled in pen.

However, the proliferation of information in F1 is only proportional to the technological revolution currently manifesting itself in society. According to American business magazine *Forbes* 90% of all the data in the world was produced in only the past *two* years.

Formula 1, like many other industries such as stock markets and sales organisations, is engaged in the science of data analytics. Decision-making through data mining and algorithms is commonplace – and impossible to avoid.

Figures from 2014 revealed that each lap an F1 car would generate around 20MB of real-time data, supplemented by 80GB of data that came from downloading the on-board data loggers. That has only increased in the intervening years.

Aside from a driver's inputs, there is virtually nothing that can't be measured on an F1 car, from the working functions of the power unit to the hydraulics systems. Typically, there are around 150 transducers on the chassis which convert temperatures or pressures into electrical signals that can be transmitted in real time or stored digitally. These sensors provide over 1,000 channels of information, ranging from simple things such as tyre or fluid temperatures, suspension movements and fuel flow, to more complex devices such as the servo valve which can control clutch, gearbox and differential in response to computer-controlled algorithms.

This wealth of data coming straight off the car is both analysed at trackside and by a team of engineers based

at the team's factory. Data-crunching engineers use the information for two main reasons, the first is to ensure the car is safe and reliable, while the other is to extract extra performance and efficiency.

The wealth of data in F1 is a situation that Mercedes boss Toto Wolff believes should be marvelled at, as he told *F1 Racing*: "As much as F1 is a gladiator sport and the fastest man in the fastest machine, it is also flying a spaceship, and very much the DNA of F1 is the high-tech aspect. People like that and the sport needs to stay high-tech."

On a typical Friday following the two 90-minute practice sessions, teams will spend hours poring over data to help determine the strategy for the rest of the weekend. In circumstances where Friday running has been limited or rained off, it has often led to more exciting races on Sunday as teams have had to react to circumstances – such as

a higher than expected rate of tyre degradation – rather than working to a prescribed strategy based on collected data.

"You need a bit of that unpredictability to come into play," argues Herbert. "If all the teams analyse Friday's data and they adjust their strategy so they are all right – then it will make the race as dull as mud. Yes the technology may be great, but the show is the most important thing."

In contrast, Haas engineer Komatsu argues

THE BETTER-RESOURCED TEAMS WILL ARGUE DATA HAS A PARAMOUNT IMPORTANCE IN THE SPORT, BUT THEY HAVE MORE ENGINEERS TO ANALYSE THE TELEMETRY AND ARE MORE INFORMED TO MAKE DECISIONS

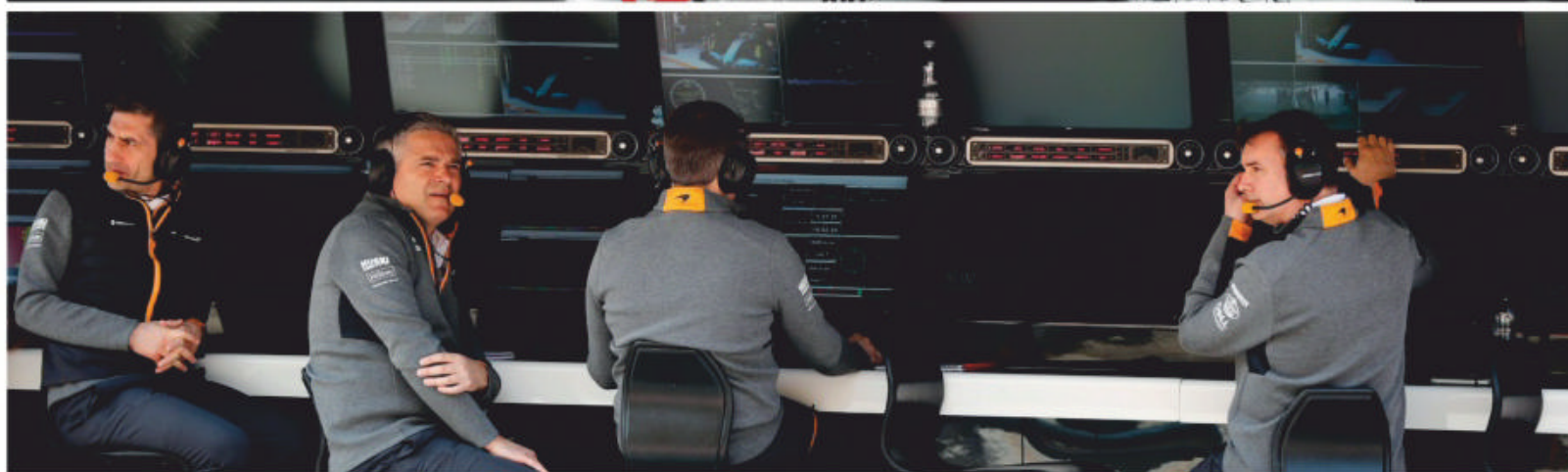
that losing track time benefits the better-resourced teams as the gap to the smaller outfits increases.

"After five hours of practice and qualifying, the difference between the top and bottom teams will be two seconds. But if you only have half an hour before qualifying then the difference between the top and bottom will be massive," he says. "Those with more process and more sophisticated understanding and more simulation tools will advance more."

The better-resourced teams such as Mercedes, Ferrari and Red Bull will argue data has a paramount importance in the sport, but they have more engineers to analyse the telemetry and are more informed to make decisions. After each session, top teams also utilise their simulator driver who will take real-world data and use it virtually by running laps back at base, trying various set ups to then feed back to the team

Data can be used to ensure safety and reliability as well as performance





Data is a tool that both drivers and engineers can analyse, together or separately

trackside. Should Formula 1 look at reducing simulation to help level the playing field?

“I think you’d have to ban all the simulations that teams do ahead of the weekend as well,” argues Kevin Magnussen. “Otherwise it leaves a big advantage to the top teams. If the smaller outfits don’t get the chance to run on Friday and Saturday and get the chance to analyse the data, they don’t get the chance to improve over the weekend and catch up.”

The complexity of the hybrid power units has meant modern F1 cars would struggle to run without detailed monitoring of their electrical systems – and, crucially, manufacturers would argue that pioneering F1 technology must continue to lead the automotive industry.

“You cannot return to the 1970s or 80s because the technology of the world has moved forwards and F1 must continue to be at the top,” agrees Robert Kubica. “When I first raced in F1 in 2006 there was less data than there is now, but honestly I don’t think having less data today will change things a lot. The power unit is more complex and if simulation and data disappeared it would get more

complicated for the driver. But I still don’t think it would change much. The point is you can’t have a road car that has more sensors than an F1 car...”

The desire to introduce more technology into F1 was born out of a drive for performance and to increase understanding. The natural extension of that has been greater complexity. While there might be a desire to return to simpler times, it would be impossible – as Kubica says – to rewind the clocks.

While extraneous personnel away from the race track could be stripped back to save costs, data acquisition during a grand prix weekend will ultimately continue. While Lewis Hamilton doesn’t need coaching, a good engineer still needs as much data as they can gather – and a driver’s input.

Data is an intrinsic aspect of modern Formula 1 and while there might be negative connotations from its usage, there is no escaping its critical role in the sport. Ultimately the show might suffer as a result, but to keep F1 at the pinnacle of motorsport and relevant to the automotive industry, data analytics is here to stay. 🏎️

F1 FLIES FIRST CLASS?

Technology developed in Formula 1 is feeding into everything from premium aircraft seats to supermarket chiller cabinets.

Strap in for a visit to Williams Advanced Engineering...



WORDS STUART COOLING
PICTURES WILLIAMS
ADVANCED ENGINEERING



**WAE IS
PHYSICALLY
REMOVED FROM
THE F1 EFFORT –
IT HAS ITS OWN
FACILITY ON THE
OTHER SIDE OF
THE CONFERENCE
CENTRE FROM THE
F1 FACTORY**

You might be waiting a little while longer if you generally turn right when getting on a plane, but if you're privileged enough to fly in the premium classes you might soon find yourself settling into the calming embrace of a seat made from innovative Formula 1-derived materials. In fact, elements of your seat may even have once *been* part of an F1 car...

Williams might be going through a challenging period on track, but it remains a design and technology powerhouse and its Advanced Engineering division is growing rapidly – it took on 30% more staff last year alone. A prototype premium-class aircraft seat created by WAE in partnership with aviation specialist JPA Design sits in the factory foyer alongside a mouthwateringly exclusive Singer Porsche 911, one of the reimagined and restored 964-generation Porkers now graced with a WAE-upgraded air-cooled engine producing around 500bhp. There's also a 'Babypod', a secure emergency transport device for new-born babies, which can resist impacts up to 20 times the force of gravity. And these are just a few cherry-picked examples of WAE's recent activities.

"Williams has always done other projects besides Formula 1," says Paul McNamara, technical director of WAE, "whether that's BTCC cars [the Williams-engineered Renault Laguna won the title twice in the 1990s], the Rover 6R4, or the BMW Le Mans prototype. WAE was set up to provide management clarity so there were no distractions for the F1 engineers."

Besides being a separate entity on paper, Williams Advanced Engineering is physically removed from the F1 effort – it has its own facility on the other side of the conference centre from the F1 factory in Grove, Oxfordshire. Close enough to use resources such as the windtunnels, but not close enough to dilute the on-track efforts.

"There's a lot of facilities and capability here that isn't fully utilised for F1," says McNamara. "That's windtunnels, the simulator, the CFD cluster and software, the manufacturing facility that makes prototype parts and composites. They're high capital expenditure, and geared towards sporting advantage rather than utilisation, so we can fill in that time with an obvious commercial benefit.

"Secondly, in being here we can collaborate and bring an offering to potential and current team sponsors, so the partnership is deeper than branding, marketing and hospitality. One of the best examples of that is our partnership with Unilever, a longtime sponsor. We have joint workshops with them that generate projects such as one where we looked at soap-drying towers – you put a 'slurry' in the top and it comes out as soap powder at the bottom, quite an energy-intensive process. We were able to analyse that using CFD and make recommendations that knocked out a lot of energy usage."

Until the late 2000s any F1 team's windtunnel (many even had two) would have been running 24/7, as would

its CFD cluster – and, in the era of unlimited testing, manufacturing would likely have been running at full chat too. Regulations introduced to cut costs have slashed test programmes as well as the utilisation of windtunnels and CFD clusters, leaving spare capacity. Williams isn't the only F1 team to have established a revenue stream from its expertise and facilities – McLaren has its Applied Technologies division – but one of the key differences is that WAE maintains a greater emphasis on practical engineering. In the coming months, it will be undertaking the restoration work on further Porsche 911s on-site for Singer clients – although the word 'restoration' scarcely does justice to the scope of the endeavour.

Evo magazine once said of the Singer 911, "The panel gaps are tighter than Tom Daley's Speedos," a Clarksonsque piece of hyperbole that nevertheless rings true when you regard the build quality up close. As breathed on by Williams as part of a 'Dynamics and Lightweighting Study', first performed at the behest of a Singer client and shown off at the Goodwood Festival of Speed last year, the renovated 911 has new aerodynamics, a new interior, new suspension, a completely re-engineered multivalve engine, and is 270kg lighter than when it originally left the factory. Essentially what the high-net-worth customer (the sticker price is \$1.8million) of a 'Porsche 911 Reimagined by Singer, Dynamics and Lightweighting Study' gets is the looks and charm of a classic air-cooled 911 with modern comforts and contemporary dynamics. Part of the brief was for the driving experience to retain the 'analogue' feel of the original while purging its vices, such as its tendency to depart the road tail-first when grunt overwhelms grip.

"You'll see we do a lot of big automotive projects because that's obviously the most adjacent technology to F1 – people get that very quickly," says McNamara. "But then



there's a lot of smaller projects such as the Babypod and the Aerofoil that take innovative uses of F1 technology and put them into a consumer context. That's helpful not just for the image and reputation of Williams but also for F1 in general, because it shows very clearly the trickle-down nature of the technology.

“And that, of course, has driven our engagement with Formula E [Williams supplied the batteries for the first four years of the series] and our technical partnership with Jaguar [both engineering support and operational assistance to the Formula E team] because we see the trickle-down of electric ▶



▶ The stunning Singer Porsche 911 is just one of a number of automotive products WAE has worked on

Built alongside the F1 cars, the Babypod actually came about through Williams' involvement in Formula E



A simple clip-on device, the Aerofoil encourages cold air to stay in the chiller



turbulent and tumbled away through the corridor,” says McNamara. “By putting these devices in you encourage the laminar flow all the way down. The aerodynamics of it was one challenge, the other was implementing it in a way that was cost-effective and retrofittable. Ideally you don’t want to have to do any drilling, because that creates swarf, so we created a clip-on solution.”

Production and marketing is handled by an intermediary company and Aerofoils are now in most branches of Sainsbury’s. Asda and Marks & Spencer have announced imminent roll-outs. Industry-standard tests have revealed a 30% improvement in efficiency, although that is in controlled conditions and real-world results can vary.

In his column this month (p26), our technical expert Pat Symonds waxed lyrical about the many varieties of carbon-fibre construction. WAE has developed two patent-pending composite technologies which can be applied to anything from car suspension components to aircraft seats, and address many long-standing composite issues such as cost and sustainability. ‘Racetrak’ and ‘223’ have very different functions – one is suitable for high-strength structures such as suspension wishbones, the other is foldable - but they both feature a high quantity of recycled material and the build processes can be automated. That business-class



Made, in part, from recycled carbon fibre, this business-class seat is based on a design already used on Singapore Airlines

technology from race series into the road as being an important driver for the industry in terms of ideas and innovations.”

The Babypod project actually came about through Williams’ Formula E involvement. The company that built the original concept, Advanced Healthcare Technology, was providing medical backup for the championship and that furnished the initial introduction between the two parties.

“They had a first version of it [the Babypod] in production via a subcontractor and wanted to improve the design – take it from a nominal 10g crash to 20g – and they wanted to make it lighter and more ergonomic,” says McNamara. “They also had a production constraint in terms of the numbers they could make through the year. So, we redesigned it and put it into production at a volume of up to 500 units per year – it’s made alongside the F1 cars and then comes over here to WAE to be finished.”

Another element of F1 technology you’ll find in a place you wouldn’t expect is the Aerofoil, a CFD-optimised wing device that clips on to the front of shelves in supermarket chiller cabinets. Most retailers use open-fronted fridges to maximise customer access because doors break easily, and shoppers can’t be relied upon to shut them properly. Encouraging the cold air to stay in the chiller rather than spilling out has obvious benefits for cost and the environment.

“The early CFD runs we did on existing fridges, you could see from about a third of the way down the airflow became


SO FAR, BECAUSE WE’VE BEEN WORKING ON LOW VOLUMES, WE’VE BEEN RECYCLING [CARBON FIBRE] BITS FROM OVER THE ROAD. OLD FORMULA 1 CAR PARTS, ESSENTIALLY

aircraft seat, for instance, is based on two thin ‘shells’ sandwiching a layer of recycled carbon fibre.

“It’s a pressed carbon composite where you robotically lay up a single-filament winding on one side, fill with recycled carbon fibre, then lay up another single-filament winding on the other,” says McNamara. “Then you put it in a press for something like 30 seconds. It’s the speed of the process compared with the traditional manufacturing methods that really brings costs down. So far, because we’ve been working on low

volumes, we’ve been recycling [carbon fibre] bits from over the road. Old Formula 1 car parts, essentially.”

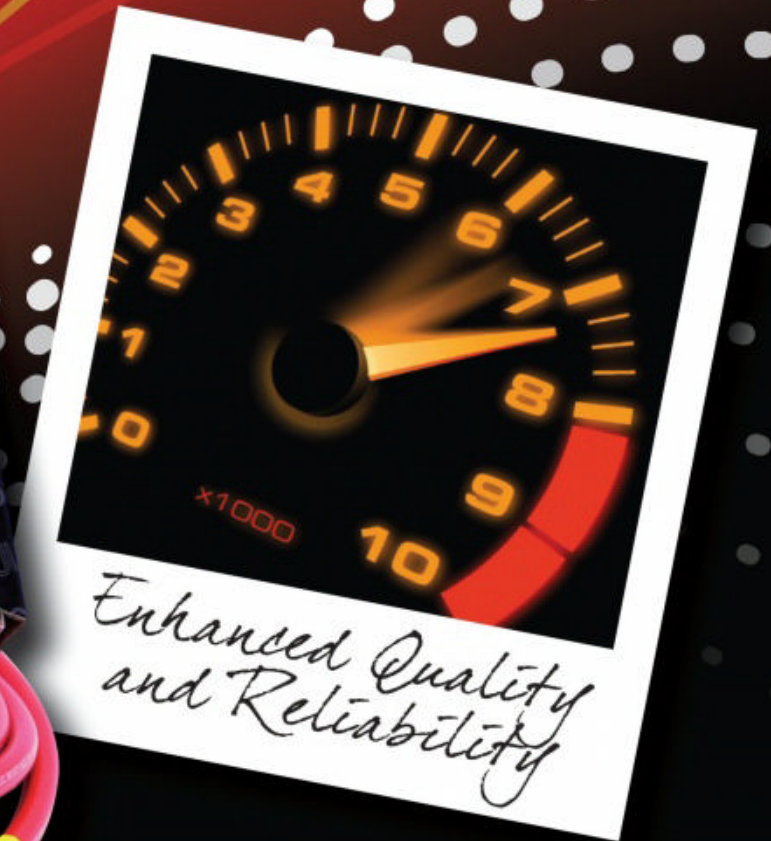
The ongoing benefits to having a light, strong seat chassis is that the unit itself can be more compact, enabling the aircraft to accommodate more seats or creating more space for passengers and hand luggage. Reducing weight lowers fuel costs, too. Singapore Airlines already uses the JPA Design seats the new prototype is based on.

Next time you fly to the Singapore Grand Prix, you might be perched on a piece of F1 history... 

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INSPIRED BY RACING, WORN BY RACERS

The latest luxury fashion brand, **8Js**, has been created by Alain Prost's son Sacha and incorporates classic racing themes within its new menswear clothing range

The logo for the brand 8Js, featuring the number '8' and the letters 'Js' in a stylized, serif font, enclosed within a white circle. The background of the entire page is a photograph of a yellow vintage race car, with the car's body and wheels visible. The car has a black and white racing livery with the name 'Sacha' written in a large, stylized font on the side.

8Js

A new luxury fashion label inspired by the fast-paced world of motor racing pays homage to the great names of the sport. The menswear brand, 8Js is both effortlessly chic and sporty, exuding a cool-yet-refined attitude.

Created by Sacha Prost, son of four-time world champion Alain Prost and his sister-in-law Delphine Prost, the clothing range 8Js encompasses both the authenticity and essence of racing. Sacha's roots, growing up visiting the world's most legendary circuits has helped him create a clothing

range, which is an ideal choice for racing aficionados.

The name for the brand, 8Js, has been inspired by eight heroes of motorsport who competed in the sport's most daring and glamorous time: the 1960s and 1970s. Those eight drivers are Jackie Stewart, James Hunt, Jack Brabham, Jochen Rindt, Jim Clark, Jo Siffert, John Surtees and Jacky Ickx – who in turn raced with charisma and style in F1's golden era.

“Racing isn't only about fast mechanics, it's a state of mind. A constant and delicate balance of danger. Passion and glamour

both on and off the racetrack,” says founder Sacha Prost.

The 8Js fashion line is committed to the highest quality standards with manufacturing in Italy and Portugal. Noble, traditional fabrics are combined with modern materials to create comfortable, practical and durable items. The clothing range's urban look has been inspired by the race track to create garments that are both functional and trendsetting. 8Js is the luxury menswear collection for those of us who love racing and love driving...



FOUR OF THE BEST

THE ORIGINAL RACING SNEAKER

The Original Racing Sneakers® are the brand's most iconic item. Entirely made in Italy, the Racing Sneakers® are directly influenced from Formula 1 racing apparel. The ankle strap and heel cut are small details that define the 8Js Racing Sneakers® offering the gentleman driver the perfect shoe for a stylish ride. Combining a sporty flair with a chic look, the Racing Sneakers® deliver a unique look and feel.

THE RACING CHINOS

The 8Js chinos feature cuffed bottom ends to encompass the characteristics of racing overalls. Made from quality sketch cotton, the trousers are built to feel more comfortable while seated behind the wheel – allowing you to focus more on the driving.

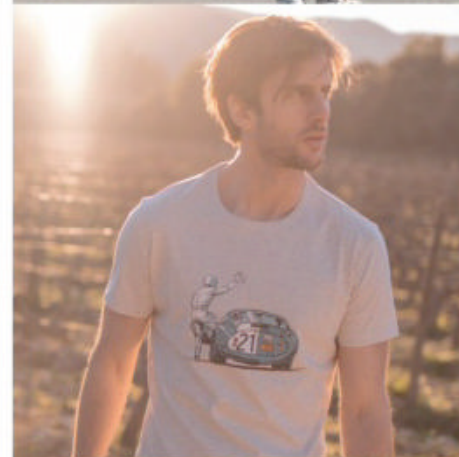
VINTAGE IMAGERY

Dedicated lines of t-shirts and scarves feature some of the most iconic images from a classic age of motor racing. Whether they show legendary drivers, tracks or the quintessential grid girls, they are all carefully handpicked photographs from the golden era of Formula 1. The emblematic scenes have been reworked by graphic designers to create truly stunning visuals.

THE RACING STRIPE

The racing stripe is the most symbolic design of the 8Js collection. The racing stripe has descended from the iconic livery of Jim Clark's 1960s Lotus which was mirrored in latter years by drivers' overalls from the 1970s. The sleek red stripe on an off-white base subtly recalls the track while creating a highly distinct and emblematic look across the 8Js clothing range.

For info visit 8-js.com





FERRARI, F1 NEEDS

YOU!

What the 2019 Formula 1 season so far has taught us is that even when Ferrari has a quick car, it's still eminently capable of flunking grand prix wins. Mattia Binotto, the new man in charge, has been very effective in transforming the technical department - but F1's most evocative and emotional team still has a mountain to climb...

PICTURES



motorsport
IMAGES

WORDS SCOTT MITCHELL

WE

are always told from a young age not to make judgements on appearance alone. However...

Take a quick look at Ferrari's new man in charge, and spend just a few moments in his company, and the extent of the change at the top of the famous Formula 1 team snaps into focus. The scowl has given way to a smile. The slicked-back hair replaced by a curly mess. Quiet self-deprecation reigns where condescension once held sway.

The good news for Ferrari, its legion of fans and Formula 1 is that Mattia Binotto's ascension to the team principal role in place of Maurizio Arrivabene represents more than just the latest rotation of the revolving door. There is substance beneath the positive change on the surface.

