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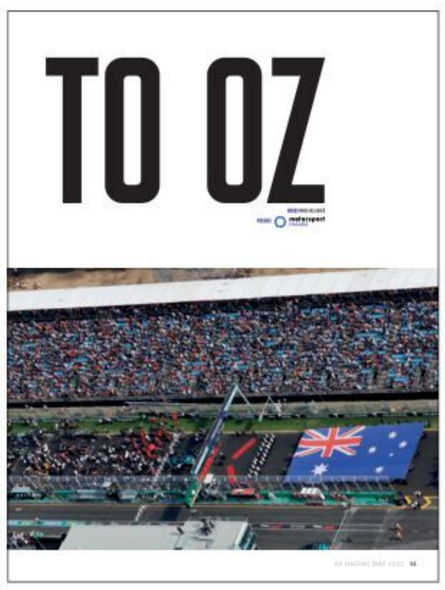

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IGNITION

MAY 2022

Ben Anderson

Contributors

ANDREW BENSON

Andrew tries to unravel the poor performance of the new car from Mercedes, F1's premier team over the past eight seasons (p30)

MARK GALLAGHER

Mark found out how Melbourne welcomed F1 back (p50) and also compared Aston's current struggles with those of Jaguar (p56)

OLEG KARPOV

Guenther Steiner reveals to Oleg how hard it was to keep everyone at a now-rejuvenated Haas motivated over the past three years (p44)

LUKE SMITH

Luke looks into the reasons F1 has signed up for a third US race from 2023, and why it is returning to Las Vegas after 40 years (p38)

How the mighty have fallen...

After so many years of watching the silver (and black) cars dominate Formula 1, it's difficult to fully comprehend what we're now witnessing. Watching Lewis Hamilton – a seven-time champion – struggling to escape Q1 at Imola, asking how far off the pace he is, describing the gap to where he belongs as "crazy", seems unthinkable when you consider this same team won a record eighth consecutive constructors' world championship less than five months ago.

What a difference a winter makes... though perhaps the writing was on the wall much sooner. Two significant rules changes, back-to-back, have derailed the mighty Mercedes winning machine. Not since 2009 has Hamilton begun a Formula 1 season this badly.

"There are people that watch and say that I've never had a bad car," he says. "And I can assure you I have. The 2009 car [McLaren MP4-24] was very, very far off. I was in my third year in this sport, it was a brand new era of car, and I remember coming back in February, or January, to the team, and the head aerodynamicists were like, 'Oh, we've already hit our target.' The new rules said that we would have 50% less downforce in 2009, so they designed the car to have 50% less downforce! In February, we were like, 'Oh, we've already hit our target.' And I was like, 'That doesn't sound right...'

"But I didn't have the experience at the time. And then obviously we got to the first test and we realised that others had almost as much downforce as the previous year. And they were like, 'Oh shoot, we've got to work to regain that.' And the ultimate un-locker of that was a double diffuser. And we got there.

"This one's different because the team have not been like, 'Oh, we've already hit our goal.' We didn't know where everyone would be. They've been super innovative with design. And our wind tunnel was telling [us] we had really good downforce. And unfortunately, we got on track and we didn't see that... there was no bouncing, for example, in a wind tunnel. And we came across this phenomenon. This experience is a lot harder to fix than then we could have ever imagined."

The background to Mercedes' fall from grace, and whether the team can bounce back quickly enough to still make a fight of this year's world championship, is the subject of Andrew Benson's excellent cover feature this month. In the meantime, Mercedes team boss Toto Wolff accepts the W13 represents a roadblock to success for his star driver.

"In a way, I have to protect him here – it's not his low. It's the low of the car performance. We know he's a seven-time world champion. The guy is the best driver in the world, and he's just not having a machine and equipment underneath him to be able to execute."

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F1 PARADE

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A sliver of hope for Silver Arrows

As the final laps of the Australian Grand Prix unfolded and the finishing order consolidated behind a no-doubt-relieved Charles Leclerc, a separate but related race began – to secure a spot to photograph the podium.

I went up on the TV tower with plenty of time in hand to get an elevated perspective on the podium, so in the closing laps I was just looking around for other potential shots while I was there. This one presented itself: a pan using the catch fencing to create an interesting graphic effect. The Mercedes looked particularly nice in the afternoon sunlight – and it was a nice result for the team too, even if a little luck was involved...

Photographer
Carl Bingham

Where Melbourne, Australia
When 4:18pm, Sunday
10 April 2022

Details Canon EOS-1DX MkII
70-200mm lens, 1/60th @ F20

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F1 PARADE
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Reflections on a gravel trip

After Lando Norris spun into the barrier at Acque Minerali (see page 12), bringing Q3 to a premature end at Imola, I remained on the scene for a while to capture his response.

This is the immediate aftermath and it was quite a relective and expressive pose which communicated a lot – despite the fact he still had his crash helmet on! After an accident like that there's a lot to digest, even though he was third on the grid.

That can't have got him too down because within a couple of minutes he was waving to the crowd and they were chanting his name. He's popular here despite being in the 'wrong' car.

Photographer
Carl Bingham

Where Imola, Italy
When 4:42pm, Friday 22 April 2022

Details Canon EOS-1DX MkII 600mm lens, 1/200th @ F4

F1 PARADE

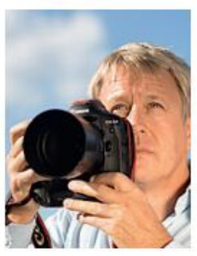
motorsport IMAGES

A chip off the old skid block

The Variante Alta – such an expressive-sounding title to English ears, even though the literal translation is the somewhat mundane ‘high corner’, which this is, being a chicane atop the hill at this undulating circuit.

This is a classic Variante Alta shot. You frame it around the entry kerb and pre-focus where you know the driver’s crash helmet is going to be sharp.

The Haas, Ferrari and AlphaTauri drivers were attacking this corner quite hard, and Mick Schumacher was among the most committed. So that made this very pleasing to shoot – I remember his dad being every bit as aggressive through here back in the day.



Photographer
Steven Tee

Where Imola, Italy
When 1:25pm, Saturday 23 April 2022

Details Canon EOS-1DX MkII 400mm lens, 1/1600th @ F8

1&1
HAAS
Haas Automation Inc.
HAAS

RICHARD MILLE
Tezos
PIRELLI

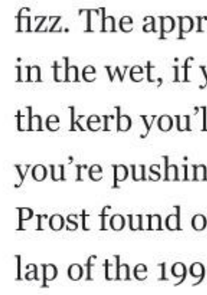
F1 PARADE

motorsport IMAGES

A spillage at Acque Minerali

Imola being a spa town, it's hardly surprising that the neighbouring circuit should have a corner named after one of the local products. And despite some of the gravel and grass run-off being replaced with asphalt, this part of the circuit hasn't lost its fizz. The approach is blind and, in the wet, if you get a wheel on the kerb you'll be off whether you're pushing or not (as Alain Prost found out on the parade lap of the 1991 San Marino GP).

Lando Norris strayed too far onto the paint during Q3 and ended up beached, though his previous lap had been good enough for third on the grid. Later he said second place might have been on the cards.



Photographer
Carl Bingham

Where Imola, Italy
When 4:39pm, Friday 22 April 2022

Details Canon EOS-1DX MkII 600mm lens, 1/640th @ F4

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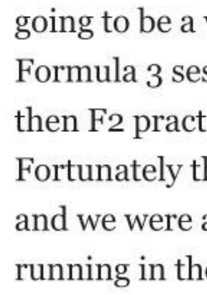
HAAS TOOLING.COM

F1 PARADE
motorsport IMAGES

Formula 1 sparkles in the rain

When we arrived at the track on Friday morning, quite frankly it looked like the entire day was going to be a washout. The first Formula 3 session happened but then F2 practice was delayed. Fortunately the rain eased off and we were able to get some running in the afternoon.

The Imola organisers allowed photographers on the roof of what used to be known as the Marlboro Tower, which gives a great perspective on the straight and pit exit. I think the current F1 cars look great from above, and the spray and sparks add to the composition. There's obviously a bump at this point because all the cars were grounding as they passed it.



Photographer
Steven Tee

Where Imola, Italy
When 2:14pm, Friday 22 April 2022

Details Canon EOS-1DX MkII 70-200mm lens, 1/1000th @ F4

F1 INSIDER

PICTURES motorsport IMAGES

WHY VW F1 ENTRY WON'T BE WELCOMED BY ALL

01 | VOLKSWAGEN IN "FINAL EVALUATION PHASE" OF F1 ENTRY

01 **The subject of furious speculation** in recent months – and, indeed, years – the Volkswagen Group's Formula 1 entry is believed to be a formality now, although the company has yet to make an official announcement. After a board meeting in early April, the company *did* confirm plans "for a potential Formula 1 entry of the two Group brands", those brands being Audi and Porsche.

Initially, it was expected that a decision on the F1 programme would be taken in March, but the discussion of the matter was postponed owing to the war in Ukraine. Now it has finally taken place, but the Volkswagen Group is in no hurry to share the outcome with the public.

The final decision will be announced only after F1's stakeholders agree on the engine regulations which are due to come into force in 2026.

The Volkswagen Group statement read: "We have not yet made a decision as we are currently in the final evaluation phase. At this point, the new regulations for 2026 and subsequent years are not yet available. These will set out far-reaching changes to make the sport more sustainable, which is a prerequisite for Audi's possible entry. Audi Sport is discussing these matters directly with the Fédération Internationale de l'Automobile (FIA)."

In the F1 paddock, meanwhile, many are convinced that Porsche's path to F1 has already been laid out. The brand will return to Formula 1 with Red Bull – and, according to rumours, not only as an engine supplier. Well-placed sources claim that Porsche intends to buy a significant stake in the team as well.

Last year Red Bull began building a base in Milton Keynes for its new powertrains department, and it has already started working on the 2026 engine.

"We will move into our new facility in May," said Red Bull team boss Christian Horner, "and the first Red Bull engine will run on the dyno by the end of the year. So they're making great progress."

It is believed Porsche will join as soon as the Volkswagen Group announces the start of the programme. If F1 does not get off-schedule, the new regulations should be agreed upon by July this year.

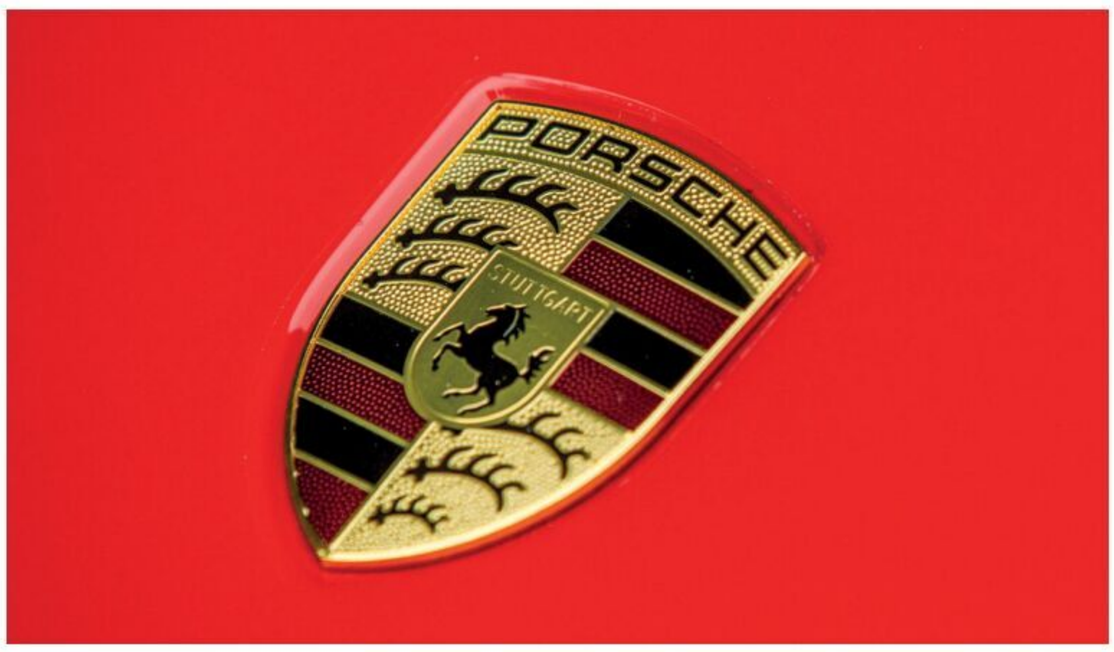
There are more question marks about the Audi entry. It is understood that the Ingolstadt brand will develop its own engine for F1 – although this is likely to be based on work undertaken by Porsche, which ran a hybrid V6 turbo project before abandoning plans to enter the series in 2018.

Its choice of partner, however, is yet to be made. There was speculation late last year that a deal with McLaren was close, but the likelihood of this has diminished. It is now believed Audi is in talks with Lawrence Stroll, whose F1 team has struggled to make progress after rebranding itself as Aston Martin. Another option is believed to be Sauber.

Nevertheless, even though the Volkswagen Group's interest in Formula 1 is considered to be very positive news for the series, not everyone in the paddock is ready to welcome Porsche and Audi unequivocally. The incumbent engine manufacturers are determined to defend their own interests.

From the next season onwards, the engine makers will also operate within a budget cap. Certain restrictions in the

PICTURES: CARL BINGHAM



Red Bull (above, left) is believed to be in pole position to be part of a return to F1 by Porsche (above). Any potential Audi involvement could be with Aston Martin (left)

IT IS NOW BELIEVED AUDI IS IN TALKS WITH LAWRENCE STROLL, WHOSE F1 TEAM HAS STRUGGLED TO MAKE PROGRESS AFTER REBRANDING ITSELF AS ASTON MARTIN

forthcoming regulations will also be prescribed for dyno time – similar to the restrictions F1 teams already operate under in relation to work in wind tunnels and on CFD processing.

The key question at this point is the possible exemptions for new entrants. In theory, these would allow new manufacturers to close the gap with the established engine suppliers – but the latter group have expressed reservations.

One of the chief concerns is that the new joint project between Porsche and Red Bull could in one way or another inherit the IP of the current Honda power unit. On one hand, Red Bull Powertrains has abandoned initial plans to acquire the IP from Honda, and its current-spec engines will continue to be built in Sakura. But on the other hand, can rivals be sure that the engineers who will be working on the new Porsche project will not have the opportunity to peek into the workbooks of their colleagues from Japan?

Rivals also want to be sure that valuable development intelligence doesn't flow between the engineers working for the Volkswagen Group's ostensibly separate engine programmes.

"We need to really pay attention to a couple of things," says Alpine boss Laurent Rossi, who is in charge of the Renault engine programme as well. "We need to check and make sure that two separate teams are two separate teams. You know where I'm going here? We need to make sure that if they're entering the arena as teams, are they works teams, is it coming from Porsche, from Audi, is it coming from Red Bull or Honda? Do they have specific treatment or not? So basically, is the sport going to be better off, or is it going to be worse off?"

At the moment, it is believed new entrants will be allowed to spend $10 million more than existing ones for their first two seasons and $5 million more in the third. Also, they should get more dyno time. Discussions about this are still ongoing and, according to insiders, the battle over concessions for new entrants is the only reason Volkswagen has postponed an official announcement – in order, from a negotiating perspective, to keep its options open.

F1 INSIDER

HAAS WANTS TO KEEP RUSSIAN URALKALI MONEY

Uralkali logos on the Haas at the team launch in February. The dispute over the money already paid to Haas is probably destined for the courts...

02 **The Haas livery does not feature** the Russian flag or the logos of its erstwhile sponsor Uralkali anymore, but there may still be a significant amount of money left in the team's accounts originating from Russia. According to a report by *GP Racing's* sister website *Motorsport.com*, Gene Haas's team has refused to return $13 million to the Uralkali company, money which had been paid upfront before the start of the season.

The contract with Uralkali was terminated unilaterally after Russia's invasion of Ukraine. At the same time, Haas dismissed Uralkali co-owner Dmitry Mazepin's son Nikita, who was one of the team's drivers in 2021.

Breaking with the title sponsor is unlikely to improve Haas's financial situation, yet it is also premature to say that situation has worsened dramatically, since a large part of the Uralkali funds for 2022 has already made its way into the team's accounts. In March, shortly before the start of the new championship season,the company issued a statement emphasising that it is seeking repayment.

"Uralkali intends to protect its interests in line with applicable legal procedures and reserves its rights to initiate judicial proceedings, claim damages and seek repayment of the significant amounts Uralkali had paid for the 2022 Formula 1 season," said the Uralkali statement.

"As most of the sponsorship funding for the 2022 season has already been transferred to Haas and given that the team terminated the sponsorship agreement before the first race of the 2022 season, Haas has thus failed to perform its obligations to Uralkali for this year's season. Uralkali shall request the immediate reimbursement of the amounts received by Haas."

In response, Haas reportedly informed Uralkali that it was not going to return the $13 million already received, and it also demanded a further $8.6m compensation for a 'loss of profits' – money Uralkali was apparently supposed to transfer to the team's accounts over the course of the 2022 season.

The letter which the team is understood to have sent Uralkali states that the agreement was terminated because of a clause in the sponsorship deal in which Uralkali undertook not to 'injure, bring into dispute, ridicule, or lessen the public reputation, goodwill or favourable image of Haas'.

The team's position is that Dmitry Mazepin's connections with the Kremlin, as well as the sanctions imposed on both him and his son by the European Union, became the reason for terminating the contract – though inclusion of the Mazepins in EU sanctions lists was announced after the break in relations between Uralkali and Haas.

In an interview with CNN, Nikita Mazepin accused both the team and the entirety of F1 of duplicity, questioning values of a sport "where teams are allowed to be keeping sponsorship money without fulfilling the contract, and even asking for more, even though they say they don't want money from Russia".

Haas boss Guenther Steiner neither confirmed nor denied the refusal to return the funds paid to Uralkali. "I don't want to comment on that," he said at Imola. "It's a legal situation. Confidentiality I respect, and that's how it should be."

It seems almost inevitable that the battlefield of this dispute will soon move from the media to the courts. ▶

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> AlphaTauri: how does Red Bull's B-team operate?
> The history of Brabham: part 3
> Now That Was A Car: Aston Martin DBR4

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F1 INSIDER

BUDGET CAP FIGHT BREWING OVER RISING FREIGHT COSTS

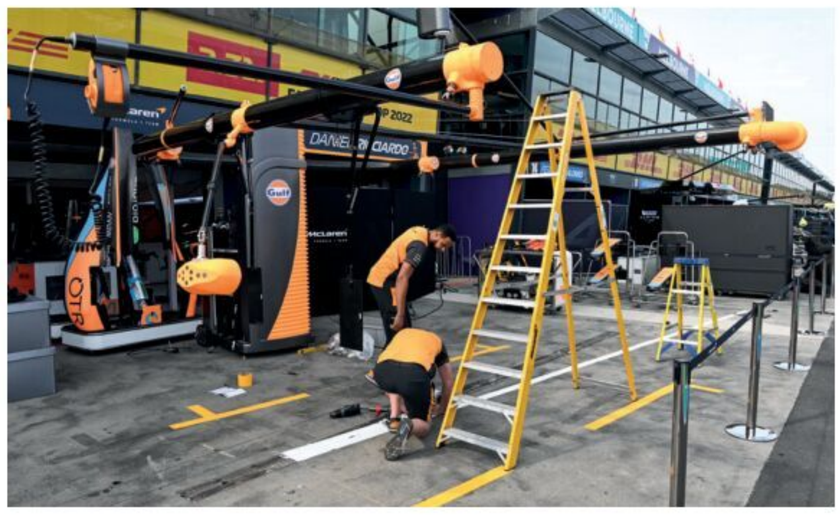
03 **Formula 1's attempt to deliver its** record-breaking 23-race season risks running into a logistical trap – especially towards the end of the championship. Difficulties with freight delivery which already existed at the beginning of 2022 have been aggravated by the situation in Ukraine.

The alarm bells rang in March, ahead of the Australian GP, when a ship carrying three teams' cargo ran behind schedule – and only thanks to emergency assistance from F1 logistics partner DHL was the equipment delivered to Melbourne on time. For this, the ship had to be redirected to Singapore, and from there – by plane – the freight got to Australia.

A week earlier, the MotoGP weekend in Argentina had to be shortened by a day owing to equipment transport delays. Many in the F1 paddock fear similar problems, especially in autumn, when within two and a half months F1 is planning to hold eight or even nine (if a replacement for the Russian Grand Prix is found) races on four different continents.

THE MOTOGP WEEKEND IN ARGENTINA HAD TO BE SHORTENED BY A DAY OWING TO EQUIPMENT TRANSPORT DELAYS. MANY IN THE F1 PADDOCK FEAR SIMILAR PROBLEMS

"We have a very complicated calendar and there's very tight timescales," said Red Bull Racing boss Christian Horner, "and with some of the triple-headers and double-headers coming up late in the year, obviously losing freight for a period of time could wreak havoc."

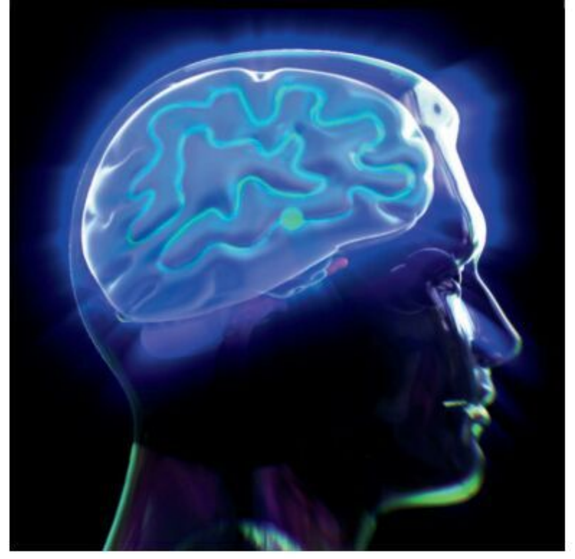


McLaren sets its equipment up ahead of the Australian GP. A logistical crisis for F1 was only narrowly averted when DHL re-routed some sea freight

However, an even bigger concern for the teams is the increased cost of air and sea freights. *GP Racing* understands that last year F1 teams spent about $4.5 million each on their logistical needs, and that this season costs will increase by at least $2 million – and this is the best-case scenario. According to more pessimistic forecasts, logistics costs could more than double compared with 2021, as costs of delivery continue to grow, which complicates budget planning, especially with the cost cap in force.

"Sometimes we only know the final price after we get our cargo at the race," one team boss told *GP Racing*. "So it may be that we'll receive some invoices at the end of the year, and it's difficult to predict the amount. It would have been easier to reduce the cost cap by $5m and take freight costs out of it."

This plan is supported by many teams, given the level of inflation this year. F1's managing director of motorsports Ross Brawn has already confirmed that the matter of increasing the cost cap is on F1's agenda. But teams currently operating under the cap will likely try to block any move to adjust the ceiling.



F1 MASTERMIND

Your chosen specialised subject: the world's greatest motorsport

Q1 At which race did Charles Leclerc claim his first pole position?

Q2 Who was the first driver to win the Monaco GP three times?

Q3 The first Canadian GP was at Mosport in 1967, but when did the circuit last host the race?

Q4 How many times between them did Aston Martin drivers Sebastian Vettel and Lance Stroll start a race from 10th or better in 2021: 9, 14 or 17?

Q5 The Arrows F1 team folded after the German GP in 2002, but who were its last two drivers?

Q6 Who am I: I started 163 GPs from 1978 to 1989 for Martini, Surtees, Renault, Ferrari and Ligier, winning seven times, with 18 poles and 12 fastest laps?

Q7 True or false: Aintree hosted five British GPs and all five were won by different manufacturers.

Q8 Which race did Kimi Räikkönen win four times between 2004 to 2009?

Q9 Up to and including the Australian GP, who has the most fastest laps: Max Verstappen, Valtteri Bottas or Daniel Ricciardo?

Q10 Which four drivers were racing in the Australian GP for the first time this year?

1 2019 Bahrain GP **2** Stirling Moss (1956, 1960, 1961) **3** 1977 **4** 17 **5** Heinz-Harald Frentzen and Enrique Bernoldi **6** René Arnoux **7** True **8** Belgian GP **9** Bottas (19) **10** Zhou Guanyu, Nicholas Latifi, Mick Schumacher, Yuki Tsunoda

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HAS AMERICA FINALLY 'GOT' FORMULA 1?

Formula 1 in Miami is a big deal. It's a lively, happening city with great vibes that I discovered for myself in the late 1990s while commentating on races from Homestead. F1 has managed to immerse itself into an even more central part of town and connect with an existing sports environment that provides a real gem. Add in the glamour and it's an event that was a sell-out before tickets even printed.

Growth of interest in the United States was always going to be key for F1 owner Liberty Media when the company took over from Bernie Ecclestone in 2017, and it has clearly made rapid progress. There was record attendance at Circuit of The Americas in Austin, Texas last season and now a third American race – in Las Vegas – will join the calendar from 2023; the US market is becoming truly significant.

Much of the surge in interest stems from Netflix's *Drive To Survive* docu-series. One person who has seen that change in the flesh is Sean Kelly (@virtualstatman on Twitter) who grew up immersed in motorsport in the UK, became fascinated by facts and statistics and has been a key provider of information to commentators and TV channels for many years.

Sean moved to the States in 2007; he started meeting people in his local gym in San Diego but when asked about his job and mentioning F1 he saw a lot of blank faces. He soon began referring to it as 'TV and motorsport', which got a nod but also a similar lack of interest.

That all started to change in 2019 and particularly during the subsequent year when COVID regulations applied around the world. "I don't know whether it was coincidence or a contributing factor but during lockdown there suddenly seemed to be an increase of interest in F1," confirms Sean," because everybody was sat at home binge-watching stuff and Netflix was one of the biggest suppliers of that.

"By the time we started to come out of lockdown, I would go to the gym and my friends were suddenly saying stuff like 'So I watched the Austrian GP, was that the first race of the season?' I would confirm it and ask why they had watched it 'Oh, I watched this show called *Drive to Survive* on Netflix, have you heard of it?' And then it was just a snowball effect. Once something catches on like that, it becomes culturally significant and completely changes things."

Last October, Sean had various roles at the US Grand Prix in Texas which included hosting events on stage for a crowd which had grown so quickly over the previous couple of years that circuit organisers were dealing with logistical challenges simply getting people in and out.

"When on stage, I would often ask people which of them were at a grand prix for the first time in their lives", Sean relates. "Half of all hands would go up. When I asked them to keep their hands up if they had become F1 fans because of *Drive to Survive*, almost every hand would stay up.

"This was a total shift in the US market. It's gone from appealing to petrolheads to being something which appeals to the younger generation. When I walked down the pitlane in Austin, there were all these teenagers and young kids and they weren't just there for Lewis Hamilton; they were excited because of Charles Leclerc or Haas or they were frantic Pierre Gasly fans, and I just thought, 'incredible, you are all invested in this'."

Several of Sean's friends attempted to get tickets for Miami – the same pals who used to have no interest in what he was doing on NBC or Speed TV. Now he's getting very different reactions.

"In Bahrain at the start of this season, half an hour before the start of the race I was getting direct messages saying, 'My six-year old is up, wearing his Lewis Hamilton hat, ready for the off!'. And this was at 8am on the West Coast, yet they were up to watch it.

"Completely different: two of my friends who I work out with are in their twenties. They are going to university in Barcelona this year, and they said 'Oh, we have to get tickets for the Spanish Grand Prix this year'. I thought, 'what's going on here?'. We've got people in San Diego who are going to the Spanish Grand Prix let alone Miami. I can't believe this is happening!"

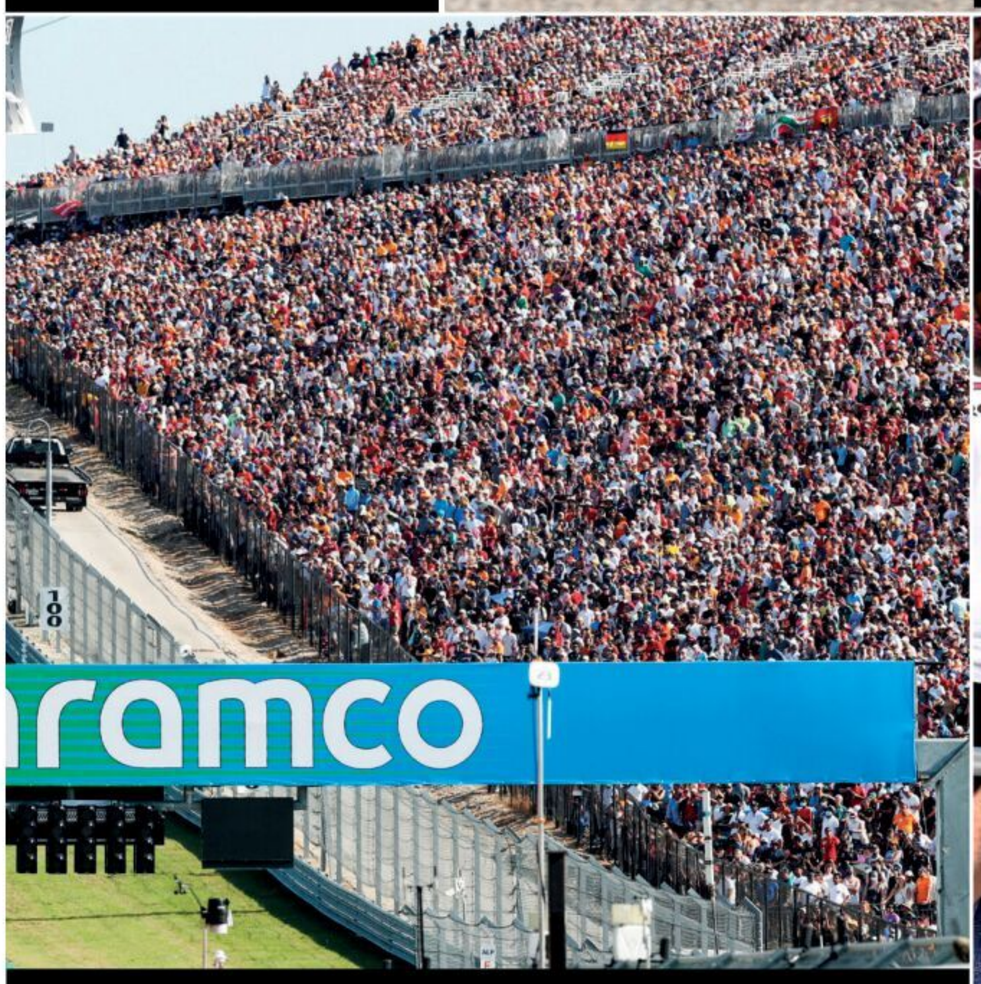
Sean also sees the Las Vegas event becoming another potential gamechanger as it will be a night race, ensuring coverage will go out at prime time in the United States. "That one will be the biggest F1 entertainment event there has ever been, because to bring the narrative onto US prime time television for the first time will be astonishing. We're just completely breaking new ground at that point."

The shift in Formula 1's recognition in the US does seem to be genuine, as discovered by this key number cruncher. Analysing statistics weekend after weekend, he's only ever watched one episode of *Drive to Survive*. But he's still a supporter.

"It's not for people embedded in the sport and it doesn't need to be," he says. "It's for people who don't know anything about it and the effect I've seen in the US has been startling – so whatever they are doing, they need to keep doing it."

