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January

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MOTOR SPORT

THE EDITOR

"Going carbon neutral will be tough for F1, which creates 256,000 tons of CO_2"

THE GENERAL ELECTION SEASON BRINGS TO MIND MY favourite government resignation letter of all time. It was addressed to then Prime Minister Gordon Brown, and read:

'Dear Gordon,

As you know I have a passion for motor racing and over the past year have competed in the British GT Championship racing a unique bio-ethanol-fuelled race car, achieving a "historic first" win for a green-fuelled car and coming second overall in the championship.

A number of special circumstances have now presented me with a once in a lifetime opportunity to take my racing to the next level. I have the opportunity to race next year in the American Le Mans Series in the United States, a key step towards my eventual dream of success in the Le Mans 24 Hours endurance race.



For the first time next year the American Le Mans Series will allow bio-ethanol cars and so this is a wonderful opportunity to showcase British motor sport technology for environmentally friendly racing.

It has also coincided with my development as a driver to the point where I am now able to compete at this level. Unfortunately, it cannot be combined with the challenge of full-time government office so I am writing to inform you that I wish to take a leave of absence from the government. Thank you for your support and understanding...'

I like this letter from Paul Drayson, then the minister for defence equipment and support, for several reasons. Mainly, I love the fact that a government minister has seen the light and realised that there is a higher calling than mere governing. But I also like the self-effacing line about him now being good enough to compete (as if the Prime Minister would really care about his departing minister's driver development).

I remember covering Drayson's resignation at the time. Many people were perplexed not only about his love of motor racing, but also about the concept of green motor sport. Surely the very idea was an oxymoron? Nonetheless he and his ethanol-powered Aston Martin did indeed take part in the 2009 Le Mans with Jonny Cocker and Marino Franchitti sharing with Drayson (an electrical fault ended his race 21 hours in).

The idea of green motor sport may have been relatively new back in 2007 when Drayson resigned, but it hasn't gone away. Famously, in 2012 came the arrival of the all-electric Formula E - which despite some dire predictions - is still going strong.

In 2009 Formula 1 introduced Kinetic Energy Recovery Systems - similar to the regenerative braking systems that were available on eco-road cars such as the Toyota Prius; and four years later went further with its hybrid V6 turbo engines. It bears repeating that these became the most efficient car engines in the world in terms of the percentage of fuel energy converted into power. This measurement - known as thermal efficiency - is around 50 per cent on F1 cars compared to 30 per cent on petrol road cars.

Some of the fuel-saving technology introduced by F1 has been in the dubious name of retaining so called 'road relevancy' - the increasingly fanciful idea that technology developed in the white heat of F1 competition eventually trickles down to road cars. But much of it came about because F1 bosses realised which way the winds of public opinion were blowing. From the mid-2000s onwards conspicuous consumption of CO_2-producing carbon-based fuels was increasingly at odds with what people thought was right.

And now, F1 has gone further with a pledge to become carbon-neutral by 2030 and a plan to make all grands prix sustainable by 2025. In a carefully choreographed announcement, it claimed it will "move to ultra-efficient logistics and travel and 100 per cent renewably powered offices, facilities and factories" and offset emissions that cannot be cut.

It will also eliminate single-use plastics and ensure all waste is reused, recycled or composted during race weekends. The targets will not be easily met for a sport which produces 256,000 tons of CO_2 each season, transporting 10 teams and equipment to the current 21 races, but the sport should be applauded for trying.

The big question is how does F1 constrain the monstrous hospitality areas, trailers, trucks and motorhomes when 45 per cent of its emissions come from moving this equipment around the world, and a further 27.7 per cent from transporting staff? Should the sport look at introducing a limit to team sizes that travel to grands prix? And if not, is all this cutting compatible with sponsor demands and the prospect of a 25-race season? Time will tell.

More immediately the changes will make the fuel used in F1 more sustainable. From 2021, the rules will demand that fuel has a biofuel content of at least 20 per cent. Not quite the bio-ethanol that Paul Drayson pioneered in racing, but not a bad start for F1.



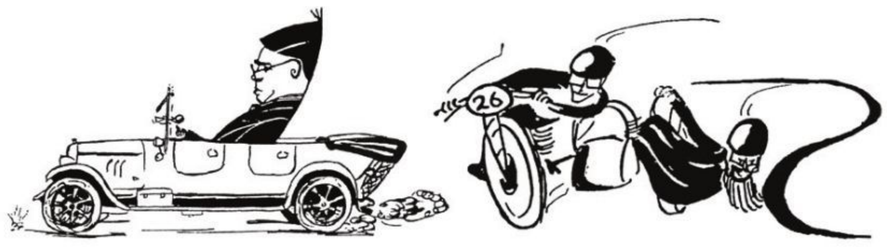
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NEXT ISSUE: OUR FEBRUARY ISSUE IS ON SALE FROM JANUARY 2

MOTOR SPORT

IN THE SPIRIT OF BOD AND JENKS



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Details matter.



Approaching the speed of sound is a risky business, and damage can occur at any point. During its recent testing run at Hakskeen Pan in South Africa – *see page 125* – the Bloodhound crew were forced to beef up the rear suspension 'deltas' after some of the metal was peeled back by a combination of air density and dust thrown up from the front wheels at 501mph...

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Can Mercedes keep making history?

MERCEDES MAY HAVE BROKEN NEW ground by securing a record sixth consecutive drivers' and constructors' world championship double, but could the Silver Arrows juggernaut be about to run out of steam?

A win in Japan for Valtteri Bottas, combined with third place for Lewis Hamilton, put the makes' title beyond the reach of Ferrari, before Hamilton went on to secure his sixth drivers' crown with second place – behind Bottas – in Austin.

The results make Mercedes the first team in F1 history to win the world title double for a sixth consecutive year. It also tied it with Ferrari in terms of consecutive constructors' championships, with the prancing horse having taken six in a row from 1999-2004. One more for the Silver Arrows team would make Mercedes the standalone dominant constructor of its era.

However, could Mercedes' chances of extending its streak be limited to just 2021?

Currently all teams are locked in negotiations with F1 owner Liberty Media over a refreshed version of the Concorde Agreement, which determines the vital commercial rights share between teams.

Discussions between Mercedes and Liberty are still going on, meaning there's no firm guarantee as yet that the brand will remain on the grid beyond the expiration of the current deal in 2021.

Mercedes is increasingly moving toward electric car manufacturing, and will this year enter Formula E as a works team for the first time.

When asked about the brand's commitment to F1 beyond 2021, Toto Wolff couldn't say anything for certain.

"Everything indicates that we will stay, but it's not a given," he said. "We are discussing the new Concorde Agreement, and we are discussing the development of the automobile and its effects on sport. There's the Ferrari model, which is to do it forever and build road and race cars. Then there's the other model to say 'We have had a very successful run and there's nothing more to prove. We're going to do something else now.' Both are plausible strategies."



Lewis Hamilton's sixth crown placed him just one behind Michael Schumacher in the all-time pecking order



F1 under lights at Indy

ROGER PENSKE'S TAKEOVER OF INDYCAR and the Indianapolis Motor Speedway has opened the door for a potential F1 return to The Brickyard.

Following the news that Penske (*left*) had taken over running the home of the Indy 500, an F1 race was touted to be on the consideration list alongside the possibility of hosting an Indianapolis night event.



As Penske ponders what next for his new purchase, Liberty Media continues to press for a second race in the United States to be added to the F1 calendar, and a spectacle under lights at Indy could make for the ideal solution.

F1 last raced at the famous oval back in 2007, with Lewis Hamilton taking victory for McLaren ahead of then team-mate Fernando Alonso.

F1's American owners have been actively trying to secure a second US race, with Miami the favoured destination. Proposals for a street race around PortMiami were effectively ended due to local protest, and a new agreement to stage a race out of the city outside the Miami Dolphins' Hard Rock Stadium is yet to be given the green light.

As Liberty continues to push for a second US date to grow the sport in its homeland, a return to Indy could be the answer to its American dream.



Liberty wants a race in Miami, but has hit trouble

MOTORSPORT IMAGES

Brabham bounces back

THE ROAR OF A BRABHAM RACING CAR returned to Brand Hatch's famous Brabham Straight last month as Brabham Automotive competed in its first race and got off to a flying start: its mid-engined sports car, the BT62, took two pole positions and one victory in a weekend of high emotion.

The occasion marked the return of the Brabham dynasty to racing in its own car, 57 years after Jack Brabham drove the BT3 (Brabham Tauranac) at its first grand prix. The last time a Brabham won a race in an eponymous car was at the South African GP in 1970.

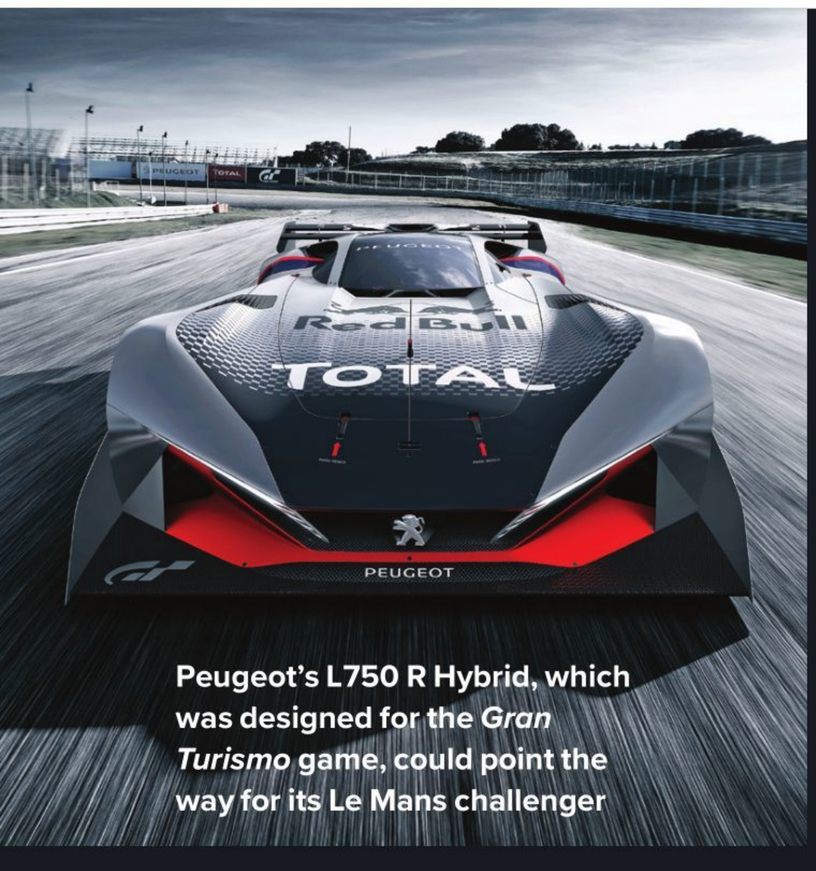
David Brabham, who together with external investors founded the start-up car maker in May 2018, said that he'd had to fight back his emotions to make sure his car crossed the line in first place.



"It was a dream start for the car and for the group," he said. "It's the rebirth of Brabham back on a racetrack and there are lots of mixed emotions. It's a fantastic achievement and I'm just really proud of everybody involved in the project."



Jack Brabham after his final win in a Brabham in 1970. Inset, his son David at Brands Hatch in the BT62



Peugeot's L750 R Hybrid, which was designed for the *Gran Turismo* game, could point the way for its Le Mans challenger

Peugeot returns to Le Mans

PEUGEOT WILL RETURN TO THE Le Mans 24 Hours for the first time since 2011 after confirming that it is working on an entry into the World Endurance Championship's forthcoming Hypercar category for 2022.

The French firm is planning to create a hybrid-powered prototype for the new class, which aims to bring sports car racing back into the scope of road relevance. Peugeot will likely line up against Toyota and Aston Martin in the new class.

Further details are set to be revealed in early 2020, and both Rebellion Racing and ORECA have been touted as partners for the project. ORECA assisted Peugeot's last entry – the diesel-engined 908 HDI FAP LMP1, which won Le Mans in 2009.

PSA Motorsport chairman Jean-Marc Finot said: "It is a new challenge, but I know our team of experts will rise to it."

The news comes as the PSA Group's other major brand – Citroen – is said to be nearing the end of its World Rally Championship programme after three middling years with its C3 WRC challenger.

SIMON ARRON, MOTORSPORT IMAGES

Hyundai secured the makes' crown after Rally Australia's cancellation, but Toyota's Tänak took the drivers' glory... before jumping ship

Hyundai handed WRC glory



"WRC teams have donated all food to the Australian locals affected"

HYUNDAI CLINCHED ITS FIRST WORLD Rally Championship Manufacturers' crown, but not in the way the squad would have wanted after the Rally Australia was cancelled amid spreading bush fires.

With the drivers' title already settled in the favour of Toyota's Ott Tänak (*below*) , Hyundai held a slender points lead heading to Australia. However, the Tommi Mäkinen-led Toyota crew never got the chance to shoot for the double after devastating bush fires spreading close to the Coffs Harbour rally HQ forced the abandonment of the event.

It was initially planned to reduce the route by 70 per cent, which would have handed Hyundai the title anyway due to the reduced points on offer. However, ongoing concerns for the safety of both the local population and the WRC community meant the rally had to be cancelled entirely.

WRC Promoter and Rally Australia organisers arranged for all food supplies earmarked for the event to be donated to locals affected by the crisis.

WRC Promoter's Oliver Ciesla said: "It's a terrible situation. The crews wanted to give something back to a community which has always welcomed them."

Hyundai caused a storm in the build-up by signing Tänak on a two-year deal, which leaves Toyota with a driver conundrum. Both Sébastien Ogier and Briton Elfyn Evans have been linked with the vacant Yaris seat - as has Hyundai's own Thierry Neuville. Alternatively, Toyota could look to promote either of its young stars - WRC2 Pro champion Kalle Rovanperä or the WRC2 event winner Takamoto Katsuta.





The new McLaren Elva (far right) flanked by an original Elva M1A, chassis 20-15, which was a race winner in America in 1965 and '66

McLaren brings back the Elva name

MCLAREN HAS REVIVED AN EVOCATIVE name from the sport's past after unveiling a modern reworking of the Elva sports car.

The Woking firm's new roadster is an 804bhp lightweight road and track machine, costing £1.4m. It has been inspired by the original Can-Am McLaren-Elvas, which were designed by Bruce McLaren in the mid-1960s.

McLaren says the new car is the lightest it has ever produced, featuring a 4-litre twin-turbo V8 mated to a carbon-fibre chassis and body. The brand claims a 0-60mph time of under three seconds,



Ingram emulates Elford with ERC victory

IN A SEASON THAT INCLUDED A NEAR-catastrophic loss of sponsorship and a title-deciding final stage, Chris Ingram battled back to become the first British driver since Vic Elford to win the European Rally Championship title.

Ingram and his Toksport WRT Škoda Fabia R5 co-driver Ross Whittock managed to overcome last-stage dramas to finish fourth on the season-closing Rally Hungary in November to put themselves into the history books. Ingram is now the first British driver to win the ERC crown since Elford's title success back in 1967 at the wheel of a works Porsche 911.

Ingram needed only a podium finish to secure the title over rival Alexey Lukyanuk, but dropped two minutes after suffering a puncture on the final stage that left him fourth. Lukyanuk then stood to take the title, but a deflation of his own later on dropped the Russian driver to second, handing the

making it quicker than the range-topping Senna hypercar.

The name harks back to the very origins of McLaren, when Bruce first branched out into building Can-Am cars with first the Zerex Special, and then the 1964 M1A. Elva Cars, run by Frank Nichols, showed an interest in Bruce's early M1A design and a deal was struck to manufacture a run of customer versions, titled the McLaren-Elva M1A. A total of 24 were built.

"The new car is inspired by the original Can-Am McLaren-Elvas"

For its new Ultimate Series road car, McLaren had to acquired the rights to the Elva Cars name.

Mike Flewitt, head of McLaren Automotive, said: "The McLaren-Elva M1A [MKI] and its successors are in many ways the true spiritual forerunners of today's McLarens – superlight mid-engined cars with the highest levels of performance and dynamic excellence.

"It's fitting that the new roadster acknowledges our rich heritage with the Elva name."



McLaren's relationship with Elva helped create the M1A and later M1B (pictured)

MCLAREN, ERC.COM

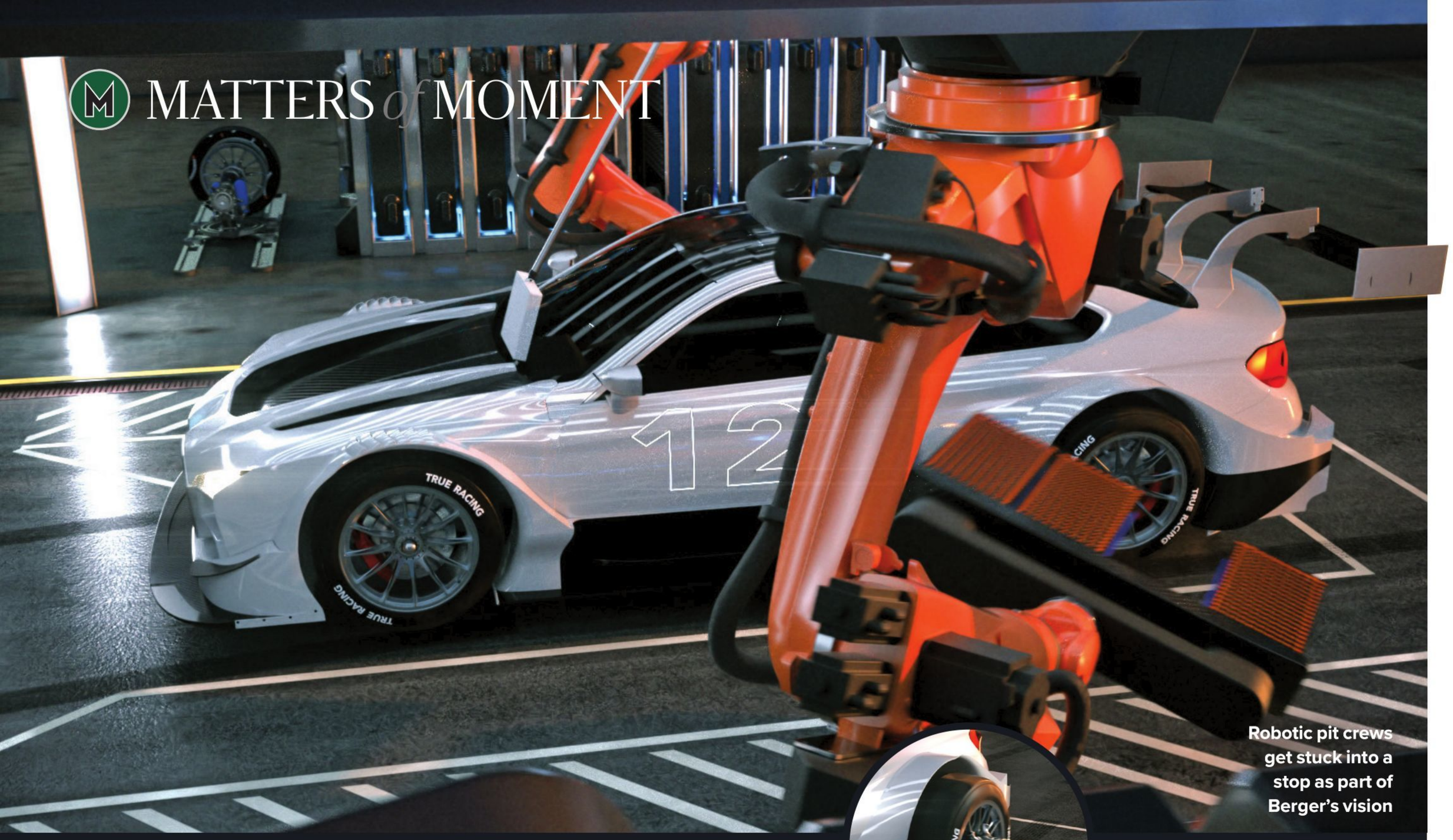
championship laurels to Ingram.

It's been a rollercoaster year for the 25-year-old from Manchester, who nearly lost his title chances altogether after a sponsor withdrew earlier in the season. A Crowdfunding page set up by his mother Jo managed to raise just over £17,000 to keep his efforts going.

"It's been a bloody hard road getting to this point, but this is everything for us," said Ingram. "Thank you so much to everyone who has helped us, everyone who has supported us. The support has been absolutely unbelievable and we are so grateful. Thank you so much to everyone who has helped us – I've certainly not done this alone."



Škoda driver Chris Ingram brought the ERC title back to Britain for the first time in 52 years



Robotic pit crews get stuck into a stop as part of Berger's vision

Berger's electric DTM dream

DTM PROMOTER ITR HAS unveiled its vision of a hydrogen-powered future.

In a video released on social media, 1000hp electric cars powered by swappable hydrogen fuel cells offered a peek into the future of touring car racing, with ITR chairman Gerhard Berger calling the idea "a courageous and innovative concept".

Pit stops also received a futuristic renovation with fully automated robotic arms replacing all four wheels and the fuel cells as part of the technological revolution. While no launch date was specified, Berger insisted that it offered a view of the future.

"I grew up racing in the 1980s, and I've never lost sight of what that decade gave us: spectacular cars that were always driven at the limit; incredibly difficult to master, and, as a result, awe-inspiring and compelling in equal measure. With this concept I want us to embrace that sensation of raw power; of racing at the limits of grip. Not just with 1000bhp, but with a car equipped with the technology of tomorrow, and using models that demonstrate a clear lineage to the major automotive brands. This new breed of touring car will be incredible to watch, and fantastic to drive."

Lorenzo quits after 'ugly' crash

ONE OF THE ALL TIME GREATS OF MotoGP called time on his career last month, claiming he had lost his motivation after a series of crashes.

In an emotional press conference the 32-year-old triple world champion said that he did not have the passion to keep going after breaking his back at Assen during the Dutch TT earlier this season.

"I crashed again in this ugly Assen crash, and you all know the consequences," he said. "I have to admit, when I was rolling on the gravel and when I stood up, I thought to myself, 'OK Jorge, is this really worth it, after what I've achieved, to keep suffering?' I'm done with it, I don't want to race any more.

"I came home, I decided to give it a try, so I kept going but the truth is, the hill became so high and so big for me that I wasn't able to find the motivation, the passion to keep climbing the mountain."

Lorenzo won the first of his MotoGP championships for Yamaha in 2010, claiming two further world titles for the team in 2012 and 2015 as part of a run of eight consecutive top-three finishes.



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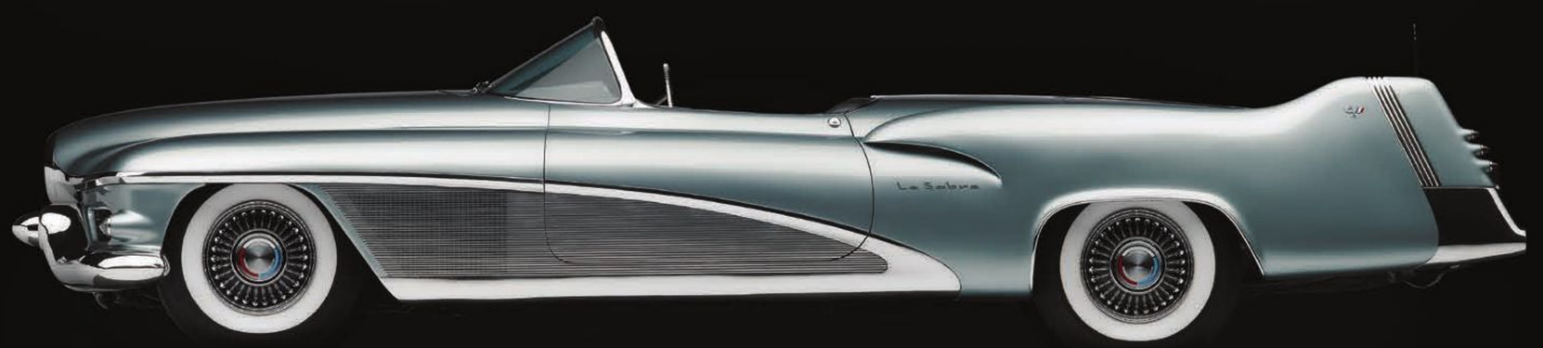
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MARK HUGHES

"For Hamilton, finding a new ace to play was so difficult this year"

THE NEW WORLD CHAMPION SAT down in Brazil and talked a little about his journey to that Fangio-surpassing title number six.

Given that both Ferrari and Red Bull took much of the season to get properly into their stride, the contest part of Lewis Hamilton's championship was realistically only with team mate Valtteri Bottas, even if the race-to-race contest with, variously, Charles Leclerc, Sebastian Vettel and Max Verstappen was often hard-fought. It was a title with a difference, less imperious, and, with just the last race to go at the time of writing, he'd secured only four poles (compared to the seven of Leclerc), though he'd won around half the season's races.

"I wouldn't say it was a plan to be less wow," he said at Interlagos. "It's just the challenges and tasks are different each year. This car has been more of a challenge to fine-tune. As cars evolve and get better it gets harder to find those nuances. I've been searching for that wow lap this year and I've had good laps but they've not shown. I think some of my second places that split up the Ferraris... for me they felt like wow laps but because I wasn't on pole by half a second it doesn't appear that way for you."