This change has been sorely needed. For the past two seasons the brains at Maranello have produced a car capable of beating Mercedes, yet the silver cars remain the undefeated champions of the V6 turbo-hybrid era. Lewis Hamilton's charge to five world titles has been an undeniably brilliant sporting achievement, but five consecutive Mercedes title doubles is not a particularly sexy sell for F1. Ferrari desperately needs to end its title drought. Formula 1 probably needs it just as much.

Prior to Mercedes' domination, F1 suffered at the hands of the all-conquering Red Bull-Sebastian Vettel partnership. While Red Bull's prowess at designing a top-drawer chassis remains sharp, it is rebuilding with its new engine partner Honda after finally giving up on Renault. As McLaren has slumped deep into midfield, and is without a win since the 2012 season finale, that leaves Ferrari as the only credible challenger to Mercedes.

Perhaps it's wrong to assume, but one cannot help but think F1 chiefs Chase Carey, Ross Brawn and Sean Bratches were quite pleased with the news that broke in early January this year. Ferrari's decision to swap out the man at the top, prompted by the ugly and unedifying spectacle of the team self-destructing in the second half of the 2018 season, may prove to be the catalyst for the fully fledged title assault Ferrari could not quite muster under Arrivabene.

Was the change necessary? Unquestionably. Plucked from Ferrari title sponsor Philip Morris International, Arrivabene was not universally loved in the F1 paddock. One could argue he enjoyed a relatively successful stint in charge. Ferrari returned to being a regular race winner on his watch, after all. But winning a championship presents a different and more demanding order of complexity, especially against opposition as well-drilled as Mercedes.

It was here, as the pressure built, that the shortcomings of Ferrari's management paraded

Binotto knows that ultimately he will be judged on whether or not Ferrari is able to break the stranglehold that Mercedes currently has on F1



themselves for the world to see. Too often the team's strategy amounted to little more than: load gun, point at foot, pull trigger.

In 2018 alone one could point to several examples. Without the needless dithering around implementing team orders in Germany, Sebastian Vettel wouldn't have seen his advantage needlessly eroded and might not have slithered off the road in tough conditions later on. In Italy, had Ferrari been tougher on Kimi Räikkönen, its two drivers would never have fought so hard into the first two chicanes – Vettel would never have plummeted to the back and Lewis Hamilton might not have stolen a victory at a race where Ferrari had locked out the front row. In Japan, Ferrari's frankly stupid decision to send its drivers out on intermediate tyres on ▶

CV

Name

Mattia Binotto

Born

November 3, 1969 (Lausanne, Switzerland)

Education

Mechanical Engineering degree from Lausanne Polytechnic, Master in Motor Vehicle Engineering from Modena University

1995

Joins Ferrari as test engine engineer on the test team

1997-2003

Race engine engineer

2007-2008

Chief engineer, race and assembly

2009-2013

Head of engine and KERS operations

2013-2016

Chief operating officer, power unit

2016-2018

Chief technical officer

2019

Team principal Scuderia Ferrari



Thoughtful and methodical, Binotto is working to get the best out of Sebastian Vettel and new boy Charles Leclerc

a dry track, trying to pre-empt the weather and taking a risk that wasn't needed, smacked of desperation and put Vettel on the back foot.

Ferrari has turned to one of its own to fix such ills, and Binotto has swiftly eliminated the air of misery that seemed to dog the team as last year's title bid turned to rubble. With a fresh approach to internal and external communication and a deep personal connection with the F1 team, he has been the perfect antidote to the miasma of negativity – and often outright hostility – that prevailed under his predecessor.

“For several years we've been working all together, trying to improve step by step, season by season,” said Binotto at the beginning of the year. “The philosophy for next season certainly is try to enjoy. That's something that we were maybe missing in the past. Certainly, we are enjoying winning but I think you can simply enjoy it by trying to be team-mates, something which we are trying to consolidate.”

Binotto has risen through the ranks at Ferrari, where he has worked for almost a quarter of a century. His progress has been methodical. He started out in the test team in 1995, before moving to the race team two years later. By 2007 he was chief engineer of race and assembly, then the engine and KERS head in 2009.

Ferrari had already misjudged the new-for-2014 engine rules by the time Binotto was made deputy director of engine and electronics in late 2013, but he played a key role in the recovery from the awful 2014 season. Team principal Stefano Domenicali had left. Engine chief Luca Marmorini had left. President Luca di Montezemolo was being ushered towards the door. Binotto stayed, moved into the chief operating officer role on the engine side, and played a vital role in Ferrari turning around its pitiful engine programme.

It won races in 2015, and as the team's performance slumped in 2016, another blow: technical director James Allison left. Binotto was the man management turned to again. This time he was made chief technical officer, and the result was the production of a car and engine package that – in 2017 and 2018 – gave Mercedes its sternest fights of the V6 hybrid era.

That Binotto established himself as the go-to guy for the late Sergio Marchionne means it was little surprise that he emerged as the most likely successor to Arrivabene. He is a studious problem-solver rather than a table-thumper. Marchionne tasked him with reshaping the technical department to unleash more creativity,



“I’M LUCKY TO HAVE A GREAT TEAM AND MY ROLE IS SIMPLY TO PUT EVERYBODY IN THE BEST POSITION TO DELIVER”

and he delivered that by encouraging and empowering individuals – a massive change in an organisation previously ruled by fear, and where ideas were stifled for fear of the blame that might attach to failures. Assuming the team principal role in January would usually mean the new man in charge would need time to start to make a meaningful impact, but because Binotto is a promotion from within, and a person whose approach has already proved successful, he is pushing against the proverbial open door.

Binotto is a happy, friendly character who exudes a genuine, positive vibe. The intelligence of the man is exemplified by his assistance in designing the layout of the building that houses *Gestione Sportiva*, Ferrari’s racing division, as well as his technical input into turning Ferrari

into a regular race winner.

There is substance behind the smile, as well as steel. He has made it very clear that he is willing to take tough decisions previous Ferrari bosses have dithered over, including the early declaration that while Sebastian Vettel and Charles Leclerc are free to race, Vettel is the initial focal point for the championship. That message is logical and zero-bullshit, exactly the sort of thing Ferrari needs at the top.

These are key factors that have held Ferrari back from taking the final step to becoming title winners again. While Arrivabene spoke of Ferrari’s ‘fear of winning’, he never explained how he would fix that. Binotto is finally doing what the team always needed: changing the inputs to get a different output.

Binotto wants his team to push hard with developments, to not be afraid to trial something risky or different. That has been hard for Ferrari to fully embrace because there is a long-standing culture of fear and blame. Push too far and make a mistake, and you get punished. Being conservative eliminates that risk, and the dread, and makes life easier – but less successful.

“I’m lucky to have a great team and my role is simply to put everybody in the best position to deliver,” says Binotto. “I’m taking care that each single person has got the right situation, can deliver well, and that’s what I need to do. Delivering well means to be in the right atmosphere, clarity of roles. That’s the best way to approach this. Will that be important during the season? Let’s wait and see. I’m sure that if you are working properly, you achieve your best.”

Another, vital element will be getting the most out of Vettel, who clearly struggled under Arrivabene. Top-tier athletes are human. Being paid astronomical sums does not eliminate the emotional factor from their performances. The indications are Vettel is a more centred individual in this new Ferrari era.

Cast your mind back to day one of pre-season testing, and the shockingly positive vibes that Vettel was throwing out at every possible angle. Either he was orchestrating an outrageous bluff or Ferrari’s new broom had swept any lingering negativity out of the corridors of Maranello.

Vettel is one of the most emotional F1 drivers on the grid, so it’s not hard to tell when he’s happy. He was as buzzing as you’re ever likely to see a top-line driver on day one of testing. And when Ferrari faltered in Australia, with a car that finished off the podium and almost a minute behind the dominant Mercedes of Valtteri

Bottas, Vettel was still smiling. Frustrated, but positive. He talked about knowing this was not the real potential of the SF90, and of the confidence of a swift fightback.

That narrative has not changed with subsequent setbacks either. Australia was a horrible false start for Ferrari but the upswing was slow to arrive. In fact, Binotto probably could not have imagined experiencing a worse run of races. Melbourne was sobering. Bahrain was heartbreaking. China was disappointing. Azerbaijan was the nadir, thanks to a sickening mix of those three. A return to Spain brought yet more disappointment. Ferrari should have claimed at least three of the first five race wins on offer, while Mercedes managed to rewrite F1 history and secure a quintet of one-two finishes.

Team orders have also dogged the early races as every single Ferrari decision over Vettel and Leclerc has been in the spotlight. Questions over that have provoked testy reactions, but Vettel has retained an unlikely calm in the face of mounting frustration.

“We need stronger pace, simple as that,” Vettel says of catching Mercedes. “We need to be faster. I’m convinced we’re looking very strong but overall not strong enough.”

“It seems that for us it’s more of a conscious effort to get the car in the right window, whereas maybe for them it seems to click a little bit easier. I can feel that I’m not driving at my best because simply the car does not answer or does not respond the way I like. And then I think it’s unnatural.”

“I seem to be more sensitive at the first races than at the test. The test was really good but that’s a long time ago now. We need to look forward and improve the way we handle things, the way we work to just get faster. That’s it.”

Last year, in pressure points like this, Vettel and Ferrari folded. But the team is revitalised from the cultural shift Binotto has triggered. As shown by his phenomenal Red Bull success, Vettel thrives in an environment where he is loved. This is the kind of environment Binotto is trying to foster for the rest of his staff: reduce the pressure, let them flourish.

If Binotto’s new culture can bring the best out of Vettel – and don’t forget, that level is very high – then Ferrari can enjoy the confidence of a driver who will go the distance in the title battle.

“Obviously there have been some changes,” says Vettel. “Of course we will be focused trying to do our job as good as we can. I think there’s a lot of passion inside this team that’s willing to get



out, and expressing ourselves through winning is the best we can do. So, that's the target but there's so many races, such a long way, so many things we're depending on. As much as we can control things, we will try to take them in our hand and get our job done. The atmosphere is good; the spirit is right inside the team."

One key change at the top can have the same effect as dozens underneath. When there's a toxic culture at the head of a company, that will trickle down to everybody below. If ingenuity, creativity, appreciation and risk-taking are encouraged and praised then that will filter through as well.

It's too simplistic to say Ferrari was one kind of place under Arrivabene and has swung rapidly to the other under Binotto. However, it is clearly a team in transition. One could even say there are echoes of the environment Toto Wolff has built at Mercedes, which has won every title

“THE POINTS AND THE RESULTS ARE NOT REFLECTING THE TRUE POTENTIAL OF THE CARS”



going since 2014. Having a leader in Wolff, who facilitates a working environment that blends fierce professionalism with human compassion, has been a crucial part of that success. It's no coincidence that Binotto is now the fourth Ferrari boss Wolff has gone up against during his all-conquering reign...

If one believed everything spoken or written, Wolff could be going up against his fifth different Ferrari adversary soon if Binotto doesn't turn things around. The danger here is that Ferrari might fall into the same trap as it did in 2016, when it followed up its season of progress with a step in the wrong direction.

However, this is a very different situation. Such haste would be rash and mark bad news for Ferrari and F1. Had tiny things gone slightly differently this season, the picture might be more balanced. Leclerc should have won from pole in Bahrain but Ferrari was let down by an unprecedented short circuit within an injection system control unit. Two races later, Leclerc crashed out of qualifying in Baku, where he was clearly the fastest driver, and Vettel wasn't in a position to pick up the pieces.

"No doubt they [Mercedes] are very strong, and certainly they've got a slightly better car," Binotto said after Baku. "But I think that the gap is not so big, and the points and the results are not reflecting the true potential of the cars."

Binotto seems a man of genuine character and integrity and this is something that, if given time and respect, should reward Ferrari. The competition at the front of the F1 grid is tougher than ever, with Mercedes redoubling its efforts to remain on top and Red Bull keen to re-establish itself as a title challenger with Honda, and looking increasingly threatening as the season continues.

That, combined with a poor start, makes Ferrari's task of ending its title drought harder than ever. However, the team and F1 should have faith that Ferrari has a leader who looks like he might be the missing piece of the puzzle.

Ferrari has looked so close to being able to beat Mercedes for two seasons now. The team is at pains to point out that it remains the same personnel-wise as it was before, which means it's just the man in the hot seat who is different. And if the right change at the top is what Ferrari needed to take that final step, it could not have picked a better option than Binotto.

Ferrari and F1 are impatient for a proper title attack from Maranello. But anybody readying themselves to write Binotto's career obituary already would do well to remember that his Ferrari reign was always likely to be defined by how the team responded to challenges, not how it operated at its peak. **F1**

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Charles Leclerc is proving a little too hot for Sebastian Vettel to handle – but can he be as cool as his predecessor, ‘the Iceman’ Kimi Räikkönen?

The sweet smell of steamed pork and shrimp dumplings fills the air. Scooters honk as they speed past, while the doorbell of a convenience store sounds its repetitive ditty *again*. The Bailian Xijiao shopping mall is redolent with everything you would expect in a large Chinese city: flashing neon signs, a Pizza Hut, cosmetics outlets and a small patisserie.

Shanghai sprawls in every direction, but we are not downtown. There are no tourists on the Xianxia Road. There is, however, a group of personnel wearing the unmistakable scarlet overalls and curious ‘Mission Winnow’ iconography of Ferrari. At the centre of them is Maranello’s newest star: Charles Leclerc.

He enters a lift and ascends to the fifth floor. When the doors open, ahead of him lies a small ice rink, a place for the locals to build an appetite before tackling the *dim sum*.

At the centre of the rink is a kart, equipped with studded tyres. A few cones are laid out to denote a course and waiting to compete against Leclerc is Han Tianyu, a Chinese short-track speed-skater who is a renowned world champion and decorated Olympian. The pair have been brought together – in the week ahead of the Chinese Grand Prix – to race in an event organised by Ferrari’s fuel and lubricants supplier Shell. The timed lap is designed to test speed and precision and as Tianyu sharpens his footwear, Leclerc asks for a jacket to keep warm. The ambient temperature in the skating rink is much closer to freezing than the humid conditions outside in the suburban district of Xianxiacuncun.

Before he slides into his kart to take on the challenge, Leclerc muses on his first couple of races for Ferrari. The heartbreak of Bahrain, ▶

where he was on course for his first grand prix victory before an electrical short circuit thwarted his V6 hybrid, still sits heavy on his brow.

The significance of that performance can't be underestimated. After securing his first pole in the Sakhir desert, Leclerc lost out at the start, but within six laps had reclaimed lost positions and had overtaken his established team leader Sebastian Vettel. Leclerc was the moral victor of the day, despite falling to a "lucky" third at the flag. Charles won a new legion of support in

"SINCE CHILDHOOD I'VE ALWAYS BEEN LOOKING UP AT THE RED CARS AND TO BE THERE ALREADY FOR MY SECOND YEAR IN FORMULA 1 IS GREAT"

the wake of his dignified response to his heartbreak.

While we're chatting before the events on race day in Shanghai, that encounter will again emphasise his position within Ferrari – a surprise thorn in Vettel's side. Leclerc's

speed has caused a headache for the Scuderia's management as they wrestle with their pre-season commitment to support Vettel's putative title bid at the expense of the young Monegasque.

"Your team-mate is the first person you want to beat," says Leclerc, "but what's more important is we're working together to make the car work better. There is competition and we want to beat each other, but Sebastian is extremely experienced, he's very talented – he's won four world championships – he's a good benchmark for me. I've learned a lot from him and still have a lot to learn, but the relationship is very good."

Just a handful of races into Leclerc's new life at Ferrari, he is still coming to terms with the historic significance of his graduation from midfield stalwart Sauber to the majesty of Maranello, and adapting to his new surroundings.

"Racing for Ferrari is a dream come true," he says. "Since childhood I've always been looking up at the red cars and to be there already for my second year in Formula 1 is great. It's a big step up from last year and now I'm fighting for podiums most weekend – it's a great challenge."

"As a driver I have grown a lot," he continues when asked about how his move has affected him. "The way Ferrari works is a lot more professional than I've been used to and that has helped me push myself in all the technical areas of the car."

"From the personal side, it has changed a little bit. In Italy people recognise me, because, obviously Ferrari is a big thing – and the same



Leclerc meets his opponent, Han Tianyu, before the speed skater tests out the newly laid ice on the rink in Shanghai



A star is born? Leclerc has made a great start to his Ferrari career and showed that he is also pretty handy in an ice kart...

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After watching the competition closely and a slow sighter lap, Leclerc came out on top in this slightly bizarre challenge



is true of where I live in Monaco – but the most important thing is that we have a quick car. Bahrain was significant to see the real performance of the cars, but we need to keep working. It's not going to be an easy season, but it's a good start and exciting because I can now fight for wins..."

Victory is in his sights now at the New World Ice Rink, on the fifth floor of a Shanghai shopping mall. His opponent has already stood on the podium in Sochi, albeit not in any four-wheeled pursuit, but after scooping a silver medal in the 1500-metre speed-skating competition at the 2014 Winter Olympics.

In position on the ice rink, Han Tianyu begins his three timed laps, cheered on by a group of local enthusiasts. Rounding the cones on



There are a few more Charles Leclerc fans in a suburb of Shanghai now after the Ferrari driver wowed the locals with his skill on the ice

the makeshift circuit, he sets a laptime of 47.5 seconds – the time Leclerc must beat at the wheel of a standard rental kart. Our hosts then report a new sheet of ice was laid on the rink only the night before, so there are few ruts to hinder his progress.

Donning his scarlet red overalls, Leclerc pulls on his helmet and gets comfortable in his kart, wiping dry the soles of his racing boots and looking happy with his right foot hovering

over the throttle. He has just three laps. After a sighter, the Ferrari man is more assured second time around. In a perfect four-wheel drift, he slides around a tight hairpin, his fingertips balancing the steering.

On his final lap, Leclerc's precision and power at the wheel proves too much for the speed-skater and the stopwatch proves his mastery on the ice. He records a 45.1s to go nearly 2.5 seconds quicker. Ice-cool and victorious under pressure.

All smiles, Leclerc shakes his opponent's hand. Dignified in victory as he has been in disappointment. There are interviews with local media and autographs to sign before Leclerc descends in the lift and heads out into the busy Shanghai streets. Although a recognisable face in his homeland and in Italy, here he walks past the sizzling woks and parked-up scooters, and no one gives him a second glance – despite the bright red cap and overalls. This time, it's the speed skater who has more trouble escaping quietly... 🇮🇹

“IN ITALY PEOPLE RECOGNISE ME, BECAUSE, OBVIOUSLY FERRARI IS A BIG THING – BUT THE MOST IMPORTANT THING IS THAT WE HAVE A QUICK CAR”



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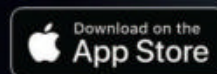
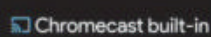
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SHOOTING FOR F1'S ULTIMATE

GOAL

You probably know he's a FIFA fiend on PlayStation, but would it surprise you to learn that Max Verstappen has a left foot like a traction engine? *F1 Racing* joined him for a (polite) kickabout

WORDS
JACK BENYON
PICTURES
STEVE ORINO

It's tough being a PSV Eindhoven fan. Having won last year's *Eredivisie* – the highest division of Dutch football – while still being in with a chance of taking this season's title, the team has waned in comparison with the Amsterdam-based Ajax squad, which has a youthful group of players that defied the odds and took on the best Europe has to offer in the Champions League.

You could say Red Bull occupies a similar position to PSV in Formula 1; once utterly dominant, now reduced to bystander status as others – namely Mercedes and Ferrari – battle it out for ultimate honours. PSV does have one leading light in Luuk de Jong, the top goal scorer

in Holland, who is often able to transcend his team-mates and outperform the club he plays for.

Is it too much of a stretch to say Max Verstappen is Red Bull's equivalent of de Jong? Probably not, and the connections don't end there.



Verstappen swaps FIFA on the PlayStation for the real thing with that hammer of a left foot

Just 21 years old but already a veteran (this season he'll rack up his 100th F1 start), Verstappen is a massive PSV fan. He's quickly risen to become the top scorer in his team, so much so that Red Bull is happy for him to lead amid what has been its biggest change in years as it welcomes new engine partner Honda after a turbulent period with Renault.

Max seems handy enough with a ball but when asked to compare himself as an F1 driver to a relevant footballer (if Lewis Hamilton is Cristiano Ronaldo, who would Verstappen be?), the answer is humble: "Compare myself with someone? I would go seventh tier or something like that! Nah, I prefer to leave that to someone else."

We're speaking to Max at Puma's headquarters in Herzogenaurach, near Nuremberg in Germany. A game of football is on the agenda on a five-a-side pitch, and it turns out Verstappen has a left foot like a rocket. The accuracy may not always be bang on, but if the ball's coming, duck...

As a Puma athlete, he's used to dealing with people who excel. The headquarters is split across two buildings with a 100-metre transparent tunnel bridging the Autobahn that passes underneath. On the day of our visit, Usain Bolt is due to run across it as part of a marketing stunt that also features the models Adriana Lima and Cara Delevingne, ▶

“Having this new engine partner in the team just gave a bit of a fresh start in a way and everyone is really looking forward to the challenge..”

but his whereabouts are presently unknown. He appears to have gone shopping instead.

The tunnel acts as a timeline of the brand's history. The story goes that brothers Rudolf and Adolf Dassler founded the Dassler Brothers Shoe Factory in 1928, but later in life they fell out and Rudolf set up Puma just down the road at the same time as 'Adi' founded Adidas. The two companies remain separated by a matter of miles and an ongoing rivalry.

As you walk through the tunnel – a horizontal version of the glass lift in *Charlie and the Chocolate Factory*, if you will – the names speak to you and evoke epic memories of sporting greats, of World Cups, gold medals and championships. It begins with Puma's first boots, taking in records from athlete



Tommie Smith, tennis great Boris Becker, Bolt and others, while also featuring boots from Pele, Diego Maradona as well as F1 stars Michael Schumacher, Lewis Hamilton and Sebastian Vettel. It's this parade of legendary sporting names that prompted *F1 Racing* to ask Max about his sporting legacy and place in the racing pantheon.

But Max speaks more passionately about his FIFA Ultimate Team than he does his reputation or legacy. He's content to

“Have you got these in a size 8?”.
Verstappen inspects some of the Puma gear he wears...



PICTURE: STEVEN TEE

live in the here and now. And why not? Having been fired into the sport at the age of 17 with Toro Rosso in 2015, he had no choice but to grow up quickly in professional terms. He was fiery in the cockpit anyway, and the early jump to F1 led to some displays of impatience and silly mistakes – which he wasn't always keen to acknowledge.

What we're seeing now is a more experienced Verstappen, with the ability to shut out the negativity and perform to the highest level, something that's necessary for all great sports people, regardless of the discipline. Almost all of that maturity has been forced onto him, whether through the age he entered F1, heading up big marketing campaigns for the likes of Red Bull and Puma, or taking control and leading the development

direction of what is Red Bull's most important car for years.