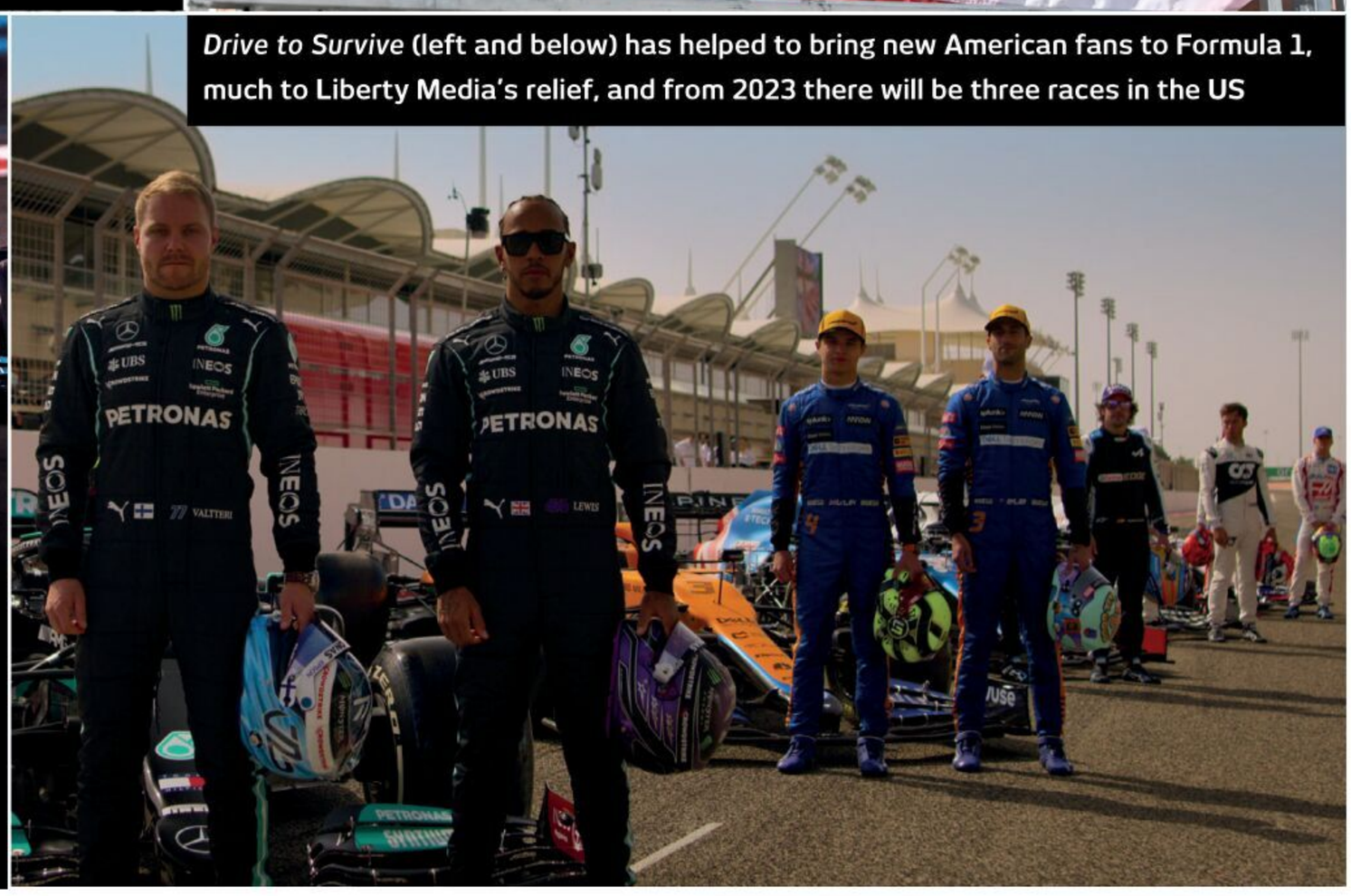
Sean Kelly has seen a change in the attitudes of many Americans to F1

US interest in F1 made a big jump, according to Kelly, for the 2020 Austrian GP, the first race after pandemic lockdowns led to people watching *Drive to Survive*



The 2021 US GP at Austin's Circuit of The Americas (above and right) was a huge success compared with previous races

Drive to Survive (left and below) has helped to bring new American fans to Formula 1, much to Liberty Media's relief, and from 2023 there will be three races in the US



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UNDER THE HOOD

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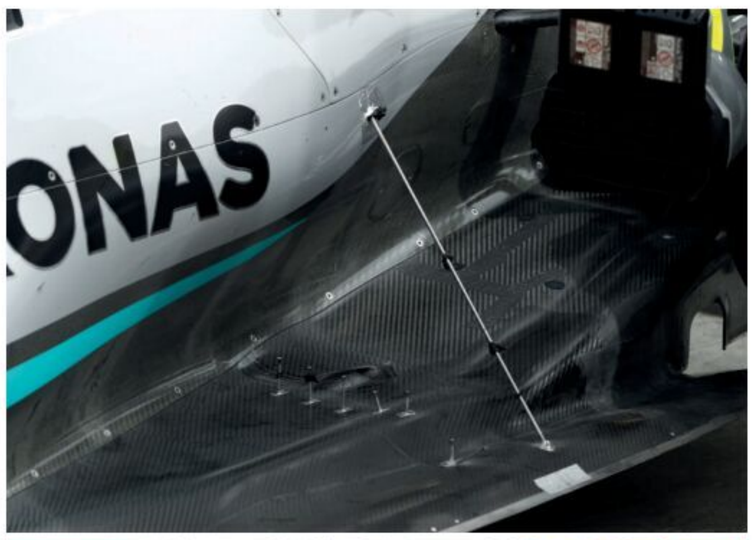
THE UNWELCOME RETURN OF PORPOISING

A new word was on everyone's lips after the first test of the radically new 2022 cars. That word was 'porpoising' – and actually it wasn't that new, as the few of us still active in F1 who were also involved in the days of skirted ground effect cars remember the phenomenon well. In fact, this troublesome effect is not just historic, as anyone who has worked with contemporary LMP cars knows. Like the new generation of F1 cars, sportscars have, for some time, incorporated design features which make porpoising prevalent, and engineers of these cars know how to tame it.

But what exactly is porpoising? Many will say it is an aerodynamic effect, but that is only partly true. It is a fact that we only see porpoising when there is an element of ground effect aerodynamics in use, but F1 cars have been running in ground effect for many years. The front wing, for example, is significantly influenced by ground effect and, prior to the advent of high-rake cars over the last 10 years or so, it was common practice to run a setup that stalled the diffuser at the low ride heights



Mercedes was forced to add a floor stay in testing (top). Red Bull's more shaped floor doesn't need one (above)

associated with high speeds in order to reduce drag.

So, if front wings and diffusers were running in ground effect why didn't cars porpoise in the recent past? To answer this question we need to both understand the mechanism of the aerodynamics and also, from a systems engineering point of view, understand how the aerodynamics interact with the chassis dynamics.

Looking at the aerodynamics first, we can see that the 2022 cars are running the rear ride heights much lower than was the case previously. This is because the shaped underfloor is no longer a simple diffuser starting at the rear axle centre line, but is now a full-length device extending from the front of the sidepods to the rear of the floor. Additionally, until this year the outer lateral part of the floor was 50mm higher than the floor on the car centre line. This 'step plane' ensured there was little sealing of the floor to the ground. What sealing there was occurred due to the presence of vortices rather than physical bodywork. Now the edges of the floor are much lower and performance is rewarded by low rear ride heights.

As the ride height lowers, which it does as speed increases and the enormous aerodynamic forces try to push the car into the ground, so too does the effective sealing increase. It is commonly thought that this leads to the airflow detaching from the floor due to stall, and to some extent this is true, but it is also true that at lower ride heights, the vortices formed by the strakes at the front of the floor can burst, thereby significantly reducing the flow through the underbody and hence the downforce.

We now have an unstable system. As speed increases, the car squats lower to the ground and downforce increases at a rate greater than would be predicted by the speed increase alone. It then reaches a critical speed at which the aerodynamics can no longer 'hang on' and downforce decreases causing the car to rise slightly. As it rises, the aerodynamics become stable again and start to suck the car down.

This movement is of course linked to the vertical stiffness of the car. If the car had no springs and the tyres were infinitely rigid then, as the speed increased, the downforce would increase proportional to the square of the speed as simple fluid dynamics theory would predict.

Even stiffly sprung F1 cars are far from rigid, however. They have two fundamental frequencies of vertical motion. The first is the bounce frequency associated with pure vertical motion of the car. This occurs ▶

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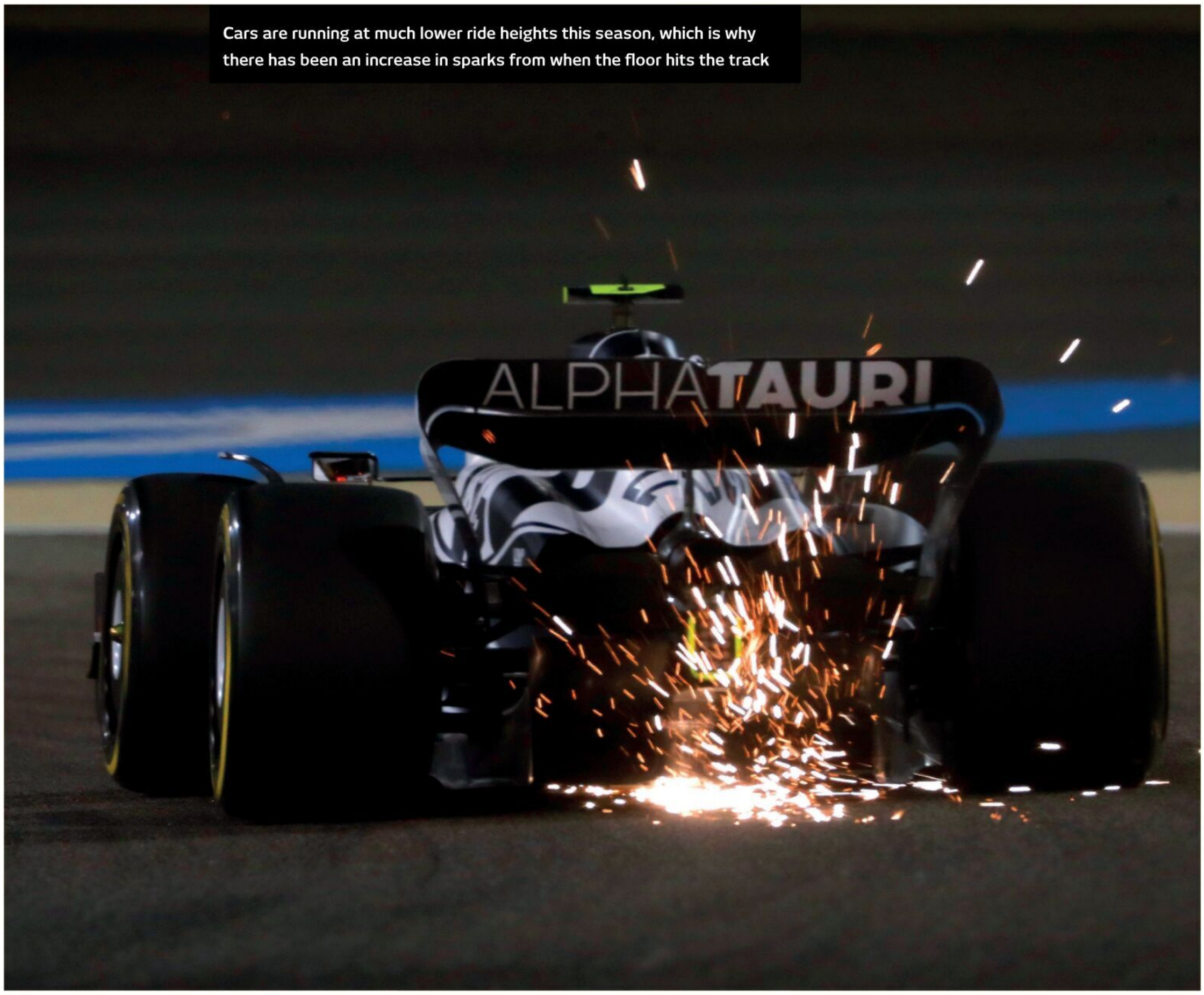

Cars are running at much lower ride heights this season, which is why there has been an increase in sparks from when the floor hits the track

typically around four or five hertz. The second is the pitch frequency associated with the front of the car going down as the rear rises and vice-versa. This is at a higher frequency, maybe up to seven hertz.

If we examine the frequency of bouncing of the cars, which we can do even without access to data by using a stopwatch and examination of video, we see the frequency of porpoising is different on different cars but lies typically between 4.8-5.4 Hz. In other words, the aerodynamics are coupled to the suspension frequency.

So what determines the suspension frequency? The simple answer is: for a car of a given mass, the stiffer the system the higher the frequency. Due to the requirement to run closer to the ground, the stiffness of the suspension springs is much greater. Additionally, the vertical stiffness of the low profile 18" tyres is higher, although not by as much as one might think.

All this assumes that the bodywork itself is rigid and it is here that some teams have specific problems. With the trend to waist the bodywork in as much as possible between the rear wheels, a significant area of the floor is left less well supported than one would like. It is noteworthy that designers are struggling to get their cars to the weight limit and part of the reason for this is a huge amount of stiffness needs to be built into the floor in this area, where it is cantilevered out from the engine and gearbox. This stiffness can only be achieved by a substantial, weighty, floor construction. Those who did not pay enough attention to this will suffer worse porpoising.

THIS STIFFNESS CAN ONLY BE ACHIEVED BY A SUBSTANTIAL, WEIGHTY, FLOOR CONSTRUCTION. THOSE WHO DID NOT PAY ENOUGH ATTENTION TO THIS WILL SUFFER WORSE PORPOISING

A very late change to the regulations to allow a further floor stay to be put in this area allowed stiffness to be increased with a minimal weight penalty. Helpful for those who had not achieved the required stiffness, but annoying for those who built heavy and substantial floors.

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F1 PRO

Essential guide to the business of F1

STRAIGHT TALK

MARK GALLAGHER

@_markgallagher

When GP2 runner-up Vitaly Petrov arrived in F1 in 2010 it seemed he had the whole of Russia behind him. Petrov was supported by his father Alexander and associates including Leonid Mikhelson, chairman of Russian gas company Novatek, and Sergey Chemezov, CEO of state-owned military and defence tech company Rostec. Both Mikhelson and Chemezov are friends with Putin. Chemezov is a former KGB colleague...

During Petrov's first season it was announced that Russia would join the F1 calendar from 2014 onwards, the PR machine going into overdrive when Putin was invited to test a Renault in St Petersburg.

Petrov managed to score a podium finish in Melbourne in 2011, but his season fell away and a subsequent move to Caterham only lasted a year. By the time the inaugural Russian Grand Prix in Sochi was held, Petrov was out of F1. Careers ending are one thing, quite another was the assassination of Alexander Petrov in October 2020.

While the Petrovs were making a splash in the F1 paddock, other Russians began making moves in a similar direction.

I first met Marussia at the 2010 Frankfurt Motor Show, later introducing them to Jim Wright at Virgin Racing in a deal which asked the Russian company to pay Cosworth's engine bills.

Owner Andrei Cheglakov and Marussia boss Nikolai Fomenko so enjoyed the opportunity to use F1 as a marketing platform that they bought the team and sponsored drivers in lower formulae, most notably Robert Wickens when he won the 2011 Formula Renault 3.5 championship.

Meanwhile, Marussia's sportscar ambitions stalled. Cosworth found the car too small to accommodate an engine with the prerequisite horsepower. That was the least of Marussia's problems. By 2014 the project was dead, and so too the F1 programme.

Russia's GP lasted eight seasons, even if the Kremlin's enthusiasm appeared to wane, while Daniil Kvyat acquitted himself well as a driver but never quite broke through.

But none of it matters. Formula 1 is finished with Russia.

During a private tour of the Kremlin Museum a few years back, my guide – Anna – showed me the Tsar Cannon and Tsar Bell. The cannon, with the largest calibre in the world, had never fired a shot, thanks in part to requiring a one-ton cannon ball. The bronze bell had never been rung, cracking due to heat stress shortly after being cast.

"That's Russia," she said. "We build the biggest cannon that never fired and the biggest bell that never rang. We're good at big ideas but very bad at execution."

An understatement of global proportions.

RUSSIA FORCED OUT INTO THE COLD ONCE MORE

Standing in sub-zero temperatures in Moscow's Red Square, Narain Karthikeyan, Tiago Monteiro and Robert Doornbos welcomed the opportunity to try out some traditional ushanka fur hats.

It was February 2005, the last car launch for Jordan Grand Prix and the first outing for F1's newest team owner, Russian-Canadian commodities trader Alex Shnaider. A military band played, the Kremlin's walls and domes of Saint Basil's Cathedral providing backdrop.

Shnaider was gone 18 months later, the team rebranded as Midland, then sold to Dutch group Spyker. If that deal heralded the start of Russia's involvement in contemporary F1, it also illustrated a degree of unpredictability.

How little we knew.

Vladimir Putin's unwarranted war in Ukraine has caused untold human misery and made Russia a pariah state. Although inconsequential by comparison, F1 has terminated its relationship with both the country and the Mazepin family.

For a time it had looked promising.

Just some of Russia's involvement in F1: Jordan in Red Square in 2005 (top), Vitaly Petrov's 2011 podium (middle) and Petrov interviewing then GP2 driver Nikita Mazepin at Sochi in 2018 (above)

PICTURES: MOTORSPORT IMAGES ARCHIVE. ILLUSTRATION: BENJAMIN WACHENJE

THE FALL OF MERCEDES

Mercedes has gone from perpetual winner to rank outsider in the space of a winter – and an aerodynamic phenomenon known as 'porpoising' is said to be to blame. But what does that actually mean, and how can the team lift itself out of such a drastic competitive slump?

WORDS
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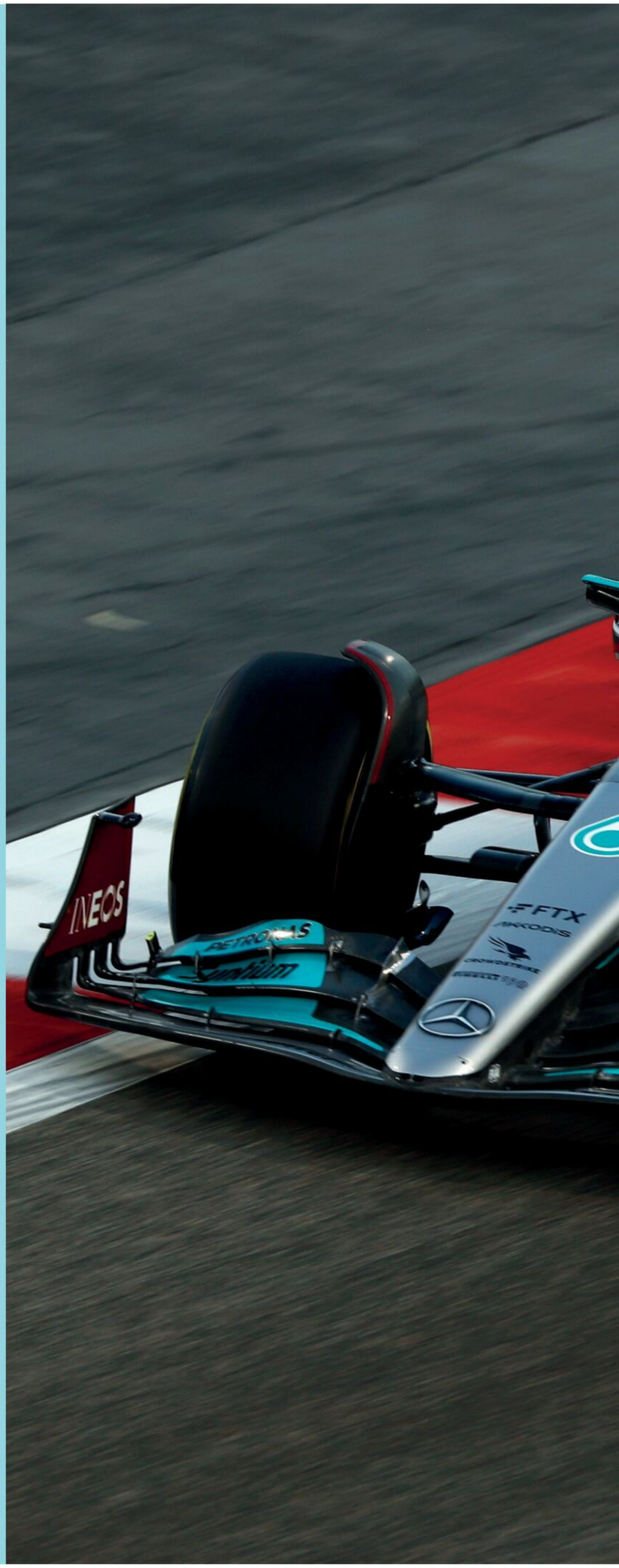

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WHAT HAS GONE WRONG AT MERCEDES?

The team that has won a record eight consecutive constructors' championships since the start of Formula 1's hybrid-engine era is floundering at the start of the 2022 season.

At the time of writing, after the Australian GP, the W13 is an average of 0.847s off the pace in qualifying. Ferrari and Red Bull are in a league of their own at the front, and Lewis Hamilton appears to have no more of a chance of avenging the controversial loss of an eighth world title in Abu Dhabi last year than Max Verstappen's new rival, Charles Leclerc, did of winning a first at the same point a year ago.

Formula 1's much-vaunted new rules have caught Mercedes on the hop, and the team is scratching around trying to understand why it is so far off the pace, and what can be done about it.

As team principal Toto Wolff puts it: "There are deficits everywhere. We have many parts on the car that don't work, that we don't understand, that don't perform enough. This is not where we expect the car to be."

Hamilton has been even more succinct: "We need more grip and we need more power."

So how much trouble is Mercedes in, and how likely is a recovery before this season becomes an exercise in damage limitation, and the championship a write-off?

WHO GETS GROUND EFFECT?

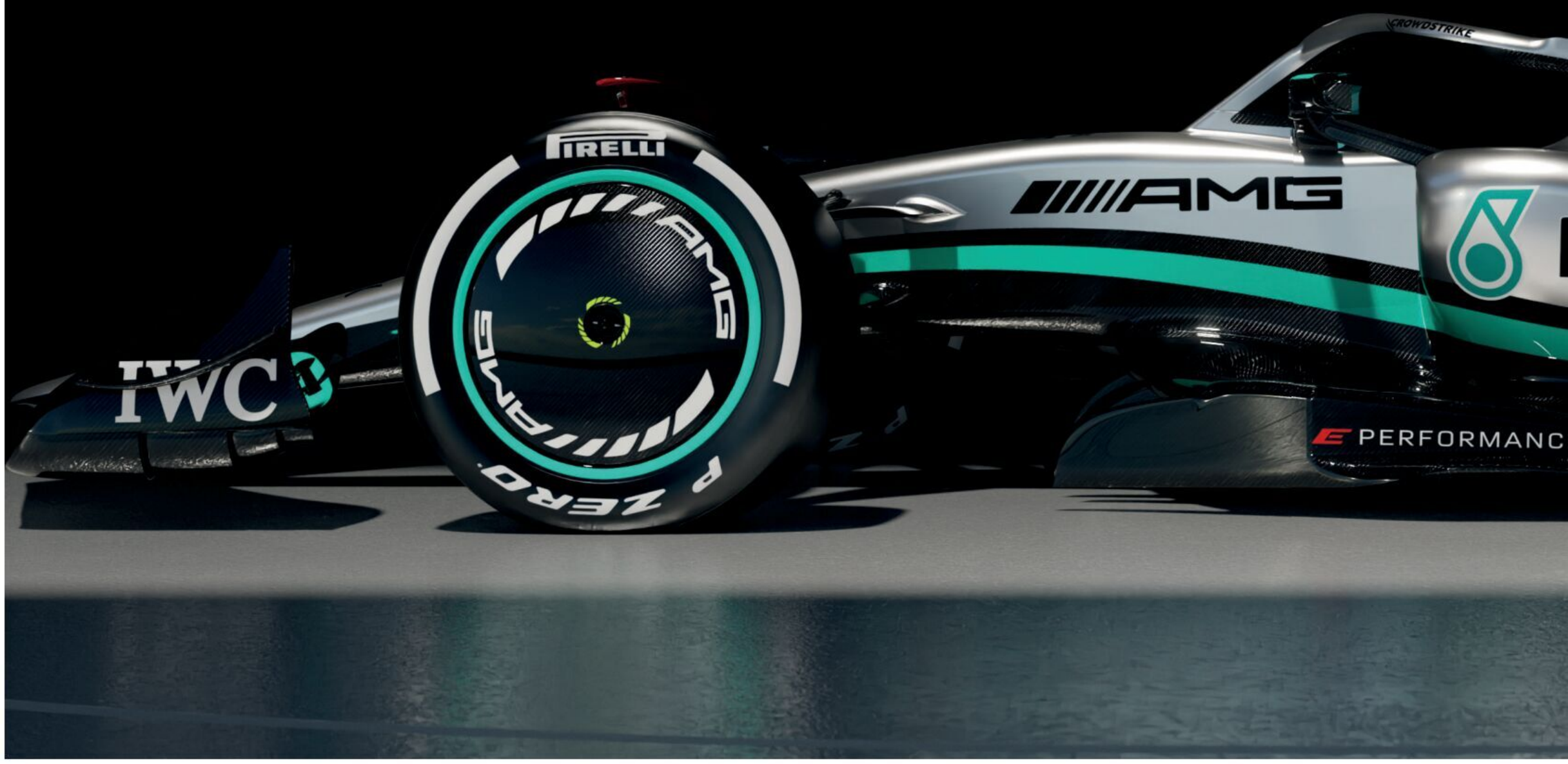
Before we get into that, it's worth outlining the context for the situation in which Mercedes finds itself.

The new technical regulations introduced this year to improve the racing are the biggest change in F1 for 40 years. They have presented the teams with a set of challenges that almost nobody currently working in Formula 1 has faced before.

The rules have fundamentally reworked the aerodynamic design philosophy in F1. Since 1983, cars have had flat bottoms between the axles, and underbody airflow manipulation fundamentally started at the rear wheels, where the floor was finally allowed to sweep upwards for downforce generation.

For 2022, shaped underbodies have been reintroduced, and with them a phenomenon known as "ground effect". The two sides of the underfloor either side of the driver are shaped like an upturned aeroplane wing for their entire length. These are called venturi tunnels. Air is accelerated along these surfaces, creating a low-pressure area, which sucks the car towards the ground.

For the first time since the start of the hybrid era in 2014 Mercedes has launched a car not at the sharp end in terms of pace



Ground effect has been used in isolated parts of the cars in recent years – for example underneath the front-wing endplates – but this is the first time since 1982 that it forms the basis of the car's entire aerodynamics. The time span involved has meant the teams were pretty much starting from a point of zero knowledge as to how to make the cars work, and how to deal with the problems that ground effect throws up.

In addition to this, an engine development freeze has come into effect from the start of this season; F1 is in the second season of a budget cap – which this year limits spending on design and development to $140m; and F1 has instigated a sliding scale of restrictions which permit the most successful teams the lowest amount of research and the least successful the most.

At the same time, Mercedes has being going through a period of internal change. Last year, its two most senior technical figures stepped away from their roles.

Engine chief Andy Cowell, who masterminded the revolutionary hybrid engine that has set the standard in F1 for eight years, decided to leave the company. And technical director James Allison, one of the most highly regarded aerodynamic designers and engineering leaders in F1, stepped away from day-to-day running of the F1 team when he was promoted to chief technical officer.

Their replacements – Hywel Thomas on engines; Mike Elliott on car design – have been with the company for years, effectively as second in command in their departments. The hope and expectation, therefore, was that the transition would be seamless.

A FALSE DAWN FOR W13

When the new Mercedes W13 was unveiled, it gave the impression of business as usual. Its bodywork continued the trend of the previous years of the team shrink-wrapping the car as much as possible – and that was even before the remarkable update introduced at the second pre-season test, which was dubbed the "no sidepod" car so much had the bodywork been reduced.

On track, though, the car had problems from the start. In testing, Mercedes was among the teams to suffer most severely from a phenomenon known as "porpoising", an aerodynamic effect that was commonplace in the first ground effect era. The underbody airflow stalls and reattaches in quick succession, causing a sudden loss and then regaining of downforce, triggering high-frequency bouncing on the straights.

"We were caught out by it quite badly," Allison says, "and the amount of porpoising on our car, especially when we put our first-race upgrade package on the car in the last winter test, has been quite extreme.

"We are starting to get it under control, but at the moment ▸

PICTURE: MERCEDES

a little bit by having to throw away the basic performance of our car as a smaller problem, in order to get the bigger problem, the uncontrollable bouncing, slightly under our control."

The Mercedes has also been relatively slow on the straights. In fact, all the Mercedes-engined cars have tended to be towards the bottom of the speed traps.

This has led many observers to the conclusion that Mercedes' engine development work with the new E10 fuel over the winter has been less effective than that of its rivals, and so Mercedes has been overtaken on performance. If true, this would have potentially large consequences, now that development – other than for reliability reasons – is outlawed.

Mercedes does not believe this is the case. "We need to analyse the drag levels first, before we really make a judgment of whether we are lacking power," Wolff says. "I don't think there are big differences in the power units but clearly Ferrari made a big step forward because last year they weren't totally competitive."

Allison says he believes "most" of the deficit on the straights "is coming from the size of our rear wing". He adds: "There will be differences, of course. There may be small differences in the power of the engines. But I don't think any of us, none of the teams, have got a handle on that, on where the pecking order is, and they are likely to be small if differences at all."

The car is also over the weight limit – but then so are many cars believed to be because meeting the limit, even at its increased level this year, is not easy as a result of a number of beefed up safety requirements in the rules.

SEARCHING FOR THE ELUSIVE SOLUTION

The core problem with the car is its lack of aerodynamic performance, which Mercedes believes is rooted in the porpoising problem.

"The only way to run," says Hamilton's team-mate George Russell, "is to raise the car very high. And obviously, with this ground effect car, (then) we lose all the downforce."

Trackside engineering director Andrew Shovlin describes finding a way to stop the car porpoising so Mercedes can run it at a ride height at which it can deliver its theoretical performance as "priority number one".

"Fundamentally," he adds, "we need to understand the problems better. We've got some avenues that I think are giving us a good direction, but it's taking a bit of time to get those parts on the car. And we're working very hard. We're well aware that there are other teams that have got on top of this problem faster than we have, and that's not the standard we normally work to."

The problem with porpoising, though, is that it's not a phenomenon that is easily dealt with by teams' normal working practices. It does not show up in computational fluid dynamics, nor in the wind tunnel.

On top of that, most teams have admitted the problem caught them by surprise – which seems odd when it was so common back in the 1970s and early '80s. But that's time at play.

A 1981 Ferrari sliding 'skirt' from the original ground-effect era. Skirts were banned for 1982

A graduate out of university in 1982 would be 61 or 62 now.

It is therefore interesting to reflect on the fact that two teams each have one very experienced – and extremely highly regarded – engineer who was around during the original ground-effect era and therefore has first-hand, practical experience of porpoising.