The W10 Mercedes, while super-fast, has not always appeared the easiest car to wring the ultimate lap time from. "Well, they're never easy on the limit and it's definitely a better car than last year... but there are still areas where it's not perfect - so if you look at our ride, it's not spectacular. If you watch an on-board of us going through the same corner, you'll see Vettel's head doesn't move whereas mine is shaking, I can't see the bloody corner for a second... But things I was asking for last year got fed into this car; the intricacies of brake temperatures, tyre temperatures, tyre pressures - it's fascinating. Each year I'm getting more involved. My understanding of dynamics is growing year on year. I've just sat with James [Allison] and these engineers are so smart; their intelligence level is on another stratosphere compared to mine. However, they can't compute what I can do in the car. We're just tuned differently."

Although Hamilton's pre-Abu Dhabi tally of 10 wins compares to Bottas' four, Valtteri got his season off to a flying start and initially had Hamilton-matching pace. It took until the Canadian GP for Hamilton to reassert himself. There's a story behind that. In between last season and this, Hamilton's number two engineer Riccardo Musconi was promoted to chief race engineer - on Bottas' car. It came as something of a blow for Lewis.

"It makes it even harder because the relationship you build with an engineer... I've got a great relationship with Bono and all my engineers and each year I sit down with them and ask 'what more can I give to you for you to give me more?' Ricki is very talented and naturally he wanted to progress; no-one wants to stay in the same position. But we had learned so much and then when he goes to the other side, he'd be saying, 'Valtteri, why are you not doing these things... Lewis does this, why are you not doing that?' Everything's now pretty much identical to what I do... it has made it more challenging. I'm thinking 'OK, how do I twist it, how do I change these small things now that they're doing the same, without losing performance?' Because they're already really good, all the settings and everything and my philosophy was all working perfect but now I've got to refine it and take it a step up. Finding a new ace to play is so difficult."

Bottas was more consistently strong this year, but Hamilton did eventually find that new ace. It's interesting though that Bottas did seem, for a time at least, to be seeping through Hamilton's shield. "There was all the outside pressures of 'Valtteri 2.0' and we're 2-2 at one stage, two wins apiece. I've got to stay solid in my mind, but it's very hard not to notice those things. But then I just started ramping up after that..."

His record-busting career numbers are coming inevitably as one of the elder statesmen against a new generation of young talents. He's going wheel-to-wheel with guys like Max Verstappen or Charles Leclerc who are 12-13 years younger. "I love that part of it," he says. "To be challenged by these exciting talents, getting to understand what they're like to race with and how to beat them... I've always been able to adapt. I'll jump in almost any scenario and figure my way through. That's why when the wind changes direction, I am always the one to ask the team. That's why it works so well in the rain because you have to be dynamic in those situations, constantly shifting your driving style. I have also studied other athletes. I listen to Valentino [Rossi] and how he feels he's had to change his riding style to keep up with the newer generation... I look at tennis players and how they change their swing. I watch golf and see how Tiger has come back after improving his swing. It is very similar as a driver. You can change small things that give you a wider platform and a wider foundation to be able to pull laps together. But, it's millimetres, or micrometers, and it's very hard to see."

"I listened to how Rossi changed his style, and Tiger altered his golf swing"

Since he began covering grand prix racing in 2000, Mark Hughes has forged a reputation as the finest Formula 1 analyst of his generation

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MAT OXLEY

"Nobody but Márquez can be that near to crashing without actually crashing"

MARC MÁRQUEZ RECENTLY won his sixth MotoGP world championship in seven years and it is difficult to see anyone ending his dominance of the sport anytime soon.

There is one overriding reason for this. The Spanish Honda rider possesses a skill that no one else has: he can slide the front tyre, a very risky trick on a motorcycle.

This is not the only weapon in his armoury, of course. Márquez has within him everything necessary to make him a great bike racer. He is intelligent, determined, committed, brave, cunning and tactically astute. He is happy to take risks, he can shrug off pain, he enjoys crushing rivals and he works well in a team. Once upon a time he had his weaknesses, but one by one he has exorcised these.

However, it is his otherworldly ability with the front tyre that really crushes his opponents. Few people understand this better than Öhlins race engineer Thomas Alatalo, who works with five of the six factories on the MotoGP grid: Aprilia, Ducati, Honda, Suzuki and Yamaha.

"I'm not allowed to say exactly what I see in Marc's data, but I can tell you that it's all about corner entry," says Alatalo. "No one else can ride a front slide for so long; nobody else can be that many times near crashing without actually crashing.

"To me it's very much related to the fact that he has a better feel for what the tyre is doing at any moment and he has quicker reactions. In racing you always come back to the famous concept that car racing engineers use: the traction circle. This came from an old Lotus engineer who basically nailed what racing is all about: it's about always maintaining the highest level of acceleration in the appropriate direction.

"When you go down the straight you accelerate as fast as possible in the forward direction. When you brake at the end of the straight you accelerate as fast as possible backwards. When you go around the corner you accelerate as much as possible to the inside of the corner, left or right. By doing all of that you are pushing the traction circle, which is how much traction you have, 360 degrees around the contact patch.

"The way Marc rides, he is a master at balancing on the edge of the traction circle because he feels the limit better than everybody else: 'OK, now I'm outside the traction circle, I'm sliding the front and I'm going to crash if I don't do something about it'. That reaction takes longer for others."

Márquez is famous for crashing without crashing. He has at least one of these moments at most grands prix, like during practice for October's Australian GP when the front tyre slid away entering a slow right-hander. Anyone who witnessed what was happening knew Márquez was falling off his motorcycle. Data measured his lean angle at 70.6 degrees from the vertical, but he didn't crash. He used the throttle, his knees and his elbows to save the day. "You cannot imagine how I play with my elbows," he says.

Most riders have seen Márquez do this kind of thing. "Last year at the [floodlit] Qatar pre-season tests Marc went out in the night with a hard front," recalls Michelin MotoGP manager Piero Taramasso. "No one else would go out with the hard front at night, when the track is cold; but he told us: 'I want to try it'.

"So he went out and soon after Jack Miller came into his box. He told us that Marc had been in front of him and losing the front on purpose, trying to look for the limit. He said it was crazy because Marc was going to full lock. Jack went into Marc's garage and said, 'what were you doing in Turn Six [a low-speed left that claims many victims] - you were leaning 20 degrees in the corner and turning the handlebars onto full lock?!' Marc said, 'oh, I was looking for the limit, because I want to know where's the limit and I want to feel the reaction'. No one else can do that. That's why he gains a lot turning into corners compared to the other riders."

Qualifying for last August's Czech Grand Prix was another memorable Márquez moment. He was out on slicks when a rain shower hit the track. Yet he kept going faster, his bike slipping and sliding through the puddles. His final lap was 2.5 seconds quicker than anyone else.

"I don't understand how the track was dry for Marc, but not for the rest of us," deadpanned 2019 Italian Grand Prix winner Danilo Petrucci.

"MotoGP isn't tennis or F1: if a rider gets it wrong they get hurt"

Who might challenge Marc Márquez in the near future? The man most likely would seem to be Fabio Quartararo, the 20-year-old Frenchman who dazzled MotoGP in his rookie season. But can Quartararo, or anyone else, match the champion's super skill?

MotoGP isn't tennis, football or even Formula 1. When a rider practices a new trick and gets it wrong he is likely to get hurt; which will damage his confidence, perhaps discouraging him from trying again.

In the meantime there is only one thing to do: watch Márquez with slack-jawed admiration, which is what the rest of the grid are already doing.

Mat Oxley has covered motorcycle racing for many years – and also has the distinction of being an Isle of Man TT winner

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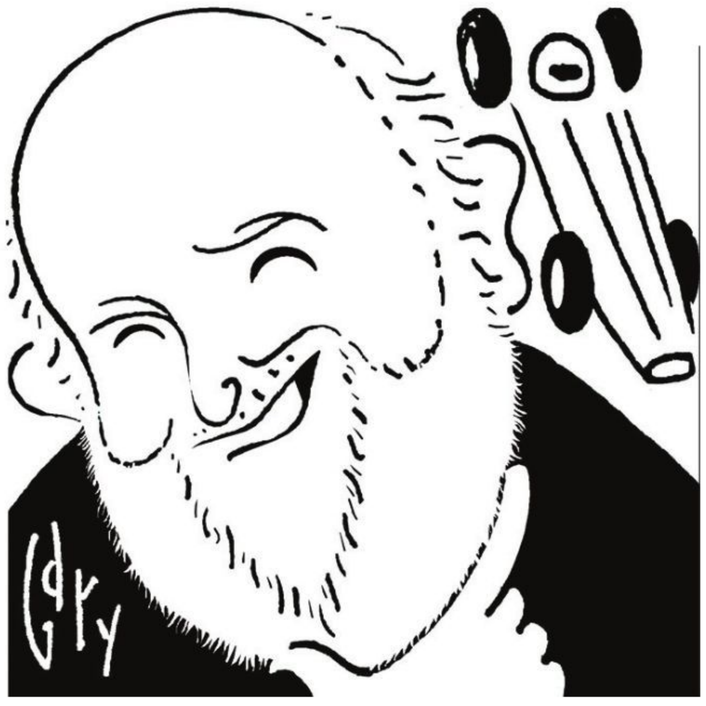
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DOUG NYE

"Back in the 1890s 'Hummingbird' electric taxis filled London streets"

ON A BOOKSHELF AT HOME IS a bound run of the early French motoring journal *La France Automobile*, which was launched in 1896 by the co-founder of the Automobile Club de France, Paul Meyan.

In November 1898, Meyan ran a timed hillclimb at Chanteloup, just outside Paris. The course was only a mile and a furlong, and its gradient 1-in-12. But 54 cars entered, 47 finished, and it was won by the Belgian Camille Jenatzy in his CITA electric car, averaging 18mph. First blow for Formula E?

Meyan ran another *course de vitesse* on a 2000-metre level road in Achères Park, St Germain. The first kilometre provided standing-start speeds, the second a flying-start maximum velocity. Meyan's aristocratic friend Count Gaston de Chasseloup-Laubat's Jeantaud electric – powered by a single 36hp motor fed by Fulmen non-rechargeable batteries – clocked 63.157kph or 39.245mph through the flying km and was acclaimed as setting the first world land speed record.

Chasseloup-Laubat's time through that flying km had been 57secs. Yet most spectators – and certainly the Count himself – had already travelled faster by train, and, deflatingly, the contemporary push-bike record through a flying km was then 56secs – a whole second faster. It would be Laubat's rival, Jenatzy, who would soon punch the new-fangled LSR beyond pedal-power in his similarly electric car *La Jamais Contente*.

That was all 121 years ago. But right now, I'm chewing over whether to replace my much-loved, clean-burn, twin-turbocharged diesel car with another, or is it really time to go green(er) and go electric?

I would do so but for none of the current crop of electric cars appealing (to me), and my underlying scepticism about what the environmental campaigners and longing-to-be-loved politicians want us to think.

Way back at the dawn of motoring, would-be buyers had a choice of internal combustion vehicles burning spirit or petrol, or steamers burning spirit or coal, or indeed electrics. Outside the main towns and cities, roads were generally poor so most early private motoring was confined to short distances or just around town. So range was not then a particular consideration.

Early internal combustion engines could be a real pain to start. The twiddle and hand-crank procedure often demanded technical knowledge, skill and muscle. Similarly, warm-up time of up to an hour counted against steam cars, and coal burners were dirty. So it's no surprise that clean, simple, switch-on-and-go electric gained popularity.

In the 1890s electric taxis filled city streets – the London fleet being charmingly nicknamed 'Hummingbirds'. But for the electric car it all then went wrong, as oil-derived petrol became cheaper and the engine technology improved, as did road networks, and filling stations proliferated.

One side-effect of such social liberation has now so damaged our planet's climate that tremendous political attention pushes today for alternative-technology transport. OK, I'd happily buy electric if there was a model which provided the performance, capacity, comfort and style I like, combined with a 400-mile range – and could be refuelled in a 5-10min service stop.

Weight is the enemy of performance, and the battery alone in something like a Tesla can weigh more than some alternative-power cars do complete. Where recharging is concerned, the downside multiplies. Judging (generously) that recharging batteries takes six times as long as filling a petrol tank, to replace a typical 20-pump motorway service station with equivalent quick-charging points would need 120 120-kilowatt superchargers, requiring a 14.4-megawatt substation – which I'm told is equivalent to the demand of 32,000 homes. And that's just for one station...

National charging demand would far outstrip current generating capacity. And could the transmission network cope? I'm told no. Then add the environmental cost of generation... and of fresh infrastructure... and of producing (and later scrapping or recycling) the millions of batteries. Whoever comes up with a rapid-recharge power store the size and weight of a fuel tank will make a killing.

If the UK's 38.4 million registered vehicles each lugged around 700-plus kg of lithium, cobalt and nickel – would there be enough? And what of the environmental cost of mining such metals? Cost is relative to demand. Allegedly VW's strategists are forecasting a 42-fold increase in the price of cobalt alone.

Yet hydrogen fuel cell technology seems to have been forgotten. The prototype Riversimple hydrogen car – which offers an even cleaner alternative – can run for 300 miles on a 74-litre tank, so 400 miles is within its grasp, and it takes three minutes to refuel.

"The battery in something like a Tesla can weigh as much as an entire car"

In the early 1900s, as the pioneering electric days of de Chasseloup-Laubat, Jenatzy, and those 'Hummingbirds' began to wane, their proponents railed about the relative dangers of using highly inflammable, potentially explosive petrol as an alternative fuel. Now that same mindset bleats about the dangers of hydrogen gas. But anyone who has ever witnessed a battery runaway reaction creating an inextinguishable fire will also appreciate the dangers of sparky cars, too.

Doug Nye is the UK's leading motor racing historian and has been writing authoritatively about the sport since the 1960s

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ANDREW FRANKEL

"I can jump in most things and drive them reasonably quickly"

A FEW DAYS AGO I HAD A fascinating but sadly unattributable conversation about electric cars with an engineer from a company that has some sporting cars in its portfolio. And I was explaining that while I could see very easily how electric cars could make quite good replacements for petrol or diesel when used as mere transport, I could not see how to make a proper electric sports car, not least because the sound of a car (or lack thereof) is so important to the driving experience.

His take was interesting: those of us who have been around for a bit were brought up on the sound of the internal combustion engine; it has worked its way into our brains to such an extent that it is so expected when we get in a car, we feel uncomfortable when it is absent. This will not be the experience of the younger generation brought up on the near-silent whirrings of electric and watching Formula E and its offspring on telly. They won't miss the howl of a V12 or the thunder of a V8 because they won't have heard them in the first place, certainly not long enough for their sound to become hard-wired.

It's an interesting point, but flawed, I feel. You may not miss what you have not heard, but that does not therefore make what you are hearing inherently easy on the ear. We've all grown up to the sound of washing machines, refrigerators and other electrical white goods and I'm yet to hear anyone wax lyrical about how their Zanussi sounds.

What's the answer? It seems to me the problem is not the internal combustion engine, but the fossil fuels we use. So why can we not use a renewable source of fuel instead? In short, why not use the same hydrogen than many reckon will in time replace batteries and instead of using it in a fuel cell, burn it in an internal combustion engine? You have a clean fuel the world needs with the sound and response characteristics we enthusiasts want.

If this sounds pie-in-the-sky, it's actually pretty old tech. About 15 years ago I drove a BMW 7-series powered by a 6-litre V12 that could swap between on-board supplies of petrol and hydrogen at the literal flick of a switch. It was called the Hydrogen 7.

As I understand it, the project failed for a number of reasons, primarily the poor energy density of hydrogen versus petrol (meaning it needed four times as much of the stuff to travel the same distance) and the fact that at the time the only financially viable way to get the hydrogen was to extract it from natural gas, thereby burning a fossil fuel. But the world in general and the renewables landscape has changed beyond recognition since then. I'm not saying it would be viable now and there may be many engineers spluttering with laughter into their coffee at the very suggestion, but I'd still be interested to see what this technology would now look like with a decade and a half of development behind it.

THE OLDER I GET THE GLADDER I am that I'm not a really good racing driver. I can jump in most things and drive them reasonably quickly, but the difference between that and being so good that people want to pay you to race for them is considerable. The racing profession is like the acting profession, with far too much talent chasing far too few jobs.

Some are rich enough to pay to race, others to race for free, but most are not, and many end up instructing for not much money, trying to help people they've never met drive around race tracks as fast as possible. It's my idea of hell. Many more simply give up the dream.

So when I race I do so for fun. I've been lucky to have been offered a number of opportunities over the years, but I've turned most down. However fast the car, however prestigious the series, the only question is, 'does it sound like fun', and if the answer is 'no', I'll leave my suit on the hangar.

YOU MAY HAVE HEARD THE NEWS THAT THE next-generation Mercedes-AMG C-class is not going to be powered by a 4-litre V8, but a four-cylinder engine of half the size which, thanks to hybrid electric drive, will still produce numbers at least as impressive as those currently generated by the V8.

Talk about missing the point. You can buy a Casio wristwatch from Argos for £7.99 that tells the time just as well as a Swiss chronograph engineered by experts with devotion, passion and skills handed down the generations (in fact the Casio will actually keep far better time). But that's not why people buy Swiss chronographs. And they don't buy AMG Mercedes just because they accelerate fast in a straight line.

"The thing I associate with an AMG is the thunder of a V8 engine"

If, as I fully expect, this is a precursor to almost all AMG V8s being replaced by hybrid fours, I expect there also to be something of a backlash, just as there was when Porsche thought it a good idea to replace a six with a four in the Boxster and Cayman. I know there are good reasons behind such a decision - chiefly the need to drive down group emissions - but this is a hell of a price to pay. If someone asked me to name one thing I associate most with the AMG brand, it's the thunder of a V8 engine. It gives that up at its peril.

A former editor of *Motor Sport*, Andrew splits his time between testing the latest road cars and racing (mostly) historic machinery
Follow Andrew on Twitter @Andrew_Frankel

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JENNIE GOW

"Despite Hamilton's achievements, the public still don't warm to him"

RED, WHITE AND BLUE TICKER tape is falling all around me as I wait to speak to the 2019 Formula One World Champion. America is an apt place to win a sixth title for someone who professes New York to be his favourite place in the world, and who has a house he retreats to in the wilds of Colorado.

Lewis Hamilton is not like any other F1 champion I have met before. He divides opinion more than almost any other British sportsman. He spends his time away from the track designing clothing lines and making music, and is one of the highest-paid sports stars in the world - reportedly earning over $110 million in 2018.

In spite of his sky-high profile, Hamilton remains a bit of an enigma. His closest confidantes in the paddock are his physio, Angela Cullen - a diminutive Kiwi who is often seen running after Lewis or holding his personalised scooter - and Marc Hynes - his long-term friend, former racing driver and the man who beat Jenson Button to the Formula 3 title back in 1999.

His family travels to races occasionally, but significantly all of Hamilton's parents are at the Circuit of the Americas to see him stretch ahead of Juan Manuel Fangio and become a six-time world champion. His mother and stepdad and his father and stepmum are by his side to celebrate.

Lewis goes to his two most used comments post-race: he thanks all of his fans - something that has become a bit of a mantra to him after a race - and he talks about his roots growing up in Stevenage and how unlikely it was for him to succeed. The sacrifice his family had to make to ensure Hamilton was given the best chance to win.

Still some of the public don't warm to him in spite of his achievements. If I think of how loved Fernando Alonso is in Spain, or how Brazilians literally weep when they remember Ayrton Senna, it is quite a contrast. Does Hamilton care? I have no idea, but among Hamilton's family and friends, his work colleagues and bosses he is worshipped and loved in equal measure. It will be a talking point if he doesn't see an upgrade from his MBE status when the Queen's list comes out in the new year.

But what now for the championship? This year has been a case of 'when' not 'if' for Hamilton from early summer when Valtteri Bottas's title challenge faded and it became clear that Ferrari didn't have the fire power that Mercedes does.

'Dead rubber' races are quite strange. With nothing really left to play for, we still go through the motions, but will anyone really care if they finish second, third or 15th in the standings? None of them have won the biggest prize in their sport. But personal grudges and freedom to push at the end of a season can make for a dynamic final few races as we've seen in the past.

Think back to 1971 when Jackie Stewart was so dominant that he was crowned champion in Austria with three races still to go. The next round was the Italian Grand Prix and it turned out to be an absolute classic. Five great drivers were all in with a chance of a debut win in the closing laps of the race - François Cevert, Ronnie Peterson, Howden Ganley, Peter Gethin and Mike Hailwood. Gethin crossed the line just 0.01sec ahead of Peterson, making it the closest F1 finish of all time. Even fifth-placed Ganley was only six-tenths away.

Other great dead rubbers include Canada in 1973 and '79. Think of Montoya versus Räikkönen in 2004 at the Brazilian GP - if a championship had been on the line that day would their battle have been so epic? That's not to mention Japan 2005 with its rainy qualifying which flipped the grid and brought some great battles, with Räikkönen winning out in the end. It was a classic race, let alone an amazing dead rubber.

During my F1 career I haven't seen a whole load of really close battles for the title - mostly due to Vettel's dominance followed by the Hamilton years - but Nico Rosberg pushed Lewis to the edge in 2016. I'd just had a baby but the title decider was not to be missed so I hotfooted it to Abu Dhabi to see which Merc driver would win out.

The whole paddock was a different place - charged! There was a real sense of anticipation that seems almost like a distant memory now. Hamilton gave it his all and won the race but it wasn't enough - Rosberg finished second and took the title by five points, despite winning fewer races during the season. The next day Rosberg announced his retirement - the season and the fight had taken so much energy out of him.

"The freedom to push over the final races means dead rubbers can be dramatic"

The only other real down-to-the-wire weekend was 2014 and the farce that was double points for the final round - one of the worst new F1 rules ever. Luckily the reliability gods decided to intervene, slowing Rosberg and allowing Hamilton to win out, but it was equally exciting and stupid all at the same time.

Will next season allow Hamilton to equal Schumacher's record of seven world titles, or will the likes of Bottas, Verstappen, Leclerc or Vettel challenge? We live in hope for fewer dead rubbers.

Jennie Gow has been a staple of the BBC's Formula 1 broadcasting team since 2011, working across both TV and radio

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Breaking the ice

A Polestar is not a Volvo, honest. But it is something special, says **Andrew Frankel**



IT'S NOT OFTEN I'D PUBLISH A ROAD test based on 20 minutes in a pre-production prototype, but there are two reasons I am now: first, this new Polestar 1 is significant, and not just because it's a brand new car from a brand new constructor. It is also unlike anything else; the usual carefully assembled view as to whether a car is or is not preferable to any given rival simply doesn't apply. It doesn't have any rivals. You'll either love it and buy it, or it won't even get on the shopping list.

I'll start by telling you what it is not, which is a high-performance Volvo. It would be an understandable conclusion to reach seeing as Polestar made its name tuning Volvos, it's owned by Geely, which also owns Volvo and it is based on a Volvo platform with a Volvo powertrain. But you can say the same about Porsche's use of VW architecture and no-one thinks a Cayenne is a Touareg.

And yes, it even looks like a Volvo because that's how its life started back in 2013 as the Volvo Concept Coupé. But it's not a Volvo, or so I am told most emphatically.

It's important customers don't think it's a Volvo too, because otherwise when they reached for their Meisterstücks to write the £139,500 cheque, they might find the ink frozen in the pen.

Yes, it's a dazzling amount of money, enough to put this not-Volvo on a collision course with the Bentley Continental GT V8 in the marketplace. Or so you'd have thought. In fact I cannot see a single Bentley customer being interested in the Polestar, but I can see Polestar customers feeling equally strongly and negatively about Bentley ownerships.