Asked what the biggest difference in the team is since the addition of Honda, Verstappen responds with a blend of flippancy and seriousness that demonstrates how comfortable he is with his surroundings: "We have a bit more sushi around. That is very positive. I'm not a fan, but the mechanics, they love it. They have all their lunchboxes prepared very neatly, a Red Bull meal here and the Honda meal there.

"There is a lot of motivation in the team and everybody is really pushing hard," he adds. "I think having this new engine partner in the team just gave a bit of a fresh start in a way and everyone is really looking forward to the challenge.

"I think we feel like there are more opportunities with ▶

“If you have a really good car, a really good engine, maybe you don’t have to force an overtake at a certain point of the track. You can wait a few corners later or on a straight or even later in the race”



PICTURE: DIRK KLYNSMITH

Honda, and at the moment there is a really good vibe. I’m always giving feedback of what can be done better or what I need to go faster so that doesn’t really change.

“As we go through the years I get more experience and that will help. As will talking to the team about how we can improve the car. Of course Daniel [Ricciardo] left and I got Pierre [Gasly] in the team. But from my side I don’t think a lot has changed. In general I think Red Bull always delivered parts to both drivers at the same time. I don’t really see a difference at the moment.”

An unusually loquacious response from Max, who typically approaches questions the way he might attack a fast corner – fearlessly and pedal-to-the-metal. The passionate and

Verstappen’s battling approach on track has resulted in some criticism from his rivals

unwavering way Verstappen both defends and attacks in an F1 car hasn’t changed in his career so far, for all the barbs aimed at him by rivals and pundits. Part of that is down to having to push so hard to extract the maximum out of the package he has; he’s hell-bent on fighting at the front but his car hasn’t quite had the all-round performance to do it, which would account for his continued punchiness.

What’s been most intriguing about the early races of this season is the manner in which the Red Bull-Honda

partnership hasn't met expectations: the engine, far from being the weak point, is demonstrating great potential while the chassis – usually a Red Bull strong point – hasn't been consistent enough for both drivers to get the best out of it.

“The better the package the easier it is because you don't need to go over the limit all the time,” says Max. “If you have a really good car, a really good engine, maybe you don't have to force an overtake at a certain point of the track. You can wait a few corners later or on a straight or even later in the race.

“Sometimes in the past few years, we've been struggling for top speed in general so you had to force a move under braking, and sometimes it would go wrong, and I think at the moment with the package we have we are getting towards having an easier life on track and at the end of the day that can only help your consistency.”

Consistency is arguably one thing this prodigious talent has lacked so far in his Formula 1 career, but having spent all of his time at Red Bull up until this year with Daniel Ricciardo – arguably one of F1's most consistent and best – that's a target providing Verstappen with a lot of pressure, a high benchmark which can make the mistakes look all the worse.

Now free of Ricciardo, Verstappen has more pressure to step up and lead, but less pressure from a team-mate in Pierre Gasly, who has had a turbulent start to his career in the team.

Still only 21, Verstappen is already approaching the total number of starts made by his father, Jos, who made his last and 106th start at the age of 31 for Minardi in 2003. Jos is a massive part of how Max got to where he is today.

While Jos has scaled back his attendance at F1 races, he remains a confidant for Max in this new age of maturity. Max no longer needs to be told to calm down, or to stop making mistakes. He is a man in his own right and what Max gets from Jos is advice, from someone who has experienced all aspects of the sport.

“It was mainly karting, he was a very big help for me,” says Max. “Without him I wouldn't be sitting here right now. In Formula 1 in the first few years he was really involved – in the background – but giving me advice and tips.

“Now it's more like I'm still telling him everything that's happening through the weekend, but he's only there now for 50% of the races. The first few years he was there every race. But I guess that's quite normal, especially when your son is just starting F1, you want it to go really well and with his experience it was always good to have him around. It gave me a lot of confidence as well. It's a very new world as well so to have your father around I think is best.

“Every morning or evening I text him to tell him what we are going to do with the set-up and he gives his opinion. He likes to have the information when he's sitting at home as well, which I can understand. He's my dad but he's a person I can talk to in the background.”

There's no doubt Max is now ready for the challenge of leading his team despite his relatively young age – and Jos has to take a lot of credit for that. The burning question left is how quickly Honda and Red Bull can deliver Verstappen a package with which to fight Mercedes.

“To be honest, I'm still waiting for the real battle against Lewis,” he says, with a wry smile that says it's a big target for



Now in his fifth season in F1, Max is more than ready for a sustained title challenge if Honda can deliver

the future. “Of course I've been driving with Lewis for a few years now but I've never really felt like the whole season I was fighting against him.”

The thought of a Lewis/Max battle in the future is a tantalising prospect for F1 fans. Verstappen probably wouldn't have been ready for a Lewis at the height of his powers at the start of his career. But now calmer and more experienced, Max is more than ready for the challenge – a shot at goal he's not going to blaze over the crossbar... **F1**

HEROES

The latest work by the man behind the *Senna* feature film is a motor racing documentary exploring the lives of heroic drivers. We catch up with writer and director Manish Pandey to find out about his new movie...

WORDS

JAMES ROBERTS

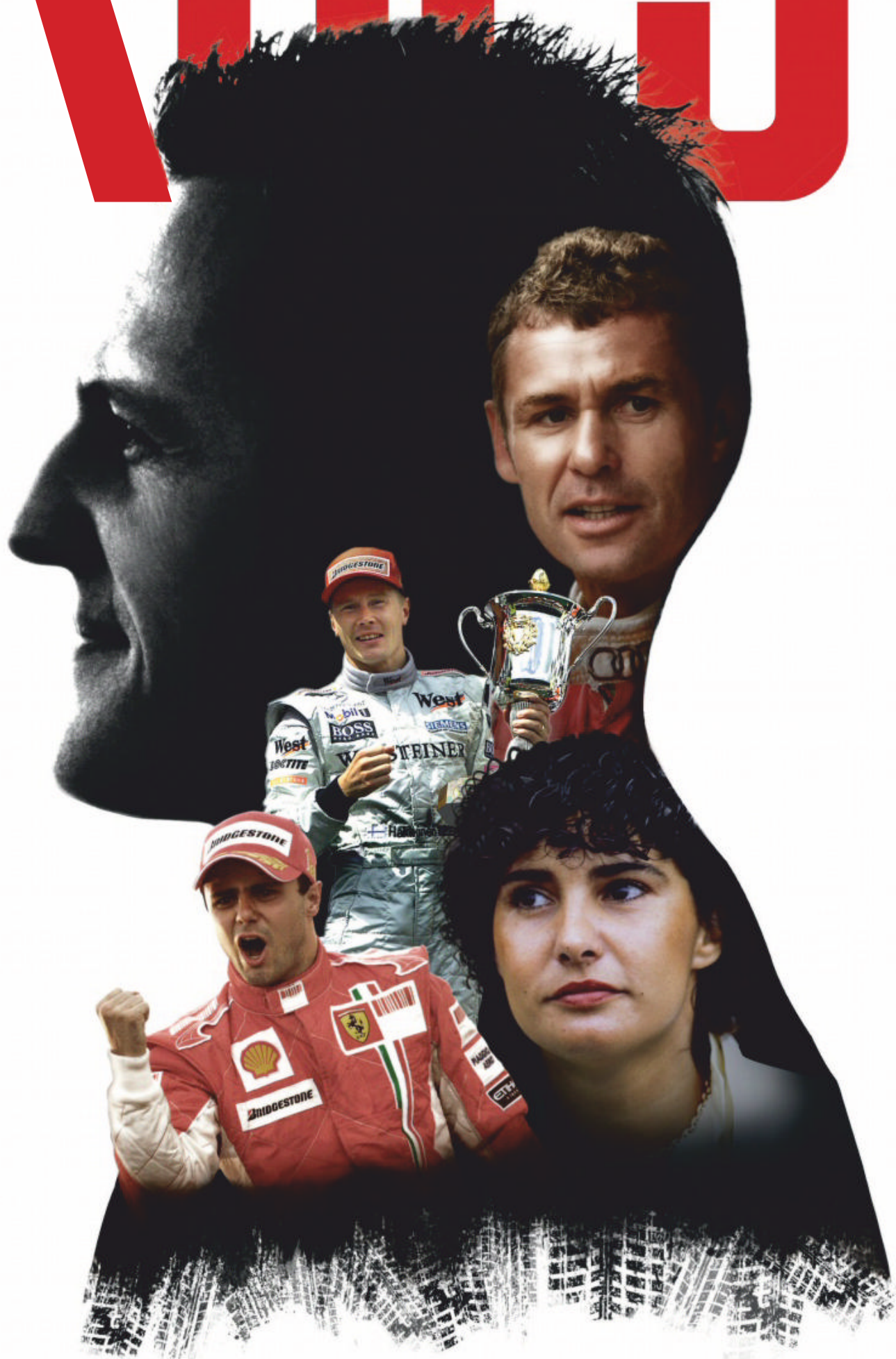
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ACT 1

■ **As he enters a small private cinema** in London's Soho, Manish Pandey suddenly pauses. "This brings back a lot of memories," he says, looking up at the projector light while surrounded by plush velvet seats. This was the screening room where the documentary feature film *Senna* was shown to Ron Dennis and the Senna family ahead of its theatrical release – and where emotions ran high. Returning to this small cinema nearly a decade on, Pandey reveals the rushes of his latest project, *Heroes*, which is a similarly poignant reflection on the lives of legendary racers, interspersed with archive footage.



Manish Pandey has spent the past two years writing and directing *Heroes*

The documentary of Ayrton Senna's life and death achieved critical acclaim and scooped two BAFTA awards for Best Documentary and Best Editing. Pandey was screenwriter and executive producer on *Senna* and, after finishing the behind-the-scenes McLaren series *Grand Prix Driver*, he has spent the past two years both writing and directing his latest big-screen offering.

This new feature-length movie (commissioned by the Motorsport Network) brings together drivers from F1, sportscars and rallying; rather than being interviewed separately, they tell their stories to each other over an evening in an English stately home.

"I wanted to get racers of different ages and disciplines together but in a location that was out of their comfort zone," says Pandey. "When you dig down into these characters, you discover – no matter what their background is – how much they have in common."

A lavish opening sequence has each driver arriving at the wheel of a beautiful car, before they reveal their stories to one another. The four racers on location are two-time Formula 1 world champion Mika Häkkinen, former Ferrari grand prix ace Felipe Massa, nine-time Le Mans winner Tom Kristensen and World Rally Championship runner-up Michèle Mouton.

Though the motor racing disciplines differ, the stories they share across ten chapters in the film are broadly similar: their love of four wheels growing up, their big breaks, successes, failures, personal struggles and life-threatening accidents. Supplementing their narratives is a wealth of archive material – much unseen – either gleaned from their personal collections or from the extensive library held at F1 TV's headquarters.

"Movie-making is very technical and there is always a formula," Pandey says, explaining the details of production. "There are three acts. After a short setup where you're introduced to the characters, suddenly there is a twist. That sets you up for the next journey in the film before the final act, which is where everything changes.

"There are techniques you can deploy. However, documentary film-makers have a responsibility when they tell the story of a living or deceased person because it needs to be the truth."

As each protagonist retells a memory in sequences in which they're having dinner or playing cards together on location, their story is supplemented with archive footage. Pandey explains the style was inspired by the classic Oliver Stone film *JFK*. "That movie was a real feat in editing," he says. "What they do is have someone speaking and quickly flash back with footage for a few seconds.

"An example we use in *Heroes* is when Mika [Häkkinen] is recalling the moment he clashes with Michael Schumacher at the 1990 Macau F3 Grand Prix. He says: 'Michael made a mistake in a fast right-hander' and we cut to a very short clip of him catching a bit of oversteer. Then he says he got a tow, so we show him getting closer and then he talks about jinking to his right – then we show the incident when they make contact. The whole point is we are getting inside Mika's head, seeing his memories as he tells the story. Then we see the reaction from everyone else listening around the table. As we listen to each of our protagonists in turn we see how they have all had very similar lives – and there is a common thread between them all..." ▶

ACT 2

■ **Pandey, 51, came to the UK** from India when he was four years old. He studied at Cambridge and trained as an orthopaedic surgeon, moving to London in 1989. As a child he adored aeroplanes and fell in love with Formula 1, likening drivers to fighter pilots. As a script writer for a couple of romantic comedies for Working Title Films [the company behind UK hits such as *Four Weddings & A Funeral*], a decade ago he was introduced to the producer James Gay-Rees, who was proposing a Senna film about Imola 1994.

Pandey worked on a script for *Senna* which he knew required the blessing of both Bernie Ecclestone and the Senna family if it was to obtain the crucial archive footage to tell the story. Pandey suggested the film follow Senna's rise and successes, before focusing on the final act. The idea was given Bernie's blessing and Pandey was literally given the keys to unlock the F1 archives.

In south London on the Surrey/Kent border is Biggin Hill, a small village with a privately owned airstrip (for one B Ecclestone) and a warehouse where Formula 1's TV operations are based and which contains footage of every grand prix since the early 1980s. Most footage is on tape but is slowly being digitised. Pandey returned to the archive for the first time since *Senna* to unearth new material for *Heroes*.

"Consider a grand prix from the late 1980s and there would be one camera at every corner, so in total about 20 – nowadays there are more like 50," says Pandey. "They would be turned on at the start of the weekend and record everything, every F1 session and support race until Sunday evening. The recording from that one camera is stored in the F1 archive. We're not just talking about every race as it aired live being stored, but three days of 20 cameras. So there are hundreds of tapes of just a single race. And the broadcasters that brought their own crew and cameras to races – so BBC, RAI, RTL, Fuji TV, whoever it may be – would also send in a copy of everything they shot.

"In addition there is on-board footage for each car, the FIA have their own safety cameras, plus whatever might be shot at press conferences or in the paddock at the end of a session –



Pandey at work, putting the finishing touches to *Heroes*





On location in an English stately home with Mouton, Massa, Kristensen and Häkkinen



the wealth of footage is enormous.”

As a result, *Heroes* has unearthed some previously unseen archive from key races such as Jerez 1997 (Häkkinen’s first win), Brazil 2008 (when Massa lost the world championship) and Monza 2006 (when Michael Schumacher’s retirement was announced). Of the 65 minutes of archive in the film, over three quarters of it is from Biggin Hill. “The hardest part,” says Pandey, “is what we’ve had to leave on the cutting room floor...” ▶



After the hard work on set (above) Pandey prepares for *F1 Racing's* private screening (right)

ACT 3

■ Much of the archive footage functions to tell the story of a fifth driver who can't join the others to share it himself. On location there are subtle references to Michael Schumacher, and each of the four protagonists in the film have at some stage in their career raced or worked with the seven-time F1 champion.

Häkkinen's first experience of racing Schumacher was at Macau, before those epic Suzuka showdowns in the late '90s and early 2000s. Massa gets his big break (saying in the film he'd signed an eight-year deal with Ferrari) as Schumacher's team-mate in 2006 and looked up to him as a father figure. After Tom Kristensen beat Häkkinen in the Formula Nordic A-Class karting championship in 1985, he raced alongside Schumacher in a handful of Formula 3 races – before encountering him again in the annual Race of Champions, an event organised and run by... Michèle Mouton.

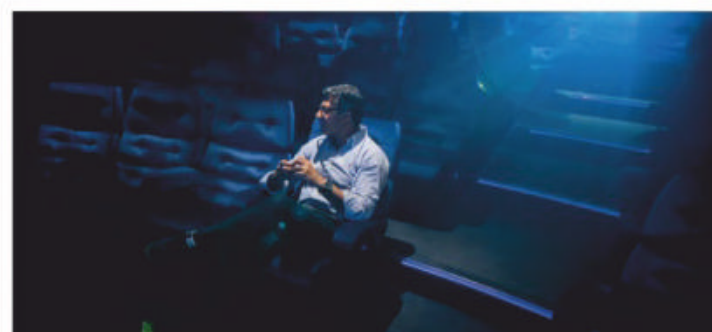
"It became clear with the drivers we had that while they would tell the stories of their lives, they would also be able to shine a little light on different facets of Michael," says Pandey. "All four of them have Michael in common and I wanted him to be the fifth story. In the years since his skiing accident I've begun to appreciate the immensity of what he achieved on the track and the absolute love that surrounded him – especially at Ferrari."

From getting his early break, through his controversial on-track struggles to securing unprecedented success with Ferrari, Schumacher's narrative runs through the movie intertwined with the other racers. There are two significant chapters towards the end of the film which reveal the human frailties behind their superhero make-ups – the moment they realise it is time to retire, and a major accident which shaped their lives.

"We have a sequence called 'Sunsets' which is about drivers hanging up their helmets. And helmets are an obvious symbol in the film. They not only define who they are, but it also protects the most delicate thing they own – their heads," says Pandey.

"Each of them have their own story about a head injury, be it Häkkinen's crash at Adelaide or Felipe's in Hungary – and of course Michael."

One of the discoveries in the archives is from the 2007 Race of Champions, where Michael





“WHAT I WANTED TO SHOW WAS THE MAGNITUDE OF THE MAN BY THEIR RESPONSES TO HIM [SCHUMACHER] DIRECTLY.

YOU JUST REALISE HOW GOOD A HUMAN HE IS”



is wearing white overalls with ‘ICM’ writ large on the front. They stand for *Institut du Cerveau et de la Moelle épinière*, the Brain & Spine Institute founded by Professor Gérard Saillant and FIA president Jean Todt. Schumacher, who continues to suffer today with the head injury he suffered skiing in 2013, is a founder member of the institute and is quoted on the ICM website as saying: “The idea of creating a research centre will help the understanding of how the brain works and to find solutions and cures.

Those privileged by life have the duty to help those who are less fortunate and especially those who suffer.”

“The great irony” says Pandey, “is that at the Race of Champions in 2007, he was raising money for cerebral injury research.”


The final sequence of the film involves a notable shift to documentary and the subjects are interviewed head-on. This is created with a series of cameras and mirrors known



The Schumacher narrative runs through the whole *Heroes* story

in the industry as an Interrotron. “You can effectively have someone looking directly into a camera – without them looking into it,” explains Pandey. “It’s terrific for non-actors. With the Interrotron, the light goes directly into your face, so your pupils are very restricted and make-up makes no difference – it’s honesty we’re looking for. I didn’t need two hours from each, I just said, in a minute or two tell me what you were doing when you heard about Michael’s accident. And any thoughts you might have about him?”

“Tom [Kristensen] says you cannot imagine the risks they have all taken in their lives, so what happened to Michael in his free time was unthinkable. Our heroes cheat death, they are gladiatorial, they live on the edge. Michael doesn’t get the chance to have the retirement they all do. What I wanted to show was the magnitude of the man by their responses to him directly. You just realise how good a human he is. He had his flawed moments on track, as did Senna, but as a human he is loved...”

The projector goes out and the screen fades to black. Manish returns to the editing suite to apply the finishing touches to his remarkable saga. It’s a powerful piece of film-making. Motor racing with a human touch. *Heroes* will be premiered in London in the week leading up to the 2019 British Grand Prix. 



The Formula 1 world championship will descend on the stylish French Riviera on the 21-23 June as the Circuit Paul Ricard hosts the 2019 Pirelli Grand Prix de France. The region around Le Castellet is famed for its elegant fishing villages and beach resorts such as Saint-Tropez and Cannes. The long summer days and guaranteed sunshine will attract race fans to watch the likes of Lewis Hamilton and Sebastian Vettel continue their world championship battle at one of the most prestigious races on the grand prix calendar.

Reinstated on the Formula 1 schedule last year after an absence of a decade, the French Grand Prix takes place in one of the most

beautiful locations in the world. The Circuit Paul Ricard is situated a stone's throw from the Mediterranean coastline and easily accessible from the south of France's most vibrant locations situated on the fashionable Côte d'Azur.

In 2019 the race at Le Castellet will be a festival of speed and sound as it celebrates an important milestone as the 60th edition of the French Grand Prix since the world championship began in 1950.

CIRCUIT PAUL RICARD

France has a long history of road racing circuits hosting grands prix. In 1970, one man conceived the idea of constructing a permanent track. Paul Ricard, the creator of the famous drink that still

bears his name, set to work in building a brand-new facility. Within a year the Circuit Paul Ricard was the venue for the 1971 French Grand Prix, based on the Castellet plateau between Marseille and Toulon.

Twenty years later, the track hosted its fourteenth and last Formula 1 race in 1990 as the French Grand Prix moved to Magny-Cours. In 1999, Bernie Ecclestone bought the site (circuit and airport) and renovated Paul Ricard into an ultra-modern high-tech track.

The new circuit featured modified corners and innovative alternatives to gravel traps, with large run-off areas featuring abrasive blue lines which helped to slow cars down, setting new standards in safety.

CELEBRATING THE FRENCH GRAND PRIX

As one of the most prestigious races on the Formula 1 calendar, we take a closer look at the Circuit Paul Ricard and what to expect at this year's grand prix in June



Photos: Motorsport Images

LOCAL TALENT ON DISPLAY

The emergence of Charles Leclerc as one of the most exciting drivers for a generation will thrill fans heading to this year's French Grand Prix, as the Ferrari driver lives only a short distance away from Le Castellet. Although born in Monaco, Leclerc spent his junior career racing in France and was a team-mate in karting to his great friend Pierre Gasly, who is competing in F1 for Red Bull Racing.

After Gasly's team-mate Max Verstappen took a podium for Red Bull in last year's race, perhaps the man from Rouen has the best chance of being the first home-grown F1 winner since Olivier Panis took an unlikely victory for Ligier at the 1996 Monaco GP

"When you are at home and you compete in your home race... to see all the flags, all the people speaking French, with messages of support when you come to the track, it's an amazing atmosphere and it's something different to other race weekends," says Gasly.

Another local competitor will be the French Swiss racer Romain Grosjean. The Haas man proudly sports the red, white and blue of France on his helmet, so will command a great degree of home support.

"The south of France is probably one of the best places in the world," says Grosjean of Paul Ricard. "I think it's just a beautiful place to have a race."

Formula 1's growing momentum in France is in part due to Renault's renewed factory team effort. Yellow and black shirts and tricolour flags will be out in force during the French Grand Prix weekend, creating a fervent patriotic atmosphere around the racetrack - which should provide a spectacular backdrop.

VISITING THE 2019 PIRELLI FRENCH GRAND PRIX

Last year, over 160,000 fans descended on Le Castellet for the country's return to the F1 calendar, which was watched by 90 million people worldwide. Fans returning in 2019 will again experience a wealth of entertainment on-track and across the weekend.

Two concerts will take place with French DJs Bob Sinclar and Martin Solveig performing at the track on Saturday and Sunday evening. These free concerts will be accessible to all holders of a 3-day pass or a Saturday or Sunday ticket, regardless of the category of the ticket purchased.