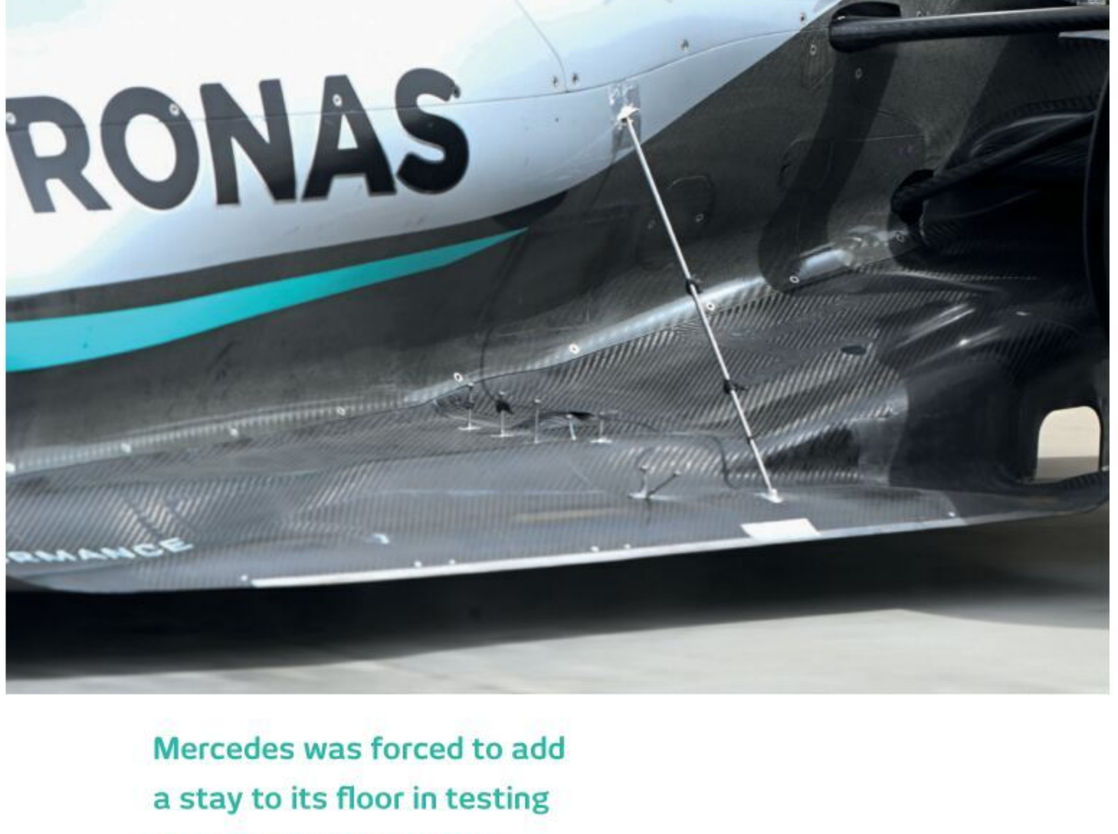
Those engineers are Adrian Newey, Red Bull's chief technical officer, and Rory Byrne, still a consultant at Ferrari, and one who played a significant role in the 2022 design concept. Can it be an accident that these two teams are by far the most competitive at the start of F1's new ground-effect era?

Frank Dernie, who had a long and successful career as an F1 aerodynamicist from the mid-1970s until about 10 years ago, thinks probably not. "They probably started off with [porpoising] in the back of their minds in the concept of the car, which is how it should be," he says.

Dernie is perhaps most famous as the aerodynamicist at Williams when it broke through to become F1's most successful team in the early 1980s. And he led the aerodynamic design of two ground-effect Williams cars: the FW07, the team's first championship winner, and its successor the FW08, which won

Mercedes' radical no-sidepod philosophy aims to create a down-draft at the edge of the floor

PICTURES: MARK SUTTON; ERCOLE COLOMBO



Mercedes was forced to add a stay to its floor in testing to make the floor stiffer

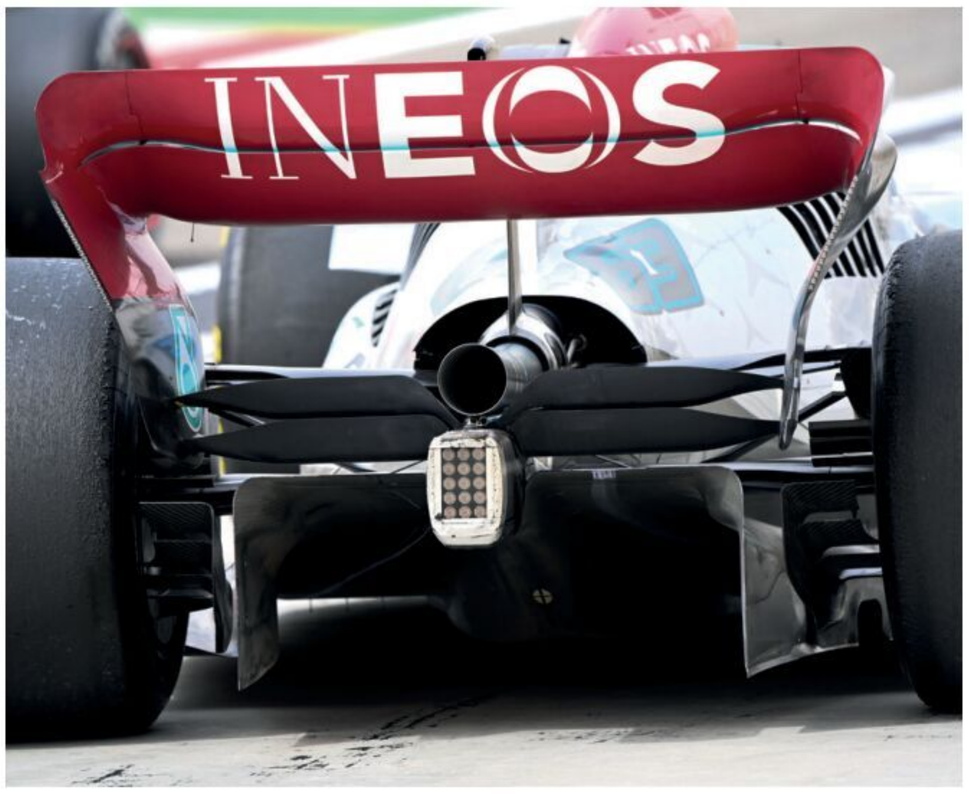
the last ground-effect drivers' title with Keke Rosberg in 1982.

Dernie admits he's "12 years out of date" with regards to some F1 knowledge – such as the latest capabilities of CFD – and in some ways it feels incongruous to be talking to someone about his experiences 40 years ago to try to make sense of a problem in the 21st century. But that just happens to be the timescale involved.

In the late 1970s and early 1980s, F1 cars had 'skirts' – bodywork that runs the length of the sidepod to seal off the venturi tunnels. These are not allowed now. But the method of creating downforce via ground effect remains the same.

Dernie talks of two key ways porpoising was typically triggered back in the day – "skirt jamming", and underfloor flexing. Both have direct relevance today.

Skirt jamming was when the sliding skirts got stuck in the "up" position, causing a loss of downforce. While current cars don't have skirts, Dernie says Mercedes' issues "could be allied to [skirt jamming], because anyone who has a floor that actually does touch the ground when they're going quickly – if they touch a bump or the circuit is uneven or it comes up – that will cause a form of porpoising similar to the jammed-skirt syndrome."



Mercedes believes its rear wing (above) is part of the problem and is planning a revised version for Miami

Mercedes' floor edges could be seen touching the ground through medium- and high-speed corners in testing.

"Unless you can keep it touching the ground all the time," Dernie says, "it is better for it to touch the ground never."

This is because of the way aerodynamic theory works. Dernie says that the length of an F1 sidepod compared to its width means "a sidepod cannot work as a wing unless it's got skirts, which effectively make the air think it's an infinite wing, and the skirt is permanently sealed. And therefore, you've got to make it work using crossflow and vortices and all sorts of other weird and wonderful things.

"Crossflow is the inevitable effect of the fact that the pressure underneath the car is lower than the pressure on the sides."

This means air will come into the underfloor from the sides. "You don't have to stop that happening," Dernie says. "You can't stop it happening. You have to work with it. You have to make that crossflow do something useful, and it's not easy.

"The first thing you need to do is understand what of the many things it is which is causing the problem. And after that, you've got half a chance of fixing it.

"It will be aero, but it could be aero due to trying to seal the sides – which is frankly stupid because it's not possible with that sort of car – or it's not stiff enough, ie it's an aero-elastic problem. They have either not made the floor stiff enough, or they haven't got it supported in the right places. It certainly looks like that to me, to be honest."

If this is the cause, it could be a function of the no-sidepod philosophy of the car, which is aimed at creating down-draft to the edge of the floor.

"It's just a big expanse of floor, isn't it?" Dernie says. "They haven't left room to put stays in it. There's one stay that goes more or less to the back corner, which is presumably where it was flexing most because it is the least supported. That will have helped, I expect. But the amount of stays we used to have on the floor of our ground-effect cars and how solid they were back in the day was way beyond anything I've seen.

"Now, I haven't seen the detailed lay-up of the floor itself, because that obviously makes a difference, but we used to use a thick aluminium honeycomb for our floor and that was one of the reasons why we were quick.

"I did say to Patrick [Head, Williams' former technical director] on one occasion: 'What we need to do, Patrick, is get the entire race team to stand in one of the sidepods to see if it's stiff enough.' Dernie laughs. "Which actually puts it in some perspective as to how stiff it needs to be."

A current aerodynamicist with another team backs up Dernie's theories.

"We don't really see a stall when we get the car touching the track in CFD or the tunnel," he says. "The thinking is that this might be to do with different flexibility of parts on track to those we model. It also could be to do with the cars being physically bounced as the car hits the track with the amount of downforce."

Dernie adds: "If they get to understand it, it might just need a new floor. That could be it. The thing that will take the most time is if they don't understand thoroughly what's causing it, they

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>
> FRANK DERNIE

PICTURES: CARL BINGHAM; MARK SUTTON

won't be able to design something that solves it."

One branch of Mercedes' thinking is that it should sacrifice downforce elsewhere to take some of the aerodynamic load out of the floor – a lower-drag rear wing is scheduled for the Miami race.

"I've heard people saying they will have to sacrifice downforce for stability," Dernie says. "I'm not completely convinced they will. We didn't do that on the Williams ground-effect cars. If they have taken that as something they will have to do, they will just end up with a car with less downforce.

"I would be experimenting at the circuit, putting inserts in floors and drilling holes in stuff and putting stays in various paces to see what the effect is."

The 'known unknown' right now is how long it will take Mercedes to get to the bottom of it.

Wolff says: "It's an understanding of how we can unleash the performance we believe to be in the car, or hope to be in the car, before throwing bits at in terms of performance."

Beyond that, there is another, more worrying question looming in the background: what if it's not just porpoising that's the problem? What if the car, fundamentally, is just not very good?

"What we don't know," Shovlin adds, "is, if we could just magically make that issue vanish, where would we actually be in terms of car pace? Is the car fast enough or not? And it's very difficult to answer that question."

Andrew Benson is BBC Sport's chief F1 writer

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FORMULA 1'S STRIP TEASE

Holding a race in Las Vegas – party central, a city of dreams and decadence and, yes, more than a smattering of tackiness – has been on Liberty Media's most-wanted list since it acquired Formula 1's commercial rights. But F1 has been here before and the relationship didn't work out

WORDS LUKE SMITH
PICTURES FORMULA 1, SHUTTERSTOCK

motorsport IMAGES

"I told myself I'd never come back..."

Dr Stuart Price makes no secret of his unease returning to Las Vegas in *The Hangover 3*. And rightly so. In the first edition of the comedy film trilogy, he had removed one of his own teeth for a bet, got married to a stripper and stole a tiger from Mike Tyson – all in one night in Vegas.

Formula 1's sojourn in Sin City in 1981 and 1982 may have lacked such fictional chaos, yet it also came away with a sour taste. The grand prix in the car park of the Caesars Palace casino proved so uninspiring it became the standard against which all bad race events since have been measured. Though both events were title deciders, the desert's extreme heat and the indifference of the American audience sapped the drivers' energy levels and enthusiasm, and F1 called it quits.

But 40 years later, F1's Vegas hangover has worn off. From 2023 it will be returning for a new street race that's set to break with convention in a number of ways, and become one of the grandest coups of Liberty Media's stewardship to date. This time around there'll be no car park, no extreme heat, and hopefully no morning-after Vegas regrets.

Upon acquiring F1 back in 2017, Liberty officials spoke of their desire to take the series to so-called "destination cities" around the world. While a putative street event around Hanoi in Vietnam fell victim to the pandemic and remains in limbo, F1 overcame all manner of obstacles to get a deal over the line in Miami, proving its new philosophy could work.

Las Vegas had been on F1's wishlist even before Liberty Media took over, yet it was hard to ever see plans properly coming off. The old

highest-bidder-wins race hosting model that Bernie Ecclestone used to great effect to line the pockets of F1's former owners was always going to be hard to pull off with Las Vegas. This was a city which didn't need F1, especially at a time when the series was struggling to connect with the American audience.

Yet these are very different times. F1 is now booming in America, seen clearly with the 400,000 crowd over three days in Austin last October. TV figures are also surging upwards: this year's Saudi Arabian Grand Prix was the most-watched race on cable since 1995. *Drive to Survive* laid the foundations, but the momentum is building.

"If you think where we were three years ago, it was difficult to have one grand prix full of people [in the US]," says F1 CEO Stefano Domenicali. "Now we are heading to a situation where this year we are going to have two events totally sold out. It's giving you the magnitude of what the US will represent for F1."

F1's new-found ability to put bums on seats Stateside paved the way for a return to Las Vegas on an initial three-year deal. The first race will take place next November, the date still subject to some loose ends being tied up, and will be the first race to take place on a Saturday since 1985, starting at 10pm local time to hit the primetime audience on the west coast and grab those waking up for breakfast in Europe. It's a flexibility from F1 that adds to the unique nature of the event.

F1 always knew that if it wanted to return to Las Vegas, it had to do it the right way. A makeshift circuit on the outskirts of the city would never do, but to secure the Strip would require buy-in from officials on a city, county and state level. The acceleration of the series' growth in the United States was instrumental to making F1 the kind of event that Las Vegas would not only take an interest in, but fully get behind.

All of the major players and resorts in Las Vegas are part of the ante. Caesars Entertainment, MGM Resorts International and Wynn Las Vegas are founding partners of the race, and the Las Vegas Convention and Visitors Authority (LVCVA) has committed to spend $6.5 million per year on all the services to make the race happen. "We think it's a great investment," says LVCVA president Steve Hill. "It's something that is going to come back to pay the city over and over again."

Las Vegas is a city where big bets fail far more often than they come off, yet Nevada state governor Steve Sisolak is confident that F1 will have an "enormous" economic impact. "We're anticipating 170,000 visitors to town to watch this race," he says. "They will accommodate 400,000 room nights, which is absolutely amazing, and the direct economic impact is approaching half a billion dollars. The indirect impact will be over a billion dollars by the time we're done." F1 will give a good excuse for many to head to Las Vegas for the kind of holiday that is often hard to justify, and appeal to more general sports fans looking to be part of a spectacular event.

One of the most significant elements of the contract is that F1 itself has skin in the game. In the announcement, F1 and Liberty Media confirmed they would "work together to promote the race in partnership with Live Nation and the LVCVA". For the commercial rights holder to get involved in the

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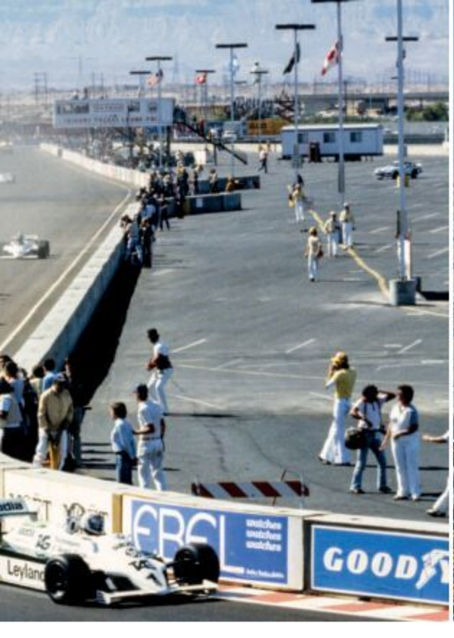
Las Vegas has developed massively as a city since those races in the early 1980s. Whether it will be prepared to put up with the disruption of a race after the first couple of years remains to be seen



promotion of a race is rare, last seen in the late 1970s when Max Mosley and Bernie Ecclestone manoeuvred for FOCA to help promote the ailing Hockenheim race.

"We're really taking a larger role because of our belief in the opportunity and our belief in Las Vegas," says Greg Maffei, the CEO of Liberty Media. "We believe racing on these historic streets, the special relationship with our local partners, and our growing fanbase will make the Formula 1 Las Vegas Grand Prix a marquee event on the calendar."

F1's role as a promoter means there is no hosting fee – it can't pay itself, after all – but also means it can be more hands-on to make the event run exactly as it wants. "It's going to be interesting because it's going to be promoted by F1, by Liberty Media as well and Live Nation," says Red Bull boss Christian Horner. "It's a different model, and it will be interesting to see how that works." For F1 to forego taking the cash another race might bring indicates a commitment to making this model work as part of the bigger picture.

F1's two previous visits to Las Vegas in 1981 and 1982, for races around a temporary circuit set up in a car park for the Caesars Palace casino, were not a success. This was despite both races being title deciders

The involvement of Live Nation should also bring a different spin on things compared with traditional race events. Michael Rapino, the CEO of Live Nation, says his company's role is to "bring that live entertainment party to the weekend" and jokes his colleagues are "excited to be doing something other than Lollapalooza and a BTS concert". This is very much an outsider-looking-in approach towards F1, which is not necessarily a bad thing. F1 has been increasingly working to add value for spectators and VIPs, adding off-track events and activations to make grands prix about more than the racing; Vegas surely has the resources to hit new peaks in this regard.

Turning one of the most famous pieces of roads in the world into a race circuit fit for purpose is no easy feat, even if the various hotels and resorts whose neon signage illuminates the Nevada sky are in on the plans. The street track proposed by Hermann Tilke's design company is 3.8 miles long – third only to Spa and Jeddah in terms of length – and features three long straights, allowing for speeds topping 210mph. But the need to balance the glamour of the event with the racing practicalities mean there could also be some tweaks, such as where the grid festivities take place – the start/finish line is quite a way from the Strip. The Saturday night start time is likely to be just the start of the breaks with tradition.

It will be the first time since 1982 (barring the COVID-asterisked 2020 calendar) that one country has hosted three grands prix. But all three occupy different time zones and each American event should appeal to a slightly different kind of fan. One would imagine Austin will still be what the more traditional race-goer picks, while Miami and Las Vegas can offer a different atmosphere and a level of hospitality that may break some perceptions of motor racing in the American market. Rest assured there'll be no RVs or tailgating here... ▸

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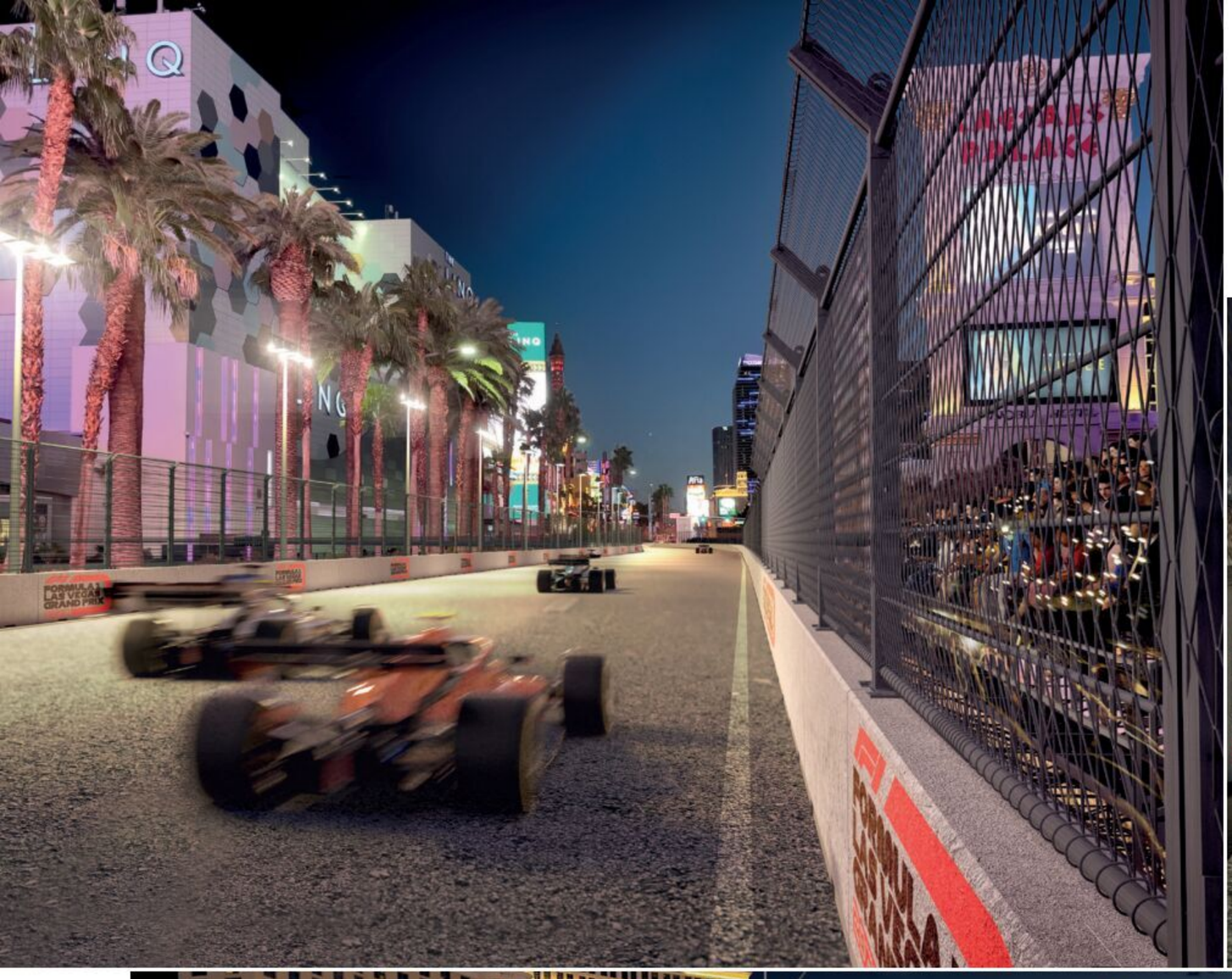
>
> STEVE SISOLAK

PICTURES: SHUTTERSTOCK; MOTORSPORT IMAGES ARCHIVE



PICTURES: FORMULA 1

The backdrops will be impressive and, for the first time since 1985, an F1 race will be held on a Saturday night, to capture the US west coast primetime audience

Las Vegas is a city made for high-rollers and deal-makers, making F1's arrival timely given the growing American commercial interest the competitors are tapping into. More and more 'big tech' companies have become involved in F1, such as Salesforce, Oracle and even Google. Horner says the swell in US growth played "a large percentage" in Red Bull pulling off its major deals with Oracle and crypto company Bybit ahead of this year. Mercedes chief Toto Wolff feels there is now a "transition from the traditional partners into big tech players" in F1, a shift the ever-changing sponsor portfolios for teams supports.

If Monaco was the place for the tobacco giants to be seen to cut deals in the 'good old days', Vegas could well become the big business event of the future.

Beyond their natural excitement about a jaunt to Las Vegas, the drivers are also conscious of the wider benefits this will bring to F1. "It'll be good for the business," said Lewis Hamilton. "I think Vegas will be an awesome addition. I have not seen the track layout, so I don't really know how that will be, but just being there and the spectacle of another night race, we welcome it." Unsurprisingly, the reaction from the paddock to the announcement has been universally positive. To quote Haas team boss Guenther Steiner: "We all like Sin City!"

Yet the challenge for F1 will be to make this a success in the long-term beyond the initial rush and excitement of the first year. Once the appeal of bringing F1 to the Strip is met with the realities of the inevitable disruption to their usual business, and probable NIMBY pushback from retiree slot-jockeys, the resorts and authorities will need to weigh up if it is all worth it. The fact they are all involved in the promotion of the event along with Formula 1 at least means they can tackle this first-hand.

The other bet F1 is making with Las Vegas is that the recent US growth will continue and not burn out. It has always been the problem market for F1 and, as exciting as it may be to now have three races, the battle will be to ensure each event remains sustainable. Domenicali is clear in saying there will be "no dilution" and only "added value for everyone" in the market; interest in the US needs to at least stay at this level, and ideally continue to grow.

Regardless of how long it lasts, Las Vegas has the opportunity to establish itself as something unlike anything we have seen before in F1. Demand for races is currently outstripping the allowance for 24 races under Concorde Agreement, meaning each event must prove its worth. Rotation is likely as F1 tries to juggle new markets with existing events, but will surely hit the heartland European races more.

The 'die hard' F1 fans may cry foul over this – even after the Vegas announcement, Twitter was awash with "what about Hockenheim?" chatter – yet it again shows how F1 is looking at the bigger picture. Las Vegas is the kind of race that will cement the series' place among mainstream sporting and entertainment events, and help to chase the kind of audience that has been so successfully attracted via *Drive to Survive*. Nostalgia has value in the branding mix, but it doesn't pay the bills.

They say you should never go back to Vegas, yet F1 is ready for round two to be an event unlike anything in its history. It will be the ultimate test for the series' popularity in the United States and its place within mainstream global entertainment – and with so much buy-in from F1 itself, it is a bet that almost seems too big to fail. But as local celebrity Frank Sinatra once said, "Las Vegas is the only place I know where money really talks – it says 'Goodbye!'"

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THIS HAAS TO BE IT

US-owned but until recently Russian-backed, Haas seems to have reached a turning point in car performance after three gruesome seasons. And it needs to if it's to attract fresh investment. Team boss Guenther Steiner tells *GP Racing* how close Haas came to the abyss

WORDS OLEG KARPOV PICTURES motorsport IMAGES

THE LAST COUPLE OF YEARS HAVEN'T

been easy for Guenther Steiner. Across 2020 and 2021, the Haas team he leads scored three points – which came from just two races out of 39. The season preceding these two barren years had provided scant returns too.

Last year felt particularly bleak. With a chassis that hadn't been developed for almost three years and a pair of rookies as its 2021 line-up, Haas was coming to races with no hope of points.

"It's always difficult to digest," Steiner tells *GP Racing*. "I mean, you know that on Sunday night you will not go home happy. When you fly back, especially if you have to go on a long flight, it's quite tiring, because you think about 'why the hell do I do this?', you know?"

Going home dismayed had become routine from 2019 onwards, when an aerodynamic miscalculation meant the cars couldn't keep their tyres within the working temperature range. It made little sense to spend money on fixing this given the impending rules overhaul, then scheduled for 2021, so Haas effectively sacrificed the following season to best prepare for the new regulations. Then COVID intervened and delayed the new rules by a year – which for Haas meant another season of pain as the pandemic wrought further financial uncertainty, the departure of many personnel, and the inevitable restructuring. Drivers Kevin Magnussen and Romain Grosjean were 'let go', but not before Grosjean was involved in a shocking accident in Bahrain.

Arguably the only positive moment was when owner Gene Haas signed up to the new Concorde Agreement in 2020, preserving the team. The team boss finally had hope – that the new car would come out well and allow Haas to return to the midfield. In a sense, it was a final hope. Steiner admits that if 2022 yielded no progress, he may well have considered exploring less exasperating employment than F1.

"If this year had been as bad as last, I think I would have come to that point," he says. "Because it's like, why do I do this? There is, I wouldn't say an easier way to make a living, but a happier way to make a living, where you're not exposed."

Kevin Magnussen (left) has returned to the team and was an impressive fifth in the Bahrain season-opener

PICTURES: ANDY HONE; STEVEN TEE

And it wasn't just hard on Steiner.

"I'm only one of a team," he says. "Can you imagine the guys who have to stay at the race track and tear the cars down to get ready for the next race, knowing that it will not be any better? I think they deserve more credit than me, because on Sunday night I go out of it.

"I mean, the only thing [why] they do it – obviously to make a living because you want to do it to make a living – but why you do this job? Because you're interested in having a result, being successful. These people are talented enough to get another job where they need to work less and can make the same amount of money and don't have to do 23 races a year being away from the family making all these efforts. These people have got the same passion as me: if you just do this for the money, you're not doing it for a long time, because it's just too hard work. And I think all of us could make a better living doing something else. And therefore the result means something to you, being successful."

Steiner confirms that his main challenge through this time was to keep the staff motivated. To do this, he relied on reminding the team of the successes of 2018 and learning from why it went wrong after that.

"The only thing you can do [is] to explain to people that they need to believe in themselves and in the team," he says. "Because you cannot tell them every day how great they are because then after a while they're thinking, 'Why am I always told the same thing?' Sometimes less is more, in my opinion.

"You need to speak with them to make sure they believe we are on the right track again, and believe in themselves. Because we did it before, and that was the key for me – because if you never did that, if you never had a good result, it's difficult to explain why all of a sudden you should be better. But my explanation was: we finished fifth, so why can't we do it again? You know, we didn't get lucky. I think we did really a good job in '18, and even in '17 and '16 we did a good job, as a new team coming in. We knew exactly why in '19 we fell back. We had the car, which wasn't good. And then in '20 obviously if you don't do any development, where [do] you expect to be? Logic comes in. And '21 even worse. We didn't do anything and had two rookie drivers. So I needed to try to explain that to people and just hope that they believe in it. Not in me, but in themselves."

Haas has changed over those years. While before a special department at Dallara was in charge of putting the car together, now Steiner has at his disposal almost a hundred ex-Ferrari staffers, working at Maranello. With the cost cap kicking in, Ferrari found one of the buildings at its base surplus to requirements, while also having to shed staff. Haas had use for both.

The Simone Resta-headed design office, re-assembled at the start of 2021, went about creating the new chassis in January. Development of the 2021 car was off the menu – the new regulations were its full focus. And in Bahrain this year, the very first race of F1's (and Haas's) new era, the team scored more than three times the points it had managed across the previous two campaigns.

"I THINK ALL OF US COULD MAKE A BETTER LIVING DOING SOMETHING ELSE. AND THEREFORE THE RESULT MEANS SOMETHING TO YOU, BEING SUCCESSFUL"

GUENTHER STEINER

"I never count one single person for the success," Steiner says of Resta's role in the team's resurgence. "Success has got a lot of fathers, you know that, and failure is an orphan. I think it's a team effort, and Simone plays a big role in it as well, because in the end, when we started last year to put a team together, he was there and organised it. And he saw it through. He works very hard. And he has got a lot of experience. So obviously, he's got a big role in this."

Someone with perhaps an equally significant role in the team's early 2022 successes is Kevin Magnussen, responsible for the fifth in Bahrain and two more points in Jeddah. As morbid as it sounds, it's quite possible that without Russia's invasion of Ukraine – which de facto led to Haas losing its Russian backing and shedding Nikita Mazepin – we simply wouldn't have known how good a car the team has come up with.

"Could easily be, yes," Steiner concedes. "I don't know exactly how to answer, but it could easily be. But do I know it with certainty? No."