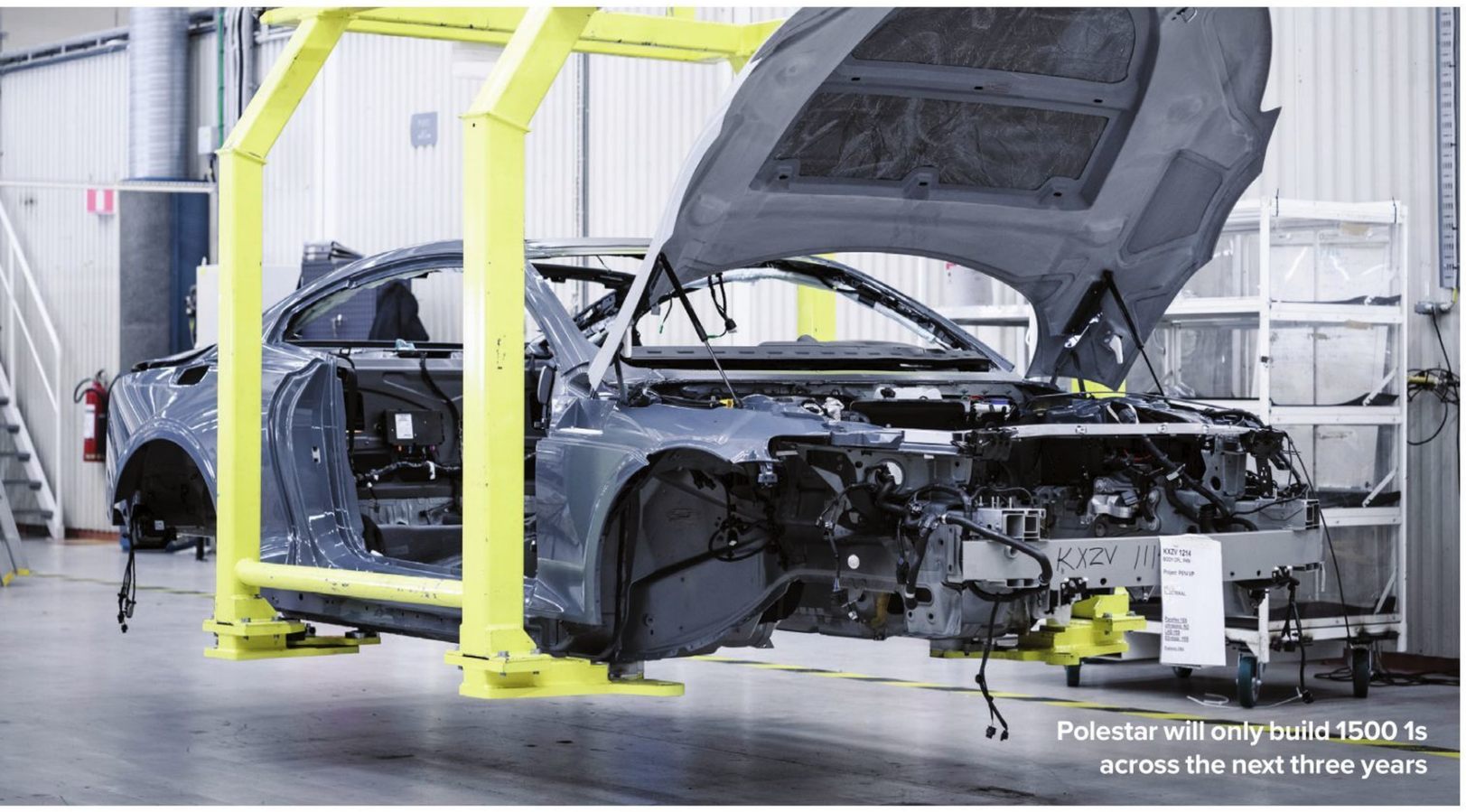
For this is a car not with a thumping V8 or W12 under its bonnet, but a 2-litre four cylinder, which was then supercharged, turbocharged and hybridised until the right numbers appeared on the board: no fewer than 600bhp backed by 738lb ft of torque, which is far more power and wildly more torque than that achieved by the aforementioned Bentley.

If now you're thinking all that tech sounds heavy, it is. Despite extensive use of carbon fibre in its massively stiff structure, and producing the entire body in carbon, it still weighs 2350kg, which is more even than the 12-cylinder Continental carrying an engine three times the size.

And yet the Polestar doesn't feel enormously overweight when you drive it, and for that I credit what must count among the most expensive passive dampers ever fitted to a road car: a set of dual-flow Öhlins with 22 driver adjustable settings each.

Most of all it feels quiet and comfortable, the former because for almost all drivers almost all of the time, the Polestar 1 is effectively a pure EV. Indeed it will do 78 miles on electricity alone, which places it in a different league to any other plug-in EV (which is not the same as a range-extender like the now deleted REX-version of the BMW i3). So you should be able to travel from London to Cambridge without the petrol motor completing a single revolution.

When it does kick in there's no escaping the fact that, for all its technological sophistication, it's still just a 2-litre four, and those used to the sound and smoothness of



Polestar will only build 1500 1s across the next three years



It may look like a Volvo and have a long association with the Swedish brand, but the Polestar 1 is an all-new car from a new constructor

"The 2-litre is supercharged, turbocharged and hybridised to make no fewer than 600bhp"

a six, eight or even 12 may be taken aback by its ordinary voice. But the performance is there: its mass means it doesn't accelerate quite as strongly as 600bhp and all that torque suggests, but it's still entirely convincing in this regard: no one is going to return this car on the grounds it's too slow.

Or too dull to drive. Lack of time meant I wasn't able to throw it around - though it's hard to imagine a Polestar customer complaining about its handling. The car is poised and controlled and, as mentioned, conceals its mass brilliantly. My fear that with it being left-hand drive only it would feel too wide and unwieldy on British country lanes came to nothing. An Aston DB11 it ain't, but it's a very pleasurable driving experience.

I don't mind the limited rear seat space, because it's limited in any Bentley, Aston or Mercedes S-class, but the boot is quite small.

Even so, the car gave such a good account of itself my primary concern has nothing to do with it per se, but its price alone. The interior is good, and in the top of the range XC90 with which it shares almost its entire operating system it would be stunning. But the Polestar costs more than twice as much and it's not that good. And I fear buyers of British blue-bloods would baulk at that engine noise. But as discussed, this car is not really for them. It's for someone who's probably not bought a car like this before, not least because there hasn't been a car like this before. He or she wants a car that looks cool and is fast and comfortable but also one that projects the image of an owner looking forward to the future, not over their shoulder to the past. They'll like the carbon tech, the fantastic EV range, the reassurance of the back-up petrol engine and probably the fact that with only 1500 being built over three years, they'll be pretty exclusive.

What is slightly perplexing is that this petrol-electric hybrid with which Polestar has launched its brand is the last one it will ever make.

Early next year the all-electric Polestar 2 will go on sale priced at a far more realistic £49,900. And unlike its big brother, there will be no problem working out the identity of its biggest rival: in size, shape, price and power it's aiming straight at the Tesla Model 3. If it can maintain these standards, it's going to be a hell of a contest.

POLESTAR 1



- **Price** £135,500
- **Engine** 2.0 litres, 4 cylinders, turbocharged, supercharged + hybrid drive
- **Power** 600bhp
- **Weight** 2350kg
- **Power to weight** 255bhp per tonne
- **Transmission** eight speed automatic, four-wheel drive
- **0-60mph** 4.2sec
- **Top speed** 155mph
- **Economy** n/a
- **CO_2** n/a
- **Verdict** Great, but very pricey

More money, less sense

Renault's new £72k hot hatch may be rapid, but misses a trick

THIS IS THE FASTEST, MOST capable fast hatchback I've driven. And frankly, I'd be surprised were it any other way. It's the quickest front-drive car ever to lap the Nürburgring, and the measures RenaultSport has gone to in order to ensure its supremacy are extraordinary. The rear seats have gone, It has thin glass, racing seats, a carbon bonnet, titanium exhaust, no rear wash wipe... and so on and on and on. The car I drove was in full 'Ring spec too, with ceramic brakes and carbon fibre wheels.

It's a trifle lively on the road as you might imagine, though its trick Öhlins dampers means it can set a blistering if not desperately comfortable pace from one point to the next. But who am I kidding? This is a track car, and on the track it is exceptionally rapid.

But I'd expect something else too: namely a driving experience that was as fun as it was fast, even more so in fact. And that's where it slips up. It feels set up to do a lap time, not make the driver hoot with laughter. And then there's the price: £51,140 if you do without the top-line bits, and a scarcely credible £72,140 with those wheels and brakes included. This is the same money the same company charges for an Alpine A110 with the same number of seats, which gives an incomparably richer, more rewarding driving experience on road or track.



The new Mégane RS Trophy R is made for the track primarily, but doesn't justify that huge outlay

RENAULT MÉGANE RS TROPHY R

- **Price** £72,140
- **Engine** 1.8 litres, 4 cylinders, turbo
- **Power** 296bhp at 6000rpm
- **Weight** 1381kg
- **Power to weight** 164bhp per tonne
- **Transmission** six-speed manual, front-wheel drive
- **0-60mph** 5.4sec **Top speed** 163mph
- **Economy** 35.8mpg **CO_2** 180g/km
- **Verdict** Fast, but lacking in fun factor

Two steps forward...

The new Huracán Evo aims to build on the epic Performante



THE THEORY IS AS FOLLOWS: Lamborghini launches the Huracán to a rather lukewarm response from the media. Lamborghini then launches the low-volume, specialised Huracán Performante and the media rejoices: Lambo can make a real driver's supercar after all! So Lamborghini takes those lessons and applies them to the standard offering and renames it the Evo, the car you see here and all is well. In theory.

It is certainly a much modified car. There's another 30bhp for the 5.2-litre V10, rear-wheel steering has been added as has torque vectoring, the steering and suspension are tuned and it's aero modified.

And in certain circumstances, it is brilliant to drive. Some might think that yowling V10, the last normally aspirated engine of its type, worth the money alone. Get on a decent road, slam through a few ratios and it would be easy to conclude nothing could make your world much better. But you still can't see out of it and the seats are still poor. It doesn't ride as well as a Ferrari 488GTB or a McLaren 720S. And if you drive it around a track, you'll find the balance found for the Performante has been lost and we're back to nasty understeer.

It still looks and sounds incredible and has the best powertrain of its kind. But while the McLaren and Ferrari could easily be used every day, the Huracán Evo is too flawed in too many areas for that.

LAMBORGHINI HURACÁN EVO

- **Price** £206,552
- **Engine** 5.2 litres, 10 cylinders
- **Power** 631bhp **Weight** 1422kg
- **Power to weight** 444bhp per tonne
- **Transmission** seven-speed double clutch, four-wheel drive
- **0-60mph** 2.9sec **Top speed** 202mph
- **Economy** 20.6mpg **CO_2** 332g/km
- **Verdict** Great, but only for weekends

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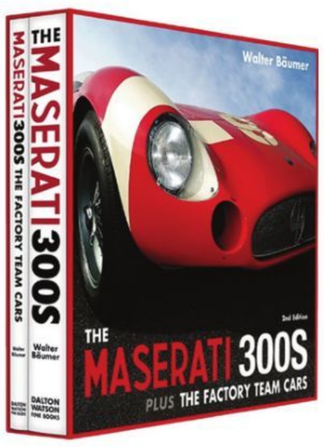
HORTONS BOOKS

The end of the trident era

Moss rated the 300S chassis better than a Ferrari as **Gordon Cruickshank** discovers



Sir Stirling Moss takes victory at the wheel of a works 300S at Silverstone in 1956



THE MASERATI 300S, PLUS THE FACTORY TEAM CARS
Walter Bäumer
Published by Dalton Watson, £195
ISBN 979-1-85443-29-7-1

YES, THIS IS A SECOND EDITION, which we don't often review. But since its 2009 appearance this detailed repository of Maserati facts and figures has been augmented, corrected with new knowledge and illuminated with an astonishing 400 mostly new photographs. The result is another of the new generation of massive works which are boosting B&Q's sales of shelf reinforcements no end. And as few of the fine pictures in the original are carried over, there's a good argument for retaining both.

Though best-known as a photographer, Bäumer comes from racing stock: his uncle, also Walter, was a Mercedes grand prix test driver pre-war, turning out for them at Donington in 1938 and then winning the 1940 'Mille Miglia' for BMW - thanks to Walter Jr we featured his fascinating scrapbook from that event in our August 2001 issue. And in 2002 Walter organised for our then editor Paul Fearnley to drive Fangio's lap-record 250F on the Nürburgring. That's influence.

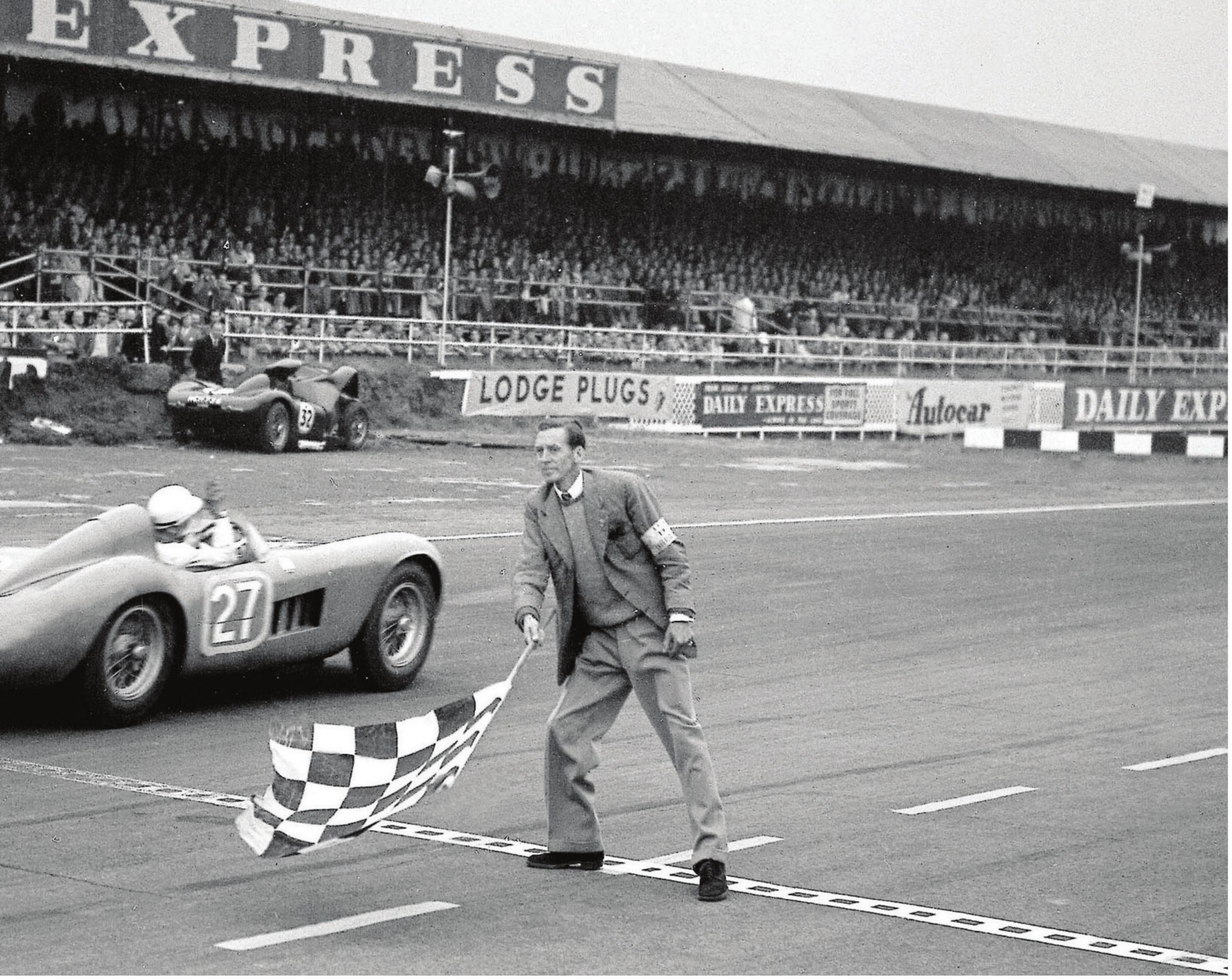
Today the author devotes himself to researching the marque and it's this devotion which has uncovered so much fresh material for his Mk2 book. Yet as a full-time historian Bäumer's frustration over historical dead-ends is obvious - for instance the missing records of Maserati's US operation which, he says, might solve "many of the mysteries that puzzle researchers today". With crash repairs, swapped chassis numbers and fudged paperwork I doubt if there's any cadre of significant cars where the entire story is recorded and accepted. Somewhere there is always an "ah, but..." hovering in the wings, particularly as the cars are now priced above rubies. In fact this edition carries a publisher disclaimer saying it is "for entertainment only and... not for valuation purposes". Yet it's a fair bet that somewhere, someone is grinding their teeth.

Still, for the unspecialised among us, expertise such as this gives us the current picture of a subject. And until Bäumer traces those US papers this production will answer any question on these sleek and pretty cars which were so successful in mid-Fifties sports car racing. Some say the 300S, with its de Dion transaxle, handled better than its Ferrari rivals - and by 'some' let's quote Mr S Moss, who won two 1000km races in one and commented that a good 300S "had a chassis that was infinitely superior to any front-engined Ferrari".

Surprisingly Bäumer doesn't spend too much time on the technical aspect and the 250F genes it shared - it's all over in 25 pages of the 564-page total. Then, rather than haul us through annual diaries Bäumer breaks up his story in several ways: the smaller volume is purely photos of the four works cars, the larger covering the life histories of all 26, including the customer cars. It starts with sections on the World Championship, US racing, and South America, where so many European exotics declined into neglect (Bäumer mentions a 300S still competing in the 1970s), then sales and advertising, featuring the firm's period brochures for its racing offerings. Thereafter Bäumer focuses on individual chassis, beginning in 1955 with the three commissioned by Briggs Cunningham, the model's first customer. His order must have encouraged the factory: if enough cash began flowing from such wealthy privateers, they might be able to stand up to Ferrari, if not to Mercedes and its sophisticated 300SLR. But Ferrari had the cleverer business model: create and sell a bevy of beautiful GT cars as a priority to maintain the cash flow to the race



The 300S was the final sports-racer run by the Modena works team before its closure



MOTORSPORT IMAGES

"Warned to look after the cars, which had all been sold, the race produced a scarlet scrapyard"

department. The number of wealthy people who don't race is far greater than those who do. It would take Maserati several years before it could offer a properly sorted and luxurious Grand Tourer, by which time works racing was over.

It was the disastrous 1957 Caracas Grand Prix in Venezuela which finished off the Maserati racing team for good. Although team director Nello Ugolini had warned the drivers beforehand to look after the cars as all were already sold to private buyers – funds needed desperately by the struggling firm – the race produced a scarlet scrapyard of four crumpled and charred Maseratis, the entire works team. And when Argentina's Perón government defaulted on payment for some machine tools, the Modena racing operation finally stalled. Thereafter it was down to privateers, some with significant quiet assistance from the works, to bear the trident and the cars raced widely. Not only is every race listed, but so are drivers and most of the owners through the years.

(One thing not mentioned is which 300S, being delivered home after restoration, broke loose from its winch cable and ran back down a ramp into steel doors – cue immediate return trip to the repair shop. But I promised to keep quiet about that.)

There are plenty of arresting images: a crane heaving cars out of what looks like a livestock truck, a pipe-smoking marshal holding a cardboard clock with the time in a 12-hour race, a blazing wreck at Sebring. While most are big, crisp and bright – there's even colour from 1955 – Dalton Watson isn't afraid to run a grainy shot if it shows something interesting, boldly running one fuzzy image huge because it shows how close to death Jo Bonnier came when the lamp post he hit crashed down across his car seconds after he leapt out of it.

If Fifties sports-racers are your thing, this is a helping and a half to indulge in. Just make sure it goes back in the slip case afterwards – such books are collectible themselves.

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GRID promises an arcade-style experience with sim racing elements, but can you have both?

A stall in the series?

Codemasters' latest offering is solid enough, but misses the mark on more than a few counts, says **Jake Williams-Smith**

CODEMASTERS REVISITS THE GRID series with its newest release after stellar entries to the F1 and DiRT series.

The road racer's last outing was back in 2014 with *GRID: Autosport*, but the 2019 revival aims to provide players with an arcade style with a route to more sim-focused sensations.

You begin a career that spans several categories of motor racing ranging from touring cars to Can-Am, with the aim of working your way through the ranks. So far so straightforward. In your way stand more than 400 AI drivers, each supposedly with their own on-track personalities, although this feature falls rather flat as you discover very little discernible difference in how each driver races, aside from your rival – one driver in the field marked out as your target to beat in that event.

In terms of the playing style, the game does suffer from a lack of feel and feedback in any car you might be driving, which is especially disappointing given how brilliant the latest DiRT titles have been in this area.

Codemasters has already promised post-launch downloadable content, but the bare-bones nature and lack of selection in terms of tracks leaves a rather noticeable hole once you have completed your first few dozen events. Only a handful of real-life venues are included and the rest of the offerings don't really add much depth.

The game launches with little over a year left of the current generation of consoles, with the PS5 and new Xbox set for launch next year. Despite this, the game lacks a level of graphical fidelity one might expect from a release at the end of the current console life cycle. Beyond being fairly pretty in wet weather conditions, the game often struggles to reach the highs of other titles.

Multiplayer is a step forward, however, with the rapid-fire events keeping you engaged as you race others online in a variety of different race types.

Where GRID is let down the most though is its indecision in pursuing the arcade style that defined its earlier entries, and its 'proper' motor sport direction.

The game is at its absolute best when it behaves like a fully-fledged arcade racer, but those looking for its sim aspects to shine through will be disappointed that the choice between the two styles is not really obvious. Driver aids make little difference to the handling of the cars across the board.

Once you have seen the first hour, there is not much beyond that to keep you engaged, resulting in a safe but rather unspectacular entry to the GRID series.



GRID. Codemasters, £40. PS4, Xbox, PC

MINI 60 YEARS

Giles Chapman

What more is there to say about the Mini marque that hasn't been said, written, filmed, spoken about or driven to victory on the Monte Carlo Rally?

As it turns out, not a lot. With the world's most famous little car turning 60 in 2019 it's prompted a flood of cash-in literary titles. And you get the sense that Giles Chapman knows this, so instead has opted to create a compendium of all things Mini, covering some topics in depth and some in a single page. There are redeeming features, such as the design, images and run-downs of the limited editions and downright bizarre one-offs. It's no work of historical reference, and is therefore more of a stocking filler for a Mini fan. **RL**

Published by Motorbooks, £25
ISBN: 978-0-7603-6399-7

DB4 GT CONTINUATION: HISTORY IN THE MAKING

James Page

With Aston Martin's Heritage division a growing force in the brand's armoury, and with the first examples of its gorgeous DB4 Zagato continuation rolling off the production line, this book is a timely offering.

Despite the title being centred around the continuation models, author James Page offers the full story of the lightweight hard-top GT model – from its inception and launch in 1959 through to its on-track success and eventual end of production in 1963.

With the back story covered in intricate detail, and with a nice collection of period imagery and collated race results, Page moves on to the 2016-17 Heritage project, which aimed to build the final 25 GTs to compliment the original 75 examples.

Page has great access to the designers, engineers and staff who helped re-create one of Aston's most famous cars. The imagery across the second half is a tad repetitive, with a few too many shots of the same one car driving about. But if you're a fan of the DB4 GT, it's a worthy buy. **RL**

Published by Porter Press, £40.
ISBN 978-1-907085-71-0

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Product of the month

Vintage small batch

These slot car racing figurines bring a whole new level of detail to motor sport in your living room



FANCY SOMETHING A BIT MORE VINTAGE FOR YOUR slot car racing collection? Take a look at these stunning creations from Spanish start-up manufacturer Velasor. The firm aims to take slot car modelling to a new level, and its first offerings are more than a bit special. The chosen subject is the 1922 Austro-Daimler 'Sascha', which was one of the first cars designed by Ferdinand Porsche when he was still working for Daimler. The intricately scaled models are made from over 200 pieces, with materials ranging from wood and metal to leather. The four cars entered for the 1922 Targa Florio are depicted with the 'four aces' at the wheel - Alexander Kolowrat, Lambert Pocher, Fritz Kulm and Alfred Neubauer, and each comes complete with a co-driver in various stages of bracing themselves. They come complete with a wooden plinth and presentation box. Race, or crash, them at your peril...
€440 (individual), €1750 (Four Aces Legendary box set)
velasor.com

TAMIYA TYRRELL MODEL

Who'd have thought Romain Grosjean had such power as a social media interweb influencer? However, the eagle-eyed of you who are signed up to Twitter won't have missed the fact that the Frenchman whiled away the hours during the cancelled Japanese GP qualifying day by building one of Tamiya's great model kits of the six-wheeled Tyrrell P34. He did it in good time too, getting fully stuck in and live tweeting the construction process. The good news is that the 1:20-scale kit is readily available, and the even better news is that you don't need a typhoon to have a crack at it yourself.
£25, tamiya.com





ALCOSENSE LITE II

This can be a dangerous time of year, what with the Christmas festivities, the New Year's parties and, let's face it, those dank January evenings where the warm, cosseting welcome of a good pub is usually a great idea. Therefore, the golden rule 'Do Not Drink and Drive' is more important than ever. Our bodies take hours to cleanse the alcohol from our system, so knowing exactly when you're safe to hit the road again is key. Cue Alcosense – set up by former GT racer Hunter Abbott. Its new Lite II model is easy to use and could save your licence. Just puff into it and get a clear message if you should drive or not. No excuses.
£45, alcosense.co.uk





CARRERA PORSCHE SET

We love Porsche and its rich racing history – which motor sport enthusiasts don't? – and therefore we loved it when the Stuttgart firm unveiled two heritage liveries for its 911 GTE chargers for the 2018 Le Mans 24 Hours. Celebrating 70 years of the brand, its pair of factory GTEs were decked out in two of its most iconic schemes – the Rothmans colours of the 956 and the Pink Pig 917. In their marketing prime, they somewhat conveniently destroyed the opposition, finishing one-two in the race. Now slot car maker Carrera has immortalised the pair in its latest premium track bundle. Called Double Victory, the set is the largest in the Carrera range, with 9.3-metres of extra-wide track, with the ability to drift, change lanes and overtake with up to four cars racing at any one point. The models are brilliant, too, supplied in 1:24 scale and intricately detailed to the official licence. All you need to really complete it is a couple of Ford GTs – preferably a lap behind to ensure 2018 authenticity...

£430, carrera-toys.com



OMOLOGATO WALL CLOCKS

Omologato has made some big waves in the watch world since its launch by entrepreneur Shami Kalra just a few years ago. His mission was to bring affordable and quality motor sport-themed watches to wrists around the world. However, the company hasn't just stopped at wrists, with its collection of super-cool wall clocks. Modelled on some of its best-selling watch designs, the 30cm-diameter clocks can brighten up any office or den. The chronograph sub-dials aren't actually functional, but who cares when they look this good? The current range features homages to the Martini and Gulf oils liveries, as well as an Indianapolis-themed design.