This year a massive overhaul of access to the venue has been commissioned by the event's promoters who have worked tirelessly to enact changes for 2019. This includes a more expansive and better organised set of car parks, a dedicated carpool route, as well as free shuttles from a remote park and ride area in La Ciotat. In addition, commercial shuttles from Aix, Toulon, Marseille and Nice will be in operation as well as enhanced motorcycle parking for convenient access.

The number of camp sites adjacent to the circuit have also increased with earlier arrival times to ensure a smoother and more enjoyable experience. It's the perfect option for fans wishing to soak up the fine weather Provence in the summer has to offer and to enjoy one of the best grand prix of the year.

BE THERE & EXPERIENCE IT LIVE

To see all ticket options and prices for the 2019 Pirelli French Grand Prix on 21-23 June, please visit the Motorsport Live dedicated site at www.motorsportlive.com

After serving as a high-speed test track, Circuit Paul Ricard re-opened its doors to the public in 2009 following the construction of a new grandstand. In 2016, a new five-year contract was announced proclaiming the return of the French Grand Prix to the classic venue.

The Formula 1 layout measures 5.8km, making it one of the longest of the year and with top speeds on the famed Mistral straight in excess of 340kph. The characteristic of long straights and tight corners, ensures a technical challenge for drivers, while providing fans with ample overtaking opportunities.

The highlight on the lap is a drivers' favourite: the daunting Signes Curve taken in 8th gear at 315kph, which proves a test of bravery and skill.



Local racer Charles Leclerc and Renault will get fan support



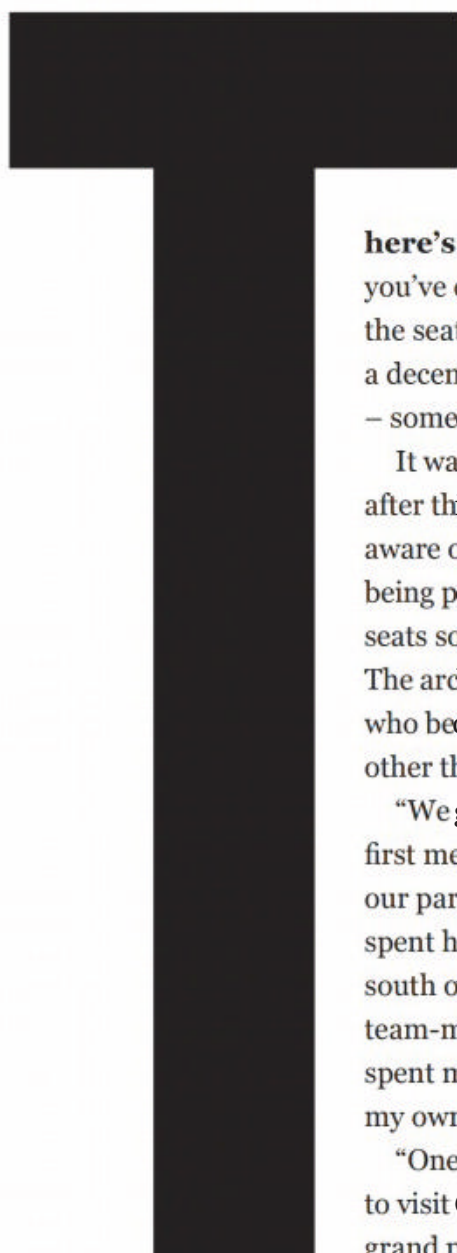
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FRIENDS

As teenagers they were team-mates and in 2010 finished 1-2 in the French karting championship. Eight years later childhood pals **Pierre Gasly** and **Charles Leclerc** race alongside each other in F1, hoping to be on the podium together once more. We spoke to Gasly to discover the origins of their friendship and how he's adapting to life with Red Bull...

WORDS JAMES ROBERTS
PICTURES KSP REPORTAGES/GASLY
RED BULL



There's always one, isn't there? Just after you've comfortably settled into your seat, clicked the seatbelt across your lap, and are scanning for a decent film on the seat's screen in front of you – someone asks you to move.

It was on the late-night flight out of Bahrain after this year's race that *F1 Racing* became aware of such a scenario unfolding: passengers being politely asked if they wouldn't mind moving seats so two chums could take up seats together. The architects of this kerfuffle, the two friends who became reunited at 30,000 feet, were none other than Pierre Gasly and Charles Leclerc.

"We grew up together," explains Gasly. "We first met in 2005, when I was about nine and our parents became really close. As families, we spent holidays, staying on boats together in the south of France and five years later we became team-mates in karting. That year I probably spent more time with Charles than I did with my own parents.

"One of my first F1 memories was when I went to visit Charles at his Monaco home during the grand prix weekend. His parents' house was miles

away from the track and yet I could hear the cars, 3-litre V10s, in morning practice. We were so far from the circuit – yet it was super impressive."

Perhaps it was no surprise Gasly was so enchanted by the sound of a racing engine, as he comes from a family steeped in motorsport. In fact, he is the third generation of Gasly to become successful on four wheels.

"I don't think a lot of people know this, but my grandmother, Yveline Gasly, was a karting champion. My father was also a racer in karting, rallying and in endurance events – and a French champion too. I also have four older brothers and three of them raced in karting. So, from three years of age, my mother used to take me in a buggy that she pushed around and I would make engine noises. From a very young age, I was always part of motorsport."

Gasly won the French karting championship in 2010 driving for Sodikart when he was team-mate to his younger friend Leclerc, who was runner-up that year. It is the pictures of the two of them together (aged 14 and 13) that Gasly has shared with *F1 Racing* this month. ▶

REUNITED





The young pretenders: Gasly (right) with Leclerc (left) and Sodikart founder Gildas Merian in 2010

“WHEN DR



MARKO CALLED ME I COULD NOT BELIEVE IT, I WAS SO SURE RICCIARDO WAS GOING TO STAY AT RED BULL”



“We had a really good fight for the championship and it was a good time testing on tracks together and racing,” says Gasly. “Although I moved on to single-seaters before Charles, we still have a very close friendship as he’s a nice, kind guy.”

Fifteen years after they first met the pair find themselves racing together in Formula 1, and following their recent graduation to Red Bull and Ferrari, they could easily find themselves sharing a podium once more.

In the early part this year, it’s been Leclerc that has made more of an impression with his assured performances for Ferrari, while Gasly admits he still isn’t yet fully comfortable behind the wheel of the Red Bull RB15. Pre-season was blighted by two large accidents in testing and it’s taken him time to get up to speed.

“It’s fair to say that I don’t feel as comfortable in the Red Bull as I was in the Toro Rosso last year,” concedes Gasly. “In a way I found a direction quickly in the Toro Rosso to get the best out of it. But I’ve found it’s a bit tricky in the Red Bull. I don’t feel I can have the input I want inside the cockpit – it’s quite inconsistent. It doesn’t do what I expect it to do in one corner and then in another it’s different again. The main thing is trying to drive the car as I would like it to be.”

The environment at Red Bull is notably

pressurised, as former drivers and power unit suppliers will attest, but Gasly hopes he will be afforded the time to adapt. Before the season began, team boss Christian Horner admitted Gasly has been “elevated 12 months before we’d ideally like” but more recently suggested his confidence had been growing.

“He had a tough pre-season, with the two incidents in testing putting him on the back foot, but at each grand prix he’s got stronger and stronger,” says Horner. “I think more seat time will be extremely beneficial to him and as we come back to circuits that he’s more familiar with, I think we’ll see him make further progress.”

The continuity for Gasly after his first full season at Toro Rosso has been the Honda power unit – which Red Bull is using for the first time in 2019. In addition, his engine engineer has moved over from Faenza to Milton Keynes with him. Gasly has a familiarity with the Japanese manufacturer’s working practices and culture, learning much when he spent most of 2017 racing in Super Formula in Japan.

Gasly made a surprise F1 debut in Malaysia that year when Daniil Kvyat was dropped by Toro Rosso, and he was surprised again when he was promoted to Red Bull for this season when Dan Ricciardo made his unexpected decision to quit the team for Renault.

“When [Red Bull consultant] Dr Marko called me I could not believe it,” says Gasly about the turn of events last August that led to his drive at RBR. “I was so sure he [Ricciardo] was going to stay at Red Bull. At first Marko told me they were going to take their time and look at the options for next year – he said to enjoy the summer break and to try and disconnect from everything.

“Of course, it’s not possible when you have something like a Red Bull drive in your mind. I was waiting and there were two clear options, either to stay at Toro Rosso or move to Red Bull. Then Helmut called me back about two weeks later to say they had decided to take me for this year and that they thought I was the best option for the team for 2019.”

Gasly’s promotion has pitched him as a direct rival to his old friend Leclerc, but don’t expect their on-track duel to come between their friendship. Indeed, don’t be surprised to see the pair holidaying together again this year.

“We still text a lot, although it’s harder now with our agendas to organise things, but every year we try and plan a trip away together in the summer,” says Gasly. “It didn’t happen last year, but we’ll try again this year.”

Better make sure they book the plane tickets at the same time then, to avoid any more last-minute seat-swapping... **F1**



Red Bull

Toro Rosso

HONDA

myWorld

PIRELLI

randstad

STEPPING OUT OF THE SHADOWS

PICTURES 
WORDS STUART COOLING

Toro Rosso's new technical director has flown below the radar for many years and boasts a more eclectic background in motor racing than many of his peers

JODY EGGINGTON CV

Born Coventry,
28 January 1974

2019
Technical director, Toro Rosso

2017
Deputy technical director,
Toro Rosso

2014
Head of vehicle performance,
Toro Rosso

2012
Operations director,
Caterham F1

2010
Chief engineer, Lotus Racing

2005
Race engineer, Midland F1

2004
Race and design engineer,
Aston Martin Racing

1999
Race and design engineer,
Opel Motorsport

1997
Design engineer, Xtrac

1996
Graduates from Loughborough
University with BSc in Industrial
Design, joins Tyrrell F1 Team as
junior designer

There's little wonder Jody Egginton's recent appointment as technical director of Toro Rosso was greeted with a chorus of "Great guy!" from F1 insiders on social media. For while his may not be a face that regularly graces TV broadcasts, his career has touched many of the great and the good of motor racing over the past two decades. And his background in practical engineering and hands-on management made him a shoo-in for a technical role that's changing in line with the broader trends in F1.

Egginton joined Tyrrell as a junior designer after graduating in 1996, though it would prove to be a brief stint in the venerable Ockham wood yard.

"My strength, if you could call it that, was that I could use 3D CAD software in an era when it was becoming more popular," he says, "so that was my 'in', and I was designing the pit equipment and all the kind of stuff that the other people were less interested in doing. It was a small group of people, and going through a lot of changes with the sale to BAR [British American Racing]."

But Egginton isn't your typical F1 'lifer'. BAR's acquisition of Tyrrell was chiefly a means of securing an F1 entry at a time when barriers were being erected against new teams. Egginton took his leave and went to the transmissions specialist Xtrac as a gearbox designer. A project to design the transmissions for the reborn DTM series in 2000 led to a job offer from Opel.

"Before I knew it, I was engineering a race car," he says. "I worked with Opel's test team for a couple of years, then back to a race team with Holzer, working in the DTM as an engineer while concurrently being a designer in the background... and doing some freelance race engineering. So I was doing a bit of everything – even the practical aero testing and research on the DTM car."

Egginton returned to the UK in 2004 to work as a designer/engineer on Prodrive's Aston Martin DBR9 GT1 project, and then answered F1's call again – with another team that's gone through many incarnations. When he joined at the beginning of 2005 its new owner, a Russian steel magnate, was renaming it Midland F1. Over the

course of five years Egginton would work through two further name changes as it became Spyker and then Force India, race-engineering Christijan Albers, Giancarlo Fisichella and Vitantonio Liuzzi.

"There were a lot of changes in team kit, shall we say..."

He'd also be working with Mike Gascoyne, the man who'd interviewed him for that Tyrrell job. Gascoyne departed in the Force India era but resurfaced in 2010 as a key figure behind one of the new teams to join the grid that year: Lotus, later renamed Caterham after a protracted spat with others claiming ownership of the Lotus name. This entity wasn't a great success but it did imbue Egginton with a greater breadth of knowledge.

"I did three seasons there as chief engineer and then got offered the opportunity to be operations director," he says. "That was interesting – the team was relocating from Hingham to Leaffield, and the former Arrows and Super Aguri factory, where it was spending a lot of money on refurbishment. So getting involved with that, organising and budgeting and trying to make a seamless transition, was a really useful experience."

Egginton had already been in talks with Toro Rosso "on and off" as Caterham withered during its final season, and at the end of 2014 moved to Faenza as head of vehicle performance, later to become deputy technical director to James Key. He's now assumed control of a tech team that's in transition: Toro Rosso has spent much of the past decade as an independent arm of the Red Bull empire but now the junior team will be drawing much closer design-wise to the senior outfit. Arguably the right kind of person for this job is someone who's been a fixer and resource-juggler as well as a hands-on engineer.

"We've made the decision to take certain parts from Red Bull, the rear end being the most obvious," Jody says. "It's something a lot of other teams are doing. For us, there's a chunk we're no longer doing, but it's enabled us to do more work in other areas to a higher level, and it's enabled designers to expand their horizons and explore different areas. It's no less work, I can tell you..."

"WE'VE MADE THE DECISION TO TAKE CERTAIN PARTS FROM RED BULL, THE REAR END BEING THE MOST OBVIOUS"



KINGFISHER

WHYTE & MACKAY
GLASGOW

MEDION

AB

i

20

KINGFISHER

THE FORCE INDIA VJM02

NOW
THAT
WAS
A
CAR

No. 76

WORDS JAKE
BOXALL-LEGGE
PICTURES
JAMES MANN

Force India's first
step on the road
from mediocrity to
midfield powerhouse



Never mind the financial woes the team now known as Racing Point went through in the past couple of seasons before its purchase by Lawrence Stroll's consortium. Vijay Mallya's late-2007 takeover alleviated an even more turbulent period for the team in which it changed hands thrice in three years – having run as Jordan until 2005, then Midland, then Spyker.

Over the following ten years, the team transcended its precarious financial situation to consistently bother the scorers, and occasionally annex podium places – a far cry from the tail-ender role it had previously occupied. But the process took time.

Force India's 2008 car, the VJM01, was fundamentally an updated Spyker F8-VII and good for little more than propping up the rest of the field. Mallya chafed at what he saw as a lack of ambition among senior management and made changes, promoting James Key and Mark Smith to lead development of the 2009 car, which was a clean-sheet design. New rules dictated a new concept, although there was some continuity: the driver line-up of Giancarlo Fisichella and Adrian Sutil.

Dropping the customer-spec Ferrari package previously used, Force India agreed an engine deal with Mercedes, which was taking on customers for the first time after years of McLaren exclusivity. The deal went further than just engines; McLaren signed a technical partnership to supply its full drivetrain to the team, including gearboxes and hydraulic systems, setting a precedent for similar tie-ups elsewhere on the grid in future.

Despite the wealth of McLaren expertise in the back of the

NOW THAT WAS A CAR

No. 76

upcoming VJM02, the late signing of the deal left Force India with much to do at the last minute: the suspension pick-up points had moved with the new gearbox, and this had knock-on effects elsewhere on the car. McLaren had also agreed upon a deal with the team to supply its kinetic energy recovery systems (KERS) – introduced for 2009 – but Force India elected late on not to run it in the interests of simplicity and tighter packaging. After plenty of late nights the neat, high-nose, low-drag VJM02 emerged on its 1st March launch date.

Even after the complete design overhaul – and showing reasonable promise – Force India picked up from where it left off the previous season and exited in the first qualifying session of the Melbourne season opener. Only the inability of Toro Rosso's Sébastien Bourdais to improve in the final stages of the session saved Fisi and Sutil from posting the slowest times.

The status quo remained in the early rounds: the VJM02s flattered to deceive in practice sessions before qualifying proper, when they were usually embroiled in a scrap with Toro Rosso at the bottom of the field. Refining the car ahead of round four in Bahrain, Force India's engineers developed a new floor complete with en vogue double diffuser, and tightened up the sidepods thanks to not having to package KERS. They also introduced the first of many front wing updates, as the field made continual gains with the new wider geometry.

Monaco handed the team an opportunity as BMW and Toyota struggled with the street circuit's unique demands, while reigning champion Lewis Hamilton dropped out in Q1 with them after a shunt at Mirabeau – handing Force India its first Q2 appearances of the season. From there, the team produced its best showing so far. Fisichella, a specialist in



THE FORCE INDIA VJM02



“A POWERFUL, SLIPPERY CAR THAT SIGNALLED THE BEGINNING OF THE STEADY ASCENT OF THE TEAM”

punching above his weight in flawed cars, perfectly executed a one-stop strategy to bring his car home in ninth – just two seconds behind Bourdais.

Despite progressing steadily through the season, the team didn't have the resources to out-develop its rivals by a significant margin so its place in the pecking order remained relatively static – until the European Grand Prix in Valencia. Bringing another new front wing package and refining the double-diffuser concept further, the engineers predicted a gain of over half a second – which duly materialised. Sutil

roared to 12th on the grid – just 0.02 seconds behind Nick Heidfeld's BMW – and converted it into a 10th place finish.

A week later, trading the Spanish coast for the Ardennes Forest, Force India came up trumps at Spa-Francorchamps. Grabbing sixth and eighth in the second and third practice sessions. Fisichella threatened to challenge in a topsy-turvy weekend in Belgium, and duly did so by storming to the quickest time overall in qualifying – batting away the attempts of Jarno Trulli late on for Force India's first ever pole position.

Fisichella got away well at the start of the race, building a solid lead over the fast-starting Ferrari of Kimi Räikkönen



RACE RECORD

Starts 34
Wins 0
Poles 1
Fastest laps 1
Other podiums 1
Points 13


SPECIFICATION

Chassis Carbon fibre composite monocoque
Suspension Carbon fibre composite wishbones, pushrod-activated torsion springs and dampers.
Engine Mercedes FO108W 90-degree V8
Engine capacity/power 2400cc/750bhp @ 18,000 rpm
Gearbox seven-speed semi-automatic gearbox
Tyres Bridgestone
Weight 605kg
Notable drivers Adrian Sutil, Giancarlo Fisichella, Vitantonio Liuzzi

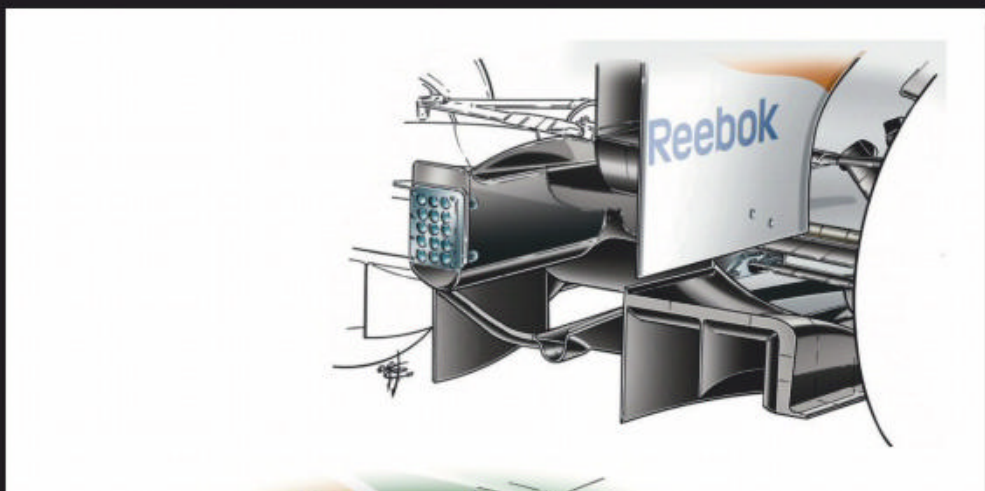
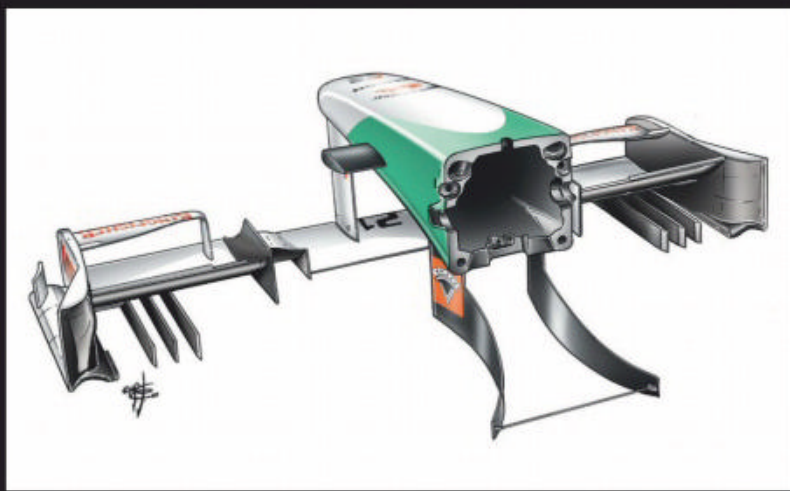
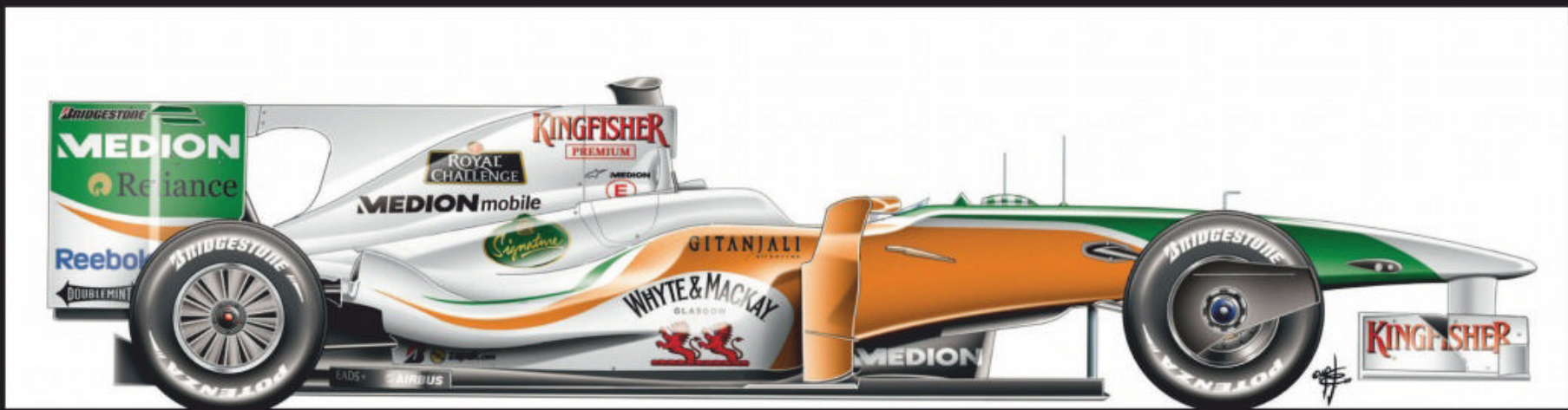
in the opening corners, before four cars – including championship leader Jenson Button – tangled at Les Combes, which triggered a Safety Car, bunching up the field. On the fifth-lap restart Räikkönen was quicker on the draw, powering past Fisichella on the Kammel Straight with KERS assistance to clinch the lead. Despite Fisi's best efforts, Räikkönen was resolute in his race-long defence – leaving the KERS-less Force India having to be content with second.