Mick Schumacher wasn't able to keep up with Magnussen in Bahrain, and ruled himself out of the Jeddah race with a qualifying crash. Given that last year Mick was comfortably clear of Mazepin, there are few reasons to believe the Russian would have been picking up points if he were still on the team. Having two rookies last year simply didn't allow Haas to properly assess both of them, or afford either driver a proper reference to work towards.

Now, with Mick sharing the garage with a well-known and more experienced team-mate, Steiner is convinced he will find it easier to progress.

"Absolutely, and I said it last year. I said we don't have a reference, we don't really know. I brought it up at some stage, [suggesting to] put something at the test [with an experienced driver] to have a reference, to see where they are.

"Obviously that sorted itself out, with what happened with the invasion of Ukraine, and here we are. But I think for Mick it's very important to have a reference to make the next step in improving his presence in F1."

Steiner says that reminding the team of previous successes helped keep them motivated through the dark times

It has not been a miracle turnaround for Haas. Its Melbourne weekend was quite poor: Magnussen failed to make Q3, exiting in Q1 instead, and neither driver scored in the race. But Steiner is convinced the team has everything it needs to stay in the midfield and avoid being left behind in the development war.

"I'm a big believer [that] it's not the quantity of the parts you throw on the car, it's the quality," he says. "I'm not scared of it. I'm always aware that other people will spend more money and have more upgrades, but I think we just need to keep ▸

PICTURES: SAM BLOXHAM; ZAK MAUGER; CARL BINGHAM

After his 11th in Bahrain, Mick Schumacher's Saudi qualifying shunt ruled him out the race

our heads down, stay calm and do our job good. Because I think we still have some good things coming out of this car we haven't discovered yet.

"If you have a good base, normally a car is good through the season if you don't mess it up. Obviously, you need to always try to keep up with the other teams, because they will improve. But it's not like we have to panic now to put upgrades on, because, as I said, I find sometimes this upgrades war is overrated. It's a good story, but performance-wise is it as good story as we try to sell it? I've seen that very few times that somebody brought an upgrade and the performance changed dramatically."

It's self-evident that after the split with Mazepin's sponsors, Haas doesn't have as much funding to match its rivals in terms of upgrade frequency. But a return to the midfield should at least rejuvenate the interest of the project's main investor, Gene Haas.

"No, he was always interested," disagrees Steiner. "He didn't like the results, but I explained to him why they are where they are. And he said: 'You didn't tell me wrong.' Yeah, I'm doing this a long time. You know, if you don't develop this is where you end up.

"But then again, he believed that we could do what we did last year, even if it was a tough year. And now we are back. He was never not interested. He's just another team member with the advantage that he owns it – or disadvantage, whatever you want to call it – and he obviously, [as] we have good results, is excited about it. But he was always behind the team, otherwise he would have stopped. Or sold it. There were plenty of people who wanted to buy the team."

Melbourne is unlikely to be Haas's last off-weekend this season. But there's been enough positives so far to dispel the sense of crisis, sufficient to enable the team to approach races with a very different mindset.

"Obviously, the better you are the more enjoyable it is, and now we're in the front end of the midfield," says Steiner. "So it's like, OK, what can we get out of this weekend? And then also, when you go away from the weekend you know: if it didn't work out, next weekend we can make it up again. So it is pretty different to last year.

"I mean, [for] people to work late at night when you know you can make points on the weekend, it's different [compared with] working at night when you know that you can just finish 18th, 19th or 20th. It's a different way of working. People are motivated and it is a different atmosphere.

"Everybody worked hard for it last year So I think that is where we should be now."

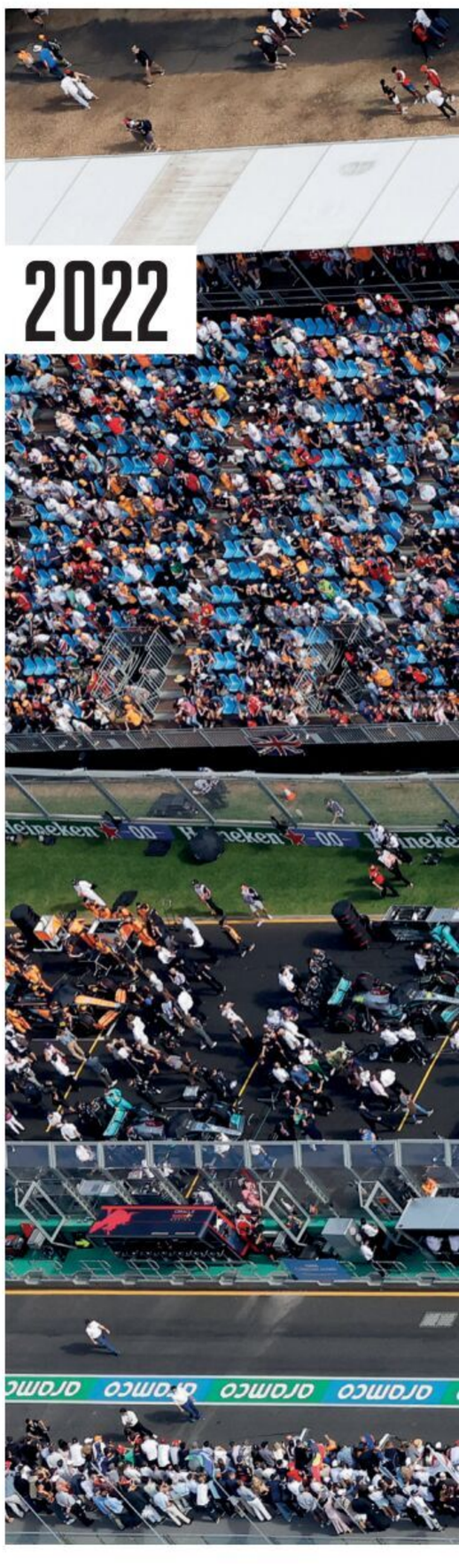
"IF YOU HAVE A GOOD BASE, NORMALLY A CAR IS GOOD THROUGH THE SEASON IF YOU DON'T MESS IT UP. OBVIOUSLY, YOU NEED TO ALWAYS TRY TO KEEP UP WITH THE OTHER TEAMS, BECAUSE THEY WILL IMPROVE. BUT IT'S NOT LIKE WE HAVE TO PANIC NOW TO PUT UPGRADES ON"

GUENTHER STEINER

Dropping Mazepin (below) and bringing in the experienced Magnussen (below left) should help Schumacher improve

RETURN

The first Australian Grand Prix since 2019 was a watershed moment in Formula 1 history. It was here, on 13 March 2020, that F1 vanished into uncertain limbo. Melbourne's triumphant return parallels F1's own rebound...



TO 07

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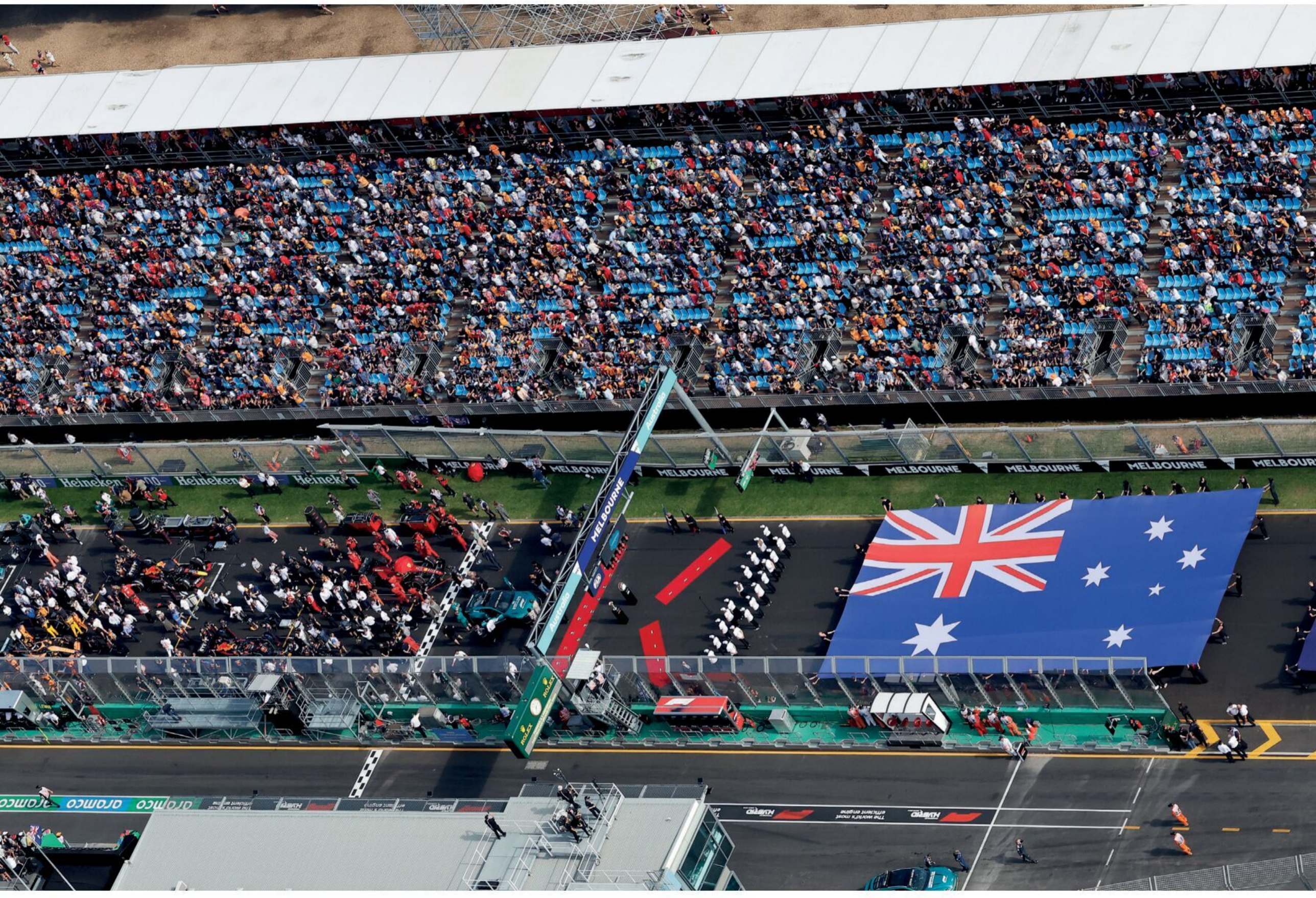


FORMULA 1 RETURNED TO AUSTRALIA WITH a weekend festival of sport which, in a world laid low by war and pandemic, was good for the soul. It was three years since Hamilton, Verstappen et al raced around the city's Albert Park, two years since that ill-fated Friday 13th in 2020 when F1, the FIA and the Australian Grand Prix Corporation cancelled that year's event to the disbelief of spectators queuing at the gates.

"I was there and couldn't believe it," said Craig, a diehard F1 fan who told me of his annual pilgrimage from Queensland's Gold Coast. "I won't even tell you what it cost me and I ended up spending the weekend with some disappointed fans drinking our sorrows away."

But he had come back, and the disappointment of 2020 was being washed away in a blaze of Melbourne sunshine, packed grandstands, rumbling V8 Supercars and excited stall-holders selling merchandise by the box load. The eight-year-old girl sitting opposite me on the number 64 tram was counting Teslas.

"Look dad, that's number 3," she said, adjusting her Lewis Hamilton cap.

Her 14-year-old sister was sitting across the carriage. She was sporting papaya orange McLaren headgear, a Daniel Ricciardo fan like her accompanying parents and grandfather.

"The girls made us promise to take them to the grand prix when F1 returned," their mother told me. "They've got into F1 through social media, then *Drive to Survive*, and it's just fantastic. I'd never have thought, having two girls, that we'd have a couple of F1 fans on our hands, but they love it."

A tram-based micro-survey of just how much has changed in F1, shifting in the make-up of Melbourne's crowd. The city's *The Age* newspaper commented F1's demographic was younger and more gender-diverse.

Opposite the tram stop at Gate 10 is the suburb of Prahran where, in 1920, Tony Gaze was born. A decorated fighter ace during World War II, Squadron Leader Gaze befriended the Duke of Richmond and Gordon, owner of the land on which RAF Westhampnett was located, and convinced him to stage a motor race around its perimeter.

"So you're telling me the Goodwood race track was invented here in Melbourne?" asked David, 73, as we walked into the circuit. "Does anyone else know that our grand prix should be twinned with the Goodwood Members' Meeting this weekend?"

The fans here understand motor racing. They love Formula 1, know its history and see its return to Albert Park as a sign that the world is righting itself.

Sam, Greg and Nathan had flown down from Brisbane, getting up at 3.30am on the Friday to make sure they were on the first available flight. A two-and-a-half-hour plane journey, the equivalent of flying across Europe. They dropped their bags off and headed straight to the circuit.

An Australian Grand Prix regular, Sam had already observed a marked shift in Formula 1's popularity.

"I've noticed there's a lot more engagement through the *Drive To Survive* series on Netflix. I remember coming down here years ago and the track would never fully sell out, but obviously this year – with the impact of a few years of *Drive To Survive* – it's completely sold out. I definitely think it's due to the series. A lot of people I have been talking to have got into it because of Netflix."

Unsurprisingly, everyone wanted a piece of Aussie hero Daniel Ricciardo in Melbourne

Nathan, on his first visit to Formula 1, was, to borrow a much-used Aussie adjective, 'stoked'. There were a lot of stoked people in Melbourne.

"This is wild," he said. "Honestly it's a lot, lot bigger than I expected it to be. I've been to other motorsport events around Australia and have always known that Formula 1 is the biggest thing on earth at the top of motorsport, but this is wild."

Familiar faces were all around. Mark Webber was having a busy home race, moving from television broadcasting commitments to sponsor appearances, constantly in demand from fans.

Daniel Ricciardo, somehow managing to project his winning smile through a McLaren-branded face mask, was mobbed irrespective of whether he was inside the paddock or out.

Australia worships its sport stars, wraps them in its nationhood. This huge country, with a land mass 37 times larger than Great Britain but a population almost 60% smaller, regards the Webbers and Ricciardos of this world as their ultimate ambassadors.

The state funeral of famed cricketer Shane Warne, held ten days before the grand prix, illustrated that. The Aussie fans cherish their heroes.

"It's really good to see it back," Alan Jones told me, the 1980 world champion in some demand from autograph hunters. "For a while I wasn't sure we'd even see this year's event go ahead but F1 and the race organisers have done a terrific job. Have you seen how many people there are?"

The answer was yes, you couldn't help but notice the volume of fans. A tidal wave of colour and enthusiasm generating a weekend record for Melbourne's grand prix and statistics which delighted the AGP Corporation's CEO Andrew Westacott.

"It has been three years since we last staged the GP and there's been 41 events that F1 has been to around the world [since Melbourne 2020 was cancelled]," he said. "The key thing we have done here and now is remind F1 of how good an event we put on. It was worth the wait, and we have set the bar very high for other events."

Australia, along with New Zealand, has had a rather different pandemic experience from most of the world, one which has given Westacott and his team more than a few headaches. While the COVID-19 ▸

Fans flood the track at the end of the race, ahead of the podium celebrations

PICTURES: CARL BINGHAM; ZAK MAUGER

PICTURES: CARL BINGHAM; MARK SUTTON; ZAK MAUGER

virus spread westwards from Asia, through the Gulf and into Europe and North America, the Australian and New Zealand governments set out to prevent it ever gaining a foothold.

The result was a fortress mentality. Australia closed its borders, applied a strict two-week hotel quarantine for those provided with travel exemption – an experience this writer endured in January 2021 – and kept pushing back its date for reopening.

An initially slow vaccine "stroll-out" didn't help, but the result of the Australian approach is undeniable: 6569 deaths from COVID compared with 170,107 in the UK and 6.1 million globally. It meant that Prime Minister Scott Morrison kept rigidly to his closed-border strategy.

This approach gave the AGP Corporation an inability to plan with any degree of certainty. The cancelled 2020 event was followed by the inevitable repeat in 2021, plans to postpone that race until later in the season scuppered by the Morrison Government's refusal to reopen the country's borders until vaccination reached 80% of the population.

Ultimately, the decision to move this year's Australian Grand Prix from its usual slot as the opening race of the season was the right one. It gave everyone an additional month with which to play, for the Melbourne organisers to prepare, for fans to buy tickets and book their travel.

With an eye to the future and improving the racing in Melbourne, the organisers went ahead with remodelling and resurfacing the track. It was a move which F1 and the FIA acknowledged.

Difficulties in recruiting the large numbers of staff needed to host the event caused Westacott to limit race day ticket sales to 130,000. In March he admitted that this year's event would fail to beat the record 156,000 race-day spectators who attended the inaugural GP at Albert Park in 1996.

He need not have worried. Thursday's supports attracted 55,107 fans, rising to 112,446 on Friday, 123,247 on Saturday and 128,314 for Sunday, the third-highest race-day attendance in Melbourne's F1 history.

The total, just shy of 420,000, was heralded by the AGP Corporation as the largest ever attendance for an F1 event, although those with longer memories were able to recall that 520,000 spectators attended Adelaide's final GP in 1995.

The relief on Sunday evening was palpable. F1 had successfully returned to Melbourne after an absence of three years, two cancellations, and some cost. According to one source the AGP Corporation had been forced to pay F1 far more than it would have ideally wished, in part due to the insurance implications of the cancelled events.

Whatever the figures, the success of the 2022 event bodes well for the future of the GP, whether in Melbourne or elsewhere. At present Melbourne has a contract to host the race until 2025 and is keen to extend.

THURSDAY'S SUPPORTS ATTRACTED 55,107 FANS, RISING TO 112,446 ON FRIDAY, 123,247 ON SATURDAY AND 128,314 FOR SUNDAY, THE THIRD-HIGHEST RACE-DAY ATTENDANCE IN MELBOURNE'S F1 HISTORY

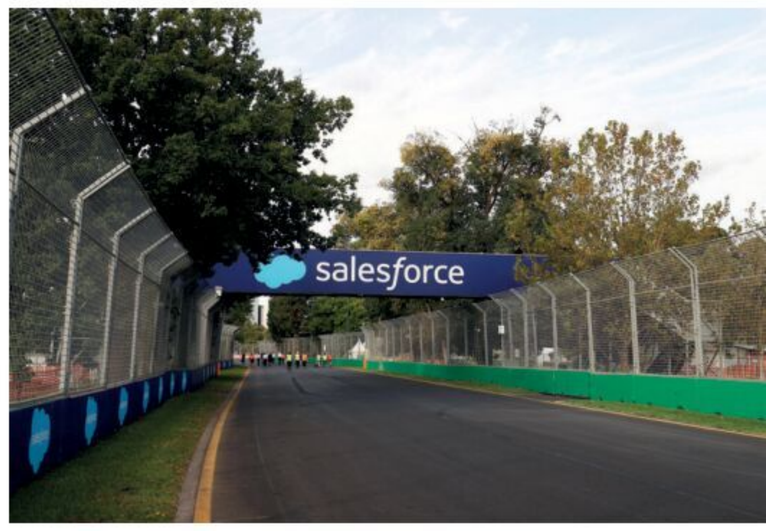
The politics of Australia's federation are such that rivalry between states and their capital cities is always intense. Daniel Andrews, Premier of Victoria, is clearly determined to support Westacott's ambition to keep the race in Melbourne, particularly in light of the New South Wales Premier Dominic Perrottet bidding to move the race to Sydney.

"We can never control what other jurisdictions can do," Westacott told *The Age*, "but if you give your partners and stakeholders exemplary service, great value for money, full entertainment and professionalism up to the standards of what they want to deliver on a global basis, you are going to make it very hard for them to look anywhere else."

In other words, Melbourne will be a hard act to follow, even if the success of this year's event attracts envious glances from other state capitals. Meanwhile, fans can already register their interest for the 2023 race, sure in the knowledge that F1 is in a healthy state Down Under.

Everyone is stoked.

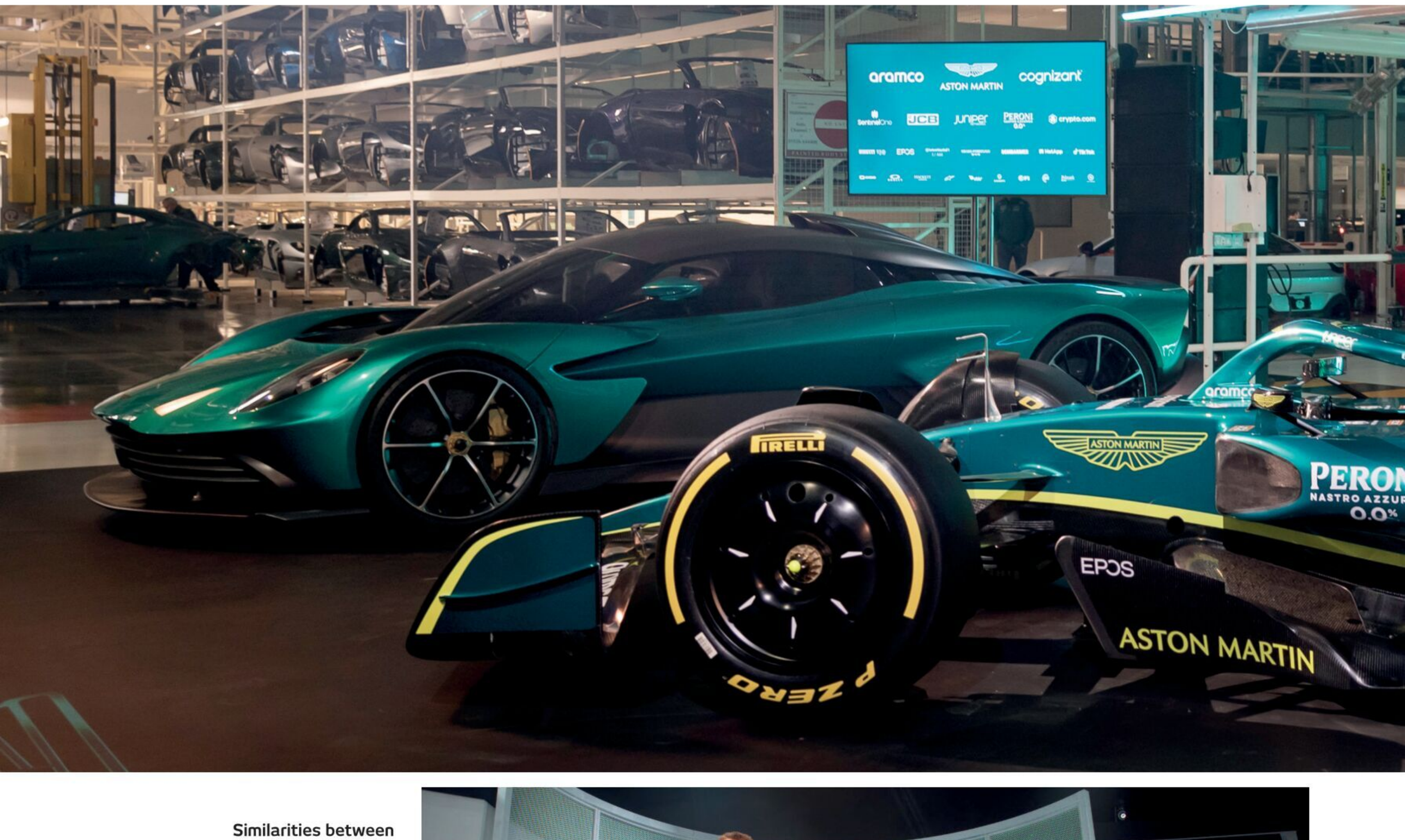
ALBERT PARK TRACK CHANGES



Melbourne used the break to make modifications to the Albert Park circuit at Turn 3 (top) and into Turns 6/7 (above)

The biggest changes were at Turns 9/10 (third from top), now a long fast curve, and a tighter Turn 13 (above)

A LESSON O



Similarities between Aston Martin's current crack at F1 (above) and Jaguar's efforts from 2000-2004 (right) go deeper than just a green paint job

F HISTORY

Two famous manufacturer teams born out of humble midfield origins, splashing the cash while attempting to rise to the top of F1 in record time. There are clear parallels between Lawrence Stroll's **Aston Martin** and the doomed **Jaguar Racing** project of 22 years ago – so how does struggling Aston avoid a similar fate?

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AN ICONIC BRITISH

sportscar brand with a rich motor racing heritage. An ambitious owner deciding that the best way to achieve success in Formula 1 is to buy an independent team with a race-winning pedigree, rebrand it in racing green, with a star Ferrari driver slotted in for good measure. The team is launched to much fanfare and attention. Britain's answer to Ferrari.

Except seventh in the constructors' championship is nothing to write home about, and all this new venture can manage. The role of team principal is unenviable, ultimately untenable. Management changes become the order of the day.

Such was the Jaguar Racing Formula 1 team. Any similarities with the Aston Martin F1 team are purely coincidental.

Ford's purchase of Stewart Grand Prix, rebranding it as Jaguar, with Eddie Irvine joining from Ferrari, is echoed by Lawrence Stroll's decision to buy the team formerly known as Jordan, now renamed Aston Martin and featuring another Maranello old boy: Sebastian Vettel.

After mirroring Jaguar's best-ever seventh in the world championship for constructors last year, Aston Martin was hoping for better things this season. Dreams of early success in 2022 have been dashed, starting with Vettel missing the first two rounds thanks to COVID-19.

Round three of this year's competition, in Melbourne, summed up how things are going. In first practice, Vettel's car ground to a halt, smoke billowing from the back. His decision to return to the pits by driving a scooter on the track resulted in a "joke" €5000 fine. The subsequent engine change meant he missed FP2, while the sister car of team-mate Lance Stroll caused the session to be red flagged when a wheel cover flew off.

In final practice both Astons crashed. In qualifying Stroll failed to set a time after colliding with Nicholas Latifi's Williams – a collision the Stewards judged to be Stroll's fault, resulting in a three-place grid penalty. Vettel managed a lap, the Astons lining up 17th and 19th on the grid following the disqualification of Alex Albon's Williams for failing to provide the requisite fuel sample.

Vettel crashed out of the race,

Jaguar (above) managed five seasons in Formula 1 and, like Aston Martin (below), took over a small but relatively successful independent team

while Stroll finished 12th, 90 seconds behind Charles Leclerc's winning Ferrari.

It's easy to see why people now draw parallels between Aston Martin and Jaguar Racing...

It was none other than Ford's then CEO, Jacques Nasser, who made the final decision to buy Stewart Grand Prix and rebrand it as Jaguar, at that time part of the company's Premier Automotive Group headed by German executive Wolfgang Reitzle. That division also included Aston Martin...

Jaguar's team wasn't short of experience. Technical direction was under Gary Anderson, Jordan's famed designer who had later been lured to Stewart. An out-and-out racer and pragmatist, he was excited by the prospect of working in a fully fledged manufacturer team. He was gone within the year. It was a sign of things to come.

Nasser and Reitzle first appointed Ford's vice president and chief technical officer Neil Ressler to oversee the team. Ressler was chairman for just a year, then stepped aside to allow American racing legend Bobby Rahal to take the helm.

When Niki Lauda was parachuted in conflict was inevitable, and Rahal departed. Even Niki, with his straight-talking style, could not make it work. The relationship never gelled.

When Lauda quit, Ford's Global Vice-President of Product Development, Richard Parry-Jones, placed Jaguar Racing in the hands of two well-regarded executives: Tony Purnell and David Pitchforth. Purnell, founder of the motorsport electronics business Pi Research, which Ford purchased in 1999, brought an altogether more analytical approach to the task. Pitchforth came with 15 years of experience managing complex automotive engineering projects.

In 2003 they were, according to Purnell, "given a good crack at it" by Ford, but seventh in the constructors' was still as good as it got. Patience was running short, the budget was cut for 2004 and by the end of the summer the team was put up for sale. Red Bull came in, saving it from closure.

Looking back, Purnell is clear about the reasons why Jaguar Racing failed. "The root cause was that Ford is a very big company and came into Formula 1 without really understanding the magnitude of what it was getting into. Or actually, anyone at board level really being

Tony Purnell (left) and David Pitchforth had to admit defeat in 2004 when Ford cut Jaguar's budget. The team was destined for closure until it was sold to Red Bull that November

PICTURES: CARL BINGHAM; RAINER SCHLEGELMILCH

very interested in it. It wasn't huge money when you have a trillion-dollar spreadsheet – and they were very enamoured by Jackie Stewart."

It seems extraordinary that Ford, a company with a successful history in F1 in partnership with Cosworth, did not understand the scale of the challenge. When Purnell took over, he realised Jaguar, for all its prestige, lacked the budget and board commitment from its owners.

His opinion is that teams are often oversold, new owners never being told the reality of what it will entail. "I always remember Bernie [Ecclestone] saying to me, 'All that matters is that you've got two teams right at the top who the public latch onto, nothing else. The rest are just to fill up the numbers.'

"I said a lot of teams are not going to survive and he said, 'Look, the way it works is that a team gets sold to a billionaire. The billionaire puts more money than they ever dreamt possible into the sport. Then they get disillusioned, and they leave. But there's always another billionaire to pick it up. So you don't have to worry.'"

Whether Ecclestone ever expressed that view to Force India's Vijay Mallya or Lawrence Stroll is unknown, but many a successful businessman and billionaire has lived the cycle of enthusiasm and disillusionment in Formula 1. Ask Caterham's Tony Fernandes...

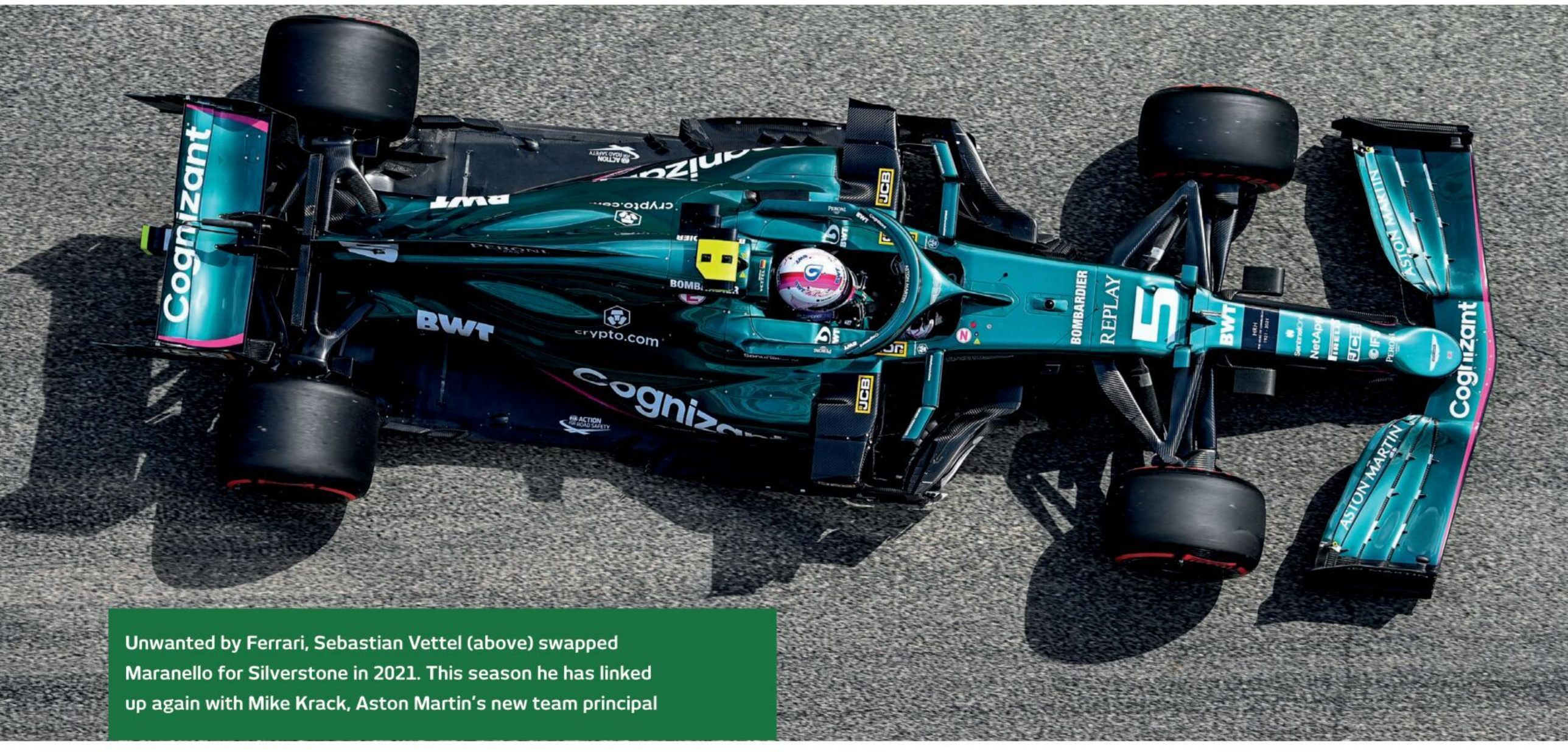
In Purnell's opinion the failure of Jaguar's owners to understand the scale of the challenge was compounded by the desire to then find a quick fix. An approach he cautions against.