£50, omologatowatches.com

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Porsche fuels the festive fever with this advent calendar, each window containing a piece of a 1:43-scale model of a 1963 911. Better than chocolate.

£60, menkind.co.uk



MERCEDES BAUBLES

We're disappointed that a three-pointed tree-topper isn't a thing, but this bauble box of key models from the firm's 125 years is cool.

£20.20, shop.mercedes-benz.com



The Gulf 12 Hours usually attracts an eclectic grid, with 32 cars set for 2019

Duel in the desert

The mainline GT racing season may be over, but the Gulf 12 Hours in Abu Dhabi has become a solid winter attraction

December 14, Yas Marina, Abu Dhabi

MINI BREAK

Are you still mourning the end of championships like the Blancpain GT, British GT and even the GT Cup? Well, good news as the Gulf 12 Hours in Abu Dhabi gives us one final chance this year to witness sports car racing at its best.

GT racing has something to offer everybody. Prototype racing is great, but seeing road-based supercars hurtling into high-speed turns at full chat is always a more relatable spectacle.

The race is held around the Yas Marina track – just a month after it hosts the final round of the Formula 1 World Championship – so it has a prestigious enough setting for one final high-profile blast in 2019.

The event features a mixture of classes, ranging from fully professional teams with professional drivers to the Pro-Am format that has been the heartland of this branch of customer racing, and even a fully amateur class, plus there's also a thriving GT4 division. There will be a handful of LMP3 prototypes at the front of the field, but they rarely do much to steal the attention away from the real battle, which will be in the GTs.

LOCAL KNOWLEDGE

- **HOW TO GET THERE** The growing popularity of the United Arab Emirates as a tourist destination means you're well served for direct flights to Abu Dhabi, with its International Airport being just 10km from the circuit. Etihad is the national airline. There's loads of hotels, too, including the spectacular colour-changing Yas Hotel, which is built around the circuit.
- **ALSO GOING ON** Around the racing, why not take a wander across the marina to visit the Ferrari World theme park and brave Formula Rossa, the world's fastest roller coaster.
- **DON'T MISS** Abu Dhabi itself. The city offers great shopping, sightseeing and plenty of things to do, such as an off-road desert safari!

Thanks to the fine weather (and undoubtedly the luxury hotels, too...) there is always a strong British presence on the entry. Top British GT squads Barwell, Balfe Motorsport and Optimum will all be fielding cars, alongside some of the best from Europe such as Mercedes crew HTP, Attempto Audi and Kessel Ferrari, so you're guaranteed high-quality competition under those distinctive desert lights.

ANDROS TROPHY

December 7-8, Val Thorens

The annual ice-racing spectacular that is the Andros Trophy gets its six-round series underway with a few star additions, such as Sébastien Loeb and Yvan Muller, who will both handle cars in the all-electric category.



WTCR

December 13-15, Sepang

Not kept up with the World Touring Car Cup? – oddly abbreviated to WTCR due to it using TCR regs. It's been a close three-way battle between Esteban Guerrieri, Norbert Michelisz and Thed Björk ahead of the finale.

CHRISTMAS STAGES RALLY

December 15, Croft, Yorkshire

An often overlooked event which usually provides great entertainment. It always boasts a big entry and a great range of cars. Plus, being a circuit rally and not out in the woods, you're never far away from a warming brew.

WEC: ROUND 4

December 12-14, Bahrain

Due to the World Endurance Championship's quirky winter series format, its pre-Christmas trip to Bahrain marks its halfway point. Can Toyota continue its dominance, and will Porsche, Ferrari or Aston top the GTs?

PLUM PUDDING RACES

December 26, Mallory Park

Sick of sitting about while trying to digest your turkey? Head out to Leicestershire and take in the mixed-discipline meeting at Mallory that has become a tradition in UK motor sport. It features both bike and car races.

MORE DECEMBER EVENTS

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Dec 8	Knockhill Stages, Scotland
Dec 13-15	Stock Car Brasil, Interlagos
Dec 29	Plum Pudding Trial, Hants

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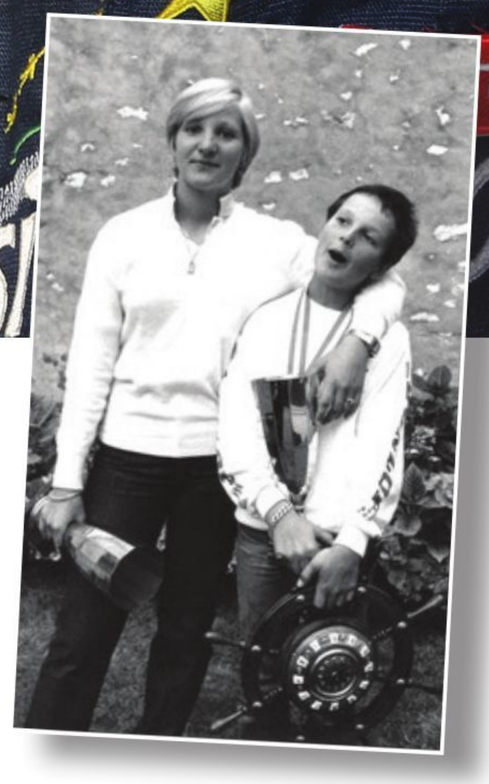
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Yvan Muller and his elder sister Cathy have competed in many branches of the sport. Below, right: during their formative years

DPPI



RACING LIVES

Yvan & Cathy Muller

THE MULLER SIBLINGS HAVE been there and seen it all in motor sport. Yvan's storied career will more than likely ensure that he'll go down in history as a tin-top legend, having racked up four World Touring Car Championship titles alongside a British success, and topped the Andros Trophy ice racing series. He's even dabbled in rallying. Cathy has been alongside him most of the way, and her own racing career spans International F3000, Indy Lights and a Le Mans 24 Hours start.
Interviews by James Mills

YVAN: "I despair of some of today's new generation of race drivers. They talk about giving racing their 'maximum' but they don't know what that means. They spend more time on social media than they do looking at their data. Sometimes, when running my own team, I was putting in more motivation and energy than them, which was frustrating.

To be successful, and win races and championships, I gave up friendships, parties, generally enjoying life. I didn't do any of that. From the age of 20 to 40 I was looking only ahead and never to the side; it was all about racing. But that's what it took for me to arrive at this level.

Unless you are super-talented and can arrive quickly at the top level, you have to make sacrifices. You can't make excuses, and have to learn from your mistakes.

Fortunately, Yann [Ehrlacher], Cathy's son, understands that. He is talented and hard-working. Some other young drivers are not ready to put themselves in that position.

I like to think that Yann benefits from the experience of both his mother and I. And Cathy is slightly less stressed by knowing that I am there to help guide him. It's only right that I do, because early in my career she helped me.

People often say she was my manager, but that's not true. A manager takes your money but doesn't do a lot! She didn't take my money and she did such a lot for me, because she is my sister. She was more like a mentor, because she had previous experience and could tell me what to expect and how to handle situations.

Cathy was always a very fast driver – as fast as anybody, when the set-up and conditions were there. Look at karting: she won the European Championship [the Individual European 100cc Championship]

in 1979, and was the only girl there. She was almost ahead of her time. Back then, sponsors weren't interested in women in motor sport. I think that today, in times of equality, sponsors would take more interest in a driver of Cathy's ability.

I never thought I could be a professional driver. Karting was just a hobby, a pleasure, but step by step, as we moved up the series, won some races and championships, we took it more seriously.

After moving into Formula cars, I won the British Formula 2 Championship and had my sights set on F1. But I needed European experience as well, before F1, so I moved up to F3000 and had a lot of problems with limited budget. The F1 teams wouldn't listen to me.

I thought that would be the end for me - no more racing, time to get proper work - we did a lot of things but life has to move on. But then I had a phone call from Hugues de Chaunac at ORECA, which had two BMWs in the French Touring Car Championship, and he was looking for an extra driver. There were 10 or 12 guys on the list and, sure enough, he took me.

I never looked back. Of all the national championships, I really enjoyed the BTCC. It was the most exciting because of the circuits, the cars, drivers and the contact, which is why I asked Audi Sport whether I could switch from Germany to the UK.

Guys like Thompson, Plato, Tarquini, Menu, Priaulx... all those guys were at a high level and to beat them and become a champion meant I had to push myself, and it's probably why at the age of 50 I am still a paid and competitive racing driver, because of the experience of racing those guys. I can't have any regrets.

However, my life was racing. I was spending at least six months on the road, at races and tests. Even when I was at home, I was thinking about racing all the time; I don't need to be away to be consumed by it.

When I decided to give up in 2016 I was very pleased to stop. It was my decision. When a new offer to drive was made, it had to be on my terms, with my team, so I secured the money for my team on the condition that I would be one of the drivers.

The way I see it, the year I stopped was a good move because it all worked out for the best. Now, if I intend to retire, there will be no official announcements. I'll go quietly - but only once I'm not enjoying myself any more."

CATHY: "Sometimes I wonder whether I was ahead of my time and I think I would like to be a woman racing today, because the environment is quite different. But I have no regrets because I am who I am today because of the hard time I had when so many in motor racing did not want a girl or woman to be driving.

Dad would go hillclimb racing at weekends, in a Group 2 BMW 2002. I was around the scene, I liked it, and then one year we were on holiday, visiting our grandparents near Valencia, and I had my first drive of a kart. I loved it.

"We would use petrol to clean my kart because the water would freeze"

So my father bought me one, and the guy who sold it to us said I should get a competition licence and race after watching me drive. So that's what we did. It wasn't easy; both our parents worked and were busy people but they impressed on us the values of dedication and hard work. I can remember that we had to strip down, clean and rebuild our karts in a small, bare garage, with no heating, and sometimes it would be -10degC and we would have to use petrol to clean it as water would freeze.

Once competing in karts, I was good. So good, in fact, that for the regional races Dad asked whether I could race against the adults, as I wasn't learning much from children of my age.

The organisers agreed, but said I would have to start last. Toward the end of the first race I had overtaken everyone bar the leader and was closing, but they waved the chequered flag two or three laps early.

In karts and cars, boys and men would rather crash into me and take both of us out of the race than be passed by a girl. Yet when Yvan and I ran an F3 team together in the French championship, the cars were the same colour and so were our helmets, so they wouldn't try and crash into us because they weren't sure if it was Yvan or me!

I came up against that sort of attitude a lot. Another time, when I was 18 years old, I entered the Volant Elf-Winfield competition [in 1981]. There were 300 drivers, and I made it to the last six, then I proved to be the fastest of all. The judges' attitude was 'No, not possible' and they decided that I and the second-fastest driver had to go again. I went faster still. So they insisted we change cars. Still I went faster.

My best ever memory, however, is of the European Formula 3 Championship when I won the race at Albi. My mechanic with the Mario Crugnola team wrote 'Grazie' on the pitboard. It pleased me greatly. I was the only driver not to lift off in the triple right-hand corner [Armand Brouzes]. Jean Alesi joked with the other drivers that he had seen me peeing against a tree, standing up; I had to be a man, he said.

They put the car in parc fermé and examined everything in detail, but that's just how it was. It made me more determined.

Probably my other highlight was driving a Porsche 962 to seventh place in the 1000km race at the Nürburgring. I wasn't able to test the car before the race but was as fast as my team mates and loved the power and exact feeling of the car. I would have liked to do more sports car racing, but the trouble was sponsorship. Nobody wanted to sponsor a woman, and I never knew whether I would be able to race from one season to the next.

When Yvan was very young, I would sit him on my lap and take him out in my kart. He'd steer while I did the pedals, and once he was old enough he got a kart and I taught him how to maintain it and showed him racecraft by driving in formation.

I am incredibly proud of him. He is so professional and committed and it shows, to be nearly 50 years old and still at the top. Yet he will sweep the garage, clean the glass on the cars, spend hours with the engineers on data and set-up. The young drivers look at him as though he's strange, but that's what it takes to be a champion.

Now it feels as though the family adventure has gone full circle - almost. Yvan has been there for my son, Yann, and they are now team-mates. He has taught him the same values our parents taught us.

What would be nice is to see Yvan's [six-year-old] daughter complete the circle and join the adventure.



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Yvan Muller only did a single F3000 season, in 1993, with Cathy on hand to support him

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It is 32 years since Tommi Mäkinen made his WRC debut – four drivers' titles followed and he is now guiding the Toyota team to success

SHUTTERSTOCK

LUNCH WITH

Tommi Mäkinen

As a multiple title-winning driver and now Toyota's team boss, the Finn has seen both sides of the WRC coin. And through it all his approach, as he tells **James Mills**, has been flat out

HIS NAME IS THE STUFF OF legend, as it should be for a driver who notched up four championships during what was arguably the most competitive era of the World Rally Championship. He battled with the greats – McRae, Sainz, Kankkunen, Burns – and still Tommi Mäkinen has a twinkle in his eye and a grin on his face when reminiscing about his days of "flat-out maximum".

As well as the silverware that his name has been etched forever into, there is a Mitsubishi – the Lancer Evolution VI Tommi Mäkinen Edition, now a sought-after future-classic – while an emerging generation of gamers cut their teeth drifting through Swedish snowbanks and jumping through Finnish forests, playing *Tommi Mäkinen Rally* on the original PlayStation.

Much has changed in the 23 years since everything clicked into place and he lifted his first drivers' trophy. Mäkinen is into the second part of his career, running his own team. He spent more than a decade building up a squad that prepares Group N rally cars before Toyota came calling.

We meet on home turf at the Finnish round of the WRC with the noise of Ott Tänak's Toyota Yaris WRC in the background.

Mäkinen is in good spirits having placed his team within striking distance of Hyundai in the WRC manufacturers' title chase.

LUNCH WITH *Tommi Mäkinen*

Tänak would go on to win the drivers' title, only to dramatically announce that he would leave the team and join rival Hyundai. To rub salt in the wounds Hyundai would also clinch the constructors' title when the last rally of 2019 is cancelled due to Australia's devastating bush fires. But for now, all that is in the future.

Over a simple lunch of chicken Caesar salad accompanied by an almost continuous flow of black coffee for Mäkinen, I start by asking about the past: how did Akio Toyoda, the most powerful individual in the motor industry, the man who leads Toyota, first get in contact with Mäkinen?

"Basically, Hiro Sato [Kazuhiro Sato, Toyota Operating Officer] knew Akio wanted to do some driver training," remembers Mäkinen. "Hiro called me and asked if I would be able to drive with him, and I was in Japan at the time, doing some projects with Subaru, so I stayed on and went on to Toyota's annual motorsport conference, in Tokyo."

The idea was for the two parties to have a quick meet and greet so that Toyoda could explain what sort of driver coaching he wanted, and Tommi could decide if he was the man for the job.

"In the morning, they said Akio wanted to meet quickly before the press conference. It was planned for us to talk for 15 minutes but we stayed for nearly one hour, and straight away it felt like we had known each other for a long time. It's amazing how quickly the chemistry can come."

"It's hard to say why I loved rallying, it was just around me"

Often, car industry executives have decidedly less interest in their company's product, car culture and motor sport than outsiders might imagine. But Toyoda is the antithesis of a bean-counter or marketing wonk, says Mäkinen.

"He does a lot of rallying and racing, and is responsible for test-driving all new [Toyota and Lexus] models. It comes from his grandfather [Kiichiro Toyoda] who started the business. His method was that you need to know very well your production and that you supply the best quality equipment for the customers. And they have kept that philosophy very deeply in Toyota."

He claims not to know whether Akio was a fan. Clearly, though, he held Mäkinen in high enough regard to have the Finn tutor him, not to mention entrust him with the minor matter of running a multi-million pound WRC project. Toyoda is chairman of the Toyota Gazoo Racing World Rally Team and even found the time to drive the new Yaris WRC during its development.

When Mäkinen speaks, he will repeat parts of sentences three or four times, something every journalist has to edit out of any transcription, yet he isn't particularly forthcoming with detail. By his own admission, he is an intensely private man.

"If I'm looking during my career I would say Ott [Tänak] is very similar to me. I was pretty much concentrated on myself. I hated to do interviews; that was the moment that I didn't like it because it disturbed my concentration. I wanted to be quiet as much as possible. It's very personal, but it was natural for me to do it that way.

"Some drivers want to be here and there and want to put energy into different areas, but some want to keep their energy just there quietly [pats his stomach] and be alone."

His transition from driver to team manager looked seamless. At least, it did from the outside. He retired from driving in 2003, but says it took a long time for the adrenalin to subside. "I remember the moment when I stopped driving, it took one and half years to settle down from that when I was there doing the championship.

"Now we travel a lot but it's different. I can stay on the side. There's no pressure. To look from the other side of the windscreen has been interesting. I'm happy that I can continue doing that; it keeps me motivated."





Mäkinen became synonymous with variations of the Mitsubishi Lancer Evo – but it was not love at first sight

Motivation is not something Mäkinen was ever short of during his career. But which is tougher, I wonder: winning the drivers' world championship, or having the pressure of creating and managing a world rally team and ensuring that it delivers the success that a manufacturer such as Toyota expects?

"Of course, winning the titles; it's far, far harder work. You have to give so much."

Kris Meeke, the Ulsterman driving for Toyota, says having Mäkinen as a team boss is a tangible advantage. Why does Mäkinen feel that is? "I know what they [the drivers] are thinking and what their needs are, and I can support them and also the whole team. It is just because I have seen it from inside and outside the sport; it helps a lot."

Mäkinen has spent a lifetime immersed in motor sport. But as a young boy, growing up on the family farm in Puuppola, near Jyväskylä, he says there was never a defining moment when he knew it was his calling.

"Growing up where we lived, the 1000 Lakes Rally [predecessor of Rally Finland] was one of the highlights. There was always



Celebrating Esapekka Lappi's breakthrough WRC win on Rally Finland in 2017 with Toyota

big interest when I was growing up for rallying, I don't know why it is.

"It's hard to say why I loved it. With all things, all equipments, machines, cars, bicycles, go-karts, everything interested me. Then rallying, finally, I think it was because the 1000 Lakes Rally was really one of the highlights. It was just around me.

"I started in autocross, and had quite a lot of experience from different cars and things. My first rally car was a Ford Escort RS2000. The famous Ford Escort!"

Mäkinen began rallying in 1985, inspired by watching the likes of Juha Kankkunen tearing it up in RS2000s and Manta GTEs.

A question any Finnish rally driver is always asked is why the Finns seem to make some of the best rally drivers. So, naturally, I'm obliged to ask Mäkinen to share his views one more time.

"It's hard to say why the Finns are drawn to rallying, where it comes from and why it's somehow so interesting to so many of us. Rallying is very much about the individual. Your cooperation has to be very good with your co-driver, but remember that somehow you are there alone, making the final decision. Whatever you do, you decide it yourself, you have to understand well what do you need to do next and you have to be very fast. But mentally you need to be very strong to compete against the other rivals. There are so many different small elements.

"When you decide, 'I want to do it this way' you have to trust yourself and you have to succeed with that," he adds. "And



The Finn took the second of three wins in 2001 in his favoured Lancer Evo 6.5 at a rain-hit Portugal, beating long-time rival Carlos Sainz by a mere 8.6 seconds

SHUTTERSTOCK, GRAZIA NERI /ALLSPORT, GETTY

Finding the cheat

Decades before he took charge of Toyota's WRC efforts, Mäkinen was witness to its most controversial moment...

In 1995, one of the greatest innovations in motor sport was uncovered by a scrutineer, confirming what drivers had long suspected: Toyota was cheating.

It took a head-to-head special stage event, at 1995's Rally Australia, to confirm Tommi Mäkinen's suspicions.

The Finn had lined up his Mitsubishi Lancer Evo III alongside the Toyota Celica GT4 of Juha Kankkunen, selected a gear, held the engine revs and waited for the off. By the end of the stage, all he could think about was how the Toyota had walked away from his Mitsubishi from the standing start.

"I remember the moment when they started investigating. We were in Langley Park, Perth and there was a nice Tarmac straight from the start. I remember when we started together and – vrrooooom! He was so much faster than me. I thought, 'What the hell happened?' He was stupid to accelerate flat-out, he was 25 metres ahead of me on that short straight. He should have slowed down and nobody would have realised."

At the next event, Rally Catalunya, a scrutineer finally found the cheat that had eluded enforcers of the FIA's technical regulations. Toyota engineers had devised a way to integrate a hidden, spring-loaded mechanism within the air restrictor for the turbocharger, which would be all but impossible to spot but would gain the GT4's four-cylinder turbo engine an extra 25 per cent of lung capacity – or about 50bhp.

When the air restrictor was removed for inspection, it was devilishly difficult to see anything out of the ordinary. So impressed were the rule makers that Max Mosley, then FIA head, said: "It is the most sophisticated and ingenious device either I or the FIA's technical experts have seen for a long time."

Toyota was kicked out of that year's WRC and banned for the 1996 season. Today, Mäkinen is in charge of its team.



The 1995 Toyota Celica masked an ingenious cheat that did not go unnoticed by Mäkinen

even if the decision is not correct you have to stay there, trust and do your best. That needs quite a strong self-belief; you have to believe in what you are doing. And mentally, it might just be that the Finns are strong characters."

His countrymen first started to sit up and take notice of Mäkinen in 1988, when he took the Group N class honours in the Finnish Rally Championship. His car was a Lancia Delta HF 4WD, but who was behind the scenes?

"In 1988, it was a very small operation. We did it with some of my friends who knew what to do and support me for servicing. It was still kind of a hobby, guys were helping and nobody was being paid."

Was that first moment of elation, his first taste of title glory, some sort of turning point? "I wouldn't say that. When I look back at my career, everything was going somehow automatically forwards, step by step.

"Maybe 1990 was one important year. Juha Kankkunen and Timo Jouhki, who became my manager, were important when we started in some world championship rounds with a Group N Mitsubishi, and we needed a lot more budget. That was when we employed someone to look after the project; it became more serious and we had a clear target.

"Then in 1991, Hannu Mikkola helped me to get the Mazda works car, the 323, for the 1000 Lakes Rally. I had a good result so I got the car for the RAC. That was the last year of Mazda. Mazda retired and that was the moment where I made a mistake.

"The Ford was brilliant to drive, better than the Mitsubishi"

"I had good offers from many different teams at the time: Toyota, there was a possibility for Lancia, there was an offer from Subaru. And then there was Nissan.

"Nissan was a new team and we were thinking, 'Okay, it's good to go to a new team to learn...' But we had an inexperienced driver with an inexperienced team. We thought that as a new team they would continue for a long time; we didn't realise they would give up so quickly and during the first season they said, 'Okay, we pull out'. That was bad."

At the end of 1992, Nissan's lack of commitment to its Sunny GTI-R programme meant Mäkinen found himself up rallying's proverbial creek.

"At the time there was no teams, not so many possibilities any more. We were discussing already for '93 with Mitsubishi but instead of me they chose Armin Schwarz.

"Luckily, I got the opportunity to do development work with Nissan, and a front-wheel-drive car. That was the year I grew up a lot. I understood much better after that.

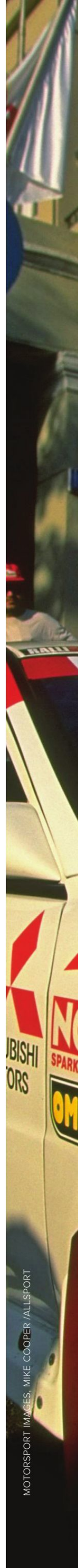
"In '94, the target was to rent a car in the 1000 Lakes Rally, then Ford asked me to drive a works car because Massimo Biasion wanted to come to Finland. I did a test rally in Finland, which I won, and then I did the 1000 Lakes Rally, which I won."

The performance was a high point for the Escort Cosworth in the WRC, and made up in some small way for Tommi's rotten year. More importantly, though, they impressed everyone on the WRC circuit. In particular, Andrew Cowen of Ralliart, the team behind Mitsubishi's assault on the sport, and RAS Sport, the private outfit from Belgium that took Patrick Snijers to victory in the European Rally Championship, with Boreham-built Escort Cosworths. Both teams made approaches to the flying Finn.

"I drove on the Sanremo Rally with Mitsubishi and then we negotiated a contract for '94 and onwards. We knew Mitsubishi was a works team, but they'd never done a full season and I didn't like it a lot. There was also an offer from Ford. But it was a private team, RAS Sport, from Belgium, who ran the Boreham cars. But it was not so trustable to be there.

"But I loved far more the Ford. That was a brilliant car to drive, brilliant behaviour, a far better car compared to the Mitsubishi. I don't know the difference performance-wise but it was a very easy car with a good feeling and I wanted to be there. But then we decided to go to Mitsubishi because it was a works team and the future was looking a bit better."

So what was it about Mitsubishi's Lancer



MOTORSPORT IMAGES, MIKE COOPER /ALLSPORT

All smiles for the camera on the Acropolis Rally, but Mäkinen was a fiercely private driver who did not relish press interviews



that Mäkinen didn't like, compared with the Escort Cosworth?

"You couldn't feel so precise the wheels, and the front wheels when you're into the steering, there was far less feedback. And then the transmission layout was really different. That makes the car have strange behaviour. Geometry-wise, the Ford was giving a lot of feedback and that makes the car easy and nice to control, and you could understand it's turning in well, better than the Mitsubishi. The Mitsubishi was lazy and under-steering.

"But that was when Armin Schwarz was testing and he was driving on the Sanremo. They took me on for the second car, and I jumped in after the Schwarz car was tested and set up and said, 'Hey! Come on. I cannot drive this car. It's absolutely impossible to drive. I have no chance to do anything!'