Ferrari then prised Fisichella from his seat to replace Luca Badoer, who had struggled deputising for the injured Felipe Massa. Reserve driver Vitantonio Liuzzi took over for Monza, where the team proved that Spa was no fluke. Strong on the high-speed circuit, especially with the powerful Mercedes engine in the back, Sutil captured another front-row start with the second-quickest time, while Liuzzi started from seventh.

In his first F1 race in over a year, Liuzzi made his way up into fourth place and set his sights on the podium before losing drive on lap 22. It was over to Sutil to pick up the pieces, and he made the best of a two-stop strategy to claim fourth.

That pair of races was Force India's high-water mark with the VJM02. A powerful, slippery car in the right conditions, it signalled the beginning of the steady ascent of the Silverstone-based squad towards the top half of the field. 

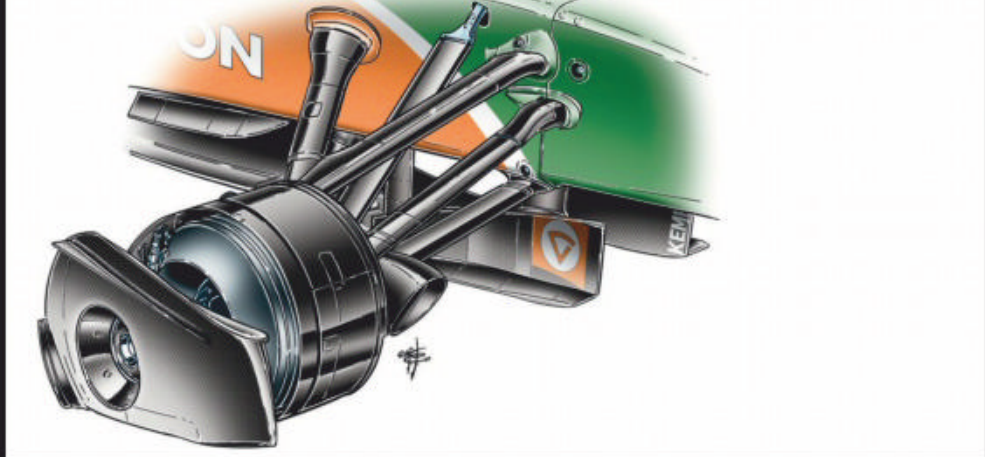




FORCE INDIA VJM02 TECHNICAL ANALYSIS

WORDS JAKE
BOXALL-LEGGE

ILLUSTRATION
GEORGIO PIOLA



CONCEPT

For the first time in two years, the car that emerged from the Dadford Road facility near Silverstone was a clean-sheet design. The new rules meant it would be impossible to carry over the chassis again – essentially the 2008 Force India VJM01 had been a warmed-over '07 Spyker F8-VII – and new owner Vijay Mallya wanted to see more progress. Justifiably so, too, since the previous car was a laggard which only claimed a single point after Adrian Sutil's Fuji heroics in the rain.

Force India targeted the low-drag circuits – where it might be able to perform more creditably compared with its competitors. While this would compromise the team slightly throughout the season in the corners, the straight-line speed of the VJM02 was never in doubt – Sutil and Giancarlo Fisichella were consistently at the top of the speed trap charts, clocking the fastest speeds in four of the first five races.

INNOVATION

The VJM02 wasn't blessed with any trick bits of kit, and neither did it generate the most downforce on the grid. What it *did* do was popularise the manufacturer tie-up in contemporary F1, as Force India obtained a McLaren rear end to complement the newly fitted Mercedes engine in the back.

Stuttgart's finest gave Force India the grunt to compete, helping the team cement its top-speed advantage, and the use of McLaren gearboxes and rear suspension paved the way for the likes of Haas and Toro Rosso to do the same with Ferrari and Red Bull parts respectively.

Although the car required a number of late adjustments at the start of the season to accommodate the McLaren-Mercedes components, it guaranteed championship-quality parts in key areas, meaning Force India could focus its efforts on developing the rest of the car.

EVOLUTION

Arguably, the VJM02 was the car that kickstarted Force India's efforts in F1. The next car – the VJM03 – was a solid midfield contender, scoring points first-time out in Bahrain courtesy of the retained Vitantonio Liuzzi. While it no longer bothered the top of the speed traps, the performance of the VJM03 fell into a much larger window, giving the team a platform to rise in the pecking order. Sutil would manage a pair of fifths across the 2010 season, bagging Force India seventh overall in the constructors' championship – a gain of two places.

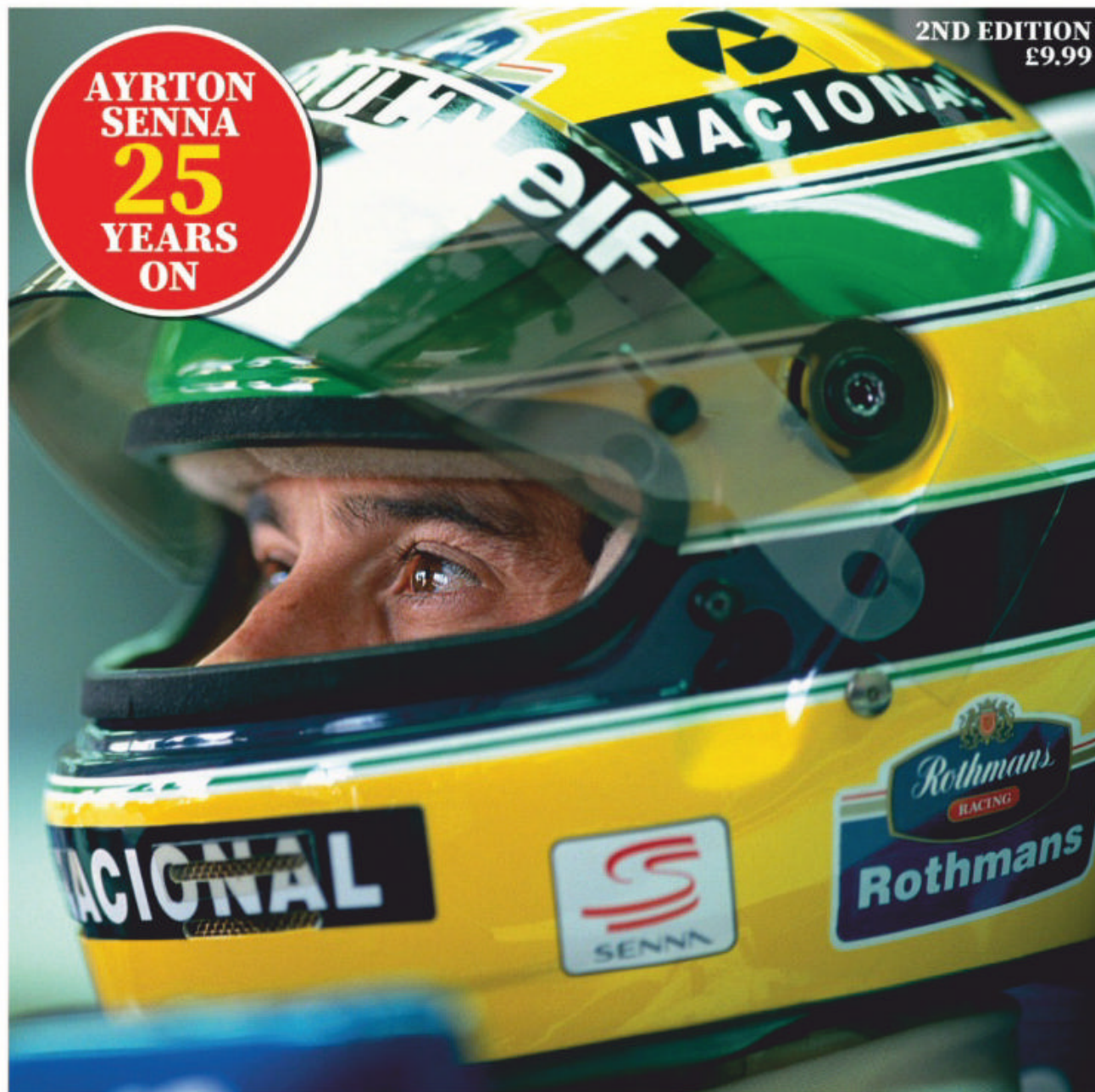
The following year Mercedes-aligned Paul di Resta replaced Liuzzi, and the team continued its ascent to finish sixth overall. The team continued to grow and, at the start of the turbo era in 2014, ex-McLaren driver Sergio Perez secured the team's first podium finish in almost five years in that season's Bahrain Grand Prix.

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THE
FIRST THING
TO KNOW
ABOUT

Alfonso de Portago is that at 17, for a \$500 bet, he flew an aeroplane under a bridge.

A profile of de Portago, written in 1956, was entitled 'The Man Who Could Do Everything', and apparently he could. One of the leading amateur jockeys in Europe, twice he rode in the Grand National, and he was expert also in swordsmanship – in every sense, apparently – as well as boxing, tennis, skiing and bobsleighting.

Born in London, of a Spanish father and an American mother, Portago might have been put on earth for gossip columnists. He was a nobleman, and he was rich, a free spirit before the phrase was thought of, one who lived by his own rules. Fluent in several languages, languid of manner, with a cigarette permanently in the corner of his mouth, he had laconic charm to throw away, as comes across in an interview recorded in Nassau a few months before his death.

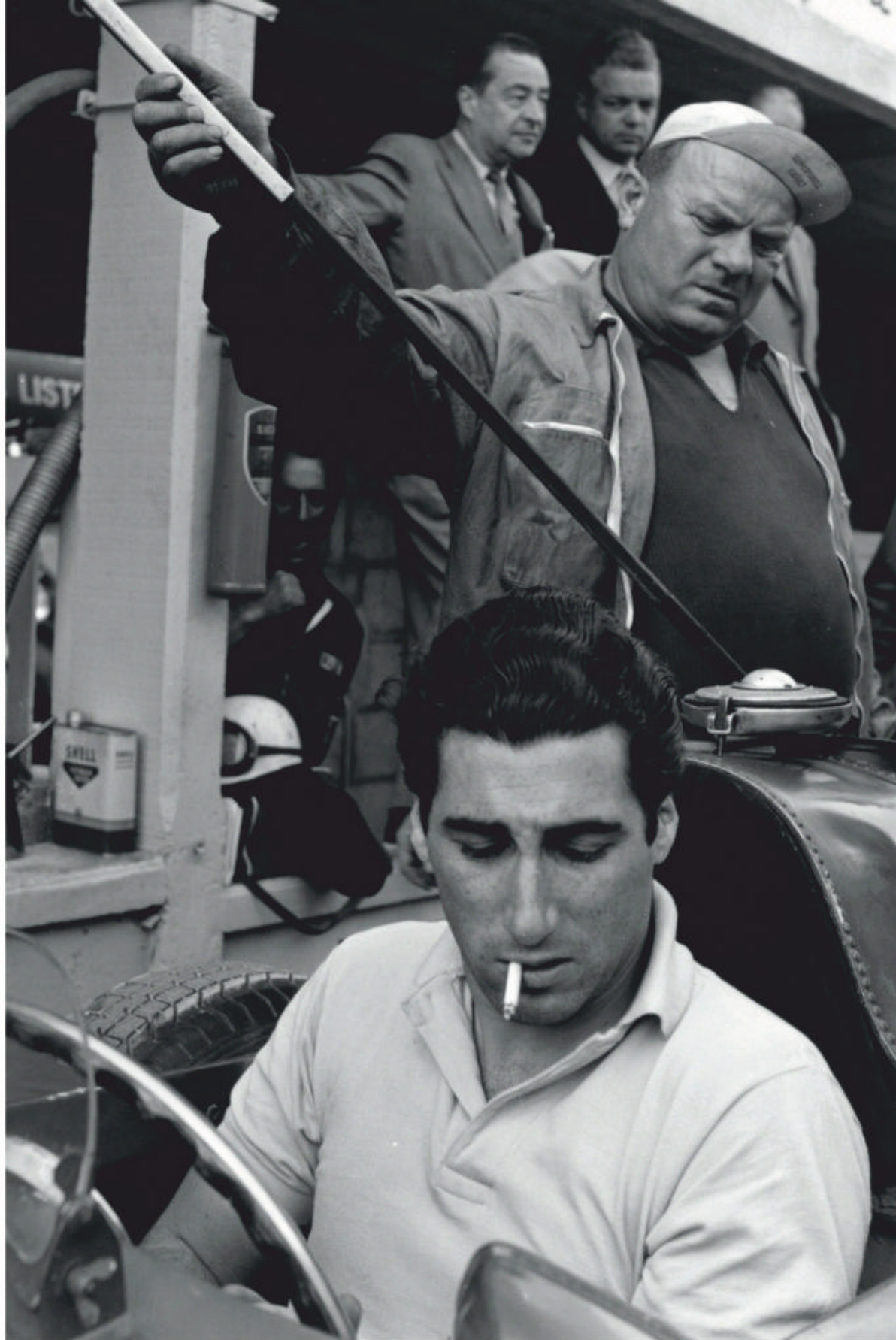
"Juan Manuel Fangio said I was his most dangerous rival at that particular race," he murmurs, "but I fear he was exaggerating."

Before getting into cars, de Portago's passion lay with horses, which he raced mainly in France. "Automobile racing didn't occur to me until I went to the New York Motor Show in 1953, and met Luigi Chinetti, the US Ferrari importer. He asked me to go with him in the Carrera Panamericana in Mexico – I was very frightened, but fortunately the car broke on the second day. For all my fear, though, I thought racing had a charm, and decided to take it up."

Thus he bought a Ferrari, and Harry Schell suggested he partner him at the Buenos Aires 1000Km. "The problem was, Harry was worried I'd break the car in practice, so he wouldn't let me drive. He did the first part of the race, then came in, and said, 'OK, now you drive'. I'd never driven a car with a manual gearbox before..."

Back in Europe, de Portago learned how to change gear, even to heel-and-toe, and he quickly progressed, winning several times in 1954. "I thought I'd arrived, and Ferrari should give me a contract..."

Although this was not forthcoming, Enzo agreed to sell him a Formula 1 car, but much of the 1955 season was lost when he broke his leg at Silverstone in May. Late in the year, though, he did well in sportscar races, and for 1956 Ferrari indeed signed him, alongside Fangio, Peter Collins, Eugenio Castellotti and Luigi Musso. Big teams the Old Man ran in those days.



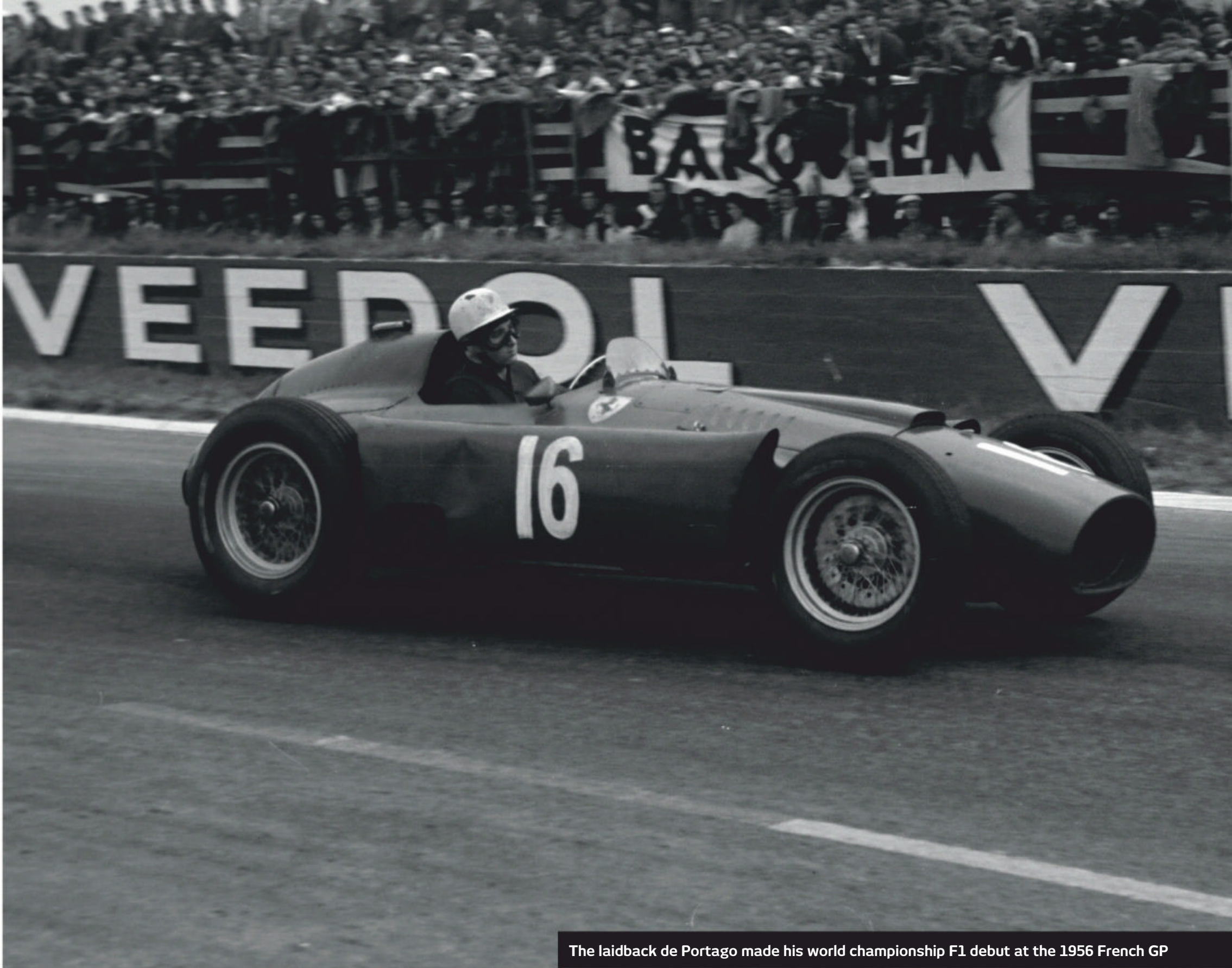
"De Portago," Enzo said, "was a kind of magnificent hippy, who made quite an impression on women, because he was a handsome man. What sticks in my mind is that gentlemanly image that always managed to emerge from the crude appearance he cultivated."

Phil Hill confirmed that impression when I spoke to him about de Portago: "When I first met 'Fon', he knew absolutely nothing about race cars, but he was a natural athlete, and he learned."

"He was also ahead of his time, in that he deliberately... dressed down, let's say. He wore this scruffy leather jacket, shaved about every four days, and looked like he had nothing. Then one day he gave me his card, with his address on Avenue Foch in Paris – and that's when I realised you could be fooled by appearances..."

At one point in the Nassau interview, Portago is asked if he is *interested* in cars. "No, not at all," comes the answer. "For me, a car is either a means of getting from A to B – or it's something to race. I'd say that half the drivers have some mechanical knowledge, and the other half – of which I am one – have none at all..." Difficult to imagine him studying telemetry far into the night.

"I have a complex about Fangio and Stirling Moss," he says. "It's perfectly feasible to *follow* them, but if I have to lead them – set the example, if you like – then I start missing braking points, and so on. In fact, when I pass someone like Stirling, I think, 'This is



The laidback de Portago made his world championship F1 debut at the 1956 French GP

rather peculiar – what’s wrong with his car?”

Self-deprecating, de Portago sold himself short. Given that he had only a couple of years’ experience, and saw nothing remarkable in being able to run competitively, clearly his natural ability was high.

While driving, he invariably wore a short-sleeved shirt and light trousers, explaining in his impossibly laidback way that he didn’t believe in overalls: “If you get gas on your clothes, and it catches fire, you have a much harder time getting out of overalls...”

For all his talent, emphatically racing was never the centre of de Portago’s universe. “I’m prepared to give it just so many years of my life – I want to be world champion, of course, but whatever happens I’ll stop when I’m 35. There are so many other things I want to do – if I live to be 100 there won’t be time for a twentieth of them, so I don’t have any time to lose. I don’t believe a racing driver is necessarily a *brave* man, as much as a man who isn’t afraid. Six hundred years ago, or whatever, I guess he’d have been slaying dragons and rescuing maidens in distress. Nowadays the

“

DE PORTAGO WAS A KIND OF MAGNIFICENT HIPPY

ENZO FERRARI

”

only man who can rescue a maiden in distress is a doctor...”

In point of fact, in his 28 years de Portago did a fair bit of maiden rescuing, one way and another. In early 1957 he was involved in a frantic affair with the actress Linda Christian, who accompanied him to Cuba, where he dominated the race – Fangio and Moss included – until his car broke, and she was also there to watch him in the Mille Miglia.