"They lash about looking for silver bullets – like bringing in Niki Lauda – and then slowly, it dawns on them that this is very tough, it needs a really long-term strategy. It needs very good management and, if you don't have that, then at least supply tonnes of money."

In the end Jaguar's fate came down to a meeting in Detroit during which Purnell was asked a simple question: What does it take to win this? It's a question Lawrence Stroll will have pondered.

"I have always kind of kicked myself because I answered it honestly," admits Purnell. "I said, 'Look, we're up against Ferrari, who you know, and to beat Ferrari means a massive effort. Also, it's going to take five years'. I think that meeting was probably the beginning of the absolute end."

The driving force behind Aston Martin is Lawrence Stroll, who has been involved in F1 for 30 years, and his commitment is the complete opposite of Ford's attitude to Jaguar



Unwanted by Ferrari, Sebastian Vettel (above) swapped Maranello for Silverstone in 2021. This season he has linked up again with Mike Krack, Aston Martin's new team principal

PICTURES: MARK SUTTON; GLENN DUNBAR; ZAK MAUGER

Aston has brought former McLaren man Martin Whitmarsh in as group CEO. He will be ultimately be responsible for making a success of the F1 side of the company

It is hard not to conclude that too many owners believe that success in one area of business means they can automatically repeat the feat in F1.

"These are high-achieving guys and along with that is a kind of Midas touch, a belief," adds Purnell. "That arrogance, I'm afraid, is in the Greek myths, it backfires on you because you don't respect the opposition. To be fair to [Red Bull owner] Dietrich Mateschitz, he did respect the opposition, although he definitely spent more than he ever dreamed of in the first five years."

Which brings us back to Aston Martin, because while some may paint a parallel with Jaguar Racing under Ford, it may be apposite to compare Stroll to Mateschitz. Not many expected an energy drinks magnate to wash the floors with F1's car manufacturers, so can a billionaire famed for building fashion brands Tommy Hilfiger and Michael Kors repeat that success?

Neither Mateschitz nor Stroll suffer fools gladly – they know what they want and expect the people they employ to deliver. They don't like to be disappointed.

Mateschitz and his motorsport advisor Helmut Marko brought in Christian Horner to run Red Bull Racing, recruited David Coulthard to help pinpoint the team's weaknesses, then headhunted Adrian Newey from McLaren.

Stroll has tasked another former McLaren man, Martin Whitmarsh, with making the F1 programme work. Appointed Group CEO of Aston Martin Performance Technologies, Whitmarsh's arrival signalled the end for Otmar Szafnauer. Undermined, with his responsibilities taken away, the American's departure to Alpine took some months to play out.

With Mike Krack brought in from BMW as replacement team principal, Aston Martin has experienced racers in all its key management roles – particularly with the continued presence of highly regarded team veterans such as sporting director Andy Stevenson, chief technical officer Andy Green and performance director Tom McCullough. Recruiting aerodynamicist Dan Fallows from Red Bull and appointing Luca Furbato from Alfa Romeo as engineering director illustrates the drive to provide greater depth.

It's no surprised Stroll is keen on recruiting the best people he can ▸

Aston Martin's list of sponsors and partners is long, and adds up to a substantial part of the team's US$140m capped budget, so finances are not really an issue

find. He has been passionate about racing throughout his life, a capable driver who has been involved in Formula 1 for 30 years – including sponsoring Team Lotus and Ferrari. It's a point Purnell is quick to acknowledge when faced with the Jaguar comparison.

"If you look at Aston Martin, there is a big difference in that the bloke who controls the board is committed and knows what he's getting into," Purnell says. "It wasn't like Bill Ford – who famously didn't know who Eddie Irvine was. Bill is the nicest guy, but had no idea about Formula 1, nor did the rest of the board."

Another major difference is that while Jaguar Racing was heavily reliant on funding from the parent company, Aston Martin has secured an impressive line-up of sponsors.

The team's chief commercial officer is Olly Dale, previously the commercial director of Liverpool Football Club, while Stroll appointee Jefferson Slack is the team's managing director for commercial and marketing. February's announcement that Saudi Arabian energy and chemicals giant Aramco would be joining American technology services company Cognizant in sharing the team's naming rights underlined the success of Aston Martin's commercial operation.

These are not small companies. Aramco boasted revenues of US$400billion last year, somewhat dwarfing Cognizant's no less impressive US$18.65billion.

Cryptocurrency exchange Crypto.com, the Peroni beer company and industrial equipment manufacturer JCB are just three of the team's 23 other partners. This translates into more than US$100m in third party sponsorship support, which goes a long way towards the US$140m budget cap. Throw in the team's slice of F1's prize money and the financial picture looks bright.

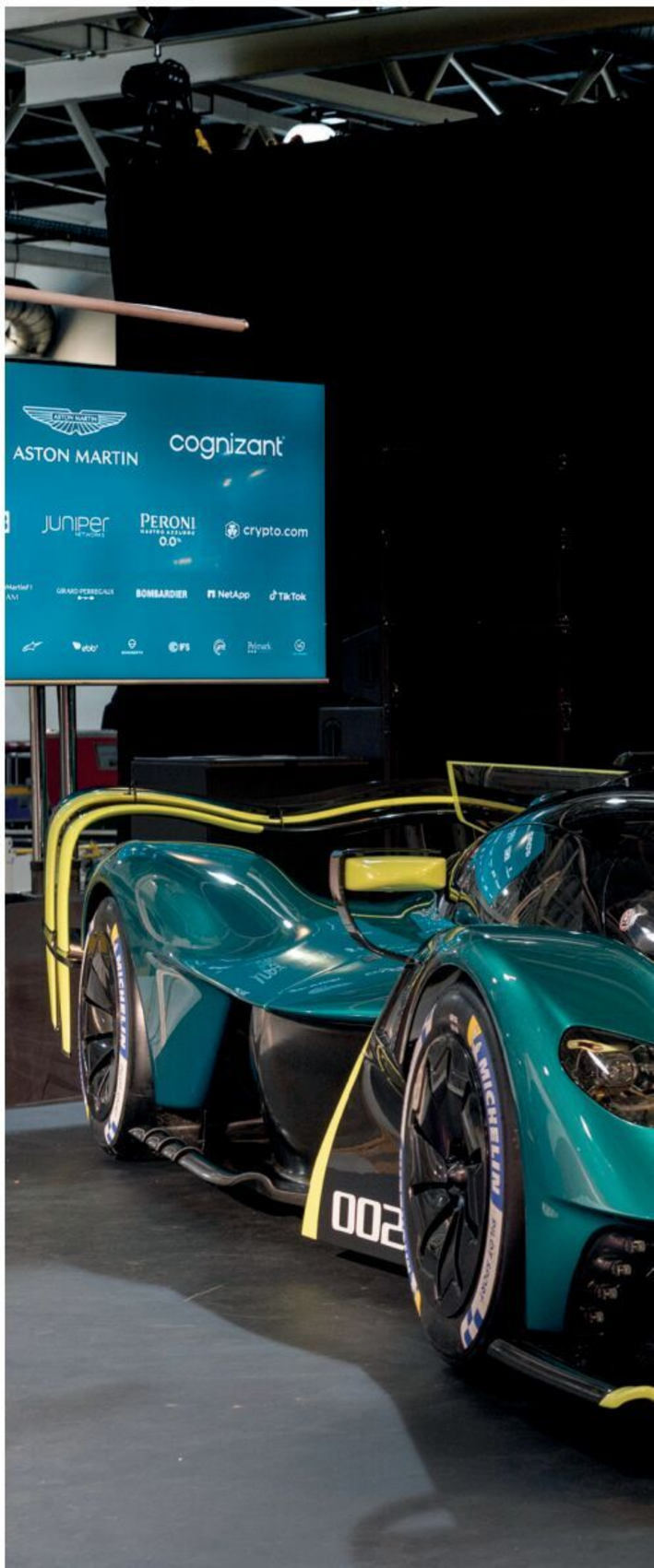
The money is there, but what about the timescales?

Lawrence Stroll and his investors are in the midst of an ambitious five-year plan to turn around the fortunes of the Aston Martin Lagonda car company, which they bought in February 2020. With the sales last year returning to pre-pandemic levels, due in part to the success of the DBX SUV, and new models in the pipeline including the DBX707 and new V12 Vantage, current CEO Tobias Moers has some formidable targets to meet.

The sales forecast for this year is good, however, with Aston aiming to sell around 6,600 cars, while the ultimate goal is to sell 10,000 units per year by 2025. Daimler Benz's 20% stake in the company is critical to helping weather the storms caused by the automotive industry's transition towards hybrid and fully electric powertrains. That relationship is also important in F1.

The F1 team also has a five-year plan which commenced last year. It will soon be freed from the confines of the Silverstone factory built by Jordan Grand Prix in 1991, moving into a purpose-built £200m, 400,000 sq ft headquarters compete with new wind tunnel.

The move will happen next year, which means the 2024 car will be the first to be designed in the new facility. Allowing for the inevitable teething problems which can



By 2023 Aston should be in its new factory complex, which is being built to replace the cramped Jordan premises constructed in 1991

come with operating an entirely new factory and wind tunnel, never mind integrating staff, 2025 should be the first year in which Aston Martin has a car capable of matching its owner's aspirations.

That's the final season of the five-year plan, and although there is talk of taking a tilt at the world championship by then, a more realistic and no-less-worthy objective would be to win races.

There is no shortage of precedents for the time it takes to become a winner, no matter how impressive the financial resources or management expertise.

When Mercedes-Benz bought Brawn Grand Prix in the aftermath of Brawn's shock 2009 title double, it took four more years to return the team to title contention. Red Bull's first victory came four and half years after the Austrian energy drinks company purchased Jaguar Racing from Ford.

There is another side to Stroll, of course, as father to Lance. Some see it as a blind spot, others point out that Stroll Jr is quick enough to have claimed three podiums and a pole position. Last season, his average grid position was 13th; team-mate Vettel's 12th – and although the German scored that fine second in Azerbaijan (and second on the road in Hungary), they weren't that far apart on points by the year's end: Vettel 43-34 Stroll.

Vettel considered retirement last year and it will surely be playing on his mind again. Although outwardly positive about his continued career, the mistakes are more frequent. The marginal gains of a superior driver are replaced by the cumulative effect of errors which suggest a focus that's drifted. He has not forgotten how to be fast, but the consistency is no longer there.

Assuming Stroll Jr continues as one of the team's drivers for as long as Stroll Sr wishes, the question arises as to what happens when Vettel leaves? Will the team target an A-lister capable of leading the team to race wins in 2024-25, or settle for something less?

That is likely to be a pivotal decision over the next 18 months, giving a clear indication of the team's confidence in itself to deliver a truly competitive car during the remainder of its five-year plan.

What happens after 2025 is anyone's guess – particularly if Porsche and Audi join F1, a game-changing development if and when it's confirmed.

Lawrence Stroll probably isn't thinking that far ahead. He's looking to his F1 team management to deliver on the immediate plan, his personal commitment to the project providing the bedrock of support and continuity of focus which a team like Jaguar Racing always lacked.

In short, the similarities are only skin deep. Aston Martin's journey is an altogether different tale. At least for now...

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PICTURES: ASTON MARTIN; ZAK MAUGER

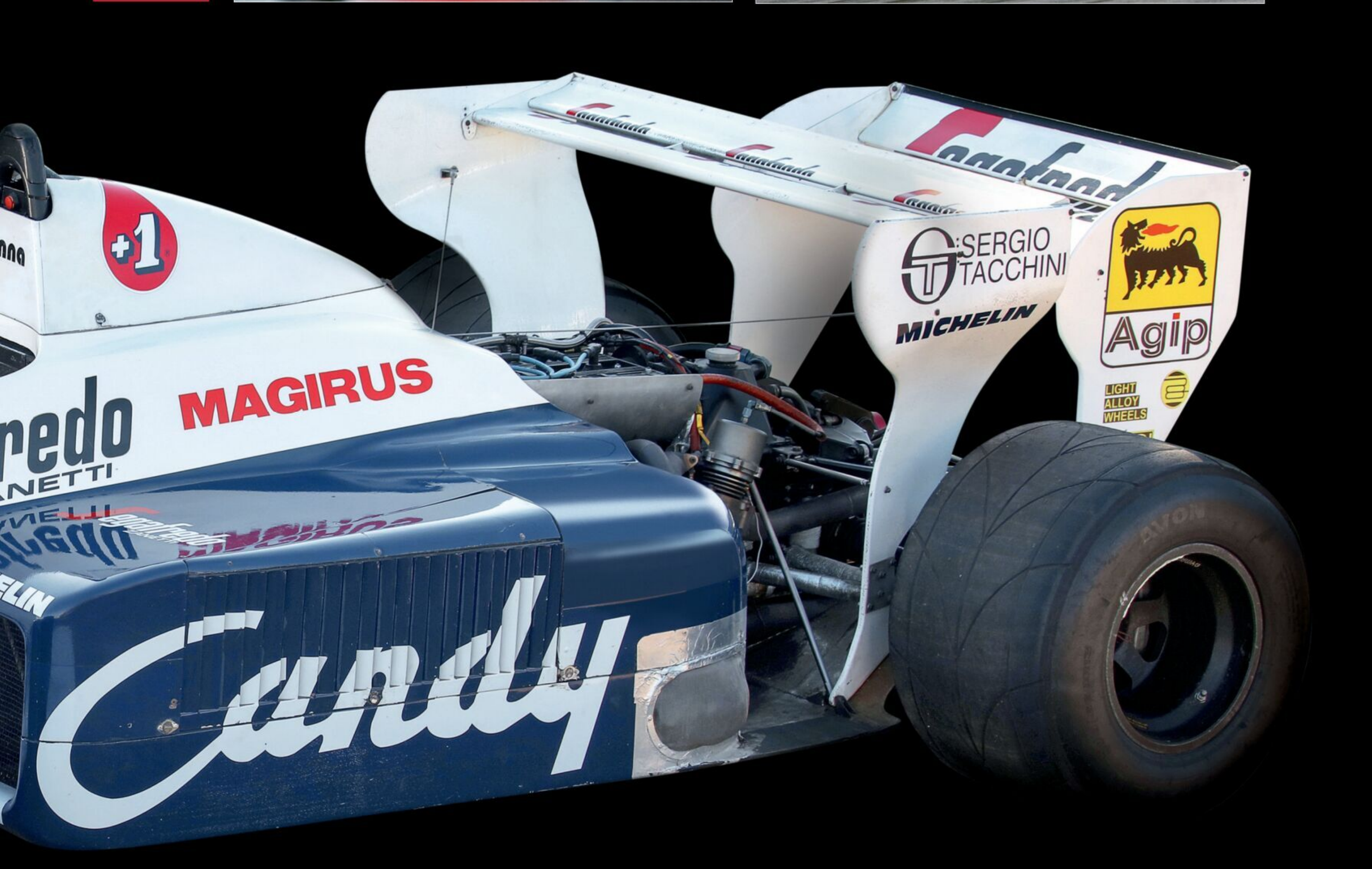
TOLEMAN TG184

Ayrton Senna's first Formula 1 racer

NOW THAT WAS A CAR

No. 108

WORDS
STUART CODLING
PICTURES
JAMES MANN



"Start small, think big," runs a quote popularly attributed to technology entrepreneur Steve Jobs. In January 1984 Jobs, whose company had begun operating from a suburban garage in Los Altos, California, unveiled the first Mac computer in a revolutionary blaze of hype, setting Apple Computer Inc on the path to becoming one of the biggest companies in the world. Four months later and thousands of miles away, a group of unproven individuals destined for greatness in Formula 1 narrowly missed out on achieving one of the greatest upsets in the history of motor racing.

Monaco 1984 is F1's great shoulda-woulda-coulda moment, an event still hotly debated. The narrative is stuffed with Hollywood tropes: a struggling, underdog team; a new car created by a who-are-you-anyway designer; a driver talented enough to have caught the eyes of top teams, but not so much that they wanted to employ him straight away; a surreal race flagged before the finish and the win awarded to a driver who had already been overtaken; and the long-tail intrigue of whether the car which crossed the line first, only to be denied a sensational victory, would have made it to the chequered flag if the race hadn't been stopped early. And most of it is true.

Indubitably Toleman was not a team of which grand prix greatness was expected. South African-born businessman Ted Toleman's father and brother were keen racers, and the family company revolved around the motor trade – delivering Fords

TOLEMAN'S FIRST THREE SEASONS IN THE TOP FLIGHT WERE BORDERLINE CATASTROPHIC. HENTON AND WARWICK QUALIFIED THE BULKY TG181 JUST ONCE EACH IN THE 1981 SEASON

to dealerships – so it was a natural fit as a sponsor. But when Bob Toleman suffered fatal injuries in a Formula Ford 2000 race in 1976, it would have been understandable if the family interest in motor racing had evaporated. Instead, driven largely by the energy of Toleman employee and race team manager Alex Hawkridge, it set its sights higher – to Formula 2.

Toleman Group Motorsport entered F2 in 1978 running a BMW-engined March chassis engineered by former Royale designer Rory Byrne for ex-Royale works driver Rad Dougall, both also South African. The operation was based in a corner of Tom Walkinshaw's workshop at Kidlington, near what is now called London Oxford Airport. After finishing third in the season opener at Thruxton, Dougall's results petered out and the team began a works association with Ron Tauranac's Ralt company for 1979, but the car was overweight and late arriving.

For 1980 Toleman and Hawkridge signed off on an in-house chassis designed by Byrne and John Gentry, using new Pirelli radial tyres. The car was built in new premises in Witney, just west of Oxford. British F3 champion Derek Warwick joined, bringing BP sponsorship, while the promising Stephen South was sacked in favour of Brian Henton after sneaking off to test an F1 McLaren. Henton won three rounds and took six other podiums in the Hart-engined TG280, bloodying the nose of Ron Dennis's Project 4 team. In late 1980 Toleman announced its graduation to F1, using the same personnel and suppliers – why disrupt a successful operation? Pirelli wanted to expand into F1 and Hawkridge, despite Bernie Ecclestone's advice to run Cosworth DFVs, saw turbos as the future: "Only an idiot would have gone with a naturally aspirated engine," he said.

But Toleman's first three seasons in the top flight were borderline catastrophic. Henton and Warwick qualified the bulky TG181 just once each in the 1981 season, and Warwick managed just two classified finishes in its b- and c-spec versions the following year, though he and new team-mate Teo Fabi made the qualifying cut more often. Warwick cuttingly nicknamed the car 'General Belgrano' after the Argentine warship sunk during the Falklands War in early 1982.

This was a time of rapid technological advance and political ferment. For Byrne and Gentry there was much to learn about 'ground effect' aerodynamics and the structures required to contain them at this level, as well as packaging a turbo engine and its plumbing. Pirelli was new to F1. Engine tuner Brian Hart also faced a huge learning curve, for all his previous successes in fields as diverse as F2 and the World Rally Championship. Creating a new engine wouldn't be as simple as sleeving down the Ford-based 420R to 1.5 litres and adding a turbo. When Renault's Jean Sage, keen to align Toleman on the grandee teams' side of the brewing FISA-FOCA war, invited a delegation from Toleman into his garage at the 1980 Italian Grand Prix, Hart ran his eye over the twin-turbo V6 and the enormity of the task hit home.

"I thought, 'My God, what the hell are we doing here? This is what we'll be up against.'"

Hart's first iteration of the 415T engine, with a single Garrett turbo, suffered huge lag – typical of the era – and lacked top-end power compared with Renault, Ferrari and, latterly, BMW. It was prone to bursting head gaskets too. The team's issues provoked tensions between Hart and Byrne, but Hawkridge was too invested in the engine project to contemplate an alternative, even if one existed, so Toleman continued to underwrite development. Hart revised the straight-four so it was cast as a monobloc – no head gasket to blow – and reckoned this single development yielded 130bhp.

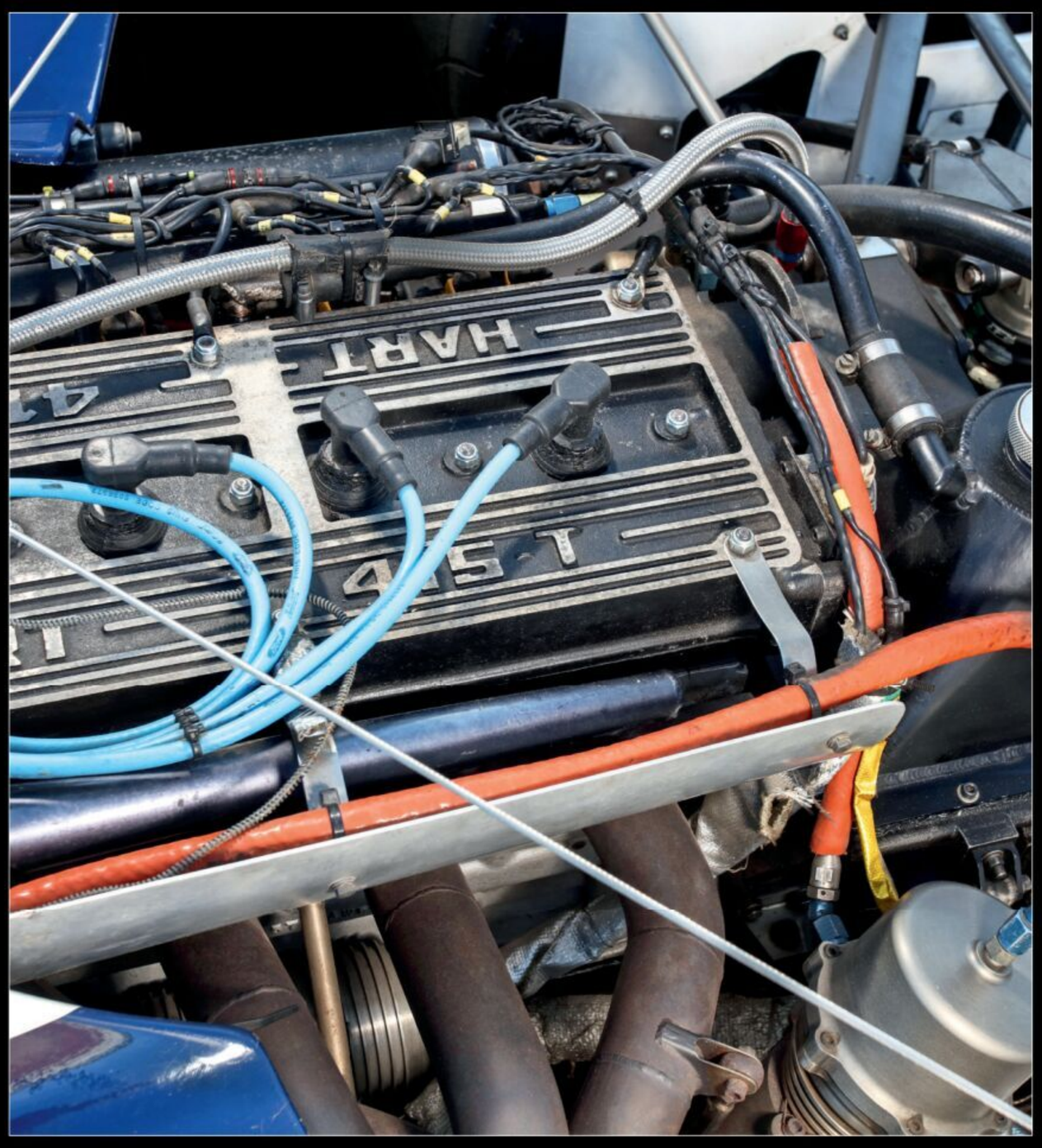
Allied to Byrne's new carbonfibre TG183 chassis, introduced for the last two races of 1982, the redeveloped Hart engine brought an improvement in performance, only for the whole project to be almost scuppered by the regulatory rug-pull which came in early 1983. Flat floors, mandated to reduce ground effect, entailed a last-minute chassis redesign. Byrne's solution was to fit double rear wings, and relocate the radiators to the front in a large wing assembly which featured venturi tunnels to achieve ground effect. Warwick amassed nine of the team's 10 points in a late-season surge.

The TG183B would soldier on into 1984, but change was brewing. Hart had radical developments planned in the form of a bespoke twin-spark electronic engine management system created by ex-Lucas engineers Bill Gibson and Bill Mason, who had recently co-founded Zytek. Byrne had a new chassis in the works with more conventional wings and plumbing, having found the front venturi setup too pitch-sensitive. The new car was being designed with Michelin rubber in mind, and with the French tyre company's data, as Toleman manoeuvred to extricate itself from its Pirelli contract. And Hawkridge had snapped up a promising driver who leading teams had tested but decided to leave on the shelf while he gained experience elsewhere: 1983 British F3 champion Ayrton Senna.

TOLEMAN TG184

NOW THAT WAS A CAR

No.108



Pat Symonds, now chief technical officer at F1 and *GP Racing's* tech columnist, was then a young race engineer at Toleman and found Senna an immediate upgrade on Bruno Giacomelli.

"Until a driver gets to F1 you cannot know how good a driver he really is," Pat recalled in a round-table interview in 2014. "I knew he was good, but he hadn't dominated in F3, he was pretty level with Martin [Brundle, Senna's title rival], very similar. Some drivers you think they're average before they get to F1 and they end up doing very well. Others you think they're brilliant and they end up doing not very well. So you never quite know. But as soon as I started working with Ayrton I knew he was very capable."

And Senna was hungry for success. When a blown turbo caused his retirement from the 1984 season opener, his home grand prix in Brazil, his response to Hawkridge was unequivocal: "What are you going to do about it?"

It's a mark of how powerful an impact Senna made at this early stage that his demand was acted upon immediately. Hart cast around for an alternative and alighted on Holset, better known for supplying truck manufacturers. The company was at first surprised, then delighted, and its products proved more robust – although Toleman was still down on power compared with rivals.

Matters with Pirelli came to a head at San Marino. A dispute caused the team to skip Friday's running entirely. The drivers were set to run until a fax arrived from Toleman HQ telling them not to go out… Saturday started wet, but Senna suffered a fuel-pressure problem which marooned him out on track when conditions were at their best. The result was his first and only DNQ in F1.

Toleman was then able to obtain Michelins – but only last year's compounds, at the insistence of McLaren boss Ron Dennis. Hawkridge always maintained this was sheer pettiness motivated by their previous rivalry in F2.

"You can't compare the handling of this car with the previous one," said Senna when he first drove the TG184, during the French GP weekend. "I feel I can take time off anyone in the corners."

Though based on the TG183 monocoque and suspension layout, the TG184 had entirely different bodywork, shaped in the Ministry

TOLEMAN WAS THEN ABLE TO OBTAIN MICHELINS BUT ONLY LAST YEAR'S COMPOUNDS, AT THE INSISTENCE OF McLAREN BOSS RON DENNIS

NOW THAT WAS A CAR

No.108

TOLEMAN TG184

of Defence windtunnel at Shrivenham. It elevated Toleman to the midfield, though Senna's last turbo failure of the year eliminated him in France. It was the next round, in Monaco, in which he would begin to establish his legend.

Now carrying Candy sponsorship, Senna's TG184 seemed to be trundling languidly around the perilous street circuit as the Brazilian essayed his first-ever laps there in Thursday practice. The atmosphere on the pitwall grew tense as the engineers and team management wondered what their new star was up to.

"This went on for a few laps," Hawkridge would later recall. "Him going round at a snail's pace and then – bang – he went straight to the top of the timesheets from the bottom. We thought, 'bloody hell – how do you do that?'

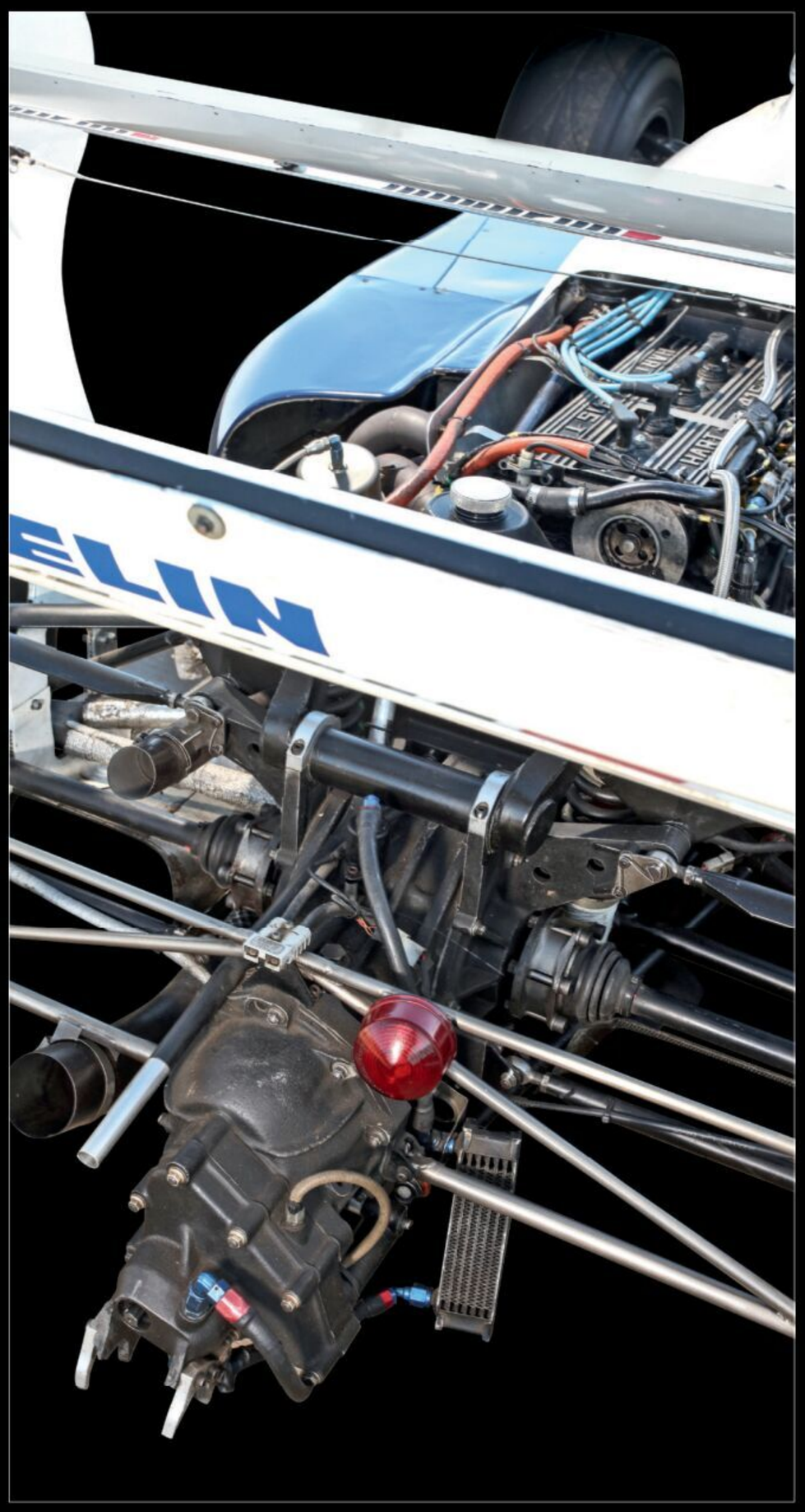
"I said to him afterwards, 'What were you doing?' He said, 'I was looking at where the manhole covers were, where the camber changed, where the gutters ran down, where the crown of the road is.' I said, 'But you can't learn Monaco in five laps.'