"But they had a test driver, the Finn Lasse Lampi, and he had a very different set-up which was more neutral. They returned the car back to his set-up and straight away I felt 'Now we start to be okay. I can drive the car!'"

He laughs loudly at the memory of really not having to do much ahead of the event, just borrowing Lampi's set-up. The car retired but Mäkinen's stage times spoke volumes about his potential.

"Straight away I did good stage times which they noticed and then they make a contract with me."

He says he rated the Lancer Evo III as better than the Evo IV, but adds that continual development meant the Evo IV got better over time. "The nicest and best car to drive was the 6.5. That slowly got less trouble and the set-up was improving step by step."

Mäkinen owns just one of his old Mitsubishis, an Evo III that he drove to first place on the 1996 1000 Lakes Rally, which is kept in Juha Kankkunen's private collection of rally, race and road cars.

He ranks Colin McRae as his toughest

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adversary during his time in rallying, but says he respects all competitors at that level. "There was good times, with many big battles with Colin. Often when we had a fight together either he retired or I did, or sometimes both! It was more than 120 per cent flat out!"

Does he think about McRae, who perished in a helicopter accident in 2007? "It's very unfortunate. I don't know if it's a reflection of his personality. This equipment [McRae was flying his helicopter] stays so dangerous, that whatever happens it is so sudden that you cannot do anything."

How about the battle with Sainz in 1998? The storyline reads like a fanciful fable from a Hollywood studio. Mäkinen gets a terrible start to his season, Sainz doesn't miss a beat. Then the Finn claws it back with three wins and the championship goes down to the wire at the last round, Rally GB.

During a special stage at the Millbrook proving ground, in Bedfordshire, the organisers had run a classic rally ahead of the main WRC event, and a Hillman Imp had lunched its engine, dropping oil on a right-hand bend that was lined with temporary concrete kerbstones. Sand was poured over the oil, but nobody thought to tell Tommi, who – running in P1 – was the first WRC driver to reach the corner. His Mitsubishi slid wide, the offside rear wheel caught a concrete kerbstone and was ripped clean off.

"Mitsubishi was a family team; friends working together"

"It was one of the worst moments," recalls Mäkinen. "We had no hurry to make the title; I just needed to drive and finish the rally, and that's it. And it was looking easy."

Mäkinen begged his team boss to let him go home. He couldn't bear to stand by and feel powerless to do anything about Sainz's inevitable championship victory.

And then… Sainz's Toyota Corolla was as good as within sight of the finishing line when its engine suffered a catastrophic failure, 500 metres from victory. Famously, and perhaps not surprisingly, the Spaniard threw his helmet through the Corolla's back windscreen.

"My brother phoned me. At first I thought it must be a bad joke and then he was shouting down the phone, and I finally realised Sainz must have had an accident. But it was not funny. It was not the way to end the season. I had a good lead before that. It was purely the organisers' mistake. They didn't inform us [about the oil spill].

"It is so awful when you when you realise that you are there and you cannot do anything. You've been working flat out the whole year and then suddenly everything – poof! – everything is taken from outside."

Is he a religious man? Does he ever feel there was some sort of divine intervention? "Not really. I don't have much belief in anything, I don't have any traditions."

Perhaps surprisingly, given he was raised on gravel and snow, and his fondness for the Monte Carlo and Sweden, Mäkinen says the highlight for him was tackling Tarmac events. "I won two times Sanremo with Mitsubishi. When the car was behaving and working well it was more like sensitive driving, not so sideways and just control the grip."

And now here he is, running Toyota's rally team. He put a simple ground rule in place with Toyoda – "flat-out or nothing" – but won't reveal the budget Toyota is investing in the project, which runs to the end of 2021. He strives to recreate the atmosphere he enjoyed with Ralliart and Mitsubishi, because "Mitsubishi was kind of a family team; it was smaller, with lots of friends working together and there was a warm feeling inside. Subaru was a bigger team and people were more like working and only doing their job.

"We are bigger than Mitsubishi was at the time. The biggest difference is that we are doing design ourselves; we have 50 designers and engineers working together but somehow I want to keep the family feeling like Mitsubishi had; the openness and information sharing.

"We are still, I would say, lots of good friends working together. And that's my dream. This is really a result of teamwork. What we have done in such a short period.



CV **BORN: 26 JUNE, 1964, PALOKKA-PUUPPOLA, FINLAND**

- **1985** Starts rallying in a Ford Escort RS2000
- **1987-89** Has WRC debut at Finland '87 in a Lancia Delta HF 4WD, but retires. Tackles rounds in Finland, Britain and Sweden, but fails to finish.
- **1988** Finnish Rally Champion, Group N, in a Lancia Delta HF 4WD
- **1990** Five WRC rounds in Group N, driving a Mitsubishi Galant VR-4
- **1991** Switches between private teams, driving a Ford Sierra Cosworth 4x4 and Mitsubishi Galant VR-4 before joining Mazda in a 323 Turbo 4x4. Team then leaves WRC
- **1992** Switches to new entrant Nissan in a Sunny GTI-R. Team cancels further development of the car at the end of the season.
- **1993** Development work with Nissan's front-wheel-drive Sunny GTI. Competes in three WRC rounds in a Lancia Delta HF Integrale and is fourth in Sweden and Finland
- **1994** Wins 100 Lakes Rally in Ford Escort Cosworth, which leads to Ralliart deal
- **1995** First full season with Mitsubishi in a Lancer Evo; second on Swedish Rally
- **1996-99** World Rally champion with Mitsubishi. Four consecutive titles in Lancer Evo III, IV, V and VI
- **2000–01** Fifth and then third in WRC with Mitsubishi
- **2002-03** Moves to Subaru, finishes eighth both seasons
- **2003** Retires at year end
- **2004** Forms Tommi Mäkinen Racing, a private rally team
- **2016** Secures contract to run Toyota Gazoo Racing World Rally Team
- **2018** Toyota wins WRC manufacturers' title
- **2019** Ott Tänak wins

LUNCH WITH *Tommi Mäkinen*



Tutoring Toyota boss Akio Toyoda, who has also entrusted Mäkinen to run his WRC team for the past three seasons

Without strong teamwork and good relationships, together with the engineers and drivers, we wouldn't be able to do that."

To fast-track development of the Yaris WRC, Mäkinen decamped his team to Spain in 2016 for six months, without the need to return to base in Finland to make changes and design new parts. The car was able to run almost daily, clocking up 20,000km, with Mäkinen personally putting in 5000km (3100 miles) of development driving. It paid off with a manufacturers' title in 2018. So who better to ask about this era of rally car?

"They are far faster. The suspension has improved so much. Plus the aerodynamics, the power, the transmission; the package is incredible. You feel you can go faster and faster, and you gain more grip all the time – it feels like it's never-ending."

It is well known that Toyota is not happy about planned changes to the WRC rules in 2022, which will bring about the introduction of hybrid powertrains. The company feels it has nothing to gain, having led development of hybrid technology for two decades.

Mäkinen mentions alternatives such as "biofuels, recycled materials, as much green energy as possible" but that is unlikely to please Citroën and Hyundai. Both are said to have favoured the regulation changes.

Curiously, Mäkinen reveals there is no common ground in the WRC. "It's difficult. I am speaking with the other manufacturers because in my opinion we should have a manufacturers' association, then we could inform the FIA what we want to do together. But they [rival manufacturers] didn't want it." He laughs in an exasperated fashion.

"Individual relationships don't help if everybody has a different vision and a different message to the FIA. When we go together, we would find the best compromise, and bring ideas that everybody supports."

"I'd like more young drivers in the team, they bring new fans"

He rules out electric rally cars, saying the battery weight is too great and the energy density isn't there yet for flat-out driving on 60km stages, and when Formula E is mentioned he simply observes how, "it's funny when you look at the back of the service areas and there are big generators supplying power. I'm not sure is that the way?"

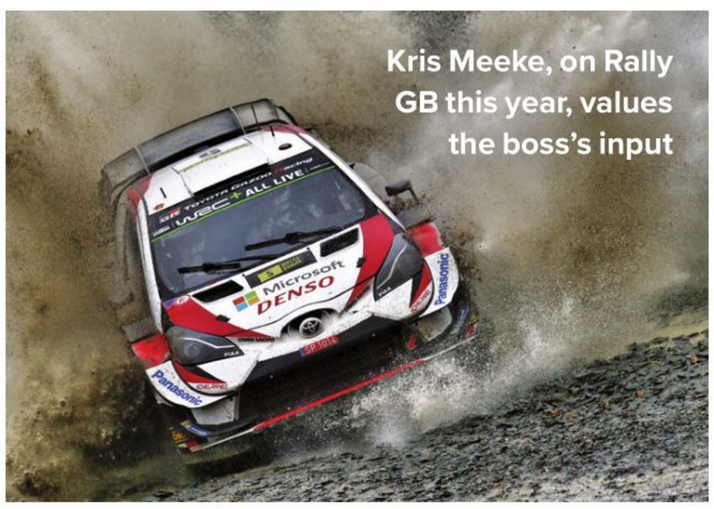
His priority is securing drivers for next season. Tänak is gone, but the likes of Kalle Rovanpera and Takamoto Katsuta have his attention. "I would like to see more young drivers in the team. Kalle is one young, bright star. I would like to see Takamoto also be on a higher level. They can handle the social media, they can bring new fans of their own age. We need new fans to keep the interest."

As for Toyota's commitment beyond 2022, he says that is still to be decided. "We are investigating already the new regulations, what it means. We are looking to develop that area, but ultimately it's for Japan to decide if they want to continue."

It is hard to imagine rallying without Tommi Mäkinen. Even if Toyota were to withdraw, the Finn has, for the second time in his career, made his mark in the WRC – this time as a team principal. Other car companies could come calling. Mitsubishi, anyone?

If he were to step away, though, what would he do with his time? "It's been very rich. Many things have happened. Sometimes things that are better not to talk about! But generally good and positive. I could have been a farmer, I suppose. My cousin and I have two farms. We grow seeds, arable. The harvest starts soon. It was a very dry June, which destroyed a really good harvest. The last three years have been challenging, because last summer it was nearly every day over 25 degrees, not much rain. The unsteady weather makes a farmer's life tough."

And with that, one of the most private men in motor sport is off. He has drivers to motivate, a team to manage and a car company to keep happy. He might be out of the driver's seat but it's still flat-out maximum all the way.



Kris Meeke, on Rally GB this year, values the boss's input

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ATB I	DL I2	6 FCS	HAB I	I KBC	4 LWH	4 PFR	RWG I	I TWB
8 BJN	I DLP	FD 3	3 HAP	6 KCD	MEK 8	9 PGM	RWK I	I VCS
BLS 5	I DSE	FH I	I HCD	KCG I	MFP 4	6 PHS	RWR I	I VEM
BME 6	I EBW	82 FJ	I HCT	I KDB	MO I	5 PKW	I SBW	I VEW
BR 6	3 ECF	3 FMW	3 HDW	I KEK	I NDH	I PLA	6 SCE	5 VJA
BRS I	I EEB	FN I	I HE	3 KGS	I NGC	PMT I	I SDO	I VMP
BW 2	5 EEP	9 GAD	59 HG	KNS I	NJA I	87 PN	9 SDT	90 VR
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99 CN	I ESR	GM 6	I JFO	I LDG	OD I	I REO	TDL I	77 WT
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We've been expecting you...

James Bond tie-ins may be a regularity now, but Omega's latest offering is worth a look, even if it's 'just' a timepiece

James Bond creator Ian Fleming was known for adding an extra touch of realism to 007 by peppering his books with brand names, and when it came to watches, Rolex and Girard-Perregaux were among them.

Never in the novels, however, were said watches equipped with features that were out of the ordinary - that only happened in the films, notably after 1964's *Goldfinger* when Bond's Aston Martin DB5 became almost as much a star of the show as Sean Connery thanks to its gadgetry. After that, gadgets became *de rigueur* and trick timepieces became integral to the plot.

In *Thunderball* (1965) Q provided Bond with a Breitling Top Time that doubled as a Geiger counter; *Live and Let Die* gave Roger Moore's Bond a Rolex with a hyper-intensified magnetic field and a buzz saw bezel, while *The Spy Who Loved Me* featured a Seiko equipped with a teleprinter.

Seikos became official issue for the '80s films, but that changed in 1995 when Pierce Brosnan took over in *Goldeneye*. By then, the huge commercial value of placing product with Bond was recognised - so 007 got a BMW and an Omega Seamaster (complete with laser cutter and explosive detonator). Omega has held the plum job ever since and, as of 2002, has produced a limited edition to mark each new Bond film.

What it will unveil for *No Time to Die* (out in the spring) is yet to be revealed - but, while we're waiting, it has launched a special version of its Seamaster Diver 300M to commemorate 50 years since the release of *On Her Majesty's Secret Service*.

Only 7007 will be made, with a black ceramic dial decorated with the rifling pattern of a gun barrel. The side of the 42mm case carries a gold plate engraved with the edition number, and the luminous 10th hour marker hides a '50' that only becomes visible in the dark. The transparent back is decorated with the Bond coat of arms.

This isn't the first time Omega has celebrated a Bond half-century - in 2012, it marked 50 years of *Dr No* (in which Sean Connery wore a Rolex Submariner Reference 6358) with a Seamaster 300M featuring a red '50' on the bezel, a dial diagonally embossed with 007 logos and the rifling design on the case back. Available in 41mm and 36mm case sizes, the editions were of 11,007 and 3007 examples respectively.

Omega Seamaster 300M James Bond Limited Edition. £5220, omegawatches.com



TW Steel (TW stands simply for The Watch) was launched in 2005 in a bid to capitalise on the trend for over-sized wristwear. Its enthusiasm for cars has brought several collaborations with racers, the latest of which is with Nigel Mansell. The back of this 48mm red, white and blue chronograph carries Mansell's famous Red 5 and his 1992 world championship is commemorated on the dial. An appropriate 1992 are available.

TW Steel Nigel Mansell limited edition. £399. twsteel.com



Boston and Stewill is (another) independent brand that designs affordable watches in the UK using Swiss-made mechanisms. This new Tourer limited edition is powered by a Sellita automatic movement and is available in two designs, each limited to 100 watches. The first has a grey dial with orange hands for a '70s look, while the second combines a blue dial with silver hands. Both have arched subdials reminiscent of a Bugatti radiator.

Boston and Stewill Tourer. £649.99 bostonandstewill.com

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MOTOR SPORT

LETTERS

OCTOBER HASN'T BEEN A VERY HAPPY MONTH. FIRST, WE LOST ANDREW COWAN, and then only a couple of weeks later Russell Brookes passed away. Both were very influential in my motor sport career. Cowan was the first rally driver I had any awareness of. It was at the time of the London - Sydney Marathon of 1968, huge news at the time, with massive press coverage and nightly TV reports. I was at school then, and it caught the imagination of every schoolboy in the land, me included.

All my pals and I had no doubt that we would take part in the event in years to come, and we all had our own ideal car already sorted, although I don't recall a Hillman Hunter featuring highly! Well, of all that group who were so sure then they were going to go rallying, only one actually did. And it took me 43 years to get my first win!

As well as being a damned fine rally driver, Andrew Cowan went on to achieve huge success as a team manager, particularly with Mitsubishi, but to me he will always be the Marathon Man who kicked off my interest all those year ago.

RIP Andrew Cowan and Russell Brookes.

IAN McRAE, NORTH LANARKSHIRE



GETTY

Barney Oldfield's legacy includes inspiring many young drivers, including Karl Kimball

---

I CAN HARDLY TELL YOU HOW MUCH I enjoyed your appreciation of the career of the great Barney Oldfield. Nearly half a century ago the rapscallion I was would back his first car out of his parents' driveway, put the big Ford 350ci V8 in drive and step hard on the loud pedal.

The neighbours having complained, dear old Dad admonished me: "Don't go taking off like Barney Oldfield!" I responded: "Who is Barney Oldfield?" "A race car driver," came the answer.

Years later when my love of motor sport led me to intense study of the sport's history I learned that Barney Oldfield's last major win came two years before my dear old Dad was even born!

Then I pictured my grandfather some time in the 1930s telling dear old Dad 'Don't be taking off like Barney Oldfield!' to which he doubtless replied, 'Who is Barney Oldfield?' And now we know.

KARL T KIMBALL, LITTLE ROCK, ARKANSAS

THE LATEST ISSUE IS GREAT AND I MUST firstly say that the editor's article is so very profound -in my younger days it was a routine to buy both *Autosport* and *Motoring News* for a few pence!

But the reason for my letter regards the article on the Lola T210 not so much for the editorial but the picture of the car driven by a very dear friend, now passed, Jeremy Lord.

I had the great pleasure to know Jeremy. He was a solicitor by profession, in the late '70s, and had then become the honorary legal advisor to the BARC at Thruxton. I really struggled to get to grips with the circuit myself, but he spent hours over a diagram of how to drive it for me.

From the back of the grid with that help I qualified fifth in FF2000 at the age of 40-something, back in the mid-80s!

One of life's wonderful people, sorely missed, and whose family I am in touch with and told them to buy the magazine.

JOHN FARMER, VIA EMAIL

I READ THE FASCINATING ARTICLE ON THE ultimate evolution of the Porsche 917 (*Best of the Best, November 2019*) with interest.

Having visited the Porsche Museum in Stuttgart this Summer, it was telling that the crowds for the 917 exhibits were bigger than those for the modern machinery. Even 50 years after they were built, these remarkable cars still grab attention. My own Porsche racing car is humbler. I own a 944 Turbo, in a striking red and white livery in homage to the Dickie Attwood Le Mans-winning 917.

To date, its greatest claim to fame is being raced by a then 16-year-old Jamie Chadwick to third place at Mondello Park. Given the trajectory of Jamie's career [she has gone on to win the British GT4 title and the inaugural W Series], she is somebody I suspect who will go onto achieve much more.

JASON MILLS, LONDON

I WAS CURIOUS ABOUT A LETTER RECENTLY (*Motor Sport, December 2019*) about the time it would take an electric vehicle to complete 700 miles from Dover to Tongue. Actually, it's very easy to answer.

My current 2016 Model S 85, has now covered 60,000 miles and I am regularly completing longer journeys in the car having taken her to Germany, Belgium, France and Spain. Even in the UK, where we are a bit behind with supercharging stations, my Tesla network provides me with countrywide coverage. I recently went to Cornwall with no range anxiety (what is this anyway?).

So in answer, my car refuels at the Tesla-provided superchargers network. To go from Dover to Tongue would require two stops along the way of about 23-30 minutes each. This would be all the time needed for a cuppa and a toilet break, before the app tells me I am ready to go again. Serenely cruising at around 69mph (the sweet spot for efficiency, it seems!) consuming between 235-285Wh/km in progress whilst listening to the sweet sounds of Beethoven's 7th.

GERARD SAUER, VIA EMAIL

I ENJOYED READING THE RALLYING ARTICLE by your digital editor Dominic Tobin (*Mud, Sweat and Tears, December 2019*). However, as a Motorsport UK scrutineer I was disturbed by the in-car photo on page 103. Mr. Tobin should be wearing his HANS device under his harness strap not above it, and his flameproof balaclava should be tucked into his overalls. An excellent result for a first time navigator nevertheless.

DAVID WALTERS, WILMSLOW, CHESHIRE

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Rivals *(noun)* a person or thing competing with another for the same *objective* or for *superiority* in the same field of activity.

Motor sport is built on rivalries, epic head-to-head battles between drivers, teams, brands or series. They can be both respectful and sporting, as well as bitter and personal, and each has its own twist. We've ranked our favourites throughout history

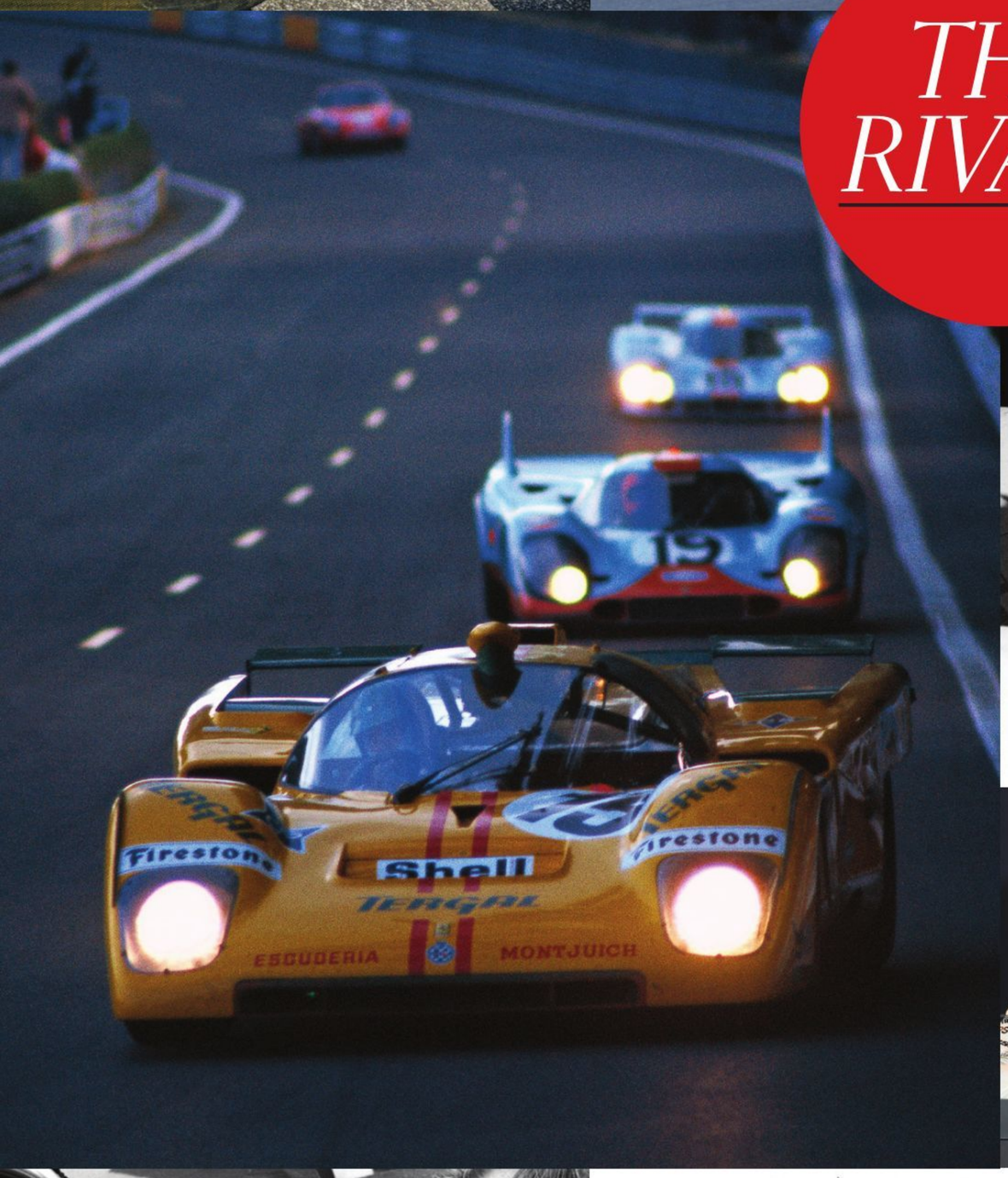
THE RIVALS


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BARCLAY
DENIM
BOSS
Nigel Mansell




34


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THE RIVALS

In a sport where there can only be one winner, it's natural that rivalries develop when two different factions are battling to become top dog. The duel over the alpha male role has produced some of the most memorable showdowns in history, and also put many of the biggest personalities in the paddock on a collision course, often with spectacular results.

A note of caution: we have deliberately shied away from some of the well-worn clashes. Tales of the likes of **Senna vs Prost** and **Hunt vs Lauda** have been covered in such detail many times before that you won't find them here. Nor will you read again about **Ford and Ferrari's** battle for glory at Le Mans. Instead our run-down focuses on the less obvious – but just as explosive – contests that have shaped the sport.



25

Audi vs Peugeot 2007-2011

There was nothing odd about Audi's Le Mans debut in 1999 – the race was awash with major manufacturers – but the company bucked the trend by introducing diesel propulsion from 2006... and winning. Peugeot followed suit one year later, its car a tad quicker on the straights, a fraction less efficient through the turns and similar in terms of lap time. The French firm would win only once, in 2009, but its presence added a partisan element that intensified the already vibrant atmosphere. If you witnessed any of Stéphane Sarrazin's three consecutive pole laps, your neck hairs are probably still standing.



24 Nico Rosberg vs Lewis Hamilton 2013-2016

Friends and team-mates in karting, and bosom buddies in F3, they won the first two GP2 titles before graduating to motor racing's top table... and friction only set in when they partnered up once more, this time in a potentially championship-winning team. Hamilton once suggested that his own modest upbringing made him hungrier for success than Monaco-bred Rosberg – odd, given that his hero Senna was hardly from an impoverished background – but Rosberg was more than a match at psychological warfare. He could not have dug any deeper to win his lone title in 2016; job done, he walked away.



23 Sébastien Loeb vs Sébastien Ogier 2011

Loeb was Citroën's golden boy, Ogier the upstart that some observers considered an even finer prospect. Between them they won 15 consecutive WRC titles from 2004, but they had more in common than a forename – and their frequently parallel speed bred tension, particularly when they were team-mates. After the opening day of the 2011 Rallye Deutschland, PSA dignitary Jean-Marc Gales ordered that his two drivers hold station – with Loeb ahead. Ogier stopped sulking only when Loeb suffered a puncture that cost him the lead. It didn't help internal relations when Ogier told reporters that he considered this to be "justice". He left for Volkswagen soon after.