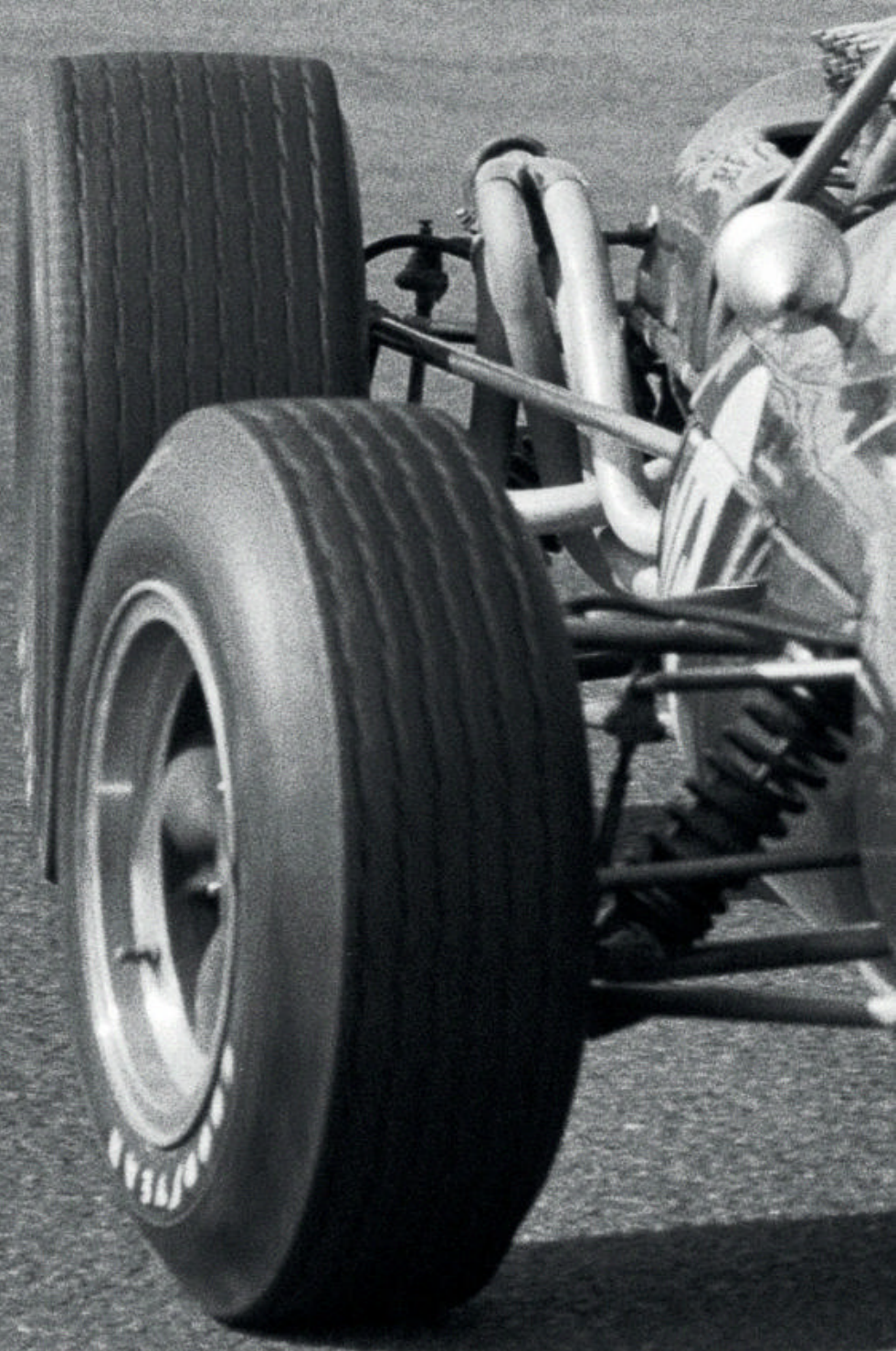
This, a race he hated, he had wanted to skip, but Ferrari insisted he drive, and at the 900-mile mark he was running fourth, albeit in a damaged car, having clouted a bank. Crumpled bodywork was fouling a rear tyre, and at the final checkpoint the mechanics did their best to pull it clear. De Portago, though, waved them away, and let out the clutch. Fifty yards down the road he spotted Ms Christian, braked hard, and passionately embraced her. There was time for that, if not for attention to the car.

Minutes later, near the village of Guidizzolo, the tyre exploded: in the ensuing accident de Portago and his navigator Ed Nelson were killed, and so, too, were 11 spectators. Next day there was hysteria in the press, condemnation of Enzo Ferrari from the Vatican.

“Every driver believes it can’t happen to him,” de Portago says in the interview, “but I *know* it won’t happen to me.” The Mille Miglia died with him. 🏁

ON THE RAGGED

In a new feature highlighting the stunning Motorsport Images archive, we kick off by showcasing pictures that capture the split second between control and disaster



➤ *Jack Brabham wrestles with his Brabham BT19 through Zandvoort's Tarzan corner during the 1966 Dutch GP. He went on to win the race, one of four victories that helped the Australian clinch his third and final championship*

EDGE



▶ *Still on track - just. Rio Haryanto slides his Manor MRT05 wide and onto the artificial grass during Friday practice for the 2016 Chinese GP. It didn't help as he started from the back row*

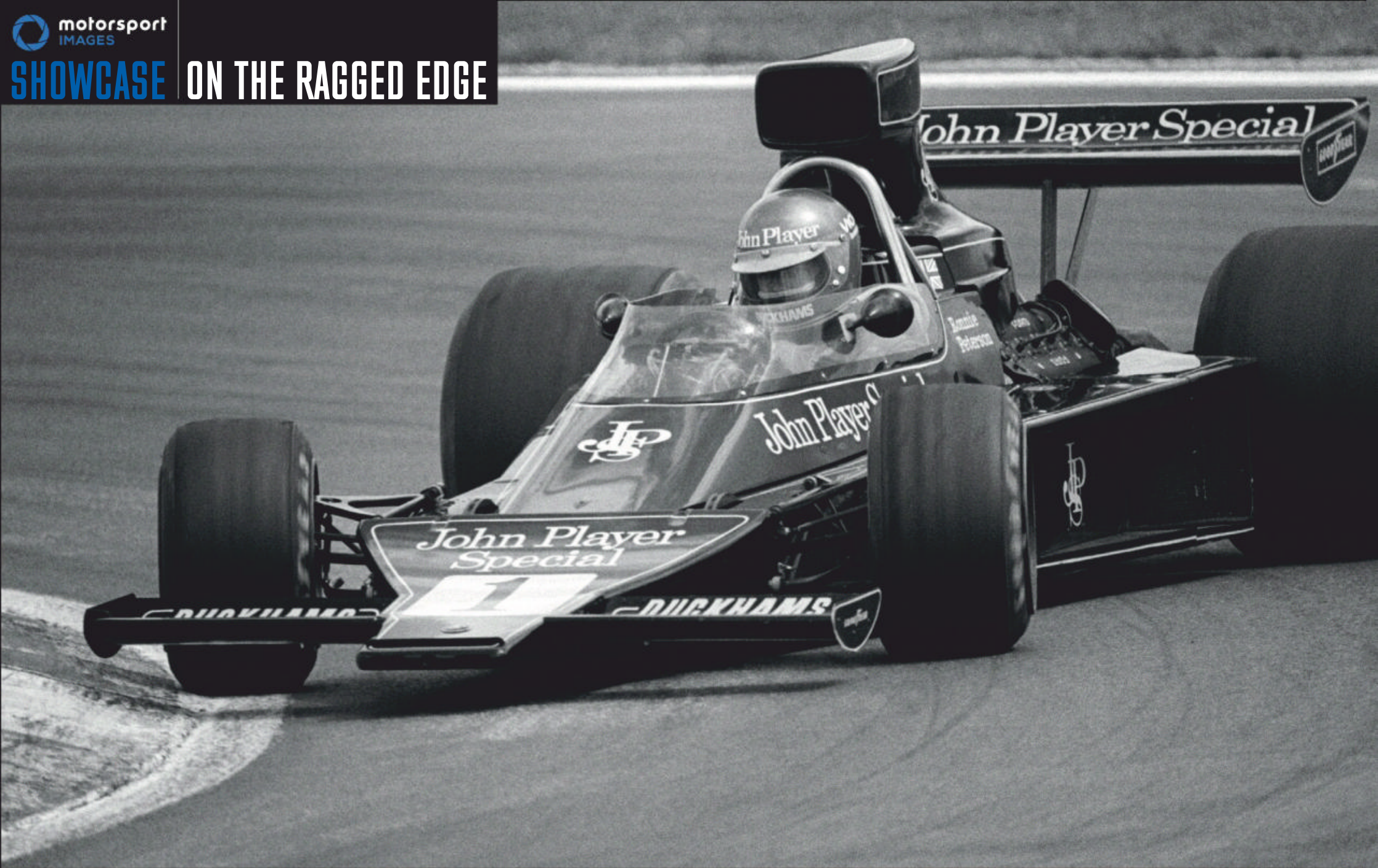


▶ *John Watson and Hans-Joachim Stuck are the onlookers as Brian Redman struggles to keep his Shadow DN3 pointing the right way in the 1974 Spanish GP at Jarama*

◀ *Juan Manuel Fangio keeps control of his Maserati 250F in the open spaces of Rouen-les-Essarts. His victory in the 1957 French GP was his third of the season and helped him claim his fifth title*

▶ *Piers Courage braves a damp Silverstone for the International Trophy in March 1969. His Brabham BT26, wings and all, finished fifth, a lap down on eventual winner Jack Brabham*





▼ Daniel Ricciardo's 2018 German GP wasn't a great one. Apart from this moment in practice, he started from the back row of the grid due to engine penalties and retired his Red Bull from the race after 27 laps



◀ Ronnie Peterson had his hands full with an ill-handling Lotus 76 at Nivelles for the 1974 Belgian GP, and that was before a leaky fuel tank and brake problems added to his workload

▶ 'Mr Monaco' Graham Hill (Lotus 49B) applies opposite lock as he powers out of the now non-existent Gasworks hairpin during practice for the 1969 race. Those ugly wings were banned after this session

▼ Peterson again, this time in the 1977 Italian GP. On the limit through Monza's Parabolica corner, the Swede took the six-wheeled Tyrrell P34B to sixth at the chequered flag





▲ *Denny Hulme corrects a slide in his Brabham BT20 around Monaco's Station hairpin in 1967. Hulme went on to win both the race and, after a season-long battle with Jack Brabham, the championship*

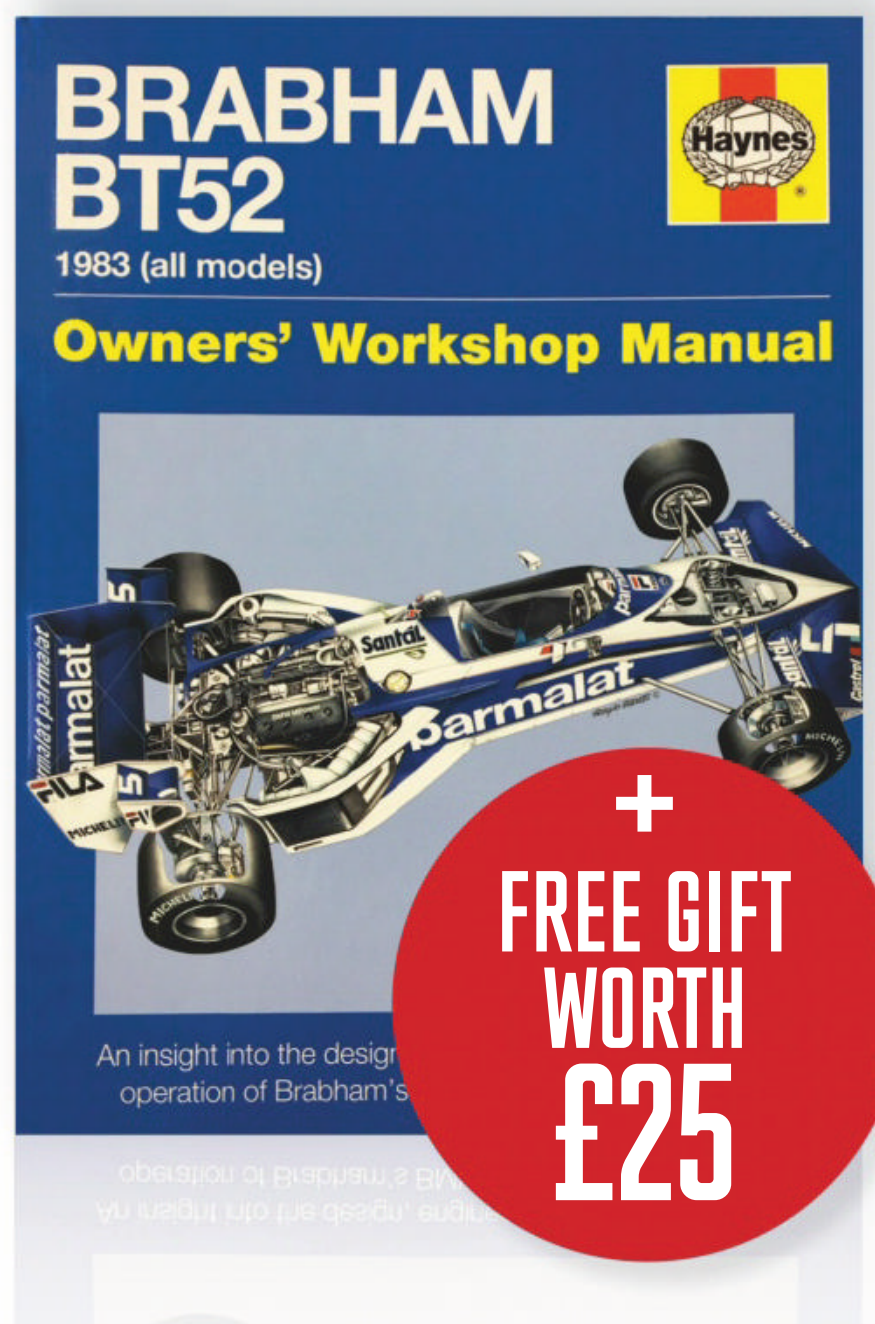
◀ *Paul di Resta grapples with the Force India VJM06 at Monza in 2013. The Scot's was the first retirement come raceday when he collided with Romain Grosjean's Lotus on the opening lap*

▶ *Almost but not quite. David Coulthard looked to have saved this moment in his McLaren MP4-17D in the practice for the 2003 German GP. He didn't and ended up in the Hockenheim tyre barriers*



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A few highlights from 2018



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Does Mercedes' early-season dominance mean it can now lay claim to be the greatest F1 team ever?



Well done C4

Huge thanks to Channel 4 for keeping F1 free for the majority of UK fans. Despite losing the live coverage to Sky and even the iconic Fleetwood Mac theme 'The Chain', Steve Jones and David Coulthard are fronting a great show which just gets better each race.

However I'm curious to know how commercially big global companies justify paying millions in sponsorship for reduced brand exposure across Europe. Doesn't sound a good deal, does it?

Andrew Highway

By email

McLaren's new start?

Is this the fresh start McLaren need? Has it been weighed down for the past four years by Fernando Alonso? I believe so.

Yes, Fernando is in the top 10 greatest F1 drivers of all-time. However, he was the leader of the team and everyone listened to his feedback. This season McLaren has a clean slate with new drivers and a technical team with fresh ideas. It's the McLaren revolution.

Billy Stead

By email

Hats off to Mercedes

To finish first and second in the first five races of the season is an unprecedented achievement and shows just how hard everyone at Brackley, Brixworth and Stuttgart works in the pursuit of success.

It is oft said that pre-season means nothing and for Mercedes to come out of the blocks in this manner and blitz Ferrari is remarkable. People may complain about dominance but surely this is the art of F1. It is the job of rivals to raise their game.

In Lewis Hamilton and Valtteri Bottas Mercedes has two drivers who can push each other to the limit, while still maintaining personal and professional respect. Full credit for that and either will be a worthy champion this season.

Surely Mercedes can now claim to be the greatest team of all-time. Shades of McLaren circa 1988, anyone?

Michael Brierley

Stalybridge, UK

2021 isn't soon enough

I write this letter very sadly. Having followed F1 for 20 years, I fear my continued viewing may not survive until the much-vaunted rule change planned for 2021.

The end of free-to-air coverage in the UK would have been less of a problem if F1 had a wide fanbase, or the product was exciting. But Nigel Roebuck's excellent article (*F1 Racing*, April 2019) hit the nail on the head – neither the cars nor the racing are exciting any more.

Strangely, Liberty has itself to

blame by making more classic footage available on YouTube. It's not mere nostalgia to say that the cars looked and sounded more exciting. Fans like myself who grew up with Schumacher and Häkkinen are completely disenchanted with the pale ersatz offerings Sky Sports F1 is demanding our money for.

As parent to a young family, I have to be more careful than before with both money and time. F1 isn't doing enough to demonstrate it's worth paying £8 on race day to watch cars glued to the track, rather than spending two hours playing with my son. I wish it wasn't so, but I fear the sport I love might well be dead before the 2021 regulations have the chance to revive it.

Daniel Stafford

Oxford, UK

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FINISHING STRAIGHT

RACE DEBRIEF

F1 WORLD CHAMPIONSHIP ROUND 4

THE AZERBAIJAN GP IN 3 KEY MOMENTS



PICTURES motorsport
IMAGES



Another race, and yet another unexpected 1-2 finish for Mercedes pair Hamilton and Bottas

PICTURES: STEVE ETHERINGTON; JERRY ANDRE; MARK SUTTON; GLENN DUNBAR

1 Mercedes execution trumps Ferrari pace yet again

Once again, Ferrari's pre-race potential evaporated in a torrent of what-might-have-beens when it really mattered. As Valtteri Bottas led Lewis Hamilton home by the slimmest of margins for a fourth consecutive Mercedes 1-2, the Scuderia could only draw succour from the fact Sebastian Vettel avoided being mugged by Red Bull's Max Verstappen for third place, and that Charles Leclerc managed to snatch the bonus point for fastest lap.

The damage was inflicted in qualifying as Bottas and Hamilton performed what Mercedes boss Toto Wolff described as a "double whammy" on a Ferrari outfit that already appeared to have lost its way after being quickest in practice. Leclerc and Vettel went out on medium-compound Pirellis in Q2 when all their rivals were on the softs. Why lock your drivers into starting on the race on harder rubber at a circuit with such a great likelihood of generating a safety car, which would give that tyre compound serious warm-up issues at the green flag?

Ultimately this point was rendered moot when Leclerc made a mistake at Turn 8 and struck the barrier hard enough to delay the session for an hour

while repairs were effected. He'd notched up a lap that would ultimately prove enough for him to move through to Q3, but Vettel hadn't.

When Q2 restarted the ambient temperature had dropped 10°C and Vettel had to run on softs to make the cut.

Mercedes delivered the coup de grace by getting its drivers to head the queue at the pit exit for Q3, then pull over as if to make practice starts – leaving Vettel running at the front and (literally) swinging in the wind. Bereft of the all-important tow down the long main straight, he could do no better than third.

Hamilton, by his own admission, flunked the first two corners on his Q3 flying lap and it was the tidier Bottas who annexed pole. From there, on race day, Bottas contained his fast-starting team-mate on the opening lap – and on one of those rare days in Baku when safety car pilot Bernd Maylander was able to twiddle his thumbs throughout, that was that, although Hamilton closed to within DRS range on the penultimate lap.

Vettel fell back over the course of a miserable first stint that he described as "really poor...

uncomfortable, inconsistent", but after changing to mediums on lap 12 he felt the car come alive and regained some ground on Hamilton. Leclerc started eighth courtesy of penalties for the Alfa Romeos, lost places to Carlos Sainz and Daniel Ricciardo early on as he struggled for temperature on the mediums, then charged through to run fifth behind Verstappen.

Stopping later gave Leclerc a long stint in the lead, but his set of softs didn't deliver the performance uplift he needed to catch and attack Verstappen when he emerged from his stop behind the Red Bull.

2 McLaren regains some swagger

Seventh and eighth places in a grand prix wouldn't warm the cockles of ex-boss Ron Dennis, and McLaren certainly won't be breaking out the champagne just yet, but after several grim seasons this was an excellent performance at a circuit

RESULTS ROUND 4

BAKU / 28.04.19 / 51 LAPS



1st	Valtteri Bottas Mercedes	1h 31m 52.942s
2nd	Lewis Hamilton Mercedes	+1.524s
3rd	Sebastian Vettel Ferrari	+11.739s
4th	Max Verstappen Red Bull	+17.493s
5th	Charles Leclerc Ferrari	+69.107s
6th	Sergio Pérez Racing Point	+76.416s
7th	Carlos Sainz McLaren	+83.826s
8th	Lando Norris McLaren	+100.268s
9th	Lance Stroll Racing Point	+103.816s
10th	Kimi Räikkönen Alfa Romeo	+1 lap
11th	Alexander Albon Toro Rosso	+1 lap
12th	Antonio Giovinazzi Alfa Romeo	+1 lap
13th	Kevin Magnussen Haas	+1 lap
14th	Nico Hülkenberg Renault	+1 lap
15th	George Russell Williams	+2 laps
16th	Robert Kubica Williams	+2 laps

Retirements

Romain Grosjean Haas	38 laps - brakes
Pierre Gasly Red Bull	38 laps - driveshaft
Daniil Kvyat Toro Rosso	33 laps - damage
Daniel Ricciardo Renault	31 laps - damage

Fastest lap

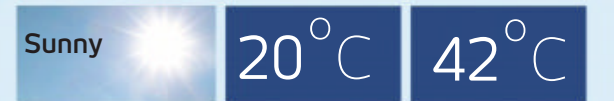
Charles Leclerc: 1min 43.009s on lap 50

TYRE COMPOUNDS USED



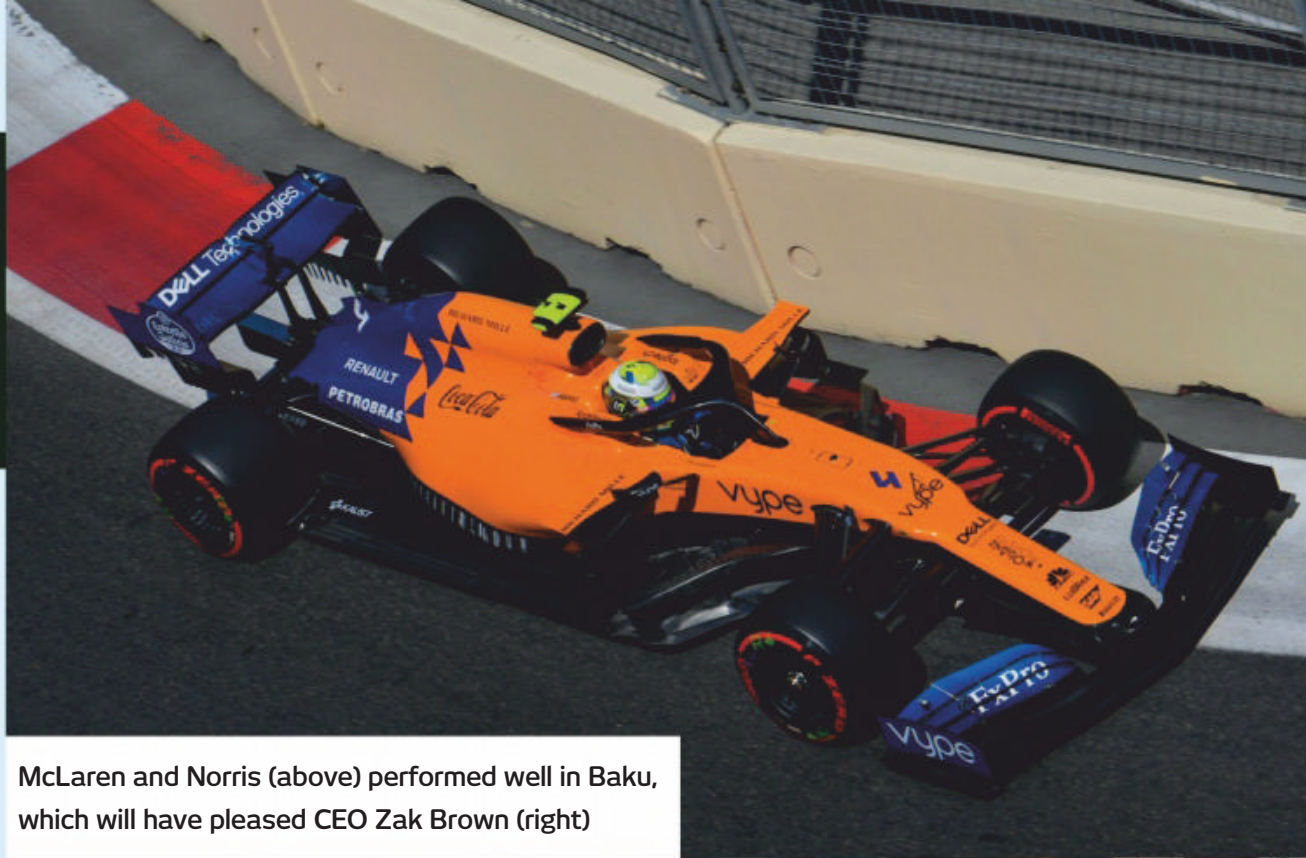
Hard (C2) Medium (C3) Soft (C4) Inter Wet

CLIMATE AIR TEMP TRACK TEMP



DRIVERS' STANDINGS

1 Bottas	87pts	11 Hülkenberg	6pts
2 Hamilton	86pts	12 Sainz	6pts
3 Vettel	52pts	13 Ricciardo	6pts
4 Verstappen	51pts	14 Stroll	4pts
5 Leclerc	47pts	15 Albon	3pts
6 Pérez	13pts	16 Kvyat	1pt
7 Gasly	13pts	17 Giovinazzi	0pts
8 Räikkönen	13pts	18 Grosjean	0pts
9 Norris	12pts	19 Russell	0pts
10 Magnussen	8pts	20 Kubica	0pts



McLaren and Norris (above) performed well in Baku, which will have pleased CEO Zak Brown (right)

that wasn't expected to flatter the MCL34's performance envelope.