"He said, 'Oh, you can.'"

Senna qualified 13th after a final session in which he left absolutely nothing on the table. Every wheel rim bore the scrapes of repeated kisses of the barriers. Come race day Senna was in his element as pendulous grey clouds deposited heavy rain and chaos ensued. For once he was equipped with 1984-spec tyres, for Michelin had no old wet-weather tyres available, and on this level playing field Senna duly excelled.

The race got under way 45 minutes late after a fire truck was deployed – at the drivers' insistence – to wet the surface in the tunnel under the Loews' hotel. A first-corner shunt eliminated both Renaults, then Nigel Mansell seized the lead for Lotus, only to spin off. McLaren's Niki Lauda also gyrated, and Nelson Piquet's Brabham succumbed to an electrical problem… but Senna required no further assistance. The rest of the attrition occurred far behind on the timesheets as Senna ascended to second and homed in on the McLaren of race leader Alain Prost. Symonds counted the laps by, noted down the margins by which his man was gaining: 1.5s one lap, 4.4s the next. The fact that Stefan Bellof's third-placed Tyrrell was gradually catching too meant nothing. Toleman's man was going to win.

Only he didn't. On laps 29 and 31 Prost gesticulated wildly as he passed the finishing line, demanding the race be stopped. Clerk of the course Jacky Ickx concurred and signalled for the red flags. Next time around Prost pulled to a halt at the line



NOW THAT WAS A CAR

No.108

TOLEMAN TG184

“NO-ONE WILL EVER KNOW WHETHER THE CAR WOULD HAVE FINISHED. IM MY VIEW, IT WAS A SERIOUS CRACK BUT IT WASN’T ABOUT TO FAIL” PAT SYMONDS

and Senna went by, believing himself to be the victor – but, since the results are taken from the lap before any red-flag stoppage, Prost was declared the winner.

Would Senna have won had the race not been stopped? Possibly. One of the front suspension rockers was damaged, but perhaps not enough to have forced Senna to park the car.

“One of the front rockers was cracked,” said Symonds. “And we believed that happened on a trip over the kerbs at the chicane. But no-one will ever know whether the car would have finished. In my view, it was a serious crack but it wasn’t just about to fail. No-one will ever know.”

Now the big teams were properly interested in Senna. Lotus custodian Peter Warr swooped during a period of three DNFs – Germany, Austria and the Dutch GP – on the bounce for Senna to tempt him into black-and-gold for 1985; a furious Hawkridge responded by suspending Senna from the Italian Grand Prix. At the end of the year, they parted ways – Senna to a maiden grand prix win with Lotus before properly establishing himself as one of the all-time greats with McLaren.

As Ted Toleman’s interest pivoted towards powerboats his team was sold to Benetton, and in that and various other incarnations it has won four drivers’ championships and three constructors’ titles. Two of those championship-winning cars were drawn by Rory Byrne before he moved to Ferrari and even greater glory during Michael Schumacher’s pomp.

Big achievements from small starts...

RACE RECORD

Starts 19
Wins 0
Poles 0
Fastest laps 1
Podiums 3
Constructors’ championship points 16

SPECIFICATION

Chassis Carbonfibre monocoque
Suspension Double wishbones with pullrod-actuated coil springs/dampers (front), double wishbones with pushrod-actuated coil springs/dampers (rear)
Engine Hart 415T turbocharged inline-four
Engine capacity 1459cc
Power 650bhp @ 10,500 rpm
Gearbox Hewland five-speed manual
Brakes Steel discs front and rear
Tyres Michelin
Weight 540kg
Notable drivers Ayrton Senna, Johnny Cecotto, Stefan Johansson

RETURN TO POWER

THE HISTORY OF BRABHAM

PART 2: 1966-71

At the ripe 'old' age of 40, Jack Brabham remained a competitive force – taking advantage of Formula 1 engine capacities doubling to capture a third world championship

WORDS DAMIEN SMITH PICTURES motorsport IMAGES

THE HISTORY OF BRABHAM PART 2

The 'old man' with the long (fake) beard and walking stick gingerly waddled to the green and gold Formula 1 car sitting on pole position. Jack Brabham was all too used to the wise-cracks about his age, so couldn't resist a comical retort. But behind the stunt and the good-natured laughter it triggered, there was also a dash of genuine niggle. Yes, he'd turned 40 in April, and yes, before this season he hadn't won a points-paying grand prix for almost six years. But look at him now, here at Zandvoort for the 1966 Dutch GP – already a winner twice and leading the standings.

In F1's 'return to power' season, as engine capacities doubled to three litres, Old Man Brabham had pulled a technical masterstroke and was winding back the clock. Zandvoort was the third in a string of four consecutive victories that happy summer of 1966 – shades of the Cooper glory days. For doughty Brabham and his tight-knit team, the 1960s were finally beginning to swing.

He'd built up to this since November 1963 when it was announced that F1 was due an upsize. More speed, more acceleration, more wheelspin, more noise: drivers rubbed their hands. Yet in an echo of the 1961 downsize, major players still wouldn't be fully prepared for the change. It didn't help that in February 1965 Coventry Climax struck a blow by refusing to build an engine to the new regulations. The company previously best known for its fire pump engines had been the power behind four F1 world titles since 1959, claiming 40 grand prix wins – 25 since the downsize in 1961. Of the 22 won by the benchmark FWMV V8, Jim Clark's Lotuses had won 19 of them. Now what?

Lotus ended up killing time in 1966, falling back on Tasman series 2-litre Climax power and BRM's hefty, overweight and reliably unreliable H16. Cooper joined forces with Maserati to use a V12 with a DNA anchored in the late 1950s, while the heritage of Ferrari's 12-cylinder could be traced even further back to its foundations deep in the 1940s. Still, John Surtees was looking good for a second (four-wheeled) world title, even if the twin-spark 60-degree V12 was on the heavy side and better suited to sportscar racing. The trouble was, Brabham undercut them all after surely the best-value flight he ever took.

He flew to LAX to view a liner-less aluminium Buick block at a GM distributor close to the Los Angeles International airport. While there, he was pointed towards a sister pushrod unit that had been created for a now-defunct Oldsmobile project. In the simple, relatively light two-valve 90-degree V8, Brabham spotted a potential answer to his F1 power vacuum. He had the engine transported to his old friends at Repco – short for Replacement Parts Company – back home in Melbourne.

Meanwhile in a flat in Croydon, Phil Irving, who'd made his reputation at Vincent motorcycles, drew a new engine based on the Oldsmobile block – with Brabham and his design partner Ron Tauranac looking over his shoulder, the latter advising on ancillary requirements. For Repco, pistons, rings, bearings, pins, guides, seals, gaskets and liners were all in-house products. The chain-driven sohc V8 proved compact, frugal (new blocks cost £11, con-rods £7!) and user-friendly fitted into Tauranac's latest spaceframe BT19. Initial power came in at 280bhp at 7500rpm, just shy of the V12 Ferrari, but at 144kg it was a deal lighter, significantly so compared with the complex 252kg BRM H16.

Surtees was worried, and his worst fears were confirmed at Silverstone's non-championship International Trophy where Jack beat the Ferrari to pole position and left it for dust. Nevertheless, Brabham's points-paying season took time to ignite. As Stewart won in Monaco with a 2-litre Tasman version of his 1965 BRM – emphasising this as a time of transition – Surtees bristled at Ferrari politics lumbering him with the big V12 when he knew a 2.4 V6 was better suited to the principality. As for poor Brabham, he suffered from a tummy bug, retired with transmission trouble and caught a bus back to his hotel because he couldn't find a taxi. Not for the first time... it's F1, but not as we know it.

At Spa, Surtees saw off Jochen Rindt's Cooper in a classic encounter – and his last F1 appearance for Ferrari before their combustible divorce post-Le Mans. Brabham finished a cautious fourth, but was just happy to be alive after scraping through a big twitch in the deluge at Burnenville that caught out Stewart,

Brabham's victory at Reims in 1966 was his first since 1960 and made him the first GP winner in a car bearing his own name

When F1 doubled capacity for 1966, the V8 Repco 620 engine proved to be the best of the new power units. And it was cheap...

An oil leak forced Brabham out of the 1966 Italian GP but with John Surtees also retiring, the title was Jack's with two races remaining

Jack had followed up his Reims win with another at Brands Hatch. Hulme was second and a constructors' title was now within reach

whose dreadful experience following his accident triggered his epochal campaign for better F1 safety.

The glory run began at Reims with a historic landmark: the first F1 world championship grand prix winner in a car bearing his own name – and Jack's first since the 1960 Portuguese GP, a drought of 45 races. To compound his pleasure team-mate Denny Hulme scored a first podium, driving the new BT20. Jack also dominated the F2 race, as Brabham chassis would all season, with a firecracker of a Honda 1-litre. Naturally, Jack's rivals (and friends) were the first to congratulate him: John Cooper, ex-Brabham driver Dan Gurney – who'd clearly left the team just at the wrong time – and Colin Chapman.

On to Brands Hatch, Jack's favourite circuit, where he and Denny notched up a British GP 1-2 – the stuff of dreams. Next, 'the old man of racing' pulled his grid stunt at Zandvoort, battled with Clark's 2-litre Lotus on another oily surface, then stroked home when the Lotus pitted. To cap his summer Jack then won at the Nürburgring in his faithful BT19, fighting off a spirited challenge from Surtees, now driving for Cooper.

The third world title was within touching distance. But at Monza Jack would claim it sitting on the pit counter following an early retirement. There's no doubt Jack Brabham engineered his way to an achievement that is likely to remain ▶

Rindt was signed for 1968 but the four-cam Repco Type 860 engine blunted Brabham's competitiveness

unique: champion in a car of his own making. But he drove damn well too. As he headed into 1967, Jack coveted a fourth world championship. All that would stop him was his team-mate.

Is Denny Hulme F1's most overlooked world champion? Perhaps it was the Kiwi's self-effacing character, for he never sought the limelight. Nevertheless, he grafted for his chance in the top flight, made the most of it when it came, and won his world title on merit.

Hulme first journeyed to the UK in 1960 on the New Zealand Driver to Europe scheme and carved a decent reputation in Formula Junior while working as a mechanic at Brabham. Gurney's presence meant it took time for him to earn his F1 chance but, when the Californian left to take a lead from Brabham and form Eagle, Hulme was perfectly placed to slot into a supporting role beside the Old Man in that glorious season of 1966. Now Denny was ready to step up a gear, which doesn't happen often with so-called 'number twos'. Think about that for a moment. How many have done it? Hulme deserves more credit.

Bad luck and lost brake fluid cost him a maiden win at Kyalami, but in Monaco Denny was supreme to score his first – only for the success to be overshadowed by the appalling death of Lorenzo Bandini, burnt in his blazing Ferrari. The best of times – and the worst.

Then Zandvoort and another landmark, one that would spell the beginning of the end of Brabham-Repco's golden era. Lotus was done killing time in the 3-litre era as Chapman wheeled out the Type 49, with its stressed-member Ford Cosworth Double Four-Valve (DFV) V8 slung ominously off the back. Clark beat Brabham first time out with the sensational new combination, but reliability gremlins undermined Lotus thereafter. Sure, Clark won four times that season, but the retirements in between allowed Hulme and Brabham to make more hay. Tried and trusted proved key in 1967 as Jack led Denny to a second consecutive French GP 1-2, this time on the funny little short circuit at Le Mans. Clark won at Silverstone, but Hulme was second to keep the points counter ticking over, then at the Nürburgring Denny scored his second win as the demands of 'The Green Hell' broke the 49s.

In Mexico for the finale Brabham found himself five points down on his employee; Jack needed to win with Denny lower than fourth to snatch the crown. But there was to be no late drama. As Clark won (too little, too late), Hulme stuck to Brabham's tail to complete the job without a hitch or fuss, the model of consistency.

Denny didn't stick around to defend his title at Brabham. That autumn he'd driven for old friend and fellow Kiwi Bruce McLaren in Can-Am, and with Robin Herd's M7A bristling with DFV power for 1968, he broke the news to Jack he was switching camps. No hard feelings.

Repco hadn't been idle in 1967, having evolved its Type 740 V8 design. But now in the face of the DFV threat, the Melbourne company took a step too far, upgrading to four camshafts and four valves per cylinder for the Type 860. For the rest of his life, Brabham was convinced his team could have scored a title hat-trick in 1968 had it stuck with the two-cam. Instead, the season ▸

AS HE HEADED INTO 1967, JACK COVETED A FOURTH WORLD CHAMPIONSHIP. ALL THAT WOULD STOP HIM WAS HIS TEAM-MATE

THE HISTORY OF BRABHAM PART 2

Hulme (driving) and Brabham at the Nürburgring in 1967. Hulme's win set up a second world title double for the team

spiralled into a disaster of poor reliability.

What a waste, especially since Jack had signed the promising Jochen Rindt. A single fifth for Brabham and a pair of thirds for the Austrian was quite the comedown. Repco's short but intensely successful time was done. Jack followed the herd and grabbed DFV power for 1969, but couldn't argue with Rindt's decision to join Lotus.

In Jochen's place came Jacky Ickx, fresh from title contention (and a broken leg) with Ferrari, courtesy of sponsor Gulf, keen to keep its sportscar star on the oil company's books. The Belgian never clicked with Jack, 20 years his senior. But Brabham had greater concerns. A crash while testing an experimental Goodyear tyre at Silverstone before the French GP shook the triple champion, now 43. The Brabham crew that cut him free was led by a promising mechanic, Ron Dennis, who had joined with Rindt the previous year. Jack was just happy to be alive, but a badly broken ankle kept him out for three races, until he returned at Monza.

Now the full focus of the team, Ickx stepped up.

Jack's last victory came in the 1970 season opener at Kyalami. He hadn't intended racing that year until Rindt opted to stay at Lotus

BUT RINDT'S U-TURN DID AT LEAST LEAVE BRABHAM WITH LITTLE OPTION BUT TO RACE ON INTO THE NEW DECADE

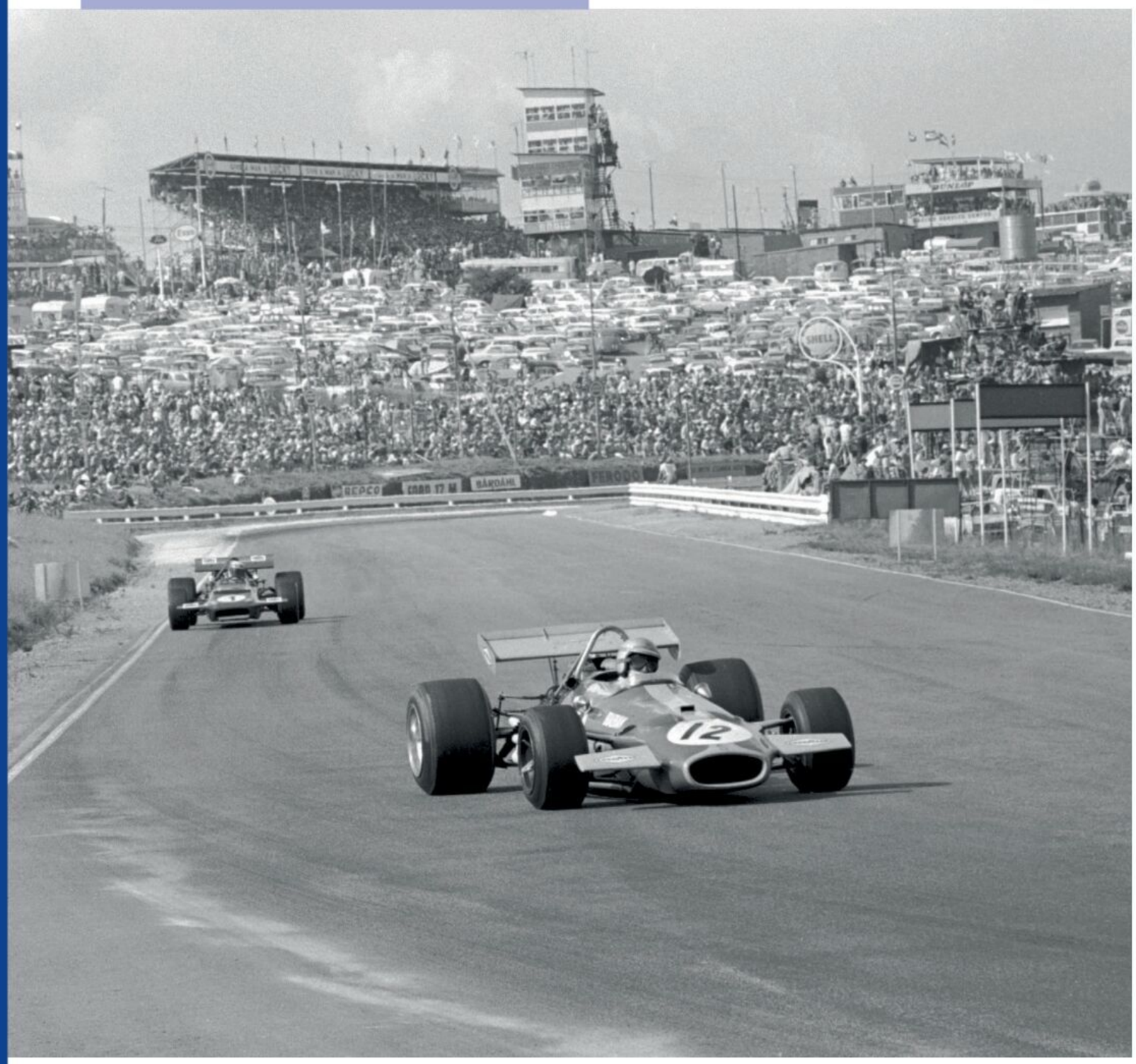
After winning the closest-ever racing finish at Le Mans in a Gulf Ford GT40, he logged F1 podiums at Clermont-Ferrand and Silverstone before taking pole at the 'Ring. A poor start dropped Ickx to ninth, but he'd carved past Stewart by lap seven for a terrific win. Another followed at Mosport, this time with Brabham following him for a team 1-2. But Jack was under pressure at home. He'd survived through a deadly era, but the Silverstone test shunt was a stark reminder of diminishing odds. The trouble was that old fire still burned. He didn't want to stop.

Still, that autumn Jack convinced Rindt to return with the promise of a first Tauranac F1 monocoque – Ron had stuck to his guns on spaceframes for long enough. But when Jochen received a counter-offer too good to turn down to remain at Lotus, he asked Brabham to be released from his deal. Rindt's manager and friend Bernie Ecclestone spelled it out: if you want to win the championship, stay at Lotus; if you want to stay alive, go back to Brabham. Jochen made his choice.

But Rindt's U-turn did at least leave Brabham with little option but to race on into the new decade. A long phone call convincing wife Betty while at Watkins Glen hadn't gone well. But he was fired up and ready for what turned into a fitting swansong.

Amid Mauro Forghieri's masterful flat-12-powered Ferrari and Chapman's 'next big thing', the Type 72, Tauranac's solid BT33 more than held its end up as the team's first stress-skinned monocoque F1. First time out at ▶

Brabham was lucky to survive a huge testing crash at Silverstone in 1969. A broken ankle meant Brabham missed three races though



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THE HISTORY OF BRABHAM PART 2

Mexico 1970: Jack had already sold his share in the team to Ron Tauranac by the time he raced a car bearing his name for the last time

Kyalami Brabham scored the last of his 14 world championship GP wins, but it had not been easy. First, Rindt's Lotus clobbered him airborne at the first turn. Surprised to be still intact, Jack got his head down and chased Stewart's new March for the lead, only for the Tyrrell-entered 701 to flick a stone into his cheek, leaving a lasting scar. Usually it was Jack himself, the old dirt-track racer, giving out such treatment.

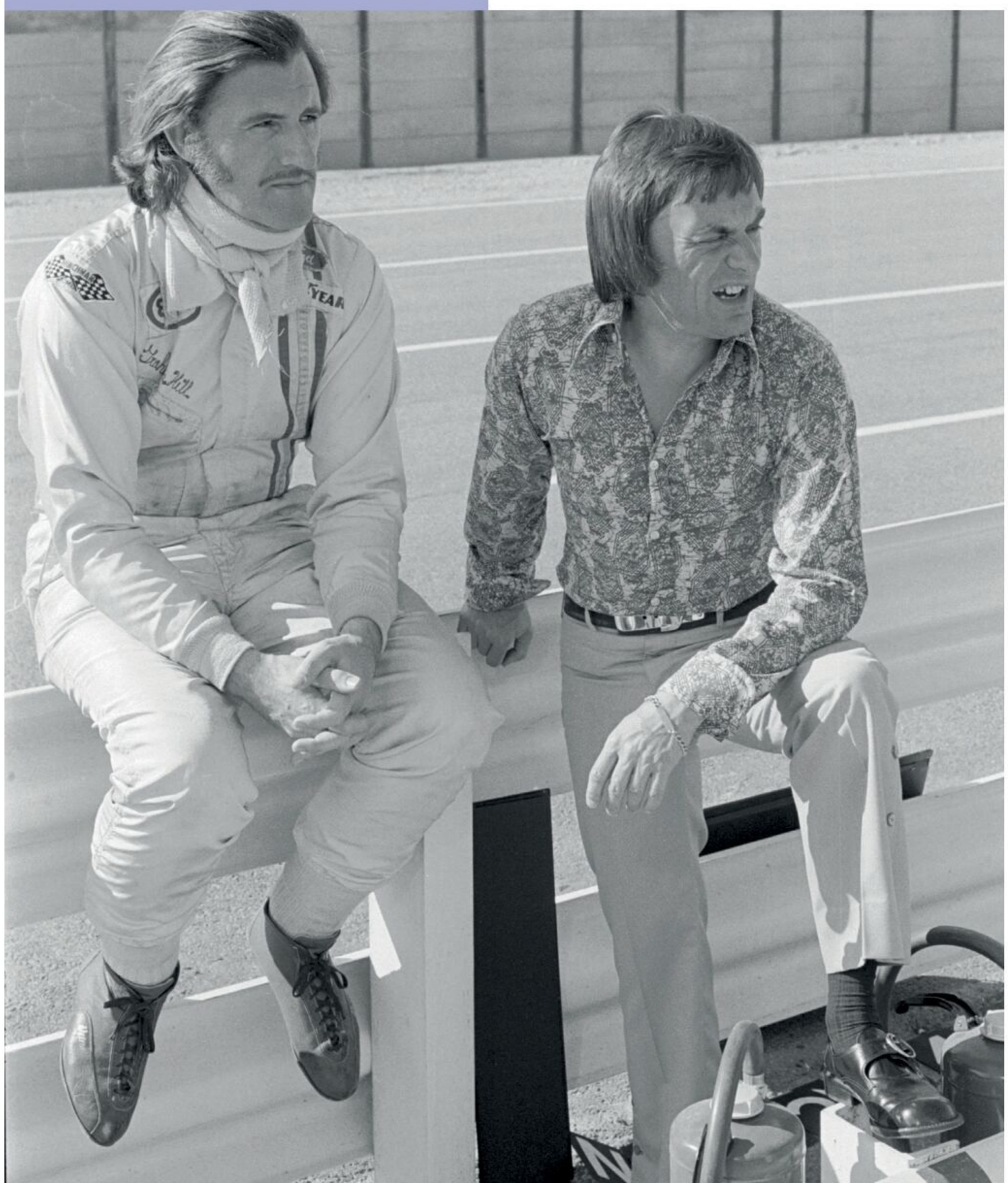
Increasing deafness from years of screaming racing engines led Jack to experiment with comical 'teddy bear' helmet designs that incorporated ear defenders. But there was nothing funny about his final flourish of form in 1970. The trouble is two races stand out, both for the wrong reason: last-lap denouements. The first at Monaco was entirely his own doing. Facing pressure from a fast-closing Rindt and in among backmarkers, Brabham broke character by missing his braking point at Gasworks for the last time and slid into a barrier. Then there was Brands Hatch, where another win slipped as Brabham stuttered out of Stirlings Bend for the final time, again to the benefit of Rindt, as Jack coasted out of fuel. A traumatic example of finger trouble: the engine had been running fully rich, and for years Jack blamed Ron Dennis for not turning down the setting on the grid – only for future Penske mainstay Nick Goozée to admit in 2002 that he was the guilty culprit.

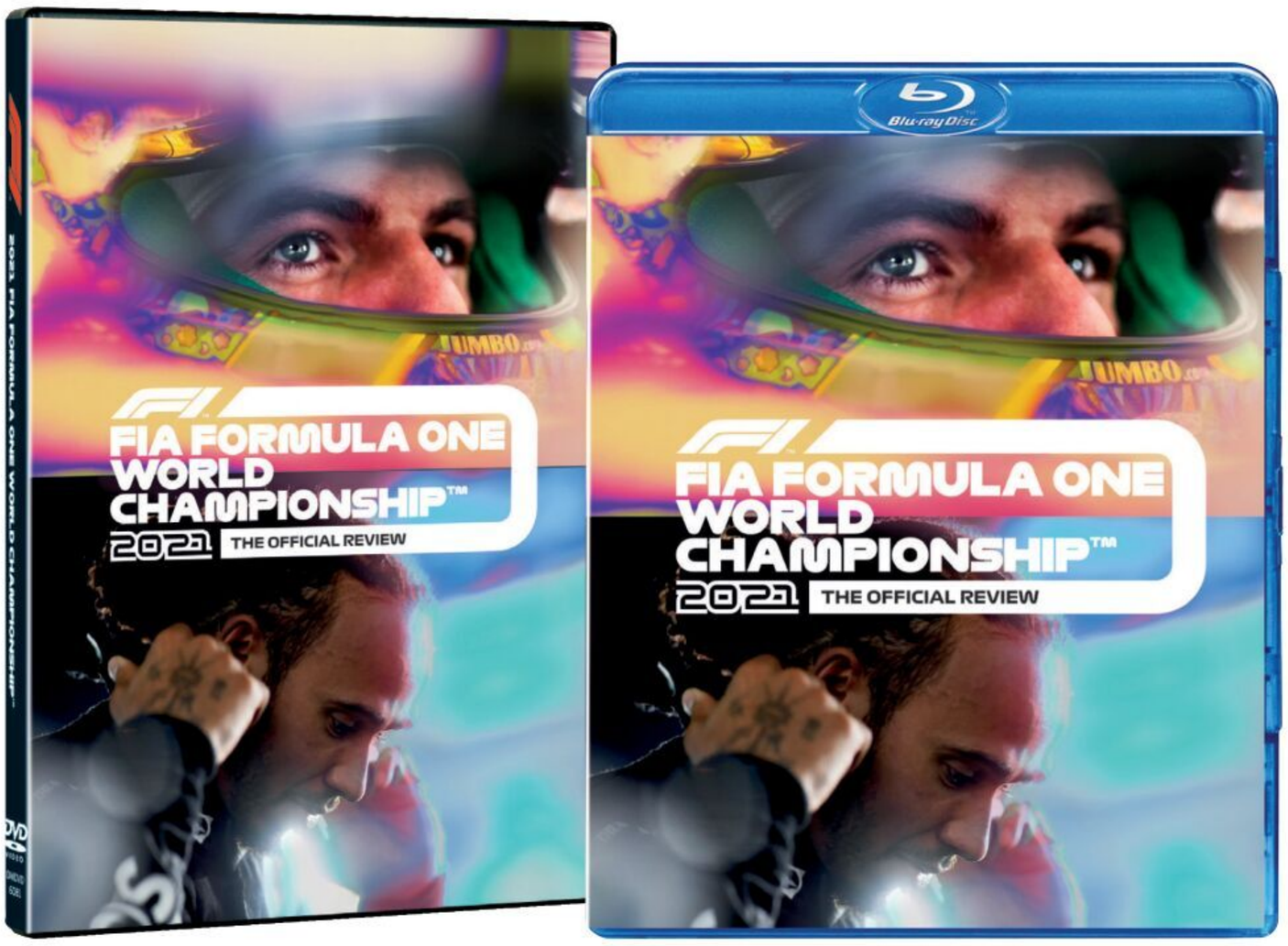
So a title that got away? Had those races not been lost, along with another at Jarama, yes, there's a case. But in the context of the horrors of that year, it doesn't matter. The loss of Piers Courage at Zandvoort, Bruce McLaren in a testing crash at Goodwood and then Rindt in practice at Monza – plus another frightening testing accident for Jack at the Dutch track – only wound up the family pressure. At 44, Brabham called time. As Rindt was crowned a posthumous champion, Jack relished his final months as a professional racing driver, also enjoying sportscar races with Matra. He'd survived 23 incredible, eventful years behind the wheel, and now began a second life. Knighted for services to motorsport in 1979, he died aged 88 in 2014 after a long and wonderful life well lived.

It says much about his mentality that he didn't stick around to manage Brabham from the sidelines. Old comrade Tauranac was handed the reins for 1971, but the hard-nosed engineer was no frontman. He accepted an invitation to meet Ecclestone on his yacht, where Bernie offered a 'partnership' – to buy the team. Years later Ron admitted he more or less gave Brabham away to the sharpest tool in the F1 box.

Tauranac, who died in 2020 aged 95, reckoned he'd suggested £130,000, only for Ecclestone to cut him down to £100k at the 11th hour. A steal... But a deal also necessary if Brabham was to continue as a true F1 powerhouse. Tauranac went on to revive Ralt, as his first hillclimb specials had been called, and made a mark on his own terms as the builder of fine F3 and F2 cars. As for the Brabham team, it was about to be transformed in a whirlwind of technical and commercial alchemy conjured by a new double-act at the helm. Ecclestone and Gordon Murray were ready to lead F1 into pin-sharp and uncharted territory.