LAT, SHUTTERSTOCK



Edwards takes an unscheduled flight after last-lap contact with Keselowski at Talladega in 2009

22 Carl Edwards vs Brad Keselowski 2009-2010

Brawls aren't unusual in the top division of NASCAR, which can be a 200mph version of rugby league. The most celebrated blows were probably those exchanged by Cale Yarborough and Donnie Allison at Daytona in 1979, but here we'll pick an enduring on-track feud between Edwards and Keselowski that began in 2009 and ran for more than a year – via several spectacular accidents, some of them deliberately triggered – until officials ordered the pair to calm down if they didn't want to risk indefinite suspension. In the States, theirs is widely considered to be the most violent of all NASCAR rivalries.

A rivalry based on the utmost respect: Graham Hill and Jim Clark were two giants of their era

THE RIVALS

21

Jim Clark vs Graham Hill
1962-1967

Before the advent of commercial pressures, duels tended to revolve around competitive friendships – a band of brothers travelling the globe and accepting the very real risks to which all were exposed. The preternaturally gifted Clark has always been recognised (quite properly) as one of the best there has ever been, Hill as one of the most determined. On his day, though, Hill was able to draw on improbable reserves of tenacity to match or even beat the Scot. You don't win two F1 world titles, five Monaco Grands Prix, Le Mans and the Indy 500 by chance. After Clark's fatal accident at Hockenheim in April 1968, Hill went to the scene with Team Lotus's mechanics to clear up the wreckage… and then set about helping to rebuild shattered morale, starting with victory in the next world championship race at Jarama. At the campaign's end he was crowned for the second time, thereby matching the achievement of his fallen colleague. They had contrasting approaches, but emerged as serious title contenders at the same time – in 1962 – and kick-started a run of six British titles in eight seasons through the '60s.





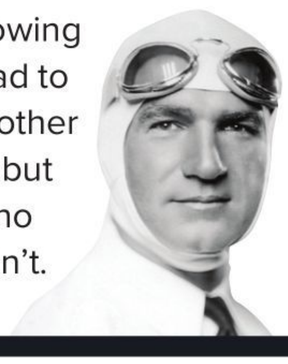
20 Damon Hill vs Michael Schumacher 1994-1996

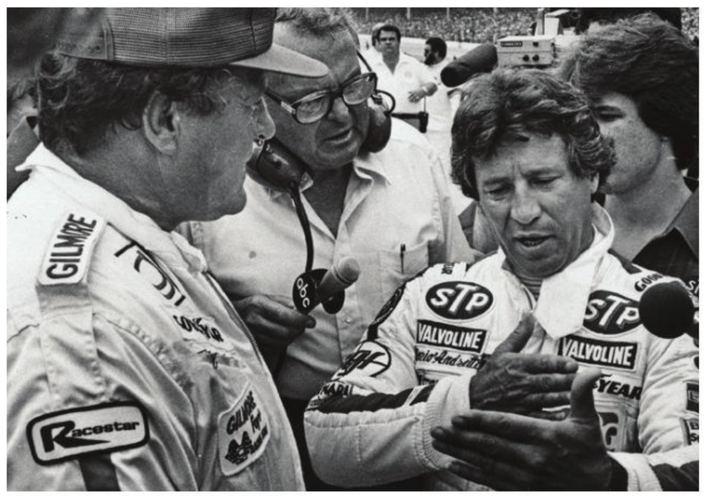
Just as his father had been, Hill Jr was tasked with picking up a team that had lost its talisman. Following the death of Ayrton Senna at Imola in 1994, Hill notched up a victory for Williams two races later – in Spain, which might sound familiar. A strong run of form on his part – plus Schumacher's exclusion from four events – set up a seasonal showdown in Adelaide... and the German resorted to a professional foul to secure his first title, clattering into Hill and putting both out of the race. On balance he was the rightful champion that year, but his methodology left a little to be desired.



19 Barney Oldfield vs Ralph DePalma 1908-1918

It's said their mutual dislike began in 1908, after the unknown DePalma (*below*) got the better of the established Oldfield (*top*) in a three-part match race. Period reports imply the older driver stomped off without congratulating his conqueror, so bad sportsmanship isn't just a modern thing. DePalma would win the Vanderbilt Cup (twice) and the 1915 Indy 500. When he filed a late entry for the following year's Indy, the organiser had to seek the approval of every other driver before accepting. All but one granted their consent; no prizes for guessing who didn't.





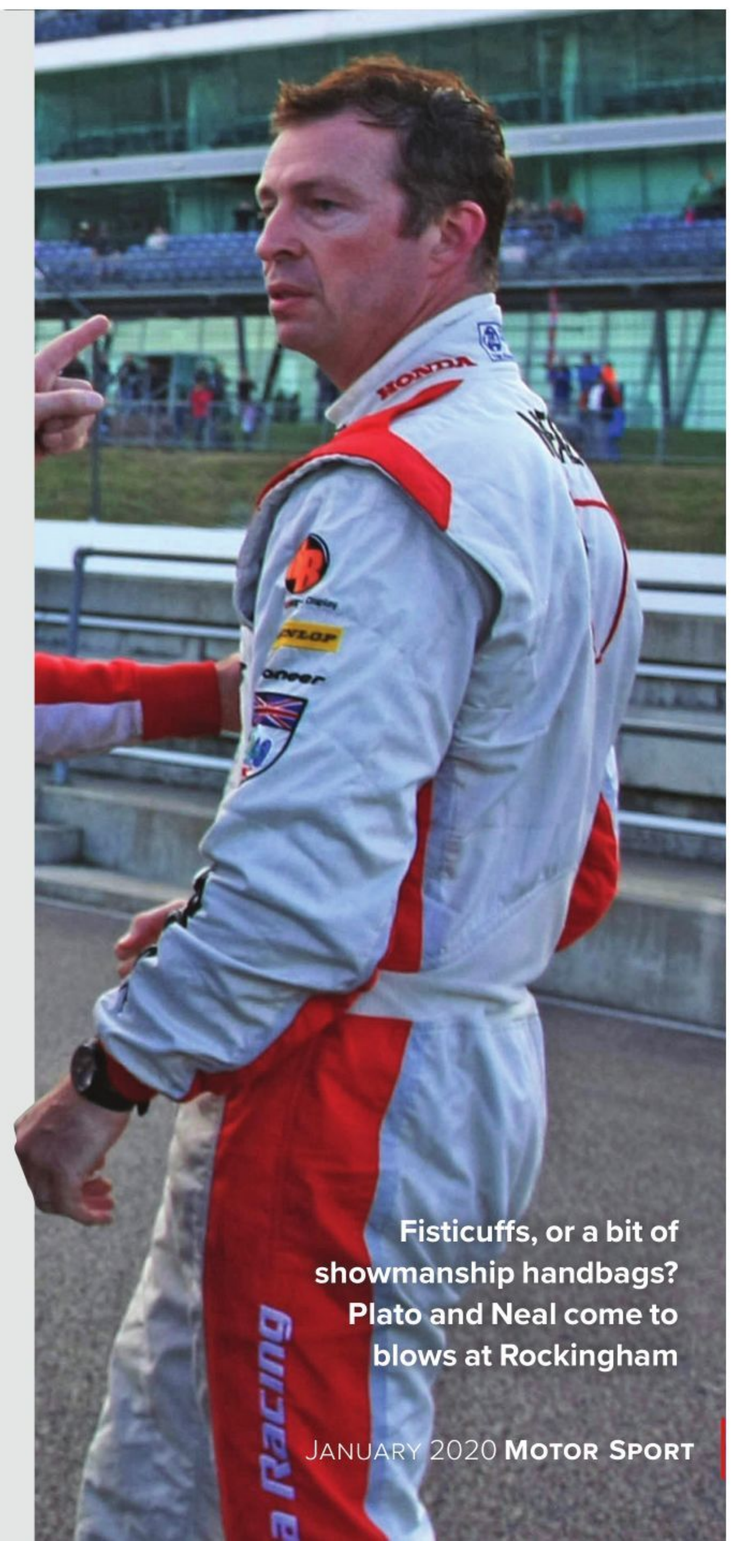
18 AJ Foyt vs Mario Andretti 1965-present

Both forged their reputations in the 1960s, Foyt winning his first Indy (of four) at the decade's dawn and Andretti recording his only such success at its end. Versatility was a given – both scored NASCAR victories, Foyt won Le Mans, Andretti became F1 champion – but it was their enduring competitiveness in America that struck a chord. When Simon Taylor had lunch with Foyt (*Motor Sport*, Feb 2015), he received a glare after mentioning that he'd shared a burger with Andretti for a similar feature. As they ate, Foyt asked, "Better than Andretti's burger, huh?" Probably time to let it drop, AJ...



17 Jason Plato vs Matt Neal 1997-present

Neal made his British Touring Car Championship debut in 1991, Plato in 1997: the former has won the title three times, the latter twice. They are part of the fabric of Britain's top domestic series and, despite having a combined age of 104, there is no indication that either plans to retire just yet. Plato is no stranger to controversy – when he won his first BTCC crown in 2001, he did so after falling out with team-mate Yvan Muller (effectively costing Plato his seat at the year's end, as Muller was under contract for two more seasons and Vauxhall had no desire to keep them both). His spats with Neal have been many, the most memorable coming during qualifying at Rockingham in 2011 (when both were fined £1000). When the session concluded, Plato gave his nemesis a traditional salute of displeasure and Neal reacted by grabbing his rival by the overalls, raising a fist and threatening to "rip his f***ing face off". An unwise strategy, perhaps, given that Plato was still wearing his crash helmet at the time...



Fisticuffs, or a bit of showmanship handbags? Plato and Neal come to blows at Rockingham

LAT, GETTY

16

Nigel Mansell vs Nelson Piquet 1986-1992

Their mutual antipathy was apparent from the moment the Brazilian arrived at Williams in 1986. He'd won two titles to Mansell's two grands prix, so considered himself number one – yet in equal kit Mansell was frequently the quicker. Piquet felt his set-up work benefited Mansell; it irked Mansell that Piquet was so precious about fine-tuning. Just get in the thing and race... A blown tyre in Adelaide cost Mansell the title in 1986; one year on he took eight poles and six wins to Piquet's four and three, but the latter's consistency made him champion. That didn't exactly bring them any closer.

Rivals whether team-mates or not. Mansell and Piquet traded places on track and verbal insults off it. This is 1990, with Mansell in the Ferrari and Piquet with Benetton

THE RIVALS

MOTORSPORT IMAGES

15

Porsche 917 vs Ferrari 512
1969-1971

Two of history's most brutal – and beautiful – sports-prototypes, symbolic of a golden era for endurance racing. In truth, though, the 512S wasn't quite match-fit when introduced, a little too heavy to challenge the finely honed 917 (also an unwieldy beast during its gestation). As Porsche dominated, Ferrari responded by developing the 512M ('Modificato'), a trimmer version of its progenitor. That should have had the potential to rattle Porsche, but when a rule change was announced for 1972 (with a ban on 5-litre engines), Ferrari focused instead on building the 3.0-litre 312P and Porsche carried on winning. Usually, at least.







14 Tom Walkinshaw Racing vs The Automobile Club de l'Ouest
1993

Tom Walkinshaw was always happy to push regulations to their absolute limit – and was no stranger to controversy. Disqualifications, though, were rare. At Le Mans in 1993, the ACO insisted TWR's Jaguar XJ220Cs should run with catalytic converters in the GT class, while the Scot argued otherwise. The team raced under appeal and David Brabham/David Coulthard/John Nielsen finished a class-winning 10th… until the ACO said TWR had not submitted its appeal on time and the car was excluded. It left its mark on Walkinshaw. As Brabham said in a recent *Motor Sport* podcast: "Tom and the ACO hated each other".

13 Carlos Sainz vs Colin McRae 1995

One field, two bulls. Their incendiary moment? The 1995 Rally Catalunya, when Subaru imposed team orders to permit a Carlos Sainz victory – yet the other party didn't listen. Members of the team's crew at one point had to resort to standing in front of Colin McRae's car to slow him. That was the year's penultimate event – and they went to the UK finale level on points at the top of the championship. Despite losing the Rally GB lead through delays (including having to straighten bent front suspension with a log), McRae looked irresistible as he fought his way back to the front. He went on to win by more than half a minute; Britain had its first World Rally Champion.

12 Ferrari vs McLaren
1976-present

Throughout the last part of the 20th century and into the 21st, McLaren and Ferrari gave each other no quarter. McLaren held the upper hand in 1998 and '99, before Ferrari and Michael Schumacher fought back. But the team rivalry – which had been bubbling for decades – reached boiling point in 2007 with Spygate. The episode – which centred on an accusation that a disaffected Ferrari mechanic leaked top-secret technical data to his counterpart at McLaren – lifted the lid on the simmering distrust and animosity between the two fiercely competitive teams. In terms of results the Scuderia has won the constructors' title 16 times to McLaren's eight; the drivers' title 15 times to McLaren's 12.

Art Arfons set the land speed record three times between 1964-65 with the Green Monster jet-powered cars. Walt is credited with introducing parachutes to slow drag racing cars

11

Art Arfons vs Walt Arfons
1952-1966

Half-brothers with an aptitude for all things mechanical, they worked together on cars and bikes and even built their own aeroplane, but their destinies were shaped when they chanced upon an organised drag race in 1952. They built their own car and, as became custom, it consisted mostly of parts obtained from a scrapyard. It was named Green Monster – due to its colour – and that became the handle for all Art's future creations.

History doesn't record precisely what caused the once close-knit pair to fall out – Art's overly competitive streak is often blamed – only that it happened in the late 1950s. They continued to build speed-record cars in adjacent Akron workshops, but without ever talking. During the early 1960s, both duelled with Craig Breedlove for the land speed record (Tom Green driving Walt's Wingfoot Express) before Walt moved on to fresh pastures and left Art to pursue fresh records. In 1966 the latter crashed at more than 600mph and initial reports suggested, incorrectly, that he had died. He was very seriously injured, however – and in time that led to a rapprochement of sorts with Walt. Their relationship would never again be as close as once it had, but they were at least back on speaking terms.

THE RIVALS



Walt Arfons chats with driver Bobby Tatroe aboard his Wingfoot Express II machine

RAINER SCHLEGELMILCH, GETTY, LAT

THE RIVALS

Italian Achille Varzi handles Auto Union's B-type in 1935. Mercedes' W25B is behind in the hands of Rudolf Caracciola



Auto Union's Varzi (left) chats with Mercedes racer Louis Chiron

10

Mercedes vs Auto Union
1934-1939

The economic landscape wasn't an obvious platform for a fertile grand prix era, with the effects of The Great Depression still felt and high unemployment in Germany. But Hitler's National Socialists, keen to advance the home automotive industry, encouraged and funded firms to compete. In 1933 Mercedes and Auto Union – product of a merger between Audi, DKW, Horch and Wanderer – built cars for the new 750kg formula and the cocktail of technical freedom and funding raised racing to a new and sensational level. From the W25 Mercedes developed the sleek W125 with its supercharged straight eight, then the V12 154. Auto Union campaigned novel but tricky rear-engined V16 cars, then a V12 and as the Silver Arrows duelled, shrieking blowers pushed power to 600bhp. From 1935-39 only German cars won a championship GP, barring Nuvolari's exceptional 1935 French race – in an Alfa with 100bhp less. Silver specials took impressive speed records, too. The British, meanwhile, were pottering about in ERAs.



9 Don ‘Snake’ Prudhomme vs Tom ‘Mongoose’ McEwen 1964-1973

Away from the drag strip they were mates – and a shared deal with Mattel’s Hot Wheels toy car brand, negotiated by McEwen, generated useful cash, introduced them to a younger audience and made both household names in the States. On the track they were fiercely, enduringly competitive. Prudhomme was the quiet one, who would sit impassively during pre-event publicity interviews while McEwen shouted about how he was going to prove who was boss come race day. It was Prudhomme who recorded the first five-second pass for a Funny Car and won four straight world titles, but there was seldom much between them.

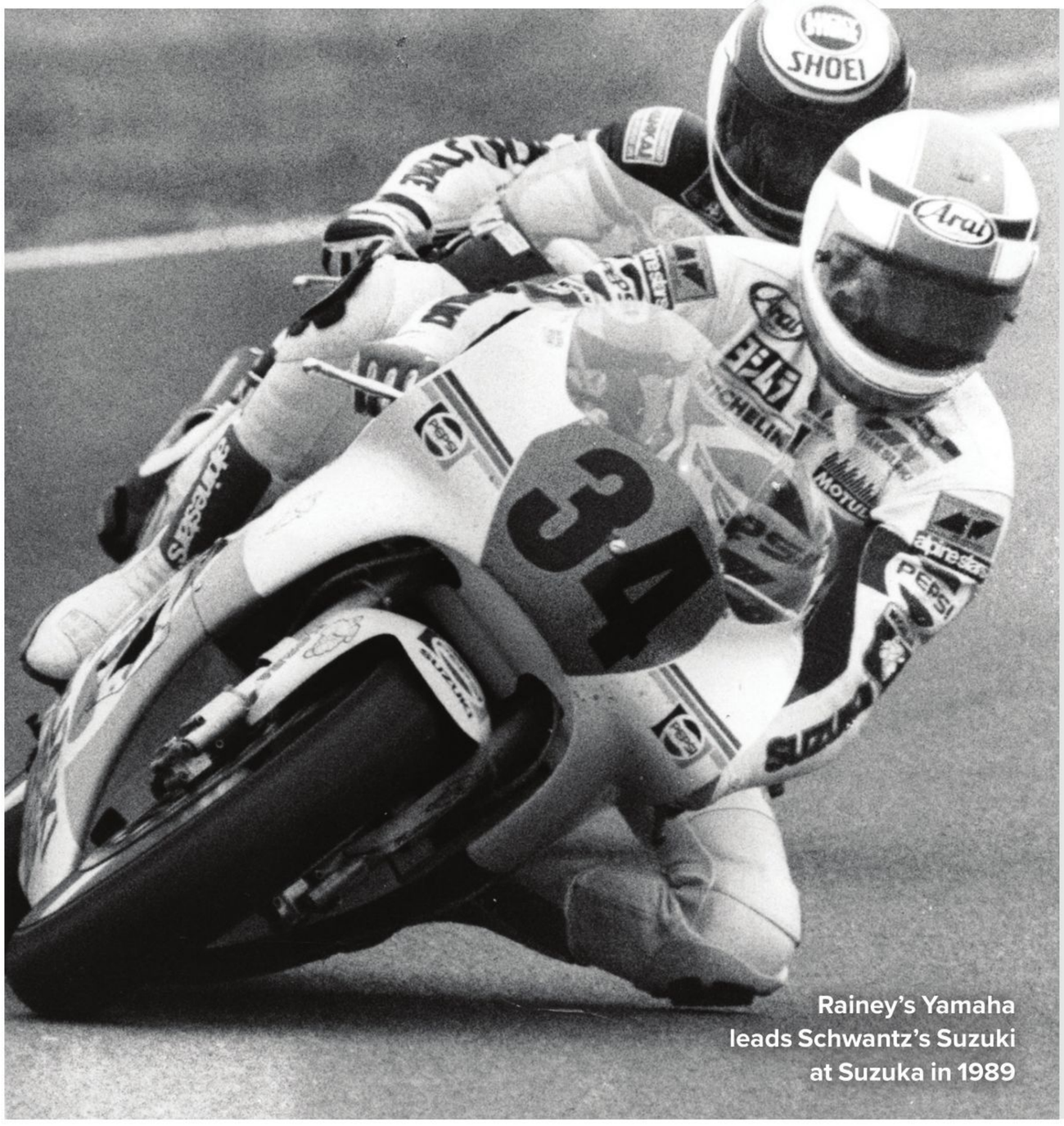
8 Turbos vs natural aspiration in F1 1977-1989

With a few exceptions (Ligier’s wailing Matra V12, the glorious flat-12s of Ferrari and Brabham-Alfa Romeo, the hopeless BRM V12 that might have been more effective as a yacht anchor), F1 was ‘Planet Cosworth’ in 1977. Of the 32 teams that attempted to qualify for at least one grand prix that season, 27 ran Cosworths. But then came Renault, with a 1.5-litre V6 turbo evolved from its sports-prototype engine. It smoked, rattled and, more often than not, blew up. But Jean-Pierre Jabouille nursed the car to a first finish at Monaco in 1978, scored points in America and won the 1979 French GP. Reliability was patchy, but Ferrari (and Toleman) went turbo in ’81 and two years later Nelson Piquet (Brabham-BMW) became the first driver to take the title with a turbo car. When Michele Alboreto won the Detroit GP for Tyrrell on June 5 1983, it would be the 155th and final victory for the Cosworth V8 – and the last for natural aspiration until 1989, by which stage turbos had been banned.





Cosworth supplied the bulk of the grid (including Ronnie Peterson’s Tyrrell, top) in 1977, until Renault arrived with turbocharging...



Rainey’s Yamaha leads Schwantz’s Suzuki at Suzuka in 1989

LAT, GETTY

7 Kevin Schwantz vs Wayne Rainey 1986-1993

Their paths first crossed in 1986, racing Superbikes in their native America – and there was more than a frisson of friction. Speaking to *Motor Sport*’s Mat Oxley (Jan 2013), Schwantz said, “I don’t know why I disliked him, except that I knew how much he disliked me. So I figured I’d dislike him just as much...” They went on to commence their grand prix careers at the same time, two years later, and Rainey won the world title in 1990 – the first of three on the trot for Yamaha. For ’93, however, Yamaha hadn’t perfected its chassis set-up and Schwantz’s Suzuki was now a match, a detail underlined by his victory in the season-opener at Eastern Creek, Australia. Rainey bounced back to win at Shah Alam and Suzuka (by 0.08sec!) before the pendulum swung again. After the 11th of 14 rounds, at Brno, each had four wins – and Rainey held a slim points cushion. While leading the next race at Misano, however, Rainey fell heavily and suffered paralysing injuries. Schwantz went on to take the title, but Rainey’s absence had diluted his zest for competition. He would score just two more wins before retiring.

THE RIVALS

6

Britain vs Italy
1950-today

Many manufacturers' reputations had been forged during the pioneering days of international racing, when the likes of Renault, Delage, Mercedes, Duesenberg, Bugatti, Peugeot, Sunbeam, Talbot and OM recorded significant victories. Alfa Romeo had emerged simultaneously – and, with compatriots Maserati and Ferrari, was at the forefront when the sport dusted itself off after WWII. When the world championship began in 1950, Italian cars dominated everything bar the Indy 500. No other nation won one of the conventional grands prix until France 1954, when Mercedes joined in for a successful two-season spell. Thereafter Ferrari and Maserati continued to paint the track red until Vanwall began winning races in 1957. Italy had dominated the decade, but when the championship for constructors began in '58, Vanwall became the inaugural recipient. Cooper was by now also on the map, having scored two victories with its mid-engined curios, and teams like BRM, Lotus and Brabham would become successful within a short space of time. The look of the cars was changing – and so was the seat of power. Alfa Romeo has not won a race as a constructor since Spain 1951; no Italian driver has been crowned since Alberto Ascari in '53.

Juan Manuel Fangio's Maserati leads Stirling Moss in his Vanwall. While Italians dominated the early days, Vanwall won the first makes' crown in 1958



5 Valentino Rossi vs Marc Márquez 2013-today

Rossi stepped up to motorcycle racing's top table in 2000, Márquez 13 years later (by which time the Italian had seven premier-class titles to his name). At first the two were all smiles; Rossi had been Márquez's idol and the former seemed to see something of his younger self in the Spaniard, whose style brought not just a knee to the track but also a shoulder. But then competition between them intensified and the relationship descended into verbal and psychological warfare. During the 2015 Malaysian GP, Rossi raised a knee and forced his rival to crash out. Those smiles had long since vanished by that point.



4 John Surtees vs Eugenio Dragoni 1964-1966

Dragoni was Ferrari's sporting director, Surtees the seven-time motorcycling world champion who'd switched seamlessly to cars and earned a Ferrari drive on merit. Dragoni, though, seemed to resent his presence, to the extent that he protested his own winning car at Sebring in 1964 – that of Surtees and Lodovico Scarfiotti – in a bid to secure victory for its sister entry. That failed. At Le Mans in 1966, against the might of Ford, Surtees felt he should take the start to maximise Ferrari's chances; when Dragoni refused, nominating the worthy but slower Scarfiotti, Surtees left the track, drove to Maranello and handed in his notice.

ALAMY, LAT



A racing rivalry for each month of the year

Motor Sport's 2020 calendar celebrates history's great clashes, and it's racier than Pirelli's, says **Jake Williams-Smith**

The 2020 *Motor Sport* calendar celebrates great rivalries in F1 with 12 incredible images from history. The pictures were chosen from the Cahier Archive and each one was taken by Paul-Henri Cahier (*pictured right*) and his father Bernard, who have been photographing F1 for over half a century.

Once the theme of the calendar was decided, we asked Paul-Henri to make a selection of his favourite pictures to illustrate it. One of his favourites is the picture of the Maserati piloted by Juan Manuel Fangio at Monaco in 1957. "That Maserati was an iconic and magnificent machine," he says. "And next to that you have the Vanwall, which is an ugly-looking thing in comparison."