"If you say so," was Lando Norris's tart response when it was put to him that McLaren appeared to be in decent shape after both he and team-mate Carlos Sainz figured within the top 10 in Friday's sole practice session. They were 13th and 14th in third practice on Saturday. Back to business as usual, then – randomly flattering to deceive on occasional Fridays, then falling back when the time comes?

Actually no: Norris punched through to Q3 on merit and Sainz might have joined him there had he not encountered yellow flags (caused by Kevin Magnussen sliding his Haas into an escape road) on his final flying lap. Norris lined up seventh on the grid while Sainz started ninth, benefitting from penalties for the Saubers of Antonio Giovinazzi (control electronics change) and Kimi Räikkönen (failed wing deflection test).

Podium finishes have eventuated from humbler positions at this often unpredictable and incident-filled event, but no such chaos came to pass. Norris passed Daniil Kvyat for sixth on the opening lap while Sainz went by Leclerc to run eighth, then



made short work of Kvyat as the Toro Rosso burned through its tyres. Leclerc predictably demoted them both before Sainz launched a DRS-assisted move on Norris for seventh into Turn 1 on lap 9.

Although the McLarens closed in on the sixth-placed Racing Point of Sergio Perez during this first stint, after changing to mediums Perez showed them a clean pair of heels. But they were far enough ahead of Pérez's team-mate Lance Stroll in the closing stages for Norris to make a second stop for softs in an ultimately fruitless bid to make a late attack.

3 Honda upgrade proves essential for Red Bull

Reliability as well as performance has been an ongoing issue for Honda since its return to F1 in 2015. That continues to be the case even though Honda has made significant progress in all areas.

Ahead of Azerbaijan it took the remarkable step of introducing brand new internal combustion engines across both teams it supplies. Since drivers are only permitted three different sets of power unit components across an entire season, this means grid drops are likely later in the season – particularly for the Toro Rosso team, which fitted new engines to both its cars last time out in China.

It was a problem Honda detected within Daniil Kvyat's internal combustion engine during practice

in Shanghai that prompted it to introduce the 'Spec 2' power unit in Azerbaijan. And although the change was predominantly made in order to achieve greater reliability, it now enables both teams to access higher power modes they were previously unable to use.

There's room for improvement. Max Verstappen qualified and finished fourth, unable to make a dent in the straightline advantage of the Mercedes and Ferraris. Pierre Gasly was condemned to a pitlane start by an "unexpected resonance" that put him over the fuel-flow limit in Q1 – necessitating an electronics tweak ahead of the race. He'd climbed up to sixth before a driveshaft broke.



FINISHING STRAIGHT

RACE DEBRIEF

F1 WORLD CHAMPIONSHIP ROUND 5

THE SPANISH GP IN 3 KEY MOMENTS



Dithering over team orders cost Ferrari dear in Spain

PICTURES: ANDY HONE, ZAK MAUGER

1 Indecisive Ferrari falls short again

PICTURES motorsport IMAGES

Ferrari's tactical indecision probably cost its drivers a chance of a podium finish in Spain. On two occasions, team management had to order Sebastian Vettel and Charles Leclerc to swap positions. Both times it was slow to make the call, allowing Red Bull's Max Verstappen to be effectively unchallenged in third as Mercedes dominated the race.

Vettel made a strong start and used the slipstream from Valtteri Bottas's pole-winning Mercedes to draft alongside the Finn and contest the lead into the first corner. But the four-time champion locked his right-front brake, flat-spotted the tyre, and ran too deep into the turn.

As Vettel recovered control he returned to the track in Leclerc's path, while Verstappen – who initially seemed to have drawn the short straw and got baulked behind Leclerc into Turn 1 – used the clear air around the outside line of Turn 3 to make a bold run into third place.

Up front the two Mercedes and Verstappen dropped the Ferrari pair, as Vettel's flat-spotted tyre compromised his pace. Leclerc was clearly

faster, yet it took Ferrari until lap 12 to issue the order for the two to swap. By then Verstappen was long gone, five seconds up the road.

Once the order was given, Vettel pleaded with the team for an alternative tyre strategy so he could switch to fresh rubber. He was brought in on lap 19, and his soft Pirellis were changed for a new set of mediums. It was a slow stop owing to a cross-threaded nut on the left-rear wheel. But his pace once under way was strong and he started lapping quicker than the leaders.

Leclerc was called in on lap 25. Again the left-rear was problematic, but the team decided to put him on hards, meaning he should to have been able to make it to the end of the race.

Within a lap Vettel, who would need to stop again, was on his tail although communication with the team indicated confusion over whether both drivers were on the same strategy. This time it took 10 laps for the call to change position.

When a collision between Lando Norris and Lance Stroll brought out the Safety Car, the various tyre strategies were reset, as Leclerc pitted for

effectively a free stop.

Verstappen aced the restart so Vettel's chance of overtaking was nullified and he came home fourth, with Leclerc fifth. Meanwhile, Mercedes recorded its fifth 1-2 in a row – at the venue where Ferrari dominated pre-season testing less than three months ago. Ferrari team principal Mattia Binotto was forced put on a brave face.

"We know we have a lot to do and that we must improve," he said. "That was made clear this weekend, but we are not losing heart. The mood is still good and there's a strong desire to do better,

2 Bottas baffled by slow start

Valtteri Bottas was at a loss to explain the reason for his slow start to the Spanish Grand Prix, which in effect ended his victory hopes in a single blow.

Bottas dominated qualifying, recording the ninth pole position of his career, though the six-tenths

RESULTS ROUND 5

BARCELONA / 12.05.19 / 66 LAPS



1st	Lewis Hamilton Mercedes	1h 35m 50.443s
2nd	Valtteri Bottas Mercedes	+4.074s
3rd	Max Verstappen Red Bull	+7.679s
4th	Sebastian Vettel Ferrari	+9.167s
5th	Charles Leclerc Ferrari	+13.361s
6th	Pierre Gasly Red Bull	+19.576s
7th	Kevin Magnussen Haas	+28.159s
8th	Carlos Sainz McLaren	+32.342s
9th	Daniil Kvyat Toro Rosso	+33.056s
10th	Romain Grosjean Haas	+34.641s
11th	Alexander Albon Toro Rosso	+35.445s
12th	Daniel Ricciardo Renault	+36.758s
13th	Nico Hülkenberg Renault	+39.241s
14th	Kimi Räikkönen Alfa Romeo	+41.803s
15th	Sergio Pérez Racing Point	+46.877s
16th	Antonio Giovinazzi Alfa Romeo	+47.691s
17th	George Russell Williams	+1 lap
18th	Robert Kubica Williams	+1 lap

Retirements

Lance Stroll Racing Point	44 laps - accident
Lando Norris McLaren	44 laps - accident

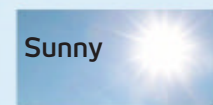
Fastest lap

Lewis Hamilton: 1min 18.492s on lap 54

TYRE COMPOUNDS USED



CLIMATE



AIR TEMP

21°C

TRACK TEMP

42°C

DRIVERS' STANDINGS

1 Hamilton	112pts	11 Sainz	10pts
2 Bottas	105pts	12 Ricciardo	6pts
3 Verstappen	66pts	13 Hülkenberg	6pts
4 Vettel	64pts	14 Stroll	4pts
5 Leclerc	57pts	15 Albon	3pts
6 Gasly	21pts	16 Kvyat	3pts
7 Magnussen	14pts	17 Grosjean	1pt
8 Pérez	13pts	18 Giovinazzi	0pts
9 Räikkönen	13pts	19 Russell	0pts
10 Norris	12pts	20 Kubica	0pts



Hamilton took advantage of Bottas' slow start and took a comfortable win in the end

margin over his team-mate was partially down to Hamilton not having enough battery charge on his first Q3 run.

As the lights went out at the start, Bottas felt a strange vibration through the hand clutch of his W10, and Hamilton was almost instantly alongside.

The defending champion left his braking slightly later than Bottas, who was also dealing with the fast-starting Ferrari of Sebastian Vettel on his outside. Hamilton took the inside line through the corner and controlled the race for his third win of the season.

"On the first lap I felt a vibration in the clutch and that's why the initial getaway was really poor," said Bottas. "It was kind of biting and releasing, in a really quick frequency. It's really annoying. But I

can look in the mirror and say it's not my fault.

"It's quite a lot easier at the front as you can control the pace and, when you're behind and trying to keep up, the dirty air on this track means you are sliding around. So I was expecting the race to be decided into the first corner and even though I tried, it was game over."

Following post-race investigation, Mercedes thinks the problem was related to the track surface. "We believe it was just a lack of grip on the pole position side," said Mercedes sporting director Ron Meadows. "If you look at the support races more often that not the second position guy or even third or fourth had a better start than the pole guy."

3 Haas back on form but rues team-mate clash

Haas won the battle to be the 'best of the rest' in Spain, though the jury is still out on whether the aerodynamic updates it brought to the race have definitively cured the tyre performance issues that have blighted the team's season to date.

The introduction of new parts in Barcelona, which included a new rear wing and revised turning vanes, came after a run of three point-less races. Kevin Magnussen came home seventh, while Romain Grosjean was 10th, but it could have been even better.

The team-mates banged wheels as they duelled for seventh place, forcing Grosjean to take to the escape road, and he ultimately dropped places to Carlos Sainz and Daniil Kvyat. Team principal Gunther Steiner admitted he had 'clear the air' talks with the drivers.

"It's neither here nor there and I told them 'I'm not sitting here until midnight to look at videos to determine whose fault it is'," he said. "We got quite lucky even if we lost some points, but in the end we had two cars in the points."

Both cars in the points was a welcome return to form for Haas, but it could have been better





FINISHING STRAIGHT

RACE PREVIEW

F1 WORLD CHAMPIONSHIP ROUND 7

CANADIAN GP

7-9 June 2019
Montréal



PICTURES: GLENN DUNBAR; ILLUSTRATION: ALAN ELDRIDGE



RACE DATA

Venue Circuit Gilles-Villeneuve
First GP 1978
Number of laps 70
Circuit length 2.709 miles
Longest straight 0.721 mile
Elevation change 17.1 feet
Race distance 189.686 miles
Lap record 1m 13.622s
 Rubens Barrichello (2004)
F1 races held 39
Winners from pole 19
Pirelli compounds C3, C4, C5

CAR PERFORMANCE

Downforce level Medium
Cooling requirement Medium
Fuel consumption 1.8kg/lap
Full throttle 67%
Top speed 217mph
Average speed 132mph

TIMETABLE (UK TIME)

Friday 7 June
Practice 1 15:00-16:30
Practice 2 19:00-20:30
Saturday 8 June
Practice 3 16:00-17:00
Qualifying 19:00-20:00
Sunday 9 June
Race 19:10
Live coverage Sky Sports F1
Highlights Channel 4

THE MAIN EVENT

Following on from Monaco, this is the second consecutive grand prix held on a temporary circuit, although drivers and teams face a very different challenge to that posed by the streets of Monte Carlo.

One characteristic is the same, the lack of run-off and the penalty of hitting a wall if a driver makes a mistake. But the circuit on the Île Notre-Dame, situated in the middle of the St Lawrence river, is a lot quicker than Monaco. Long straights are followed by slow corners enabling a number of overtaking opportunities.

The number of heavy braking zones on the lap make the Circuit Gilles Villeneuve one of the toughest of the year for brake wear. The track's temporary nature also results in grip increasing as the weekend progresses, and the high chance of rain often leads to unpredictable races.

2018 RACE RECAP

After dominating proceedings in recent years, Lewis Hamilton was on the back foot in Montréal in 2018. He could only manage fourth on the grid, qualifying behind his team-mate Valtteri Bottas, Max Verstappen (Red Bull) and pole man Sebastian Vettel (Ferrari).

On the opening lap Toro Rosso's Brendon Hartley hit the wall and collided with the Williams of local driver Lance Stroll, sending them both into retirement. Vettel dominated the race and took the chequered flag – although it was accidentally shown a lap early.

KEY CORNER: TURN 10 The hairpin is a tight second-gear corner where entry and exit are equally important. The entry is a potential overtaking opportunity, but a clean exit is vital because the longest straight on the circuit follows.



THE WINNERS HERE...



2018

Sebastian Vettel
Ferrari



2017

Lewis Hamilton
Mercedes



2016

Lewis Hamilton
Mercedes



2015

Lewis Hamilton
Mercedes



2014

Daniel Ricciardo
Red Bull



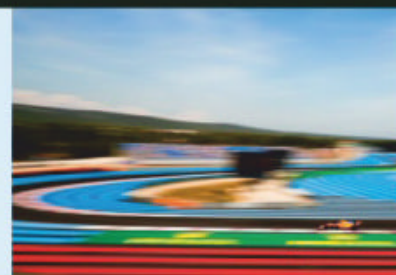
FINISHING STRAIGHT

RACE PREVIEW

F1 WORLD CHAMPIONSHIP ROUND 8

FRENCH GP

21-23 June 2019
Le Castellet



PICTURES: GLENN DUNBAR. ILLUSTRATION: ALAN ELDRIDGE



RACE DATA

- Venue** Circuit Paul Ricard
- First GP** 1971
- Number of laps** 53
- Circuit length** 3.63 miles
- Longest straight** 0.64 miles
- Elevation change** 108 feet
- Race distance** 192.432 miles
- Lap record** 1m 34.225s Valtteri Bottas (2018)
- F1 races held** 15
- Winners from pole** 9
- Pirelli compounds** C2, C3, C4

CAR PERFORMANCE

- Downforce level** Medium
- Cooling requirement** Medium
- Fuel consumption** 1.7kg/lap
- Full throttle** 58%
- Top speed** 213mph
- Average speed** 139mph

TIMETABLE (UK TIME)

- Friday 21 June**
- Practice 1** 10:00-11:30
- Practice 2** 14:00-15:30
- Saturday 22 June**
- Practice 3** 11:00-12:00
- Qualifying** 14:00-15:00
- Sunday 23 June**
- Race** 14:10
- Live coverage** Sky Sports F1
- Highlights** Channel 4

THE MAIN EVENT

In 2018, after a hiatus of ten years, the French Grand Prix returned to the Formula 1 calendar. Instead of Magny Cours, which held the race from 1991-2008, the venue for the reinstated race was the Circuit Paul Ricard, situated in the Le Castellet area of the south of France. After first hosting the French GP in 1971, the 3.6-mile venue was used another 14 times until its last race in 1990.

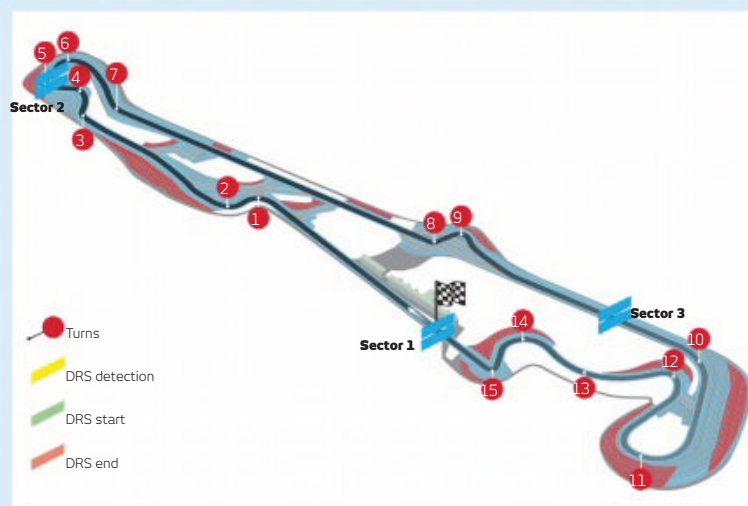
After redevelopment, Paul Ricard was predominantly a testing facility until calls to reinstate the grand prix gathered momentum. The circuit combines a series of slow-speed technical sections with a long back straight – although the original 1.1 mile Mistral straight has been tamed with a chicane, cutting its distance in half.

The weather can sometimes be temperamental here in the hills above the French Riviera and the Mistral wind is an added factor for drivers to contend with.

2018 RACE RECAP

There was drama at the start of last year's race when Ferrari driver Sebastian Vettel made a bold attempt to pass Valtteri Bottas at Turn 1 and collided with the Mercedes driver – sending the Finn into a spin. Further back there was an incident in which local drivers Esteban Ocon and Pierre Gasly made contact – leading to the deployment of the Safety Car. Vettel was issued a time penalty for his first-lap error and finished fifth, well behind race winner Lewis Hamilton.

KEY CORNER: TURN 10 The famous Signes corner at the end of the Mistral straight is one of the quickest turns of the year, taken in eighth gear with an entry speed of 198mph. If the drivers make a mistake here they will be thankful there's plentiful run-off.



THE WINNERS HERE...

2018	1990	1989	1988	1987
Lewis Hamilton	Alain Prost	Alain Prost	Alain Prost	Nigel Mansell
Mercedes	Ferrari	McLaren	McLaren	Williams



FINISHING STRAIGHT

RACE PREVIEW

F1 WORLD CHAMPIONSHIP ROUND 9

AUSTRIAN GP

28-30 June 2019
Spielberg



PICTURES: GLENN DUNBAR; MARK SUTTON. ILLUSTRATION: ALAN ELDRIDGE



RACE DATA

- Venue** Red Bull Ring
- First GP** 1970
- Number of laps** 71
- Circuit length** 2.683 miles
- Longest straight** 0.539 miles
- Elevation change** 208 feet
- Race distance** 190.42 miles
- Lap record** 1m 06.957s
Kimi Räikkönen (2018)
- F1 races held** 30
- Winners from pole** 9
- Pirelli compounds** C2, C3, C4

CAR PERFORMANCE

- Downforce level** Medium
- Cooling requirement** Low
- Fuel consumption** 1.7kg/lap
- Full throttle** 66%
- Top speed** 192mph
- Average speed** 140mph

TIMETABLE (UK TIME)

- Friday 28 June**
- Practice 1** 10:00-11:30
- Practice 2** 14:00-15:30
- Saturday 29 June**
- Practice 3** 11:00-12:00
- Qualifying** 14:00-15:00
- Sunday 30 June**
- Race** 14:10
- Live coverage** Sky Sports F1
- Highlights** Channel 4

THE MAIN EVENT

Since the Austrian Grand Prix returned to the calendar in 2014, the event has proved to be one of the most enjoyable races of the year. This is partly due to the Styrian mountains providing a dramatic rural backdrop, plus the huge number of Max Verstappen-supporting Dutch fans that attend the race.

The Red Bull Ring has effectively nine corners (although a tenth is considered on official FIA maps by counting the flat-out kink between Turns 1 and 2). The short nature of the lap leads to incredibly small margins between lap times and qualifying is notoriously competitive.

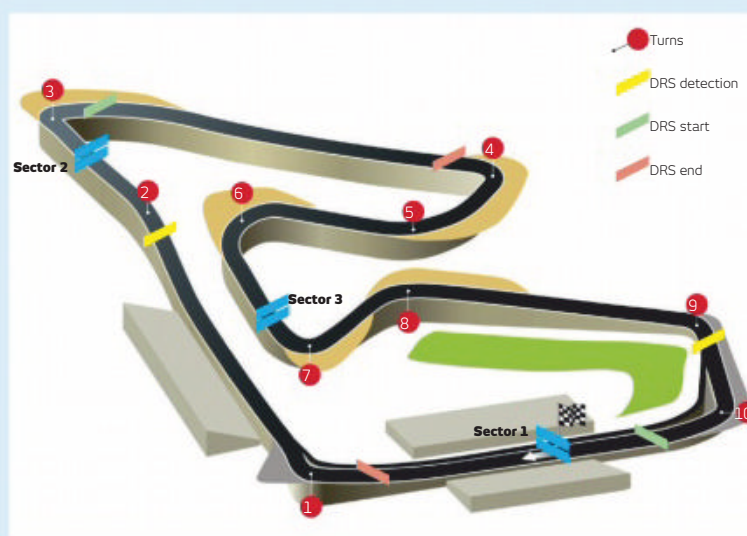
Given the tight corners linked by four straights, engineers try to set up cars for both optimum traction and straight-line speed in the quest for success.

2018 RACE RECAP

Despite locking out the front row, both Mercedes ran into trouble here last year. From fourth on the grid Max Verstappen muscled his way ahead of Kimi Räikkönen's Ferrari on the opening lap to run behind the Mercedes duo. Kimi made a great start and challenged for the lead on lap one, but losing out to Max proved crucial in the end.

After 14 laps, Bottas retired with a gearbox issue which led to a Virtual Safety Car. Verstappen pitted, while leader Hamilton didn't. Ultimately that was a strategic mistake and gifted Verstappen the win, although Hamilton was later forced to retire.