New owner Bernie Ecclestone (right) with one of his drivers, veteran double world champion Graham Hill, at the start of the 1972 season





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SHOWCASE

THE SPANISH GP

We take a look at the Spanish GP, first run in 1951 then inconsistent and nomadic until the race landed at its current venue

Michael Schumacher passes Jacques Villeneuve's Williams for the lead, on lap 12 of the 1996 Spanish GP. In one of F1's greatest wet-weather drives, at times Schuey lapped five seconds faster than the rest of the field. It was also his first victory for Ferrari

Fernando Alonso's Renault R26 goes by the Spaniard's adoring fans (and a huge banner from his home region of Asturias) in the 2006 GP. The reigning world champion started from pole position and went on to win his home race for the first time

On lap 21 of the 2008 Spanish GP, the front-left tyre on Heikki Kovalainen's McLaren suddenly deflated as he went through Turn 9 and sent him into the barriers. The Finn suffered an impact in excess of 25G and a concussion but was otherwise unhurt

Damon Hill was named as Williams test driver for 1991 and he carried that role on into 1992. However, at the Spanish GP in 1992 he attempted to qualify for a race for the first time, for the ailing Brabham team, only to miss out by nearly two seconds

Nigel Mansell's Williams passes in front of the 'Jerez wall' during the 1986 Spanish GP. This was the first time Jerez had held the race and Mansell went on to finish second behind Ayrton Senna, just 0.014s adrift of the Lotus in one of F1's closest-ever finishes. The track's remote location and resulting lack of spectators meant it only held a further six F1 GPs

After the deaths of Roland Ratzenberger and Ayrton Senna at Imola in 1994, F1 was desperate to slow down cornering speeds. The Spanish GP at Barcelona was just four weeks after Imola, so this temporary tyre chicane was installed on the straight that now precedes the current Turn 10

The 2016 Spanish GP was when the simmering tension between Mercedes team-mates Lewis Hamilton and Nico Rosberg boiled over. Hamilton had qualified on pole but Rosberg pulled into the lead at the start. Exiting Turn 3 on the opening lap Hamilton tried to close on Rosberg but got squeezed onto the grass and collected the championship leader, forcing both cars into the gravel on the outside of Turn 4

Although the first F1 world championship Spanish GP was run at the Pedralbes circuit in 1951, the first race officially called the Spanish GP was held in 1923 at the Autódromo de Sitges-Terramar, 25 miles from Barcelona. The circuit was a 1.2-mile oval and the GP was won by Albert Divo, in a Sunbeam. Barely used after 1923, there are plans to reopen the site in 2023 for equestrian events with some motoring activities on the track

A broken axle on Jackie Oliver's BRM P153 was the cause of this fiery accident on the first lap of the 1970 race at Jarama. Oliver careered into Jacky Ickx and Ickx's fiery Ferrari 312B remained on the outside of the track but the BRM, once Oliver had escaped, rolled onto the inside of the corner. Amazingly the race wasn't halted and Bruce McLaren's M14A is the car passing through the flames

In 1968 Team Lotus appeared at the Spanish GP at Jarama bereft of its talisman Jim Clark, who had died in an F2 race just over a month earlier. The 1962 world champion, Graham Hill, had joined the team at the start of the season and stepped into the gaping hole left by Clark's death to win this, the very next GP. He went on to win the world title too

In 2015 Max Verstappen became the youngest-ever driver in F1. He started 2016 driving for Toro Rosso but for race five, the Spanish GP, he was parachuted into Red Bull, replacing Daniil Kvyat. Red Bull hadn't won a race since Belgium in 2014, but Verstappen took advantage of the Mercedes drivers taking themselves out on lap one to become F1's youngest ever winner, aged 18 years and 228 days

Spain's F1 fans have, since he first appeared in F1 back in 2001, adored Fernando Alonso. No other Spaniards have matched Alonso's fanbase in F1 yet, but in 2015 Carlos Sainz, son of world rally legend Carlos Sainz Sr, made his first GP appearance on home soil, finishing ninth for Toro Rosso. Now a Ferrari driver, Sainz would take a maiden victory at Barcelona all day long...

This shunt on the opening lap of the 2009 Spanish GP was caused by Jarno Trulli's Toyota (not shown) going off exiting Turn 2. Trulli came back onto the circuit, missed Nelson Piquet Jr's Renault, but collected the Force India of Adrian Sutil (top of shot). The two Sébastiens, Bourdais and Buemi, in the pair of Toro Rossos, had nowhere to go and joined Sutil and Trulli in retirement

In F1's 72-year history only two female drivers have qualified for races. The second of these, Lella Lombardi, scored a world championship [half] point in only her second start. Lombardi was running sixth in the 1975 Spanish GP at Montjuic when the race was stopped prematurely, due to a fatal accident involving Rolf Stommelen's Hill which killed four bystanders

The 1971 Spanish GP was the second of four held at Barcelona's Montjuic Park, and was notable as the first where slick tyres were used. Firestone took the plunge, with the Goodyear runners still using lightly treaded rubber. Second-placed Jacky Ickx's Ferrari was the leading slick-tyred car and in the early laps Ickx headed eventual winner and Goodyear-shod Jackie Stewart

Seven years after his emotional win at Barcelona in 2006, Fernando Alonso was again the pride of Spain with his second win on home soil. Alonso had a stunning opening lap from fifth on the grid, and Ferrari took a calculated risk in stopping the Spaniard four times, but it all worked out in the end. This is, as things stand, Alonso's last F1 win...

Pedralbes, which translates into old Catalan as 'white stones'. is a district in the west of Barcelona. It was here in 1951, around a 3.95-mile street circuit, that the Spanish GP officially joined the world championship. It was the last race of the season and Juan Manuel Fangio clinched his first world title with a comfortable win, his Alfa nearly a minute ahead of second

A disappointed Mika Häkkinen hitches a ride back to the pits with McLaren team-mate David Coulthard after retirement from the 2001 Spanish GP. Unfortunately for Häkkinen, who had yet to win a race in 2001, that retirement was on the last lap when he was leading Michael Schumacher's Ferrari by over 42s. The cause was a hydraulic leak which led to clutch failure

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FINISHING STRAIGHT

RACE DEBRIEF

F1 WORLD CHAMPIONSHIP ROUND 3

THE AUSTRALIAN GP IN 5 KEY MOMENTS

Leclerc finally mastered a track that he openly admits doesn't suit his driving style

1 Leclerc finally discovers his Melbourne mojo

"Qualifying yesterday, we did not expect to have another bit of performance coming into today's race. But to be honest, we were even stronger than yesterday in qualifying. So this has been a good surprise."

It's an ominous sign when the team running at the front of Formula 1 is surprising itself with how fast its car is. But the level of dominance Ferrari displayed in Australia came as a genuine shock to F1's form man of the moment – Charles Leclerc.

As fine a driver as Leclerc is, he admits his driving style has never really clicked with Melbourne. Leclerc is someone who makes his time by monstering his way through slow corners at rates others find baffling – feeling his way on the brakes, creating levels of rotation from the rear of the car that rivals find difficult to live with. Then he's on the throttle earlier, with the car pointing straighter than most, exiting those turns.

"I've always struggled with these type of corners – that are not really 90 degrees," he said after qualifying on pole by nearly three tenths of a second. "It's just a bit strange. I've always struggled with my driving style here."

Melbourne has traditionally been more about medium-to-high-speed chicanes and other quickfire sequences – and kerb-hopping, which is much trickier to do now floors are so low and vulnerable. Perhaps only two corners (towards the end of the lap) fit Leclerc's ideal profile. Track revisions for this year's race – returning after two years' COVID-enforced absence – tightened one of those corners (at the end of the back stretch) and removed the right-left chicane that used to precede it.

Not exactly tailor made for Leclerc. And although he was at the right end of the timesheet all weekend, Leclerc admitted to errors and inconsistency through practice. In fact, he didn't really hit form until his final run in Q3, when another close fight with Red Bull suddenly became a clear defeat of Max Verstappen.

"It was a good lap," said Leclerc of the moment that set him up for a dominant victory in Sunday's race. "This time I took quite a bit of risk, especially in Turn 6, which was quite tricky. I wasn't really on it during qualifying on this corner, just doing some mistakes, and then in the last Q3 laps, I managed to make it right. And I think I gained quite a bit on myself compared to the other laps."

PICTURES: GLENN DUNBAR; ANDY HONE

Verstappen suffered a second retirement in three races and his Red Bull is also beset by inconsistent levels of performance

Leclerc's 0.286s advantage over Verstappen in qualifying was closer to 1s per lap in the race, as the Ferrari pulled clear of the Red Bull almost at will. Leclerc was never under threat during the pitstop phase, and even Safety Car interventions (Virtual and otherwise) failed to really trouble him.

Verstappen got close when Leclerc understeered through the final corner at the second Safety Car restart – but a successful defence into Turn 1, plus a lack of DRS for Max on the subsequent run to Turn 3, preserved Leclerc's lead. After that, there was only ever likely to be one winner...

2 Red Bull is off the pace *and* unreliable

The significance is not lost on Red Bull now it's needlessly conceded 48 points to poor reliability across the first three races of this season – 36 of them on Max Verstappen's car alone. Like in Bahrain, Verstappen was heading for a solid second place in Melbourne when a new – and "totally separate" to the one which struck in Bahrain, according to team boss Christian Horner – fuel system problem forced Max out of the race.

"I had an indication before starting the race that it was going to be tough to finish," Verstappen said. "If you want to fight for the title, these things can't happen. The gap is already too big."

Verstappen also suggested there isn't a "clear fix" for whatever caused his RB18 to again become starved of fuel – something Horner said was "external to the [fuel] tank" (meaning a leak). Max described Red Bull's current reliability record as "not good enough", and he now trails Charles Leclerc by 46 points.

Perhaps of equal or greater concern should be Red Bull's apparent inconsistency in performance. Carlos Sainz reckons there is only a tenth between Ferrari and Red Bull, and Red Bull is ahead at higher speeds. A lower downforce setup helped Verstappen pinch victory from Leclerc in Saudi Arabia, but on higher downforce settings in Melbourne Red Bull just could not get RB18 working properly.

"It's been terrible for me the whole weekend so far," Max said after qualifying. "Just not a good balance, all the time chasing something, and I never felt comfortable for one lap – except the long runs. It just doesn't give you confidence to push. My first run in Q3 started to feel a bit better and I was actually hooking it up, but then I lock up again in one corner, just because of a random balance shift. So, it's not been great, to be honest."

Although Sergio Pérez recovered from being overtaken by Lewis Hamilton's Mercedes at the start to finish second in Verstappen's absence, thanks in part to Carlos Sainz's weekend unravelling so spectacularly following Fernando Alonso's untimely Q3 crash, it was clear there was a huge performance deficit to Ferrari in the race, as Red Bull struggled with front-left tyre graining that simply wasn't present on the Ferrari.

Horner's post-race comments suggested Red Bull encountered rear tyre graining during Friday practice, so engineered understeer into the car to protect against that – only to find the balance shift the other way once the track improved. "We ended up with a car that was very front-limited," Horner said. "We never got to see Max's ultimate pace."

FINISHING STRAIGHT

RACE DEBRIEF

F1 WORLD CHAMPIONSHIP ROUND 3

3 Hamilton compares W13 to a venomous snake

Mercedes was close to a second off the pace of the leading cars in Melbourne. Lewis Hamilton and George Russell both qualified behind the McLaren of Lando Norris and, although relative performance in the race was better, Russell's podium owed much to good fortune. Without Verstappen breaking down, Sainz spinning off and Fernando Alonso crashing in Q3, this would have been a borderline top six race for the Silver Arrows.

Hamilton says the W13 is like a "rattlesnake or a viper – you never know" when it's going to bite you when you commit to a corner. He says the team has made "no progress" with the car yet, while Russell confirms the straightline bouncing is so severe it makes it impossible to commit properly in the high-speed corners.

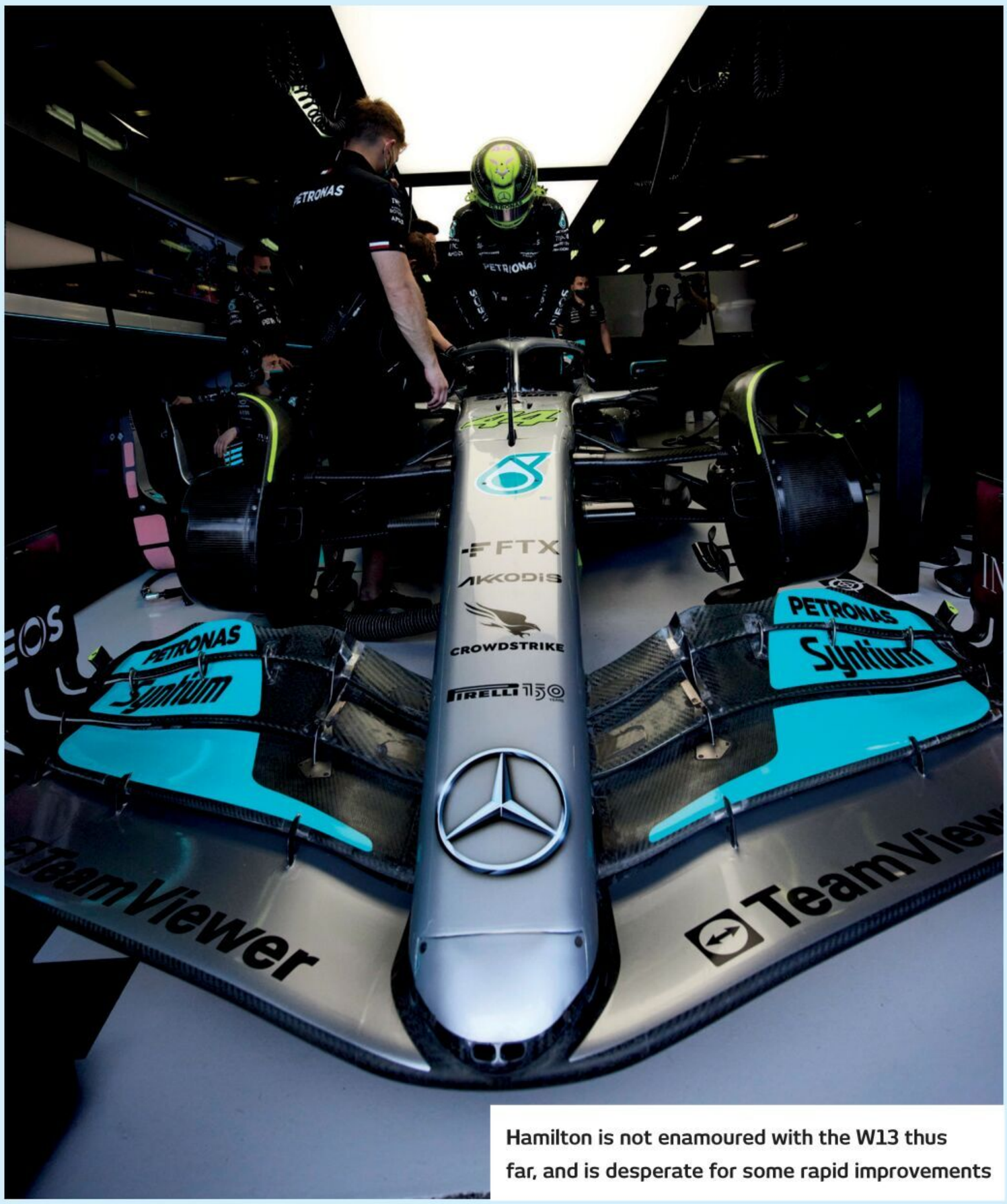
The team is not bringing updates yet because adding downforce worsens the bouncing. Team boss Toto Wolff says there are also other "gremlins" in the car the team hasn't found while it's been dealing with porpoising.

"Our bouncing is worse in the sense that we are carrying that into the corners and in the high-speed," he said after qualifying. "When you look at the overlay, sector one, we are very competitive. Sector two we are competitive, and sector three, through [Turns] 9 and 10 and through 12, we're losing all our margin. It's almost like a second through a couple of corners.

"Is curing the bouncing the miraculous unlocking of a second within the car? No, for sure not. But there are many little improvements we can make on weight and a few others where we can optimise."

The timing of Sebastian Vettel's crash helped Russell jump both Hamilton and Pérez in the pits and consigned Hamilton to the "difficult position" he mentioned over team radio, specifically having to back off behind his team-mate to cool the car.

Pérez raced comfortably past both W13s, and after finishing fourth here Hamilton said he would conduct an intensive round of Zoom calls with Mercedes to push for improvements to the car, then spend time in the simulator (which ordinarily he hates) to help prepare for Imola.



Hamilton is not enamoured with the W13 thus far, and is desperate for some rapid improvements

4 Will McLaren's double top six be 'as good as it gets'?

A double top-six finish for a team that rediscovered how to occasionally fight for pole positions and race victories on merit last season is clearly not good enough – but it's a start of sorts for out-of-sorts McLaren.

Seriously on the backfoot since the brakes started immolating during the final pre-season test in Bahrain, the story of the first three races has been one of steady improvement without doing a great deal to catalyse that progress. McLaren is still utilising a temporary fix on the brakes, and although it brought an aerodynamic upgrade to Melbourne – a revised rear winglet endplate – Lando Norris reckoned this was worth only a tenth of a second.

Most of McLaren's relative improvement in form from Bahrain through Saudi Arabia to Australia has been about track layout. The more slow corners there are, the less downforce the MCL36 produces; the faster and more flowing the track is, the better the car works. This year's Melbourne revisions certainly played to McLaren's strengths.

"It's mainly down to three reasons," said team boss Andreas Seidl of McLaren's relative success

PICTURES: GLENN DUNBAR; MARK SUTTON; STEVE ETHERINGTON; CARL BINGHAM

McLaren was more competitive in Melbourne but still a long way off its 2021 levels

in Australia. "We bought some small upgrades here to the car which worked. The track layout suits our current package, a fluid layout. And we have simply learned again about the car in Jeddah and could apply the learnings here – and that, in the end, put us in a more competitive position."

This seems the opposite of the AlphaTauri, which works better at low speed and seems to go backwards the faster the circuit becomes. Norris was under no illusion: "It shows there are still those strengths in the car. We just need to keep working on the weaknesses if we want to be here more often. Not all tracks are as smooth and as quick as this, so this might be as good as it gets for a while."

5 Alonso's DRS zone removal ploy backfires

Part of the package of revisions to improve racing at Albert Park for F1's return included a fourth DRS zone, which activated where the old Turn 9 chicane was and created the possibility of easier passing into the fast chicane on the back straight.

However, this DRS zone was removed following the drivers' meeting on Friday evening – and sources indicated that Fernando Alonso led the call to scrap this zone on spurious safety grounds. It's no secret that Alpine struggled with its new, bigger DRS mechanism in testing – so perhaps there was a performance gain to be had from this move?

There was a delicious irony in Alonso being the ringleader for this call then crashing in Q3 – after an oil leak sent his Renault engine into a safe mode – and needing DRS to bail him out in the race. Alonso hung onto the coat-tails of Red Bull and Ferrari through Q1 and Q2 and felt he was in the hunt for pole before the crash. Certainly, top five was on.

As it was, he started 10th – on the unfancied hard tyre – and then was undone by the timing of the Safety Car for Vettel's crash. Alonso stopped for mediums under the VSC for Verstappen's breakdown, dropping to 12th, and from there Fernando's race fizzled out as the tyres gave up.

After an additional stop with five to go Alonso finished a lap down, last of the classified runners. Williams waited until Alex Albon had done 57 laps on his hards before his stop. Albon finished highest of the drivers who started on the 'wrong' tyre.

Alonso felt Alpine was in the hunt for pole until he was compromised by this Q3 oil leak

RESULTS ROUND 3

ALBERT PARK / 10.04.22 / 58 LAPS

1st	**Charles Leclerc** Ferrari	1h27m46.548s
2nd	**Sergio Pérez** Red Bull	+20.524s
3rd	**George Russell** Mercedes	+25.593s
4th	**Lewis Hamilton** Mercedes	+28.543s
5th	**Lando Norris** McLaren	+53.303s
6th	**Daniel Ricciardo** McLaren	+53.737s
7th	**Esteban Ocon** Alpine	+61.683s
8th	**Valtteri Bottas** Alfa Romeo	+68.439s
9th	**Pierre Gasly** AlphaTauri	+76.221s
10th	**Alex Albon** Williams	+79.382s
11th	**Zhou Guanyu** Alfa Romeo	+81.695s
12th	**Lance Stroll** Aston Martin	+88.598s*
13th	**Mick Schumacher** Haas	+1 lap
14th	**Kevin Magnussen** Haas	+1 lap
15th	**Yuki Tsunoda** AlphaTauri	+1 lap
16th	**Nicholas Latifi** Williams	+1 lap
17th	**Fernando Alonso** Alpine	+1 lap

*includes 5s penalty for weaving on straight

Retirements

Max Verstappen Red Bull	38 laps - fuel leak
Sebastian Vettel Aston Martin	22 laps - accident
Carlos Sainz Ferrari	1 lap - spin

Fastest lap

Charles Leclerc 1m20.260s on lap 58

TYRE COMPOUNDS USED

Hard (C2) **Medium** (C3) **Soft** (C5) **Inter** **Wet**

CLIMATE	AIR TEMP	TRACK TEMP
Sunny	27°C	38°C

DRIVERS' STANDINGS

1 Leclerc	71pts	12 Gasly	6pts
2 Russell	37pts	13 Tsunoda	4pts
3 Sainz	33pts	14 Alonso	2pts
4 Pérez	30pts	15 Zhou	1pt
5 Hamilton	28pts	16 Albon	1pt
6 Verstappen	25pts	17 Schumacher	0pts
7 Ocon	20pts	18 Stroll	0pts
8 Norris	16pts	19 Hülkenberg	0pts
9 Magnussen	12pts	20 Latifi	0pts
10 Bottas	12pts	21 Vettel	0pts
11 Ricciardo	8pts		

motorsport STATS

FINISHING STRAIGHT

RACE DEBRIEF

F1 WORLD CHAMPIONSHIP ROUND 4

THE EMILIA ROMAGNA GP IN 5 KEY MOMENTS

There was unadulterated joy in the Red Bull pit area at Imola following a masterful 1-2 finish

1 Jury's out on upgrades as Red Bull tames Ferrari on home ground

It would be easy to say Red Bull's commanding 1-2 finish in the Emilia Romagna Grand Prix, following Max Verstappen's victory in Saturday's sprint event, vindicated the team's decision to introduce an upgrade on the RB18. But it's too early to be so definitive. Really this was a story of fine setup margins, changing conditions, and blunders by both Ferrari's drivers.

This being a sprint weekend, the track sessions were arranged disadvantageously for any teams planning to evaluate upgrades, with just one practice period before qualifying on Friday. Wet weather then rendered Friday's practice running largely irrelevant so Red Bull's decision to stick with its new floor and cooling package (saving 4kg) was, as Helmut Marko acknowledged, a "risk".

The first dry running came in qualifying, resulting in a messy session as drivers scrambled to bank fast laps before more rain arrived. Ferrari's Carlos Sainz was one of several drivers to provoke red flags, "surprised" as his car snapped when he took too much kerb at Rivazza during Q2. Max claimed pole ahead of Charles Leclerc in a wet Q3, but not through car performance – he just drove a cleaner lap, while two more red flags (of five in total through the session) denied Leclerc a proper opportunity to make amends for his scruffier first effort.

In dry conditions on Saturday Leclerc got much the better start and led convincingly until his right-front tyre began to suffer, enabling Verstappen to close in and pass for the lead. But was the Red Bull the faster car, or had Charles simply asked too much of his tyres as he fought to keep Max out of DRS range early on? Had Red Bull achieved a marginally better setup to mitigate graining?

On Sunday, Leclerc's race was defined by more rain ahead of the start, and the obstructive presence of Pérez. With a dry line forming in some places around the track, starting on the wet side of the grid compromised Leclerc's getaway and enabled both Pérez and Lando Norris to sneak into second and third. Getting past the McLaren and then probing at the defences of the second Red Bull meant Charles was asking more of his tyres than the untroubled Verstappen up front. Sainz was already out of the picture, nerfed into a spin at Tamburello on lap one by Daniel Ricciardo.

Managing two cars against one enabled Red Bull to pit Pérez for slicks first (at the end of lap 18) so, although he fell behind Leclerc when the Ferrari pitted, Pérez had the advantage of tyre warm-up and immediately reclaimed second place. Thereafter, even when Leclerc had the slipstream and DRS (finally enabled on lap 34), Pérez had enough straightline speed to fend him off. This is a factor of power unit configuration as well as aero, as evinced by Leclerc's engine 'clipping' (running out

PICTURES: ZAK MAUGER; SETEVN TEE; MARK SUTTON

of recovered energy) at top speed – Ferrari's power unit is set up for greater hybrid deployment out of corners, an advantage elsewhere but not here.

Leclerc's stop for softs on lap 49 was a gamble to "reset the tyre picture", according to Ferrari boss Mattia Binotto. Although it had the desired effect of making Red Bull follow suit, Charles got "too greedy" (in his words) on the kerbs at the Variante Alta and spun, damaging his front wing and giving Verstappen and Pérez a clear run to the finish.

"We brought upgrades but I don't know how much that brought us," said Verstappen. "We were on top of everything better than in Australia and sometimes that's more important than upgrades. I think we just did a better job today as a team."

2 Imola sprint underlines extent to which DRS flatters new regs

While there was much to commend about the first sprint race of the season, those sections of the commentariat who immediately hailed it as a triumphant vindication of F1's new technical rules were getting a little ahead of themselves. What we *can* say is, based on the evidence of this and the preceding races, that DRS is now a more powerful influencer on overtaking than ever before.

Imola has always been a fast and flowing track on which it is remarkably difficult to overtake. A tricky pitch indeed for the sprint format, which was trialled with mixed results at three rounds last year. In response to criticism that the races degenerate into World Touring Car Championship-style processions after the start, F1 and the FIA have tweaked the points allocation so that finishers up to eighth place are rewarded, as opposed to the previous three. Mooted changes for the future include a divorce from its influence on the grid for the grand prix.

A typically frantic opening lap ended with Leclerc leading, after Verstappen got far too much wheelspin when he let his clutch out, but then the Safety Car was deployed to cover the broken Alfa Romeo of Zhou Guanyu, who was tagged into a spin at the Piratella by Pierre Gasly. When the race restarted Leclerc was able to break out of DRS range almost immediately, only to be chased down and passed by Verstappen as the Ferrari's right-front started to grain. This was the first pass for the lead, other than at the start, in a sprint race so far.

That this was down to setup choices and driving style rather than compound selection was underlined by the performance of the three drivers whose teams opted for medium Pirellis rather than softs: Kevin Magnussen, Mick Schumacher and Nicholas Latifi. Not among the frontrunners, for sure, but Magnussen had bagged fourth on the grid in the wet qualifying session.

Haas made its decision based on trying the softs for the first time in dry free practice that morning, fearing they would not last the distance. But it put Magnussen at a disadvantage in the early phase of the race: though he held on to fourth at the start (earning a black-and-white flag for weaving), he was passed by Pérez's Red Bull, Daniel Ricciardo's McLaren and Sainz's Ferrari on consecutive laps once DRS was enabled. Valtteri Bottas relegated Magnussen to eighth two laps from the end.

DRS accounted for the majority of the overtaking in a sprint race which – to raise another regular criticism of the format – reset parts of the grid in pace order as Pérez and Sainz reclaimed ground after a troubled qualifying and the likes of Magnussen and Fernando Alonso slipped back. But at least there was plenty of overtaking – something which couldn't be said of Sunday, when it was wet off-line and the sole DRS zone was disabled for half the race...

Leclerc beat Verstappen away at the start of the sprint race (bottom) but Max fought back to take the lead (below) and claim the win ahead of Leclerc and team-mate Pérez (below, right)

Third for Norris at Imola validated McLaren's improvement after a poor start to the season

3 McLaren's recovery might be real

Half a minute behind the leaders, but in a podium position nevertheless, was Lando Norris. Granted, McLaren's first podium of the season was aided by attrition and the errors of others, but it provided further evidence the team has turned a corner after the severe setback of the Bahrain season opener.

McLaren had the fourth fastest car in Australia, and in Imola Norris qualified third and finished fifth in the sprint, while Daniel Ricciardo was sixth – enough for Norris to say, "We're now seeing Bahrain [where neither driver finished in the points] as a little bit more of an outlier compared with the last few weekends."

In the grand prix Norris had a lonely race to third after Ricciardo took out Sainz at the first corner – enough of a racing incident for the stewards to write it off, but Ricciardo still went to the Ferrari garage to apologise. Does McLaren now have the third fastest car? Norris reckons that's "too difficult to say" given the interplay of variances in car characteristics over different circuits.

"The Mercedes wasn't so bad this weekend," said Norris. "I think we were a little quicker than them, probably throughout. The Alfa Romeo was maybe quicker. I think we just executed a great race from our side."

George Russell was fourth for Mercedes, a position earned chiefly through a combination of starting on the dry side of the grid (in 11th), then neatly capitalising on the Ricciardo-Sainz shunt at Tamburello as well as further contact between Mick Schumacher and Fernando Alonso. Qualifying and the sprint were miserable affairs for both Mercedes drivers, though team boss Toto Wolff remains confident the W13 is inherently the third fastest car on the grid when it can get its tyres in the operating window. On top of its well-documented porpoising issues, the car struggles to generate enough heat in its tyres, which was a limitation in the sprint as well as in qualifying, where Russell and Lewis Hamilton fell short of the top 10. An equipment malfunction also meant Russell didn't get a front-wing adjustment when he stopped for slicks, giving him understeer for the remainder.

Starting 14th, on the wet side of the grid, made the grand prix a horror show for Hamilton. Stuck behind Yuki Tsunoda's AlphaTauri in the opening stint, he lost more places when Esteban Ocon's Alpine was unsafely released ahead of him in the pits. Lewis then became embroiled in a DRS train behind Alex Albon and Pierre Gasly

4 Alfa Romeo can be disappointed with fifth

George Russell spent the closing laps fending off a very lively series of challenges from the former occupant of his seat. Valtteri Bottas certainly had the pace for fourth in his Alfa Romeo, and might have been in a position to challenge Lando Norris for what ultimately became third place. But while team boss Frédéric Vasseur proclaimed this "a strong weekend", Alfa Romeo must feel 12 points represents a sub-optimal outcome.

Bottas completed only a handful of dry laps before the start of Saturday's sprint race, the result of a broken exhaust which forced him to stop during Q3. That ultimately forced a chassis change owing to the routing of the heat-damaged wiring loom. The gearbox casing was also damaged. Parc fermé regulations meant Bottas would start the sprint from the pitlane if the team worked overnight; rather than squander a top-10 start, Vasseur took the risk of missing FP2 if the work wasn't completed in time – and that is what came about.

Having qualified 14th, Zhou Guanyu successfully completed a sprint-race distance on Pirelli's softs during practice, enabling the team to be confident about that choice during Saturday's race. But he was then eliminated from the sprint – and in effect from the grand prix points – when he clipped the front of Gasly's AlphaTauri at the Piratella on lap one and went into the barriers.

PICTURES: STEVEN TEE; MARK SUTTON

Bottas followed Russell home for fifth but the Alfa looked quick enough for a podium

In its scramble to fix the damaged car, Alfa Romeo breached parc fermé rules and Guanyu was consigned to a pitlane start for the grand prix, in which he laboured to pass Nicholas Latifi's Williams early on and finished 15th.