He also picks out the image of Ayrton Senna shadowing Alain Prost's Ferrari at Monza during the 1990 Italian Grand Prix.

"They were the two best of their era, no doubt. I was a massive Senna fan. I think it's to do with the idea of sacrifice. He was prepared to take the risks when he got in the car.

"This was shot at Lesmo 1. It is one of my favourite places to go at Monza. The speed of the cars is incredible here."



Another shot of Senna shows him leading Nigel Mansell under pressure at Monaco.

Paul-Henri recalls: "I had to crawl through between fence and guard rail to get into position for that photo, it was somewhere photographers weren't supposed to be."

James Hunt and Niki Lauda's rivalry is part of F1 legend, but the picture of them taken during 1974 at the Swedish Grand Prix (*top*) reveals their friendship.

"This was taken before their rivalry really began. I think that they were able to build up a camaraderie that they then maintained even when they were fighting for the title later on in their careers.

"My father took this one, it's a great photo, really close to the two of them. He had an uncanny ability to get close to drivers. I'd like to have the same thing."



The 2020 Motor Sport Calendar is available to order now for £29.95 from motorsportmagazine.com



13

Brabham vs The Paddock
1978

It was an idea that occurred to Brabham designer Gordon Murray in the bath. Wings had been bolted to F1 cars during the 1960s, but serious aerodynamic progress began to be made the following decade, when Colin Chapman introduced his ground-effect Lotus 78 and improved it significantly with the following 79, which carried Mario Andretti to that season's world title.

In a bid to find some way of matching the levels of downforce that Lotus had, Murray imagined the Brabham BT46B, or 'fan car'.

It featured a radiator mounted horizontally over the engine and cooled by a vast, gearbox-driven fan at the rear. The car featured flexible skirts, so the fan fed the radiator with air and quite literally sucked the car to the track. Brabham team boss Bernie Ecclestone suggested his drivers take things easy in qualifying for the 1978 Swedish GP and they lined up second and third, John Watson ahead of Niki Lauda, but both more than half a second adrift of Andretti… largely because they ran heavy with fuel.

Amid much bickering from rivals, Lauda won by more than half a minute. "Andretti claimed the car was projecting stones at other cars, which it wasn't, and it was legal as the rules stood," said Murray. "I had to ensure that over half of the air was cooling the radiator. After the race the FIA came to the factory and measured the flow of air through the fan and through the radiator. I'd worked out that 55 per cent of the air was for cooling and 45 for downforce, but they said it was 60/40."

The FIA confirmed the car's legality, but also underlined that the loophole Brabham had exploited would be closed for 1979. But the BT46B had won its first, last and only race.

At the time, Ecclestone had his eye on establishing a power base through the Formula One Constructors' Association – and for that he needed the support of such as Chapman, Ken Tyrrell and the other team owners who had been upset by the BT46B.

Speaking to us for *Lunch with (Motor Sport* Jan 2008), Murray said: "I didn't understand this at the time, but Bernie had his eyes on bigger things. He was working on getting his foothold in FOCA and launching himself towards what he did later. He reckoned the uproar was in danger of collapsing FOCA completely. So he asked me – he didn't dictate – to fit normal radiators to the car. I was very pissed off, but I agreed."

Contrary to popular perception, the car was never actually banned.

MOTORSPORT IMAGES

The BT46B 'fan car' was just one of Gordon Murray's ingenious creations for Brabham. He also created the adaptive suspension for the 1981 BT49C that outfoxed the paddock

THE RIVALS

"Andretti claimed the car was projecting stones at other cars, which it wasn't. It was legal."

THE RIVALS

There was mutual respect between Sir Jackie Stewart and Denis Jenkinson, but there were also very public disagreements

"Can you really ask me in all honesty to admire, or even tolerate, our world champion?"

2

Jackie Stewart vs Denis Jenkinson
1972



"You'd see him there," says Jackie Stewart, smiling about it in retrospect, "a small figure, close to the Masta Kink, and think, 'Oh no, Jenks'. You knew why he was there and think to yourself, 'Better make sure I take it flat next time'. And you had a full lap of the old Spa to think about that..."

Back in the day, though, Stewart and *Motor Sport*'s own DSJ were overtly opposed to each other's ideals.

Jenks was no shrinking violent. He was passenger to inaugural sidecar world champion Eric Oliver in 1949 and, perhaps more famously, served as Stirling Moss's navigator during their extraordinary victory on the 1955 Mille Miglia. He was strongly opposed to the notion of the sport moving away from its traditions and embracing "standardised, characterless autodromes".

Stewart, in contrast, felt too little was being done to protect drivers. Cars were getting faster and circuits weren't adapting to accommodate rising speeds. Stewart played his part in steering F1 away from both the Nordschleife (for 1970, at least) and the original road circuit at Spa. He admits this made him "very unpopular".

In *Motor Sport* June 1972, Jenks let rip. "Before the Sebring 12 Hours a certain beady-eyed little Scot was going around drivers encouraging them to sign a GPDA petition calling for a boycott on all F1 or FIA Sports Car Championship races at Spa.

"I frequently receive letters from readers who ask why I keep attacking Stewart and his GPDA; surely the reason is becoming all too clear. If he said, 'I had a nasty experience at Spa in 1966 and have no intention of going there again' I would accept his feelings. But it is not as simple as that. His pious whinings have brain-washed and undermined the natural instincts of some young and inexperienced newcomers to grand prix racing and removed the Belgian GP from Spa. I will admit that grand prix racing is his life and he has every justification in anything he does concerning that, but WHAT HAS LONG-DISTANCE SPORTS CAR RACING GOT TO D0 WITH STEWART? To the best of my knowledge he has never been a serious competitor. Can you really ask me in all honesty to admire, or even tolerate, our current world champion?"

In the August issue, Stewart hit back: "I devote considerable time and effort to make motor racing safer for as many people as possible – officials, spectators, drivers and even journalists. It is very easy to sit on the fence and criticise. You can always find faults in what other people are doing, but at least they are doing something. All Mr Jenkinson seems to do is lament the past and the drivers who have served their time in it. Few of them, however, are alive to read his writings.

"There is nothing more tragic than mourning a man who has died under circumstances that could have been avoided. It angers me to hear people who oppose an effort to make our sport safer... Such men to me are hypocrites, the only consolation being that in years to come they will be looked back on as cranks."

Slightly spicier than modern F1.

GETTY



Tazio Nuvolari vs Achille Varzi
1930-48

A relic from an age long before social media or even TV, Nuvolari was a prototype John Surtees, if you like, a serial motorcycle racing champion who found cars suited him just as well. You don't always see him referenced when the sport's 'greatest of all time' are discussed, a reflection of the shadow in which motor racing existed during his day, but when Mark Hughes attempted to unravel that very topic for *Motor Sport* (Nov 1999), he placed Nuvolari at number one – and Ferdinand Porsche, founder of the car company, is said to have described Nuvolari as "the greatest driver of the past, the present and the future".

That is the context in which Varzi (12th on the *Motor Sport* list) should also be judged.

Nuvolari was apparently a man bereft of fear, a blend of showman, daredevil and thinker, somebody able to temper his natural instincts with the mechanical sympathy required to pull off improbable feats. How else could he have defeated the combined might of the Silver Arrows in the 1935 German GP? It was more impressive still that he beat them four times in major races the following season, when the German cars were getting ever better, the Alfa ever older. He remained loyal to Alfa until the start of 1938, when a split fuel tank during the Pau GP persuaded him that his future lay elsewhere. Next stop: Auto Union. If he could no longer beat them...

The son of a wealthy textile manufacturer who also cut his teeth (successfully) on two wheels, Varzi was by then fading, his focus having been deflected by morphine addiction and an affair with the wife of fellow racer Paul Pietsch. At his peak, though, he had been Nuvolari's closest adversary, fuelled by the same competitive will yet calmer in his delivery – a Prost to Nuvolari's Senna.

Their most celebrated contest?

Perhaps the 1930 Mille Miglia, when Varzi felt sure he was leading – that was the information coming from the time controls as he headed back towards Brescia – until his nemesis nipped past. Legend has it that Nuvolari had kept his Alfa's lights switched off during the darkness of early morning, so that Varzi would be less aware of his approach.

That, though, had been a race against the clock. In terms of wheel-to-wheel ferocity, the 1933 Monaco GP perhaps showcased their contrasting yet similar talents to fuller effect. Varzi took pole in his Bugatti T51, with Nuvolari fourth on the grid in his Scuderia Ferrari Alfa Monza. The latter was soon through to second and the pair swapped the lead continuously. Varzi had a more agile chassis, Nuvolari better acceleration.

On the final lap, Varzi risked his engine by holding third gear for longer than usual to take the lead and Nuvolari's ability to respond was scuppered by piston failure. They had been locked together for all bar three of the 100 laps, but Varzi was able to drive relatively gently towards the finish as Nuvolari jumped out and tried to push his car to the line. When a mechanic lent a hand, he was disqualified.

His gesture underlined a refusal to accept defeat that was common to both.

Having cheated death many times, Nuvolari's health deteriorated after WWII – not least due to asthma, brought on by years of inhaling exhaust fumes. He made his last competitive start in 1950, winning his class in a hillclimb, and died in 1953 following a stroke.

Now in his 40s, and having sorted out his personal life, Varzi returned to racing after the war. Having very rarely crashed during his racing pomp, he was killed while practising for the 1948 Swiss GP at Bremgarten.

THE RIVALS



Far left: Nuvolari's Alfa leads Varzi's Bugatti during their epic 1933 duel in Monaco. Left: Nuvolari hoisted aloft by his Alfa team

"Ferdinand Porsche said Nuvolari was 'the best driver of the past, the present and the future'"

GETTY

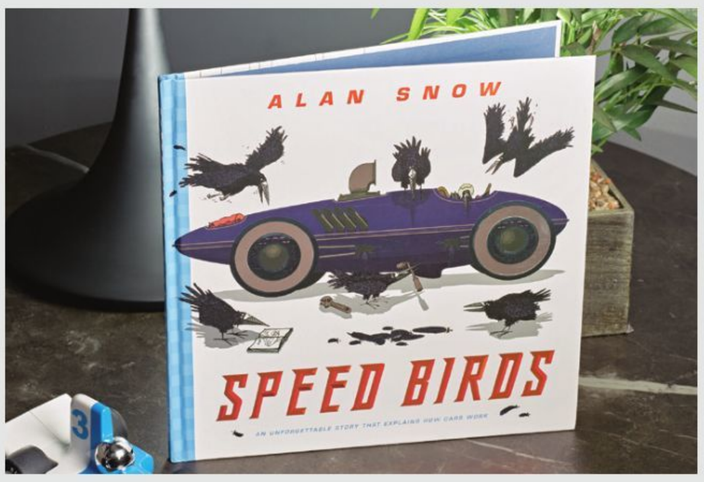
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Season review Mark Hughes on the highs and lows



Rules of engagement: 2021 regs explained



Jenson Button 'I got the fear before Brazil'



They said what? Quotes of the year



Doug Nye on Lewis Hamilton's place in history

F1 SPECIAL

Mexico GP **USA GP** **Brazil GP**

Playing to his strengths

With a sixth world title on his mind, Lewis Hamilton didn't have to win this triple-header, but gave it his best shot anyway, says **Mark Hughes**



LEWIS HAMILTON, WITH THE 2019 crown coming into full definition in the last few races, was always going to tread more carefully than usual. But only in the high-risk moments. His focus was still absolutely on winning each race, but in any potentially treacherous trice, the task would always override the instinct. In the three-race sequence of Mexico, Austin and Interlagos, Hamilton respectively prepared for, clinched and reflected on the winning of world championship number six.

The dynamics of the situation were beautifully played out in the opening moments of the Mexican race as Red Bull's Max Verstappen - the weekend's bad boy after staying flat past yellows on the last lap of qualifying and thereby being penalised out of his pole position - took advantage of Hamilton's situations short term and long. Short term, Hamilton's momentum was checked by Sebastian Vettel's Ferrari swerving across, pushing him towards the dirt. With the title prospect taking precedence over the split-second moment, Hamilton backed off and played it cautious. "All of a sudden Max is alongside me. I always leave Max a lot of space - it's the smartest thing you can do. But there wasn't a lot of space for me to give him..."

Through the sequence of turns 1-2, Hamilton stayed on the outside, Verstappen ran him wheel-to-wheel. A snap of oversteer put the Red Bull's outside-rear wheel in contact with the Merc's floor and they tangoed off together into the dirt, rejoining a few places down as the Ferraris of Charles Leclerc and Sebastian Vettel lead the pack.

Verstappen's fearless youthful audacity has won him races but it lost him this one. As he made his recovery he went for an outrageous move inside the hairpin of the stadium on Valtteri Bottas' Mercedes. Nice guy Valtteri is one tough nut wheel-to-wheel and after being mugged by Verstappen at Monza last year had privately made a vow to himself: Verstappen doesn't get to do that twice. So he didn't appear to try too hard to co-operate in making Verstappen's move work. Mercedes front-wing endplate sliced a Red Bull right-rear tyre and by the time it had deflated Max was past the pit entry. Strike one Hamilton opponent away. Lewis was at this time running fourth, with Alex Albon's Red Bull tightly tailing the Ferraris.

Albon was in fact a crucial factor in Hamilton's Mexican victory, as Red Bull used him to apply undercut pressure to the Ferraris at a time when it wasn't clear if theirs should be a one- or a two-stop race. To protect Ferrari's lead, it responded with leader Leclerc, thereby committing him firmly to a two-stop. Which turned out to be the wrong strategy on the day. Strike another Hamilton opponent away.

Vettel would ordinarily have already lost track position to Albon if he'd been brought in the lap after Leclerc, but now was given the opportunity to pit without losing track position, as Albon had been delayed on his outlap passing Carlos Sainz's McLaren. Would Seb like to come in, he was asked? Feeling his tyres could run a long time yet and sensing that the race was migrating towards a one-stop, Vettel replied that 'all was peachy' and he'd stay out there, thanks. He thus assumed the lead - albeit with Hamilton's Mercedes now filling his mirrors.

On the Mercedes pitwall they'd been carefully monitoring the tyre deg and, ▶



MOTORSPORT IMAGES

An early puncture for Verstappen wrecked his chances in Mexico

A charging Hamilton worked his way through the pack to win in Mexico. Sainz would return McLaren to the podium for the first time in five years in Brazil

realising it was very low, had long-since concluded that so long as it could run Hamilton for at least 19 laps, then a one-stop was feasible. Ferrari wasn't so gung-ho and believed it needed to get Vettel until at least lap 30. Hamilton pitted on lap 23, thereby undercutting him ahead of the Ferrari. Even on his newer tyres Vettel was not able to cut into Hamilton's lead in the final stint. Which is how Hamilton won the Mexican GP. His only championship rival, team-mate Bottas, kept himself in mathematical contention with third, right on Vettel's tail. But Hamilton went to Austin needing just four points.

He wanted to clinch it with the full 25, however. His focus was on winning this race from the front, taking destiny into his own hands. That was to reckon without him inadvertently knocking the cover from the brake bias control on his steering wheel in Q3. He didn't realise he was changing the bias as his hands moved over the wheel and consequently gave himself several time-costing moments, which left him fifth and Bottas on pole. "That was totally down to myself," he would later reflect. "I was in a dark place after that. Earlier in my career, 2007 and '08, if I'd had a bad race I couldn't leave my room for three days... As I've grown I've understood how to stay centred, to get myself out of dark holes. But I was in one after qualifying. I put it right the next day."

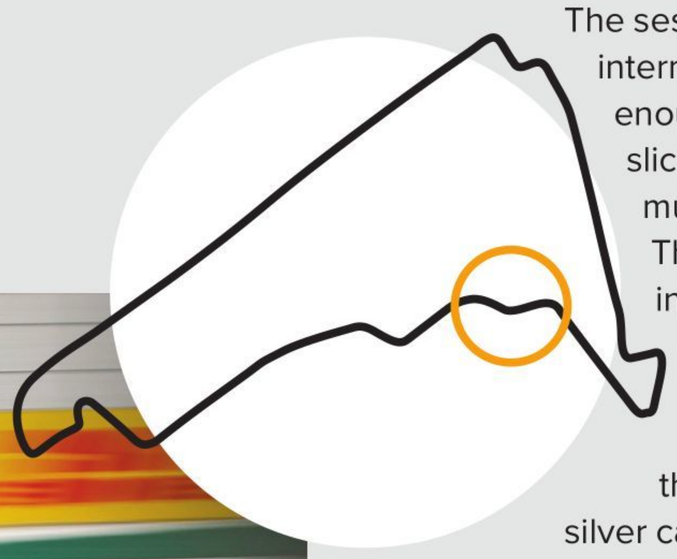
He was up to third a few corners into the race, Bottas leading from Verstappen as the Ferrari challenge collapsed (a detuned old-spec engine and under-temperature tyres for Leclerc, collapsed suspension for Vettel). Like Mexico, this would develop into a race of tyre strategy. But the other way around, migrating from an apparent one-stop to a two as this time the tyre deg was greater than expected. This worked against Hamilton, as Verstappen forced Bottas into pitting early – thereby putting him into what turned out to be the correct strategy. Hamilton went the opposite way and stayed on a one-stop. It got him into the lead, but with Bottas coming back at him on way faster tyres and plenty of laps left. Hamilton defended, but only up to a point. There was a title to win after all. An honourable second

Trackside View

Esses, Mexico



Mercedes is mighty in most places, but looks a handful when things get twisty in low grip



The session begins on intermediates but soon enough everyone is on slicks but still there's not much grip to be had. The Mercedes look incredibly demanding, fast but so twitchy. Valtteri Bottas is the first to really attack the sequence and the silver car has a great initial rotation – that part between him first turning the car and it taking a definitive set into the turn – but the rear then keeps sliding. On a grippier surface, it would rotate and then grip. But not today, the Merc getting a wild-looking oversteer twitch on the exit of 10 and then clattering hard over the kerbs of 11, Bottas dominating the machine. The opposite shortfall is that of the Ferrari – which looks too stable. The air is thin at this altitude and the SF90's underlying understeer seems to have resurfaced as the front wing cannot generate its usual grip. It takes longer to take a proper look at the corner but once it does, it gives its drivers an easier ride. But neither of the year's top two cars are happy here.

There's responsiveness and there's balance, and on the limit they are not always the easiest of things to combine – especially when the corners are long or the track grip is low. Or both – which is exactly what we had in the early stages of Friday practice through the Esses of Mexico's Hermanos Rodríguez circuit. This interlinked series of sweeps – from turn 8 through to 11 – build speed, each turn quicker than the previous, with a punctuation of the slightly slower turn 10.

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on the wrong strategy was the price to be paid for the qualifying mis-hap and under the circumstances of title number six, it's a result even Hamilton can live with.

In Brazil he could race without a care. In the post-qualifying press conference he looked straight at Verstappen sitting next to him and, smiling, answered a question about that with, "Maybe we can be more aggressive, we can have some fun with these guys." Verstappen was on pole while Hamilton was third in a Merc definitely down on power to the Honda at this altitude.

On race day Hamilton did perhaps drive with more carefree abandon, and was pushing his team to make aggressive choices - but he was against a faster Red Bull. He went wheel-to-wheel with Vettel through the Senna Esses at the start to vault to second. He managed to briefly squeak ahead of Verstappen around the first stops after the latter lost time to an errant Williams in the pitlane, but had used all his extra battery energy in doing the stunning outlap, so was literally powerless to prevent the Red Bull sailing past 20mph faster down the pit straight. A late safety car put him back in the lead as Verstappen pitted for new rubber and sat himself on the Merc's tail for the restart - but again Verstappen had the straight-line speed to retake the lead and pull away. The Ferraris of Vettel and Leclerc taking each other out brought one final safety car, and induced Hamilton to gamble on surrendering two places to get new tyres on and try for a last-gasp win. Racing restarted with two laps left - he was instantly past Pierre Gasly's Toro Rosso and chasing the second-placed Albon. Hamilton was running out of time and there was no title to worry about, so he tried a marginal move on Albon into Turn 10. They collided, spinning Albon to the back and losing Hamilton a place to Gasly, which he couldn't retake before the flag as Verstappen lead a Honda-powered 1-2. Hamilton was deeply apologetic to Albon later. But he'd given his all. "I raced my heart out. I left nothing on the table and I took a lot of risks. We could keep up with them in the corners but they were outshining us on the straights. I don't think there was anything we could do."

Word on the beat

Rumour, gossip and news from the F1 paddock

● The Brazilian GP promoter **TAMAS ROHONYI** is adamant that the race is staying at Interlagos despite resurfacing claims that it could be set for a switch to a new venue in Rio.

● In **AUSTIN** a technical directive was issued regarding pulsing of the fuel flow meter to subvert the maximum flow. It was in response to a query from **RED BULL**, which thought one of its competitors may have been using such a system. The FIA stipulated that such a system would be illegal.

● Two races earlier **FERRARI** requested clarification about the rear brake duct and suspension arrangement on the **MERCEDES**, which appears to direct air between the brake drum and rim, allowing the tyre temperatures to be controlled. The FIA cleared it as legal.

● **ALEX ALBON** (*above*) has retained his Red Bull drive for 2020 following his promising part-season with the senior team this year. **TORO ROSSO** keeps **PIERRE GASLY** and **DANIIL KVYAT**.

● Verstappen, after both Hamilton and Vettel said in Mexico that they race him differently to others, so as not to 'get torpedoed' responded in Austin with: "It's easy to have a dig at someone but from my side, it's fine. It's always positive when someone talks about you because it just means that you are in their heads. I just focus on my driving and that's enough said."



● **RENAULT**'s interim chief executive officer Clotilde Delbos has confirmed that the company's F1 involvement post-2020 is under review. "It's not a minor review," she said. "This is a deep review of our strategy and plan." Asked if he could confirm Renault would be competing in F1 for 2021, **CYRIL ABITEBOUL** said, "I can't tell you that... but let's be optimistic. If everything [in the 2021 financial and rules package] is better, I don't see why we would get to a different position to the commitment we made in 2015."

● Against that backdrop, the Enstone-based team is in the process of re-structuring its technical department. **DIRK DE BEER** returns as head of aerodynamics after stints at Ferrari and Williams. **PAT FRY** – ex-McLaren and Ferrari engineer – returns to the team which he last worked for in 1993 in its Benetton guise, with his exact role yet to be announced. **JAMES RODGERS** has been promoted to chief aerodynamicist.

● The proposal to experiment with a Saturday **REVERSED GRID SPRINT RACE** format for three races next year did not receive the unanimous approval from the teams. Mercedes' Toto Wolff voted against it, saying: "When you watch the 100-metre final at the Olympic Games, Usain Bolt doesn't start five metres behind the others to improve the show." Liberty's Ross Brawn was disappointed that Wolff and one other team boss vetoed the idea.



F1 SPECIAL

2019 SEASON REVIEW

A calendar that started with tragedy developed into a mesmerising battle for supremacy. **Mark Hughes,** who spent the year on the road following the F1 circus, analyses the key moments and reveals his highs and lows of 2019.



A season put into focus. Lewis Hamilton's Mercedes streaked clear of the field, both in terms of image and in results

Lewis Hamilton in 2019 rode as an avenger of doubt, swashbuckling aside all challengers as he drove to his sixth world title, still the dominant force even as the other warriors of his generation began to fall, replaced by fearless, thrusting young padawans transitioning into jedis.

That was the seasonal narrative as Formula 1 took a step towards somewhere, with a reworked set of technical regulations which sought to improve the cars' raceability, borrowing from research for the 2021 formula. Quite where 'somewhere' ends up being isn't yet clear, but as the sport's owners and bosses worried and argued behind the scenes about that, the shop front put on a pretty good show.

As the best team with the firmest combined technical grasp of engines and aero, Mercedes flourished from the regulation change as Ferrari's potent challenge of the previous two years faltered. Despite bouts of promised but unfulfilled dominance from the Scuderia, five consecutive Mercedes 1-2s at the beginning of the season built title foundations that Ferrari was never going to crack. A record-breaking sixth consecutive clinching of both drivers' and constructors' championships for Mercedes was an outcome that was foreshadowed in the opening race in Melbourne, as were pretty much all of the season's significant themes.

The passing of Charlie Whiting (the FIA's technical, safety and race director) in Australia put a line beneath an era. It was an awful way to start the season. There he'd been Thursday afternoon, walking the track, busy and wise-cracking, as ever. He didn't wake up next day. His death left a huge gap that F1 still hasn't properly filled. It turned out to be just one of many ways in which Melbourne set a new template.


Bottas won in Australia, but soon lost momentum against Hamilton

The Silver Arrows spear the Prancing Horse

"Going into Melbourne after seeing how fast Ferrari were in testing, we thought we would be somewhere behind them," said Merc's tech director James Allison, "but not embarrassingly so and with the development potential we felt was in the car we thought we'd then have a strong early part of the year to catch up on the points, and then a brilliant final. That was what we were thinking and Toto [Wolff] gave a stirring speech before we left about the scale of the challenge we faced but if we wanted to show everyone that we were worthy winners then there'd no better way than this. Then we go to the first race and actually found that we were pretty decent - and we saw the shocked looks on Ferrari's faces."

The development potential he talked about was built into the aero team's response to the regulation changes that simplified (but widened) the front wing and put restrictions on brake ducts, barge boards and under-nose guide vanes. This made achieving a good outwash around the front tyres to carry down the whole car (and therefore not interfere with the underfloor and bodyside airflow) much more difficult. Ferrari and others figured they'd prefer to surrender some direct front wing downforce by tapering in the outboard ends so as to enhance the outwash. Mercedes didn't and chose to use the full allowable depth at the outboard ends.