KEY CORNER: TURN 10 A tricky right-hander ends the lap with a fast, downhill approach. It's easy to make a mistake under braking and run wide. Drivers need to get the power down cleanly for the start/finish straight that follows.



THE WINNERS HERE...



2018
Max Verstappen
Red Bull



2017
Valtteri Bottas
Mercedes



2016
Lewis Hamilton
Mercedes



2015
Nico Rosberg
Mercedes



2014
Nico Rosberg
Mercedes

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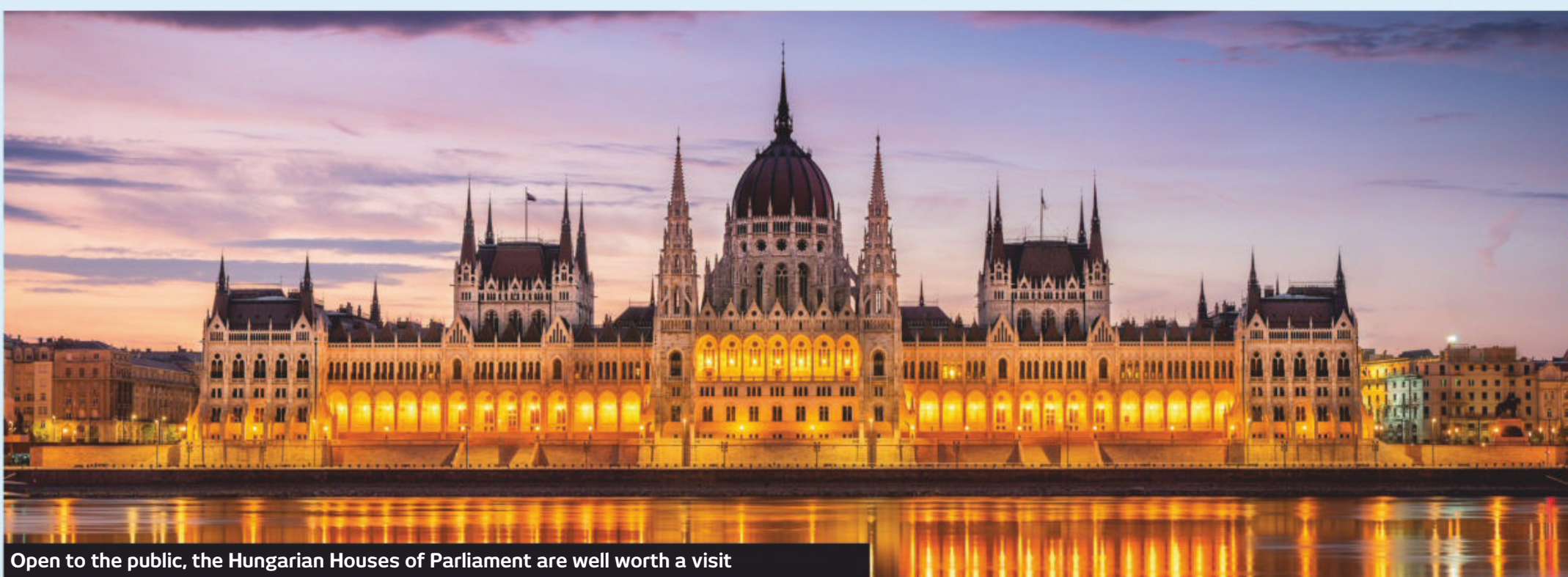
TRAVEL

FINISHING STRAIGHT



The Hungaroring is one of the more picturesque tracks on the calendar

PICTURES: ZAK MAUGER; ANDY HONE; OTHER IMAGES: SHUTTERSTOCK



Open to the public, the Hungarian Houses of Parliament are well worth a visit

VISIT THE HUNGARIAN GRAND PRIX

HUNGARORING, 2-4 AUGUST, 2019

PICTURES motorsport IMAGES

YOUR GUIDE TO BUDAPEST

The Hungaroring is a 30 minute drive outside of Budapest and plays host to one of the more established races on the Formula 1 calendar.

The championship has visited the small town of Mogyoród every season since 1986.

The Hungarian Grand Prix is a fan favourite and while the racing takes place out in Pest county, most of the visiting faithful set up camp on the banks of the Danube in one of Europe's most beautiful cities. Budapest was established in 1873 when Buda and Óbuda, in the hills to the west of the river, officially unified with Pest on the plateau to the east.

A great way to start your visit is a walking tour of the city's incredible architecture. You'll be struck by the stark juxtaposition as you pass between the three founding pillars of this city. The hangover from the days when the country was behind the Iron Curtain becomes more apparent as you move through the densely urban Pest; grey buildings tower over the streets and the iconography of the old USSR is never far away.

Hidden away in the side streets are the famed ruin bars, the first and most striking example of the new, young population of the city taking ownership of their country's turbulent past.

Step inside former tower blocks, factories and offices to be greeted by the trendiest bars in town.

Head through the packed streets to the River Danube and as you emerge from the towering structures of Pest, you'll be greeted with a panorama of Buda in the hills on the opposite side of the river, home to the city's oldest and most beautiful sites. You'll be stunned by the sudden shift in atmosphere from the edgy, modern Pest to the scenic historical Buda. But before heading up into the hills, pay the Hungarian Houses of Parliament a visit. Open to visitors from 8am-6pm, the country's seat of



in association with
**Thomas
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The Széchenyi Baths is a popular place to relax and unwind



High on the Buda hills is the Fisherman's Bastion, which gives great views over Pest



FAST FACTS

Flight time: 2hrs 25mins
from London
Currency: Forint
Time zone: BST+1
Temperature: 27°C (average high)

power is a magnificent sight comprising four towers and a central dome. The clean cream outer walls sit underneath a deep red tiled roof making for a spectacular vista – head down of an evening for a remarkable view of the façade lit up against the night sky.

Once up in the hills, you'll find the city's world-famous spas and bathhouses. Bathing became a fashionable pastime in the early 1900s and the Gellért Baths and Hotel, Lukács Bath and Széchenyi Baths all established themselves at the start of the 20th century – home to pools of 40°C, freezing plunge pools and everything in between.

Szimpla Kert on Kazinczy Street is one of the new ruin bars



You'll spend the day revitalising and relaxing before a frantic weekend of Formula 1 fun.

End your whistle-stop tour on the walls of the Fisherman's Bastion, high on the Buda hills with incredible views over Pest and the fourth largest parliament building in the world. Constructed between 1895 and 1902, the neo-gothic white-walled castle consists of seven towers and a series of high-walled battlements built into the Buda hills. Catch a musical performance or theatrical piece in the structure's grand courtyard and then walk the walls for a perfect parting shot of the city.



ASK THE EXPERT THE THOMAS COOK SPORT REP'S VIEW

What's your favourite part of the track?

The grandstands clustered around the final corner and also the Red Bull stand situated on the hill overlooking the final two corners – the views are amazing.

And the best thing to do away from the track?

Take time to soak in Budapest, go on a tour, wander the streets, sit and watch the world go by. It's gorgeous, certainly up there among the most stunning cities in Europe.

If your guests are celebrating a birthday or anniversary, how could they make their experience more amazing?

Perhaps an evening river cruise down the Danube or dinner in one of the many ridiculously cheap restaurants. You'll get an amazing meal for a fantastic price, so you can go all out to make it a special evening for your loved ones.

What local food/drink would you recommend?

Has to be a pint of their local beer, Sporon, and a bowl of goulash. The beer is crisp and strong, while goulash is an amazing traditional broth-style dish.

And your top tip for this race and destination?

Bring plenty of cash to the track to take advantage of the cheap prices, and lots of sun protection. It was 35°C for the race in 2017.

THOMAS COOK SPORT BREAK DETAILS

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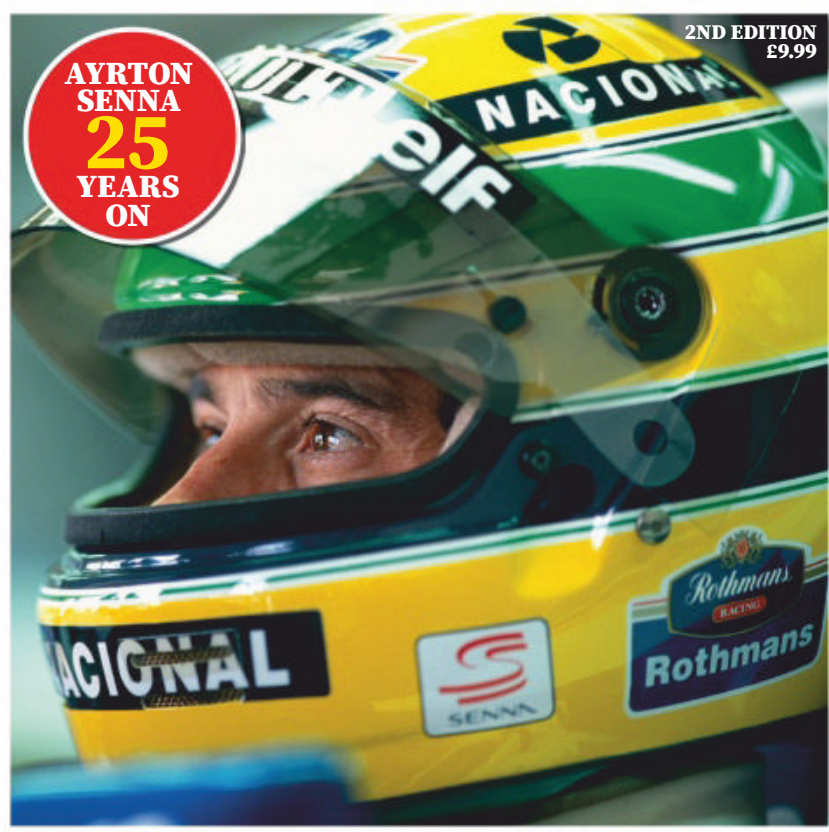
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A celebration of his amazing career



SENNA: CHAMPION, HERO, LEGEND (SECOND EDITION)

Autosport Media UK

Price £9.99

autosport.com/senna

A special magazine celebrating the career of Ayrton Senna is now on sale. Autosport Media UK has launched a second edition of its 172-page special about Senna's life, including new interviews and perspectives on the Brazilian legend.

Among those included are his arch rival Alain Prost, team-mates Gerhard Berger and Damon Hill, and former McLaren team boss Ron Dennis.

All aspects of Senna's life are captured and interviews are reproduced from the *Autosport* archive, covering his early days in British junior single-seaters, right through to arguably his most famous season – battling against the odds in F1 in 1993.

There are also stories of his great cars, including the McLaren MP4/4 that dominated Formula 1 in 1988, and a look at the safety changes that Ayrton's death at Imola in 1994 brought to motorsport.

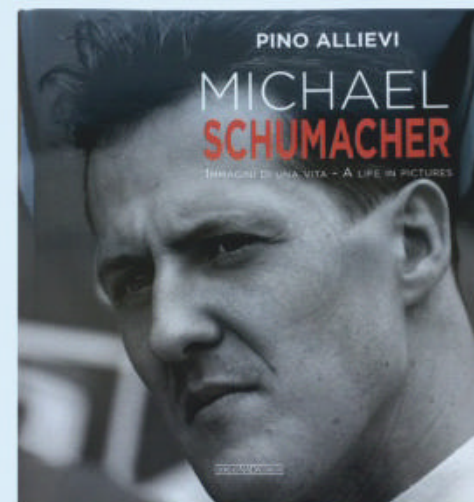
Senna: champion, hero, legend is available in selected WHSmith stores and from autosport.com/senna.

MICHAEL SCHUMACHER: A LIFE IN PICTURES

Author Pino Allievi

Price €37.40

libriadiellautomobile.it



This 240-page book is dedicated to the career of Michael Schumacher, but is less of a picture book than the title suggests. Aspects of the great champion's life are broken into 17 chapters, ranging from 'Mysteries and Shadows' to 'Faith and the Champion' – the latter featuring a short interview with the secretary to Pope Benedict XVI, Father Georg Gänswein.

The words are written by the venerable Italian journalist Pino Allievi, who covered all of Michael Schumacher's Ferrari career from 1996 to 2006. Allievi works for the influential *La Gazzetta Dello Sport*

newspaper and has been a pundit for television channel RAI – as well as contributing to *F1 Racing* magazine.

This glossy Italian publication is bilingual, presented in both Italian and English, which explains why the book is rather text heavy. If you are a Michael Schumacher fan then this is the book for you.

FORMULA 1: THE KNOWLEDGE (SECOND EDITION)

Author David Hayhoe

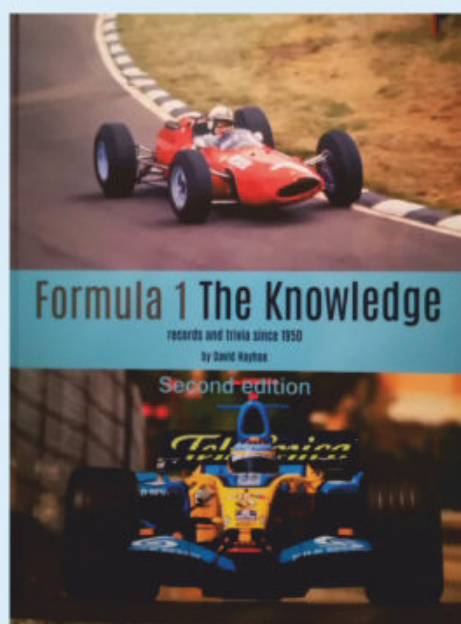
Price £55

veloce.co.uk

There are only a handful of expert Formula 1 statisticians, and none is more dedicated than David Hayhoe. The problem is, by the very nature of keeping up to date with a sport that is forever writing new history, his work is never done – hence this second edition of his masterful work of fascinating facts and figures.

And they really do draw you in. Flick to any page and you'll find titbits and records for every facet of grand prix racing through the ages. For example, page 158: interval between podium drivers of the same nationality? Spain tops that list thanks to Alfonso de Portago and Fernando Alonso; 47 years and 113 days separated their last and first podiums, in 1956 and 2003 respectively. And so it goes on.

This 544-page heavyweight includes the results of every grand prix and records of every driver. But there's so much more in here, including anecdotes and F1 oddities to go with the hard facts. It's only been three years since the first edition – but that's the equivalent of another 60-odd grands prix. Hayhoe had better get working on version three.





F1 MOBILE RACING

iOS & Android

Price Free (in-game purchases)

f1mobileracing.com

If you prefer your gaming on a phone or tablet, then the official F1 Mobile Racing game is for you. And the good news is that it's free to download (with in-app purchases). Teams and circuits are impressively recreated, but obviously the game is much

more limited in scope and realism compared with the computing power of home consoles.

While the game first appeared last autumn, last month a new update appeared offering all the 2019 driver/team combinations as well as updated driver helmets and liveries.

Within the game there are options to customise your own livery, earn R&D upgrades and take on either multi- or single-player game modes.



WHO WORKS IN FORMULA 1

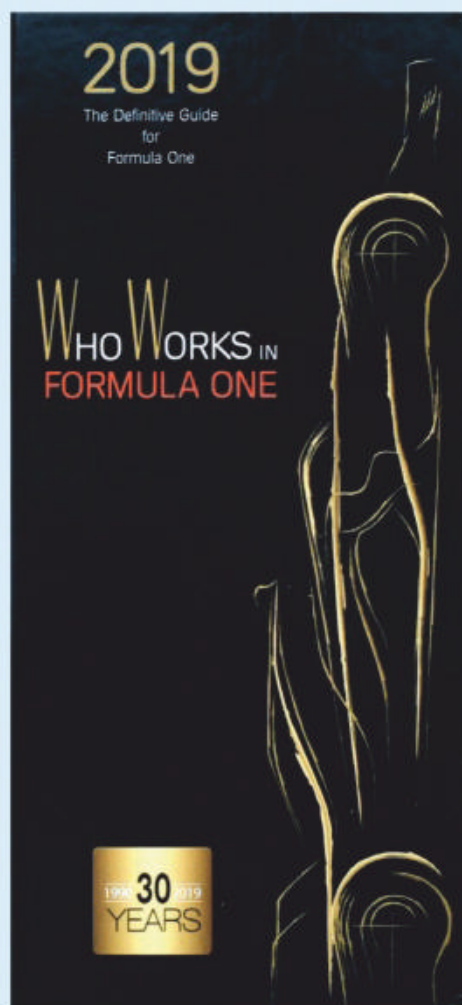
Author Francois-Michel Gregoire

Price £69.00

whoworkssportsguides.com

Now into its 30th year of publication, this is an indispensable directory for the motorsport industry. At over 800 pages it's a cross between the Yellow Pages and Who's Who for Formula 1. With a short bio and contact details – accompanied by a photograph – *Who Works* is the go-to book if you need to find someone in the sport. In total there are over 5,000 contacts and 700 companies listed.

There are also digital versions available online, and sister titles for the wider motor racing scene.



THE LIFE - MONACO GRAND PRIX

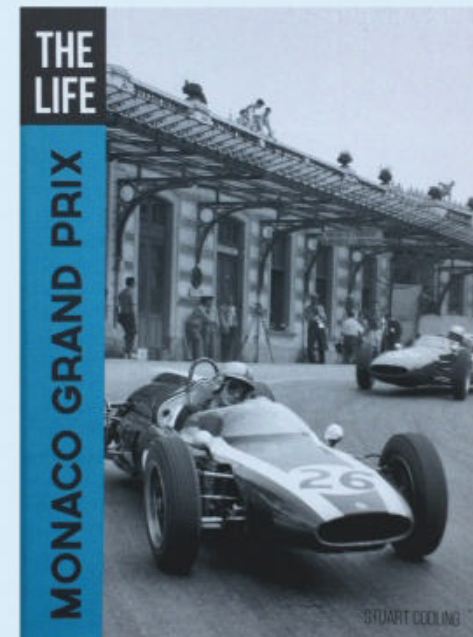
Author Stuart Codling

Price £19.99

quartoknows.com

Motorbooks' 'The Life' series focuses on the social and cultural histories of its subjects and this latest one examining the Monaco Grand Prix joins works on Vespa scooters, Harley-Davidson motorcycles and the actor Steve McQueen.

The lavishly and atmospherically illustrated hardback is authored by our very own executive editor, Stuart Codling, and covers the whole gamut of life in this sun-drenched corner of the world. It traces the origins of the Principality itself and its long-established reputation for roguery, interweaves the story of the development of the grand prix through 20th century history, and



further chapters look at its colourful inhabitants, the famous nightlife, and the Riviera's place in literature and popular culture. It's a comprehensive exploration of the place memorably described by Somerset Maugham as "a sunny place for shady people".



THE FINAL LAP

FINISHING STRAIGHT

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FLAT CHAT

{ FULL THROTTLE
MUSINGS WITH
STUART CODDLING }

PICTURES motorsport
IMAGES

TIME TO BASH A FEW HEADS TOGETHER?

It's a cliché but no less true for being oft-repeated: you can't please all the people all of the time. So, as the business of shaping a new F1 for 2021 and beyond stalls in the mire of inertia, disagreement and vested interests, I have to ask – quite apart from anything else, is this the end of Liberty Media's chums-with-everyone project?

It should all have been settled by now. Gone are the days when new regulations were cooked up behind closed doors by the likes of Max Mosley and Bernie Ecclestone and presented to a bunch of divided-and-ruled teams as a *fait accompli*.

There's also an element hitherto unseen in any new F1 rules package: technical rigour. Both the F1 and the FIA have tooled up with experienced personnel. Where sundry Overtaking Working Groups and Strategy Groups have failed to swerve the unintended consequences of change, surely this army of experts *must* succeed?

What's placed the process on a sticky wicket is that the new rules package is bound in with the



Would the shaping of the new rules for 2021 have been sorted by now if Bernie had still been heading up F1?

beginning of a new commercial settlement – the dreaded Concorde Agreement. This double-whammy has handed the teams – or, to be more accurate, the big manufacturers F1 is relying on to stick around – unprecedented negotiating power, and strained the illusion of unity and chumminess

F1 has cultivated since booting Bernie upstairs.

Not only are the teams more powerful than ever, their fragmented agendas militate against them forming a coherent bloc. Witness the hoo-haa over when to publish the 2021 regulations – you know, the ones that haven't been decided yet. The FIA's own Sporting Code dictates these must be finalised in June – ie now – but the small teams fear such an early start would hand the larger and better-resourced teams an unfair advantage.

The only consensus reached so far is when to publish the rules that haven't been decided yet: not June, not December, but October, this being the peak point of mutual disadvantage. And there's still a disturbing absence of clarity over the philosophy of the 2021 regulations beyond empty sloganeering. What do we want? Better racing! When do we want it? Now! The ratio of noise to science is worryingly unbalanced.

IT'S TIME TO START UNDER-PROMISING AND OVER-DELIVERING. IF THAT MEANS PUTTING A FEW CORPORATE NOSES OUT OF JOINT, SO BE IT

Imagine how dumb it would be to lurch onwards to this imaginary nirvana with no idea of how it could be achieved, how it will work, what it will look like, or even what the tangible benefits will be. The parallels with Brexit – interminable negotiations between impotent stakeholders, endless delays, undeliverable promises – are disturbingly vivid. It's like something out of the pages of Kafka, or perhaps Nigel Roebuck's beloved (nay sublime) *Grand Prix of Gibraltar*.

There are some who opine the answer is to "bring back Bernie". Obligingly, Ecclestone has been showing his face at recent grands prix and practically charging towards anyone with a camera and a live microphone... Watch as the joy of the interviewer – *I've got Bernie!* – evaporates into dismay as they realise they might as well have canvassed the opinions of the mad woman in the attic from a Victorian novel. If there is anyone on this earth whose vision for post-2020 F1 resonates with F1's principals not one iota, it is Bernard Charles Ecclestone.

But there's a grain of plausibility to this yearning for a 'benevolent dictator' figure to ride in and crack heads. F1's policy of trying to please everyone has resulted in deadlock. It's time to start under-promising and over-delivering. If that means putting a few corporate noses out of joint, so be it.

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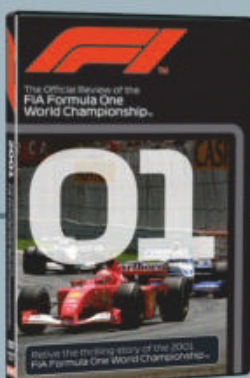
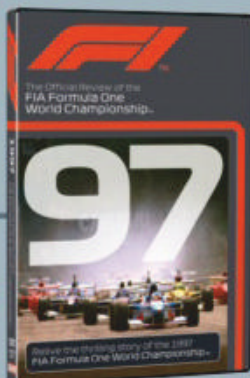
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