Bottas was seventh in the sprint and barely put a wheel wrong in the grand prix after losing ground during the Sainz-Ricciardo incident, where he nudged the spinning McLaren. But for this, and a cross-threaded wheelnut at his pitstop, it might have been a podium...

5 Green shoots of recovery at Aston Martin

A double points finish for Aston Martin might seem like a significant turnaround for the struggling team but it still has a substantial distance to travel to its previous position in and around the head of the midfield. Sebastian Vettel described his eighth place as being "like a victory", especially since the car remains truculent.

Aston didn't fit any performance upgrades for Imola, though it has relocated a stay at the front of the floor in a bid to reduce ground contact. But Vettel and team-mate Lance Stroll worked the changing conditions well to achieve the result, a much-needed boost for team morale after they notched up four crashes between them in Australia.

Vettel made it to Q3 but dropped from ninth to 13th in the sprint as his soft tyres grained, while Stroll started and finished 15th. On the drying track surface on Sunday both drivers started well, benefitting from their grid positions being on the drier side. Vettel gained four places on the opening lap, then moved up to eighth when a portion of Alonso's sidepod blew off, the legacy of a first-lap tap from Schumacher. Being among the first to pit for slicks, at the end of lap 17, then enabled Seb to undercut the Haas of Kevin Magnussen. But the Aston was unable to fend off Tsunoda or the recovering Leclerc in the final laps.

"We suffered an issue with the steering feeling," said Vettel, "and we were able to improve it slightly for this race. But it's still a handful. Our car is very difficult to drive."

Aston scored its first points of 2022, but is still a long way from where it wants to be

RESULTS ROUND 4

IMOLA / 24.04.22 / 63 LAPS

1st	**Max Verstappen** Red Bull	1h32m07.986s
2nd	**Sergio Pérez** Red Bull	+16.527s
3rd	**Lando Norris** McLaren	+34.834s
4th	**George Russell** Mercedes	+42.506s
5th	**Valtteri Bottas** Alfa Romeo	+43.181s
6th	**Charles Leclerc** Ferrari	+56.072s
7th	**Yuki Tsunoda** AlphaTauri	+61.101s
8th	**Sebastian Vettel** Aston Martin	+70.892s
9th	**Kevin Magnussen** Haas	+75.260s
10th	**Lance Stroll** Aston Martin	+1 lap
11th	**Alex Albon** Williams	+1 lap
12th	**Pierre Gasly** AlphaTauri	+1 lap
13th	**Lewis Hamilton** Mercedes	+1 lap
14th	**Esteban Ocon** Alpine	+1 lap*
15th	**Zhou Guanyu** Alfa Romeo	+1 lap
16th	**Nicholas Latifi** Williams	+1 lap
17th	**Mick Schumacher** Haas	+1 lap
18th	**Daniel Ricciardo** McLaren	+1 lap

*includes 5s penalty for unsafe release

Retirements

Fernando Alonso Alpine	6 laps - damage
Carlos Sainz Ferrari	0 laps - collision

Fastest lap

Max Verstappen 1m18.446s on lap 55

F1 Sprint - 21 laps

1st Verstappen 2nd Leclerc 3rd Pérez
4th Sainz 5th Norris 6th Ricciardo
7th Bottas 8th Magnussen

TYRE COMPOUNDS USED

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

CLIMATE	AIR TEMP	TRACK TEMP
Damp/dry	14°C	16°C

DRIVERS' STANDINGS

1 Leclerc	86pts	11 Ricciardo	11pts
2 Verstappen	59pts	12 Tsunoda	10pts
3 Pérez	54pts	13 Gasly	6pts
4 Russell	49pts	14 Vettel	4pts
5 Sainz	38pts	15 Alonso	2pts
6 Norris	35pts	16 Guanyu	1pt
7 Hamilton	28pts	17 Albon	1pt
8 Bottas	24pts	18 Stroll	1pt
9 Ocon	20pts	19 Schumacher	0pts
10 Magnussen	15pts	20 Hülkenberg	0pts
		21 Latifi	0pts

motorsport STATS

FINISHING STRAIGHT

RACE PREVIEW

F1 WORLD CHAMPIONSHIP ROUND 5

MIAMI GP

6-8 May 2022
Miami International Autodrome

PICTURES: MIAMI GP; STEVEN TEE; MARK SUTTON. ILLUSTRATIONS: ALAN ELDRIDGE

RACE DATA

Circuit name Miami International Autodrome
First grand prix 2022
Number of laps 57
Circuit length 3.362 miles
Race distance 191.612 miles
Lap record N/A
F1 races held 0
Winners from pole N/A
Pirelli compounds C2, C3, C4

CAR PERFORMANCE (ESTIMATED)

Downforce level N/A
Cooling requirement N/A
Full throttle 58%
Top speed 199mph
Average speed 134mph

THE MAIN EVENT

The Hard Rock Stadium complex in Miami Gardens becomes the 11th different American venue to host a grand prix. Commercially this is a hugely significant step for F1 and nothing has been left to chance. Apart from Long Beach, US street circuits have fizzled rather than sizzled as races in Dallas, Detroit and Phoenix failed to engage an audience; to avoid a similar ho-hum feel, the Miami organisers evaluated 36 different layouts via simulation before finalising the present 19-corner layout.

Originally envisaged as a street race in a downtown location, but rebuffed by antsy local stakeholders, the event seems to have benefitted from the change of strategy which brought it to the home of the Miami Dolphins NFL team. The track now has a distinctive and photogenic central focus in the form of the stadium, and the wider campus affords a broad variety of corners as well as three DRS zones. "They've made a really good job of the track," Indy 500 winner and sometime Tyrrell F1 driver Danny Sullivan told *GP Racing*'s sister website *motorsport.com*.

Shortly after the drivers' parade on race day, there will be a similar affair featuring the team principals. This will be the first of its kind and emphasises the influence on the US audience exerted by the Netflix series *Drive to Survive*, which has elevated certain team bosses to prominence as part of the off-track soap opera.

Will Toto Wolff and Christian Horner pointedly stand at opposite ends of the flatbed truck, shunning one another's society? Stay tuned...

KEY CORNER: TURN 17 A sharp corner at the end of the longest straight, where DRS-enabled cars are expected to hit nearly 200mph, Turn 17 presents the key overtaking opportunity of the lap – as well as the potential to get it horribly wrong, Baku Turn 1 style.

TIMETABLE (UK TIME)

Friday 6 May
Practice 1 19:30-20:30
Practice 2 22:30-23:30
Saturday 7 May
Practice 3 18:00-19:00
Qualifying 21:00-22:00
Sunday 8 May
Race 20:30
Live coverage Sky Sports F1
Highlights Channel 4

FINISHING STRAIGHT

RACE PREVIEW

F1 WORLD CHAMPIONSHIP ROUND 6

SPANISH GP

20-22 May 2022
Circuit de Barcelona-Catalunya

THE MAIN EVENT

Though the Circuit de Barcelona-Catalunya has been a mainstay of the F1 calendar since its debut in 1991, and a ubiquitous testing facility on account of the variety of its corners, in recent years doubts have lingered over the future of the race. The Catalan government's enthusiasm for subsidising it seemed to have waned, and the 2022 race appeared in the first draft of the calendar with an ominous-looking asterisk beside it, along with the dread phrase 'subject to contract'. All that changed last November when F1 announced it had done a new deal which would keep the Spanish GP on the roster until 2026. The return of favourite Fernando Alonso to the grid has re-energised the local fanbase and the 2022 event is reportedly a sell-out.

2021 RACE RECAP

A wheel-to-wheel battle between title protagonists Lewis Hamilton and Max Verstappen was ultimately determined by the Mercedes pitwall. Verstappen launched a let-me-through-or-we-crash move into Turn 1, forcing polesitter Hamilton to capitulate. Usually that would have been that at processional Barcelona but Merc resisted the temptation to try to undercut Max at the first stops, building a tyre offset which enabled Lewis to make a second stop for mediums and come back strongly in the final phase. Red Bull didn't have a second set of mediums and so was unable to respond.

Valtteri Bottas was 26 seconds down the road in third place and didn't enamour himself to the team by being slow to let Lewis past after his team-mate's second stop.

KEY CORNER: TURN 1 Given how powerful the influence of DRS has been in the races so far this season, this right-hander at the end of the Circuit de Barcelona-Catalunya's main straight is likely to be a battleground throughout the GP.

RACE DATA

Circuit name Circuit de Barcelona-Catalunya
First grand prix 1991
Number of laps 66
Circuit length 2.892 miles
Race distance 190.825 miles
Lap record 1m18.149s, Max Verstappen (2021)
F1 races held 31
Winners from pole 23
Pirelli compounds C1, C2, C3

CAR PERFORMANCE

Downforce level High
Cooling requirement Medium
Full throttle 64.4%
Top speed 200mph
Average speed 119mph

TIMETABLE (UK TIME)

Friday 20 May
Practice 1 13:00-14:00
Practice 2 16:00-17:00
Saturday 21 May
Practice 3 12:00-13:00
Qualifying 15:00-16:00
Sunday 22 May
Race 14.00
Live coverage Sky Sports F1
Highlights Channel 4

THE PAST FIVE WINNERS HERE

2021	2020	2019	2018	2017
Lewis Hamilton Mercedes	Lewis Hamilton Mercedes	Lewis Hamilton Mercedes	Lewis Hamilton Mercedes	Lewis Hamilton Mercedes

FINISHING STRAIGHT

RACE PREVIEW

F1 WORLD CHAMPIONSHIP ROUND 7

MONACO GP

27-29 May 2022
Circuit de Monaco, Monte Carlo

PICTURE: FIA POOL; ANDY HONE. ILLUSTRATION: ALAN ELDRIDGE

THE MAIN EVENT

F1's move towards a compressed weekend schedule this year – with an eye on keeping expenditure down – has entailed the almost unthinkable in Monaco: the end of the four-day F1 weekend. While the traditional break in F1 activity on the Friday of the Monaco GP was supposedly in celebration of Ascension Day, cynics have long felt it was merely a ploy to squeeze an extra night's stay from visitors. While the supporting events will take to the track on Thursday, F1 business will now kick off on Friday.

While overtaking opportunities remain vanishingly few on this tight street circuit, Monaco occupies a special place in the hearts of fans and competitors. This is an incredibly hard race to win – and even if luck plays a part, it's likely the victorious driver worked hard to manufacture that luck.

2021 RACE RECAP

From practice onwards the 2021 Monaco GP established itself as an outlier event, as Charles Leclerc claimed an emphatic pole position in the hitherto mid-grid Ferrari, ahead of Max Verstappen's Red Bull. Lewis Hamilton could manage no higher than seventh in qualifying, while Lando Norris was a stunning (by recent McLaren standards) fifth.

Leclerc had crashed after setting that sizzling lap in Q3, though, and a driveshaft failed on the way to the grid so he failed to make the start. That left the way clear for Verstappen, threatened only by Valtteri Bottas, who was then eliminated by a stuck wheelnut at his pitstop. Carlos Sainz therefore restored some Ferrari pride by finishing second ahead of Norris.

KEY CORNER: TURN 15

Monaco is an exercise in driver precision throughout the whole lap, but there are few corners more demanding than this fast right around the swimming pool. It's very easy to ding the front-right wheel against the barrier.

RACE DATA

Circuit Circuit de Monaco
First GP 1950
Number of laps 78
Circuit length 2.075 miles
Race distance 161.879 miles
Lap record 1m12.909s
Lewis Hamilton (2021)
F1 races held 67
Winners from pole 30
Pirelli compounds C3, C4, C5

CAR PERFORMANCE

Downforce level High
Cooling requirement Maximum
Full throttle 43%
Top speed 181mph
Average speed 98mph

TIMETABLE (UK TIME)

Friday 27 May
Practice 1 13:00-14:00
Practice 2 16:00-17:00
Saturday 28 May
Practice 3 12:00-13:00
Qualifying 15:00-16:00
Sunday 29 May
Race 14.00
Live coverage Sky Sports F1
Highlights Channel 4

THE PAST FIVE WINNERS HERE

2021	2019	2018	2017	2016
Max Verstappen	Lewis Hamilton	Daniel Ricciardo	Sebastian Vettel	Lewis Hamilton
Red Bull	Mercedes	Red Bull	Ferrari	Mercedes

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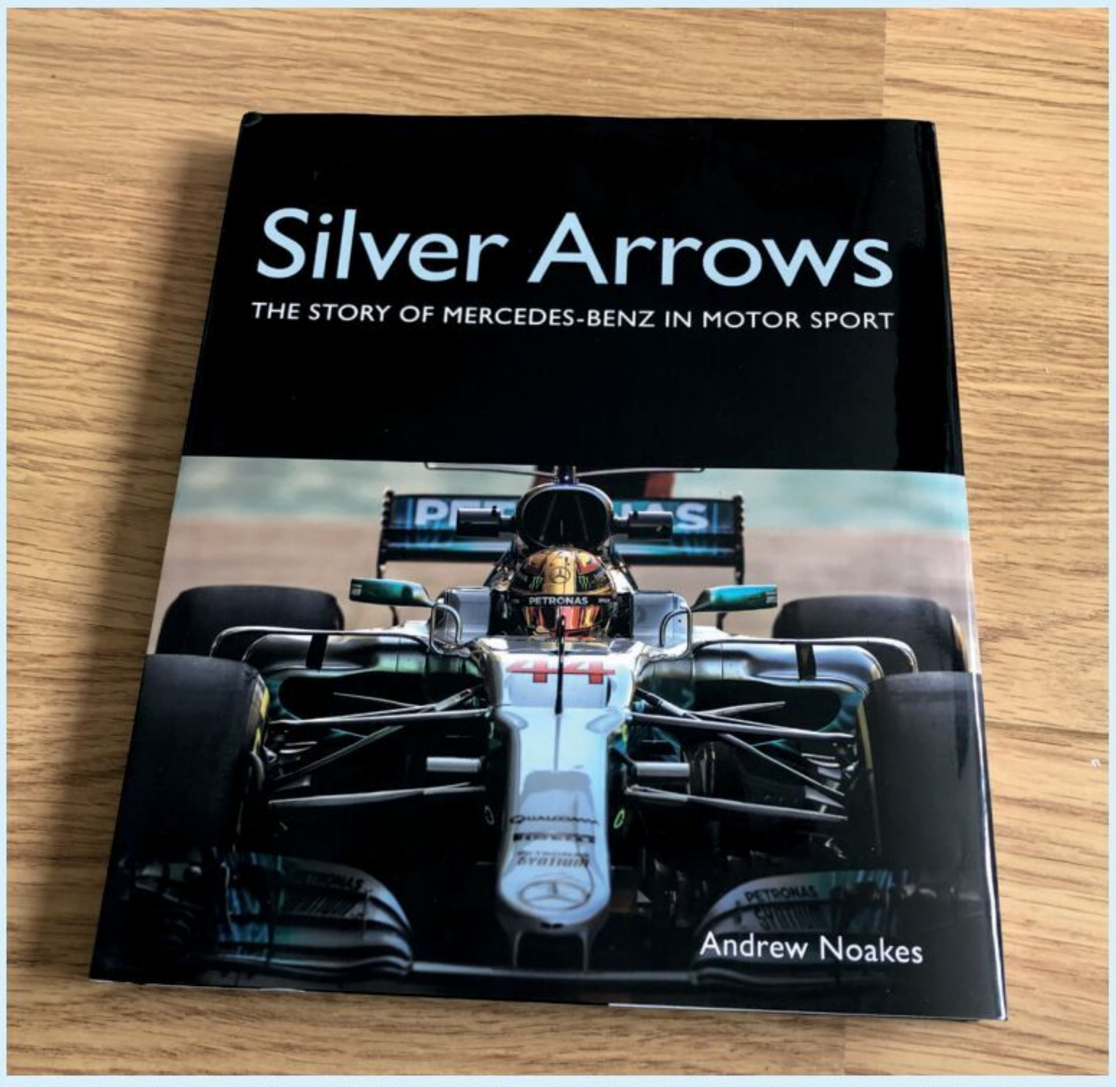
Who knew Jenson Button was partial to a wee dram? The 2009 world champion, in partnership with entrepreneur and whisky expert George Koutsakis, has launched the Coachbuilt whisky brand. The two were introduced through mutual friends while Jenson was in the process of relaunching the coachbuilding company Radford.

While rare, aged and limited-edition releases are in the pipeline, the core product is a blend of liquids from Scotland's five iconic whisky-producing regions of Campbeltown, Highlands, Islay, Lowlands and Speyside, married in premium sherry casks. It is described as "full-bodied, intricate and well-balanced with notes of summer fruits and subtle spice, followed by toffee, chocolate and a touch of citrus".

Or at least that's what was scribbled on the note our managing editor found in his pocket after staggering home from the launch.



SILVER ARROWS

Author Andrew Noakes

Price £25

crowood.com

While Mercedes' recent plunge in F1 form might appear to make this competition history of the marque poorly timed, actually it's a timely reminder of the many downs the company has faced as well as its numerous ups. Author Andrew Noakes, founder editor of *Classics* magazine, unpacks the complete story of Mercedes-Benz in motorsport, from its representation in reliability trials in the 1890s to grand prix success, plus starring roles in sportscars, rallying and touring cars.

Mercedes was a pioneer of the early racing scene before the worsening economic situation in Germany forced it to the altar with Daimler in 1926. It became one of the dominant forces in pre-war grand prix racing before making a triumphant comeback in what had become known as Formula 1 in 1954. A long self-imposed exile from the top flight followed the Le Mans disaster of '55 but it maintained a presence in rallying until it returned to the circuit – successfully, of course.

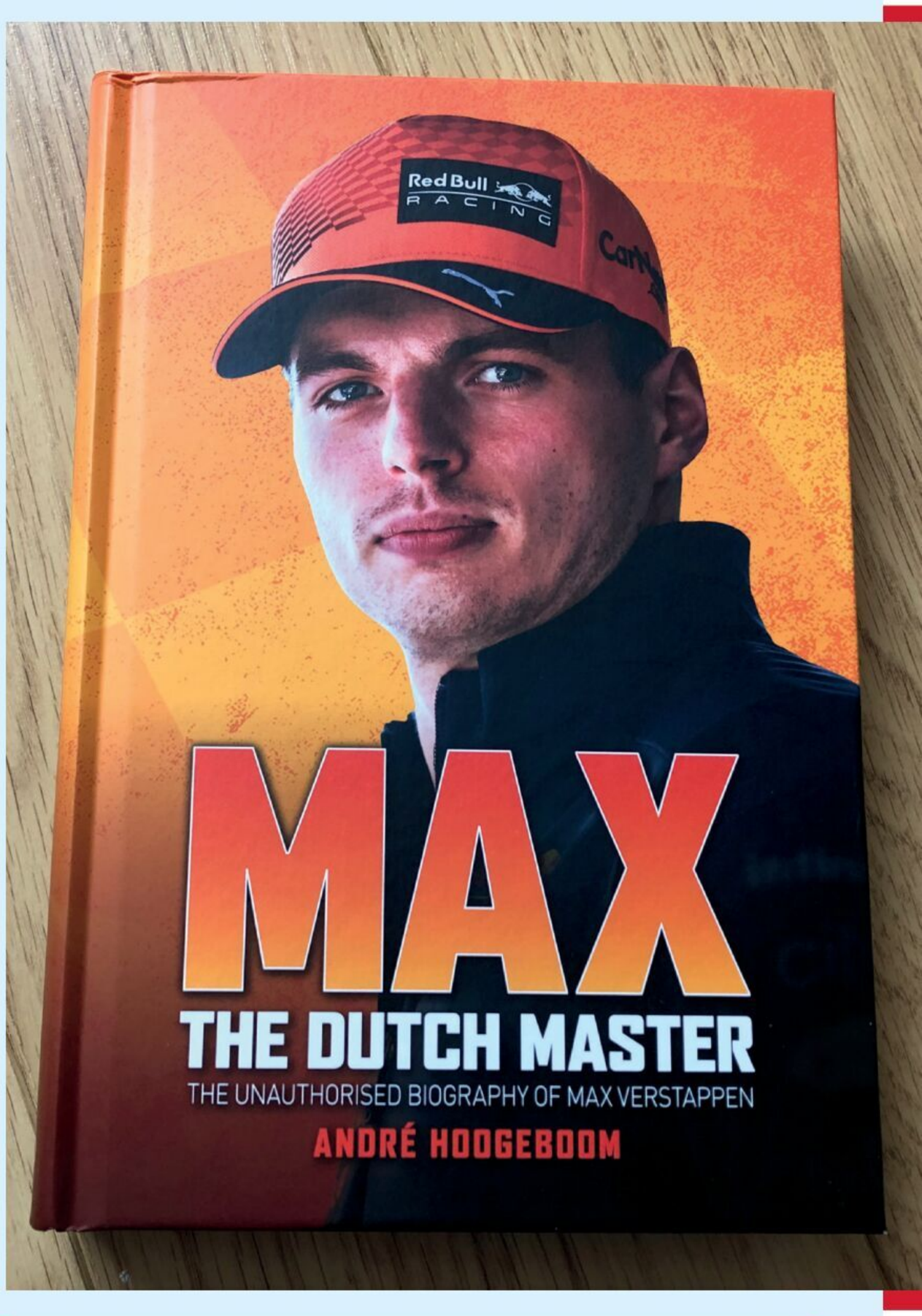
BANG & OLUFSEN BEOPLAY H95

Price £779

bang-olufsen.com

Described as the "ultimate over-ear headphones" and with a price tag to match, the Beoplay H95 wireless headphones were launched to celebrate the 95th birthday of new Williams F1 partner Bang & Olufsen. The Danish high-end-hi-fi company has certainly not cut corners in the spec of these 'phones, which feature magnetic detachable lambskin ear cushions and a headband made from a combination of custom-knitted textile and cowhide.

You can adjust the functions through a combination of touch-sensitive controls and mechanical dials, the latter supposedly inspired by the focus rings on SLR cameras. With these you can adjust both the volume and the five-step active noise cancellation. Sorry, Nicholas, the ANC doesn't mute idiots on Twitter...



MAX: THE DUTCH MASTER

Author André Hoogeboom

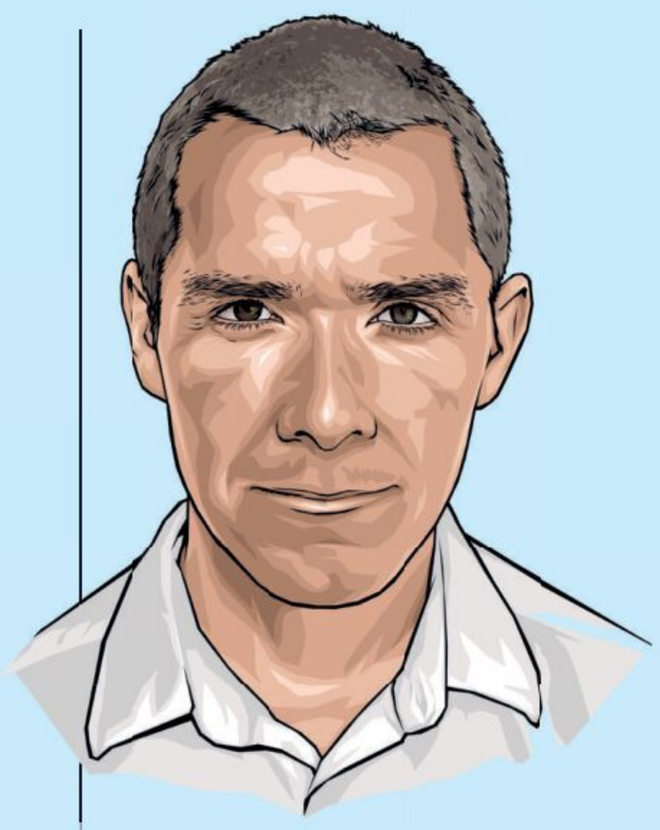
Price £25

evropublishing.com

"Like a true Dutch master, he has brought fresh artistry into F1" says the sleeve of this unauthorised biography of the reigning world champion. It's a tenuous link – we're not sure if Brueghel the Elder ever swerved in the horse-and-cart braking zone, although perhaps Max knows a few girls with pearl ear-rings.

Over the course of this well-illustrated 320-page hardback, Dutch F1 journalist André Hoogeboom tells Max's story so far, from the early days of being born into a motor racing family to his karting triumphs, and his rocketship ascent through the junior single-seater ladder. Just 12 months elapsed between his first Formula Renault test at Pembrey and his appointment to a Toro Rosso F1 testing role; by contrast it took fellow Dutch master Rembrandt van Rijn three years to paint *The Night Watch*.

Max has accomplished a lot in a very short time, and he's only 24. By the time he hits 30 there will probably be enough material for Hoogeboom to fill another two volumes.



FLAT CHAT

{ FULL THROTTLE MUSINGS WITH STUART CODLING }

PICTURES motorsport IMAGES

IS THE CRYTPO SECTOR JUST A MODERN FOLLY?

The Scottish journalist and poet Charles Mackay was best known for his book *The Thames And Its Tributaries* when, in 1841, he published a seminal text in the study of human stupidity, its insight rendered no less relevant by the passing of almost two centuries. In *Extraordinary Popular Delusions and the Madness of Crowds* Mackay details subjects as diverse as the South Sea Bubble, the Crusades, and indeed 'the Influence of Politics and Religion on the Hair and Beard'.

"Every age has its peculiar folly," wrote Mackay, "some scheme, project or phantasy into which it plunges, spurred on by the love of gain, the necessity of excitement, or the force of imitation."

Low interest rates over the past two-and-a-half decades have prompted a rush into alternative investments as a means of making money. Money created by central banks via quantitative easing, for the purpose of propping up the global economy after the financial crash of 2008, has fuelled asset bubbles in stock markets worldwide along with an orgy of high-risk venture capitalist 'big bets'.

The crypto sector is throbbing with such seed capital largesse as newly minted companies vie for market share, fighting to draw the 'investment' cash of the average punter. And F1 is benefitting from this – not only has pretty much every team added a crypto 'platform' to its portfolio, F1 itself has an official crypto partner which took out naming rights to the Miami GP. Alfa Romeo counts among its roster a cryptocurrency lending platform, Vauld, which claims to offer "automatic wealth creation" (really?), and Floki Inu, a "cryptocurrency meme platform" censured by the Advertising Standards Authority in March.

There are those who argue cryptocurrencies and NFTs *do* justify a place in a balanced portfolio since they have a perceived value – after all, we're long past the point where conventional currencies are backed by central bank gold reserves. But this is to enter the territory of the Greater Fool Theory – the principle that you can still profit from overpaying for an asset, provided you can offload it to a 'greater fool' who is willing to pay an even higher price.

Eventually, asset values in a bubble reach a point at which fools rush *out* rather than *in*, and prices crash. This is difficult to predict – famously, Sir Isaac Newton cashed out of the South Sea Company early, making a tidy profit, only to be drawn back in by rising values and eventually banking a loss. As Mackay wrote in his preface, "Men, it has been well said, think in herds; it will be seen that they go mad in herds, while they only recover their senses slowly, and one by one."

F1 ITSELF HAS AN OFFICIAL CRYPTO PARTNER WHICH TOOK OUT NAMING RIGHTS TO THE MIAMI GP

The warning signs are there if you care to look. Last year McLaren announced Turkish blockchain start-up Bitci as a sponsor, an arrangement which included the marketing of non-fungible 'fan tokens'. In February McLaren, and two European football clubs also carrying Bitci logos, terminated their deals. No reasons were given – nor word of what would become of the 'fan tokens' – but it's understood that promised sponsorship payments were not forthcoming.

In April, F1 Delta Time – an officially licenced game involving the acquisition of digital collectibles launched to much fanfare in 2019 – was shuttered when F1 pulled its licence. Among those left in limbo was Vignesh Sunderesan, aka MetaKovan, a Singapore-based blockchain investor who had paid over $110,000 for an ultra-rare digital effigy of an F1 car on this platform.

In the mainstream crypto space another speculator, Sina Estavi, recently put up for auction an NFT of Twitter co-founder Jack Dorsey's first ever tweet. Estavi paid £2.9m for it in March 2021. A year later no one bid more than £6,800. "This is the Mona Lisa of the digital world," Estavi insisted.

Only if someone else is prepared to pay Mona Lisa money for it...

The Bitci logo on the side of a McLaren last year. The deal was terminated this February. Is it a sign of things to come?

GP Racing has a podcast!
Search for 'Flat Chat with Codders' in your podcasting platform of choice.

PICTURE: MARK SUTTON. ILLUSTRATION: BENJAMIN WACHENJE

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MSV 2022 SEASON HIGHLIGHTS

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Sat 14/Sun 15 May	Cadwell Park	Vintage Motorcycle Club Championships
Fri 20 - Sun 22 May	Donington Park	Bennetts British Superbike Championship
Sat 28/Sun 29 May	Brands Hatch	Masters Historic Festival
Sat 28/Sun 29 May	Donington Park	British GT and GB3 Championships
Sat 4/Sun 5 June	Cadwell Park	Historic Wolds Trophy
Sun 5 June	Donington Park	Vintage Motorsport Festival
Sat 11/Sun 12 June	Oulton Park	Kwik Fit British Touring Car Championship
Sat 11/Sun 12 June	Brands Hatch	American SpeedFest 9
Sun 19 June	Brands Hatch	Tunerfest South
Sat 25/Sun 26 June	Snetterton	British GT and GB3 Championships
Fri 15 - Sun 17 July	Donington Park	MOTUL FIM Superbike World Championship
Sat 16/Sun 17 July	Snetterton	Snetterton Historic 200
Sat 16 July	Oulton Park	Tunerfest North
Fri 22 - Sun 24 July	Brands Hatch	Bennetts British Superbike Championship
Fri 29 - Sun 31 July	Oulton Park	Oulton Park Gold Cup
Sun 7 August	Brands Hatch	Mini Festival
Sat 13/Sun 14 August	Snetterton	Kwik Fit British Touring Car Championship
Sun 14 August	Brands Hatch	Festival Italia
Sat 20/Sun 21 August	Donington Park	British Truck Racing - Convoy in the Park
Sat 27 - Mon 29 August	Cadwell Park	Bennetts British Superbike Championship
Mon 29 August	Donington Park	Tunerfest Midlands
Fri 9 - Sun 11 September	Snetterton	Bennetts British Superbike Championship
Sat 10/Sun 11 September	Brands Hatch	British GT and GB3 Championships
Sat 17/Sun 18 September	Snetterton	British Truck Racing Championship
Sun 18 September	Brands Hatch	Ford Power Live!
Sun 25 September	Brands Hatch	Go Japan!
Fri 23 - Sun 25 September	Oulton Park	Bennetts British Superbike Championship
Fri 30 Sept - Sun 2 Oct	Donington Park	Bennetts British Superbike Championship
Sat 8/Sun 9 October	Brands Hatch	Kwik Fit British Touring Car Championship
Fri 14 - Sun 16 October	Brands Hatch	Bennetts British Superbike Championship
Sat 15/Sun 16 October	Donington Park	British GT and GB3 Championships
Sat 22/Sun 23 October	Brands Hatch	Formula Ford Festival
Sun 23 October	Snetterton	Modified Live
Sat 5/Sun 6 November	Brands Hatch	British Truck Racing and Fireworks
Sat 5 November	Oulton Park	Stage Rally and Fireworks
Sun 20 November	Cadwell Park	Stage Rally and Fireworks

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