It resulted in a Merc that had more downforce than anything else and a Ferrari with a shortfall of frontal aero grip, although it was very low-drag and very powerful. An unintended consequence of the new regulations was the reduced productivity of the aerodynamic development paths Ferrari and Red Bull were following. The Merc's long wheelbase/low rake concept appeared to be more adaptable to the trickier trade-off between underfloor and front wing downforce.

So at Melbourne Hamilton qualified on pole 0.7sec faster than the fastest non-Mercedes and Valtteri Bottas cantered to a comfortable victory after Hamilton lost the start and subsequently damaged his floor. The Ferraris were almost a minute adrift by the end, mechanically compromised at the rear just to get a balance through slow corners from the lack of aero load on the front. There were also engine compromises on the red cars, the motors turned down while a fix was made for a weakness in the ERS that became apparent during the last day of testing.

These themes would repeat for much of the season. The Ferrari's ERS problem was fixed by the next race but various mechanical breakdowns cost it probable victories in Bahrain, Hockenheim and Sochi. It was doubly unfortunate that these failures should have occurred at venues where the SF90 was otherwise the likely winner. The layouts of Bahrain, Baku, Montréal, Hockenheim, Spa and Monza allowed its power advantage (which grew through the season) to find it more time than its downforce deficit cost. But of those six venues where Ferrari had a genuine pace advantage even with the original aerodynamically flawed car, only two victories were secured. Three of the four losses were mechanical.

A very effective upgrade went onto the front of the car for Singapore and from that point it finally had a decent balance and was on pole for another four consecutive races - but with only one victory to show from that sequence. In those races where the Mercedes didn't set pole, it often remained the fastest car on race day and even when it wasn't, Merc's tactical nous could still conjure victories. Annealed by some of the key people having worked together for 18 years in the team in its various guises, Mercedes was every bit as exceptional operationally as it was technically.



Ferrari's toughest job

After Maurizio Arrivabene was shown the door during the off-season, former tech boss Mattia Binotto (*above*) brought a very different - more enlightened and less dictatorial - management style to the role. But he had a couple of tricky issues to deal with: a difficult car and a challenging new driver dynamic as the steely, highly ambitious - and very quick - sophomore Charles Leclerc was brought in alongside the proud champion Sebastian Vettel.

Vettel's paranoia antenna would have been twitching. Going into his fifth season with the Scuderia and still not having won it a title, the recruitment of the young gun in place of Kimi Räikkönen could easily be perceived as a benchmarking of Vettel. This indeed is what the late Sergio Marchionne had intended. But to allay Vettel's fears, Binotto said on the eve of the season that Seb started the season as the nominal number one; in any 50/50 situations, he would be given strategic preference as a four-time world champion. But the drivers were otherwise free to race. The situation arose in Melbourne - just as it would many times through the season. Leclerc was on much newer tyres than Vettel late in the race and so was catching his fourth place fast -


Charles Leclerc should have had more wins this season, such was his pace in the Ferrari SF90

LAT, SUTTON IMAGES

Mercedes struggled at the Singapore GP, where Ferrari secured its sole 1-2 of the season

"If we wanted to show we were worthy winners, there's no better way than this"

and he let the team know over the radio just how much he was being held up. On this occasion they called him off, but it was clear he was not going to be operating like Kimi did. "Yes, I think it makes sense there's a number one in the team," Leclerc said, "and at the moment it's Seb. But it's up to me to change that situation by performance." In Bahrain, one race later, upon being told to stand by for further instructions but to stay behind Vettel for two more laps, he took matters into his own hands and passed his team-mate three corners later.

He would go on to score more pole positions than any other driver and when fully on song he was invariably the quicker Ferrari driver, although Vettel did turn it around in the latter part of the season. Leclerc was within a few laps of victory in Bahrain before mechanical dramas. He finally made the breakthrough in Spa, followed seven days later by a repeat in Monza. But it was what happened in Q3 the day before that was really significant. Uncannily like Hamilton in Hungary 2007, Leclerc pulled a fast one within the team



Leclerc throwing it off in Germany was one of Ferrari's slip ups that gave ground to Mercedes and Hamilton

Despite flaring up inter-team relations, all was forgiven for Charles Leclerc as he gave Ferrari its first Italian GP win for a decade

to ensure himself pole (by taking the opportunity of not towing Vettel in return for Vettel having towed him on the first runs) – and earned censure from Binotto for doing so. A brilliant victory the following day (including getting physical to keep Hamilton behind him) led the boss to say "all is forgiven". Those imagining this might have been the final psychological blow for Vettel underestimated him. If anything, he seemed to use it as fuel for a renewed vigour and if his Singapore victory over Leclerc two weeks later was fortuitous, he wasn't shy about celebrating it. Furthermore, his reluctance to give Leclerc back the lead in Sochi after a pre-planned choreographed start to protect them from the Mercs needed the back story of Monza Q3 to be properly appreciated. Singapore was actually his second 'across the line' victory of the season, but that of Montréal was lost to a five-second penalty for the manner in which he rejoined the track after a brief off while dicing with Hamilton. The outrage that followed that led to a less hardline approach from the stewards subsequently for the season's balance.

All remained courteous and professional between Ferrari's young gun and old hand in public, but this was one fierce and potentially volatile intra-team competition, a cauldron that Binotto at times struggled to keep under control.



Hamilton vs Bottas II

The internal competition at Mercedes was by comparison very benign. This remained true even as Bottas got his season off to a flying start, not only with his Melbourne victory but with a genuine Hamilton-beating qualifying pace at China, Baku and Barcelona. He won two of the first four races but it might easily have been three, he scored three consecutive poles and his form was enough for the tag 'Bottas II' to take hold. He'd been deeply hacked off with himself during the off-season for having put himself in Hamilton's support role in late 2018 by his own performance shortfall.

He came back a tougher cookie. "To whom it may concern," he famously prefaced his slow-down lap radio declaration in Melbourne, "f**k you." This was Bottas the badass – in the car, at least. Out of it, he remained the same supremely gracious and unassuming individual.

Hamilton admitted later that Bottas' early form raised questions in his mind about what he was missing from his own performances. Hamilton at this stage of the season was scratching wins rather than taking them.

A scrappy Bottas weekend in Canada was the fulcrum on which Hamilton's underlying form turned. From there he was unstoppable, even once Bottas came back on-song. Bottas' stealing of pole at Silverstone brought out the best of the champion on race day. There was no way Hamilton wasn't winning this one, he'd decided – and he had a plan for exactly how he was going to achieve it. He ran Bottas ragged in the early stages, forcing him to use up his tyres in defence as Bottas (and the team) planned around a two-stop. Hamilton reckoned he could do it with a one-stop and his uncanny knack of combing pace with extended tyre life allowed him to pull it off.

Both Mercs crashed out of a wet Hockenheim, the team's seasonal nadir, Hamilton took an inspired victory out of the grasp of Max Verstappen in Hungary, split the faster Ferraris at Spa, pounced to take advantage of Ferrari's problems in Sochi and utilised the strategy advantage the team gave him to win Mexico. Bottas took victories in Suzuka and Austin.

In upping his game throughout 2019, Bottas forced one of the all-time greatest drivers to do the same.


Verstappen secured Honda's first win since 2006 in Austria

Red Bull's recharge

There was a moment in the Australian Grand Prix where Max Verstappen's newly Honda-powered Red Bull got a run going on Vettel's Ferrari. He needed DRS to make the pass into turn three - but he also needed competitive grunt. It got him third place there, but of more significance, it marked Honda's breakthrough to competitiveness in the hybrid era.

The Red Bull RB15 began as a difficult car but once its aero was developed, it was good enough for Verstappen to give Honda its first victory since 2006. This came in Austria for round nine and marked the first time in the season Mercedes had been defeated. Verstappen repeated the trick two races later - and came within an ace of making it three victories from four in Hungary, where he'd set pole position.

Max remained his brilliant hardcore, controversial self and both Hamilton and Vettel admitted they treated him differently to the others. Something which gave him some satisfaction. Red Bull desperately needs to retain the services of both Verstappen and Honda as it looks beyond 2020.

Brilliant rookies

Lando Norris, Alex Albon and George Russell all eclipsed their more experienced team mates as they made their grand prix debuts in Melbourne. In the vastly improved McLaren, Norris had a tough benchmark in the fast and relentless Carlos Sainz, who prevailed over the season as 'best of the rest' outside the top three teams. But Norris was frequently as fast, or faster. Albon shone so brightly in the Toro Rosso that he was in the Red Bull by Spa - and he matched Verstappen's qualifying time on his first visit to Suzuka. Russell in the wildly off-the-pace Williams completely eclipsed the comeback of Robert Kubica. Combined with the emergence of Verstappen and Leclerc, a brilliant new generation has arrived. In this context, 30-year-old Daniel Ricciardo - who had left Red Bull for a dispiriting season with an off-the-pace Renault, despite comfortably eclipsing Nico Hülkenberg - may have cause to ponder whether he's missed his slot.

LAT, SUTTON IMAGES

Mark Hughes' Top 10 Drivers

Our man in the paddock ranks his top performers of 2019



Lewis Hamilton
Steel and flair continue to flagellate the record book.



Max Verstappen
Obnoxiously brilliant, but talked himself into trouble.



Daniel Ricciardo
Still one of the finest out there. Disastrous team choice.



Charles Leclerc
The Prost to Verstappen's Senna of the new generation?



Sebastian Vettel
When he looked punched out, he bounced back like a champ.



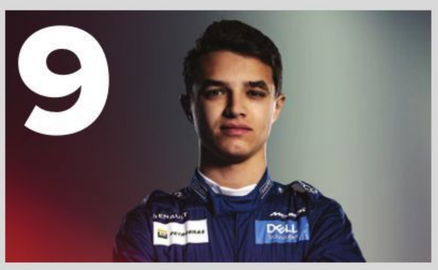
Carlos Sainz
Almost flawless maximisation of his McLaren machinery.



Valtteri Bottas
'Bottas II' gave team-mate Hamilton cause to ponder.



Sergio Pérez
Pulled better results from the Racing Point than it deserved.



Lando Norris
Bouncing puppy of a character, fighting terrier in the car.



George Russell
Every single box is ticked. He's just waiting for the car.

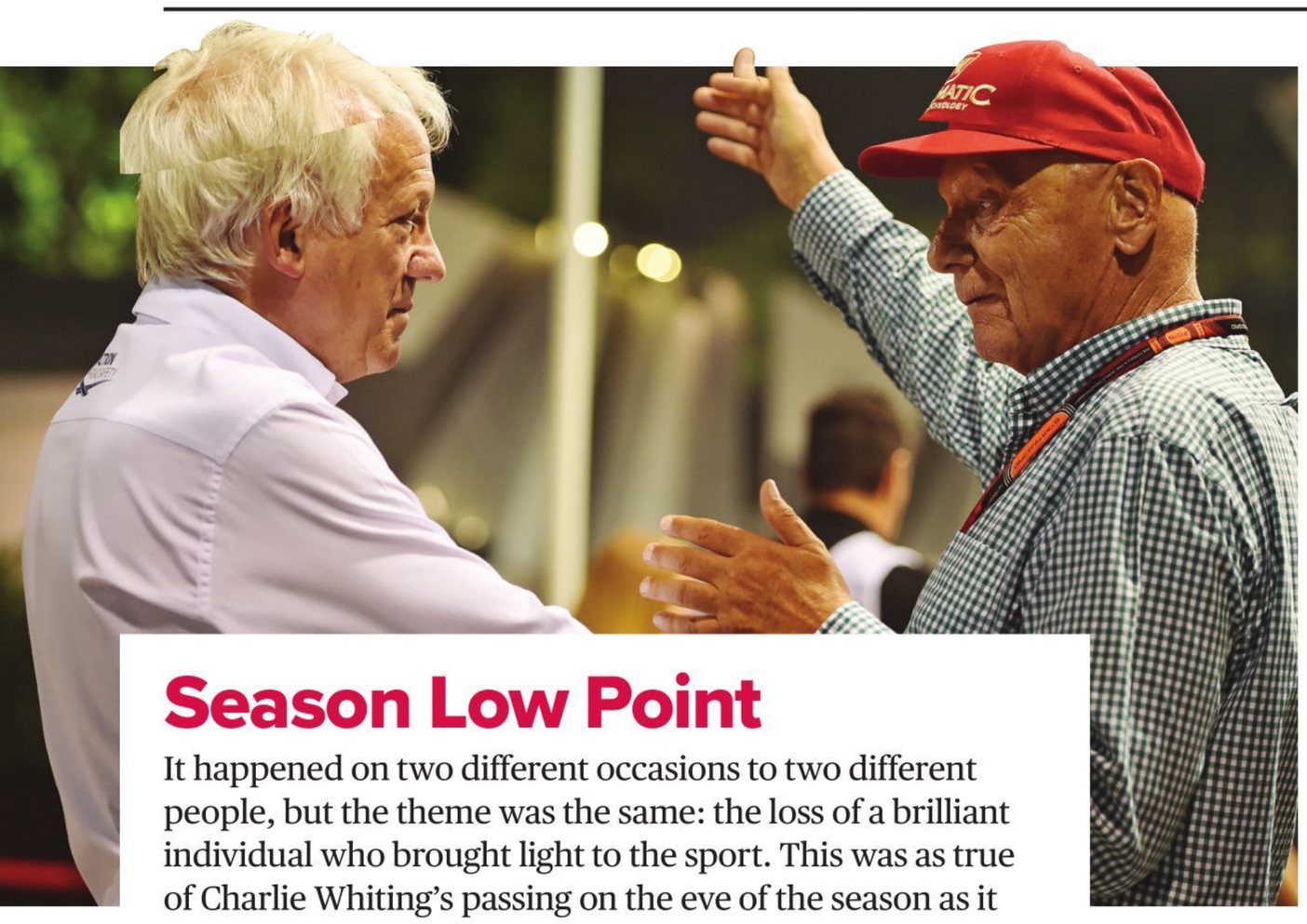
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Mercedes celebrate in Mexico and send a message to race engineer Pete Bonnington

Team of the Year

Mercedes, no contest. Not only did it come up with the best technical solution to the new aero rules, it operated so cohesively under pressure, its reliability was superb. Its victory in Mexico – a circuit on which it assumed it had no hope, going in – with Hamilton was a perfect illustration of winning by being smarter rather than faster. The James Vowles-led strategy crew numbers around 100 people (most of them at the factory), the software is cutting edge but the crucial factor is probably how well-oiled the team of people very familiar with and respectful of each other are. Toto Wolff guides it with a light but sure touch.



Season Low Point

It happened on two different occasions to two different people, but the theme was the same: the loss of a brilliant individual who brought light to the sport. This was as true of Charlie Whiting's passing on the eve of the season as it was of the great Niki Lauda's just before Monaco. Forty one years earlier Lauda had taken a charging second place there in the Brabham-Alfa BT46. He'd been running in that position when he sensed he had a puncture – and was forced to pit. They turned him round quickly and efficiently and he lowered the lap record in his recovery drive. His mechanic Charlie Whiting checked the tyre that had just come off – sure it had a puncture, but the pressure loss just after Lauda had detected it was just two psi. In their later-life roles they were equally brilliant.



Season High Point

Lewis Hamilton chasing Sebastian Vettel flat-out through the Ardennes countryside, silver pursuing red at 200mph along the valley floor, inches apart, hounding it all the way back up again, through Eau Rouge, the sport's two most iconic teams, two drivers with (at the time) nine world championships between them and so much history. Hamilton pressing, probing, looking for a weakness, Vettel shrewdly covering the right bits of track. Regardless of how it played out, this was the magnificent essence of the sport still visible and beautiful, and at Spa.



GOODWOOD TRACK DAY



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Motor Sport has once again teamed up with Classic and Sports Finance to host a special track day at Goodwood in March 2020. Goodwood Motor Circuit is one of the fastest and most prestigious venues in the country, as well as one of the most challenging. Even the best drivers admit to learning something every time they tackle the layout, with its old-school sweeps providing a testing driving experience.

With the 78th Members' Meeting only just around the corner, this could also be the perfect time to get some testing in before the event, or simply just share the circuit in a safe and fun environment with some of the machines that will be on the grid a week later for one of British motor sport's most exclusive meetings.

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F1 SPECIAL

Year of the GOAT*

Lewis Hamilton's sixth world title sparked fierce debate about whether he was truly now the *Greatest Of All Time. Our historian **Doug Nye** examines the rival claims in the light of a century of racing

Much has been made of Lewis Hamilton's sixth F1 Drivers' World Championship, and of where this may place him in the list of all-time greats.

But upon what parameters have people based their judgements? Even though motor sport is relatively young – around 125 years – 'all time' is one helluva long time – and modern racing is a hugely different activity now from what it was. Race driving today is so altered – and is now shared not just with often-limiting technology (the car) but also with the back-up blanket of radio and telemetry-linked engineers (and commercially-minded managers) – that comparison between historic eras is really impossible.

Unlike other sports, motor racing has not been played on any pitch, nor regulation running track. Instead it's a technological sport, pursued over a variety of courses, by a variety of people, confronting different challenges, using hugely different equipment.

How can one truly compare an era of cork helmets, polo shirts and bulging midriffs with a current climate of Halo head protection systems, Tilke-designed tracks and racing-dog athleticism?

Stats are no help either. Every stat demands qualification, since the number of events and the rules governing them have changed so markedly. Where a World Championship-qualifying Grand Prix was once a relatively rare event, highly valued – as in the truncated 1955 season when only six road-race GPs qualified (discounting the FIA's potty political ploy of having included the Indy 500 in the first place) – there are today 21 each year, so arguably the currency has been devalued.

What, then, might be a worthwhile measure by which to compare great racing drivers from different periods? I was brought up to regard fellow driver's true assessments – not the ones they necessarily admit to, but the ones they hold instinctively – as being the true identifier of an era's standard setter. These standard setters of each era are the stars whose lap times all rivals have instinctively studied first. Stirling Moss once likened the value scale to a pyramid: "On the point up top there's only room for one, then below him there's room for maybe three or four, and below them... there's the rest." And by that measure Lewis Hamilton is most decidedly right up there amongst the greats.

Some 73 years have passed since the resumption of significant motor racing after World War II. Since then, I would identify only 13 drivers who have been the true standard setters. The first of those didn't even live long enough to see an F1 Drivers' World Championship race – and each must be considered in combination with the cars he drove, for one can argue that signing the right team contract has proven to be the only constant on the road to greatness.

This is a tough judgement on great drivers, as not all could top Stirling's pyramid...



Jean-Pierre Wimille 1947-49

Widely regarded as the standard-setting Grand Prix driver of the late-1940s, Wimille was - like Jacky Ickx - the son of an enthusiastic motoring writer. He had begun racing aged 22 in 1930, began winning at significant level in 1932, won Le Mans twice and led Bugatti's team with distinction pre-war. Once peace returned he shone for Alfa Romeo, won 10 major races - larking about with a little Gordini for fun - and as the standard-setting veteran he had become he willingly shared advice and experience with newcomers he rated. Tragically, he ran out of luck - not skill - while practising in a Gordini at Palermo Park, Buenos Aires, Argentina on January 28, 1949 - dead at 40.



Alberto Ascari 1949-53

The son of a famous racer - Antonio Ascari, Grand Prix winner 1924-25 for Alfa Romeo - 'Ciccio' (more or less 'Tubby') Ascari raced motorbikes before cars just pre-war, then emerged post-war with Maserati before being poached by Ferrari - with which he won some 44 significant races between 1949-53 to becoming the sport's first double World Champion, 1952-53. A rift with Mr Ferrari over money made Ascari move to Lancia in 1954-55, and he won the mighty Mille Miglia sports car classic and two non-championship F1 GPs. When Mike Hawthorn joined Ferrari for 1953 'Ciccio' offered to lead him round Spa during practice for the Belgian GP. Mike said at the time: "I stayed with him for a while, but once he decided he'd shown me enough The Old Boy just buggered off!.." That's surely the true mark of a standard-setter. On May 26, 1955, four days after tumbling his Lancia D50 into Monte Carlo Harbour, Ascari crashed fatally in a sports Ferrari at Monza while exploring the after-effects of his ducking. He was just 36.



Juan Manuel Fangio 1951-1957

The rural Argentine mechanic who developed his driving skills - and stamina - in hyper-distance Carretera Turismo racing before aspiring to single-seaters, backed by the Perón regime's national automobile club. Fangio was already 38 when he burst onto the European scene in 1949, driving a club-backed Maserati. Alfa Romeo snapped-up his services for 1950, he won the first of his five world titles in 1951, broke his neck in 1952, then returned to dominance 1954-57 with Maserati, Mercedes-Benz and Ferrari. Fangio's sublime skills were evident in any kind of car, though he would recall: "It was my fortune to have luck in Grand Prix cars, and not in sports cars...", in which category his protégé Moss first beat him. Fangio had the rare gift of maturity combined with a gracious nature, occasionally generous to his rivals. One could sense that his true backbone was of absolute spring steel.



Stirling Moss 1958-1962

In period, absolutely Britain's best - and perhaps the greatest living Englishman. Most leading 1950s-60s drivers maximised income - and glory - by driving everything available. Moss's transcendent skills were shown in F1, F2, F3, sports, GT, saloon and even rally cars. After early years wasted seeking a competitive British car, he began winning in F1 with a Maserati 250F in 1954, earned a Mercedes-Benz drive for 1955 (winning the Mille Miglia) - and learned in Fangio's wheel-tracks. He at last found a competitive British-built F1 car with Vanwall in 1957-58. Having helped achieve its first frontline GP win, followed by the first British victory in the F1 Constructors' Championship, Moss was marooned by Vanwall's withdrawal for 1959. Confident of his own ability and quite fancying the underdog role he then drove for private owner Rob Walker 1959-62 in Cooper and Lotus F1 cars - but the world title eluded him. Still, none of his peers had any doubt who they had to beat. He was only 32 by the time of his career-ending crash at Goodwood in 1962. In contrast to Fangio whose mantra was "The sensible driver wins at the lowest possible speed" - Stirl's was "I love to get stuck in and have a real tear-up..." And amongst modern drivers Hamilton is perhaps his only heir.



Jim Clark 1962-1968

The charming, thoughtful sheep farmer spent his entire F1 career with Team Lotus, 1960-68. By 1961 Moss would describe him as "the only young driver I would fear," and when he began winning races with the Lotus 25 in 1962 it was Clark who assumed Moss the Maestro's mantle. Colin Chapman told me: "I don't think Jimmy ever realised just how good he was," and he certainly sustained a similar humility and respectful popularity to Fangio's before him. Not least he was similarly encouraging and supportive of one who would replace him, fellow Scot Jackie Stewart. The hole in Jimmy's record was that he rarely competed at topline sports car level - a rare shortfall for a race-driving genius. His life was cut short by tyre failure in an F2 Lotus 48 at Hockenheim on April 7, 1968. Like Moss, he was 32.



Jackie Stewart 1968-1973

Cocky, bouncy, wee Jackie just seemed born for greatness - kid brother of established racer Jimmy Stewart. He showed stupendous class from his earliest races, and in 1964 made not only his F3 debut, but also his F2 and F1 debuts and 'straight out of the box' proved almost fully-fledged. He won his first frontline GP in his learning season with BRM in 1965, before his progress was punctuated by the Belgian GP accident of '66. By 1968 with Ken Tyrrell's Matra team he had emerged as the real deal, and three World Championship titles, huge

commercial success and the life of a team principal and entrepreneur ensued, after his retirement at the end of 1973 – aged 34.



Ronnie Peterson 1973-74

Never a World Champion but could anyone claim that Ronnie was not the standard-setting F1 driver of his heyday, with John Player Team Lotus? Ronnie's career path was similar to – if rather slower – than Jackie Stewart's – but before his F1 debut in a private March in 1970 his F3 and F2 exploits had left none in doubt that here was a special talent. Quiet, modest and friendly, the tropical fish-keeping 'SuperSwede' simply grew horns and a tail on track – and was spectacular and quick if his car permitted. Subsequent success of the driver below somewhat submerged Ronnie's status in 1975-78 but what a driver he was. He was 34 when he was killed in the 1978 Italian GP, on September 11, 1978.



Niki Lauda 1975-1981

One of the most dedicated, motivated, bright and uncompromisingly manipulative racers. He won three world titles after gambling every penny on his career. After buying a March drive in 1971 he won a BRM F1 drive for 1973 and announced himself to the team mechanics by declaring "You all think that I am just a vanker – but vun day I vill be World Champion!" And he was. He was perhaps the first modern F1 standard-setter in exclusively driving those cars to the exclusion of other categories. Finding his feet with Ferrari through 1974 he won races but was yet to show maturity. That came in 1975 – and the story of '76, his German GP crash and burns, is just too familiar, and heroic. He bounced back to another title in 1977, later came back after brief retirement 1980-81 to win again with McLaren. He passed away in 2019, aged 70.



Alain Prost 1981-1987

The Professor's metronomic driving style might have made winning look boring but in the neat, near-flawless tradition of Clark and Stewart, Prost was truly special – as his four world titles attest. John Barnard of McLaren described how: "Lauda had been stroking it with us, content that he could beat his team-mate whenever he needed to. But then Alain arrived – and Niki found he had Concorde up his backside..." Gallic flair combined with coolness and calculating control.



Ayrton Senna 1988-1994

A split personality – the brilliant and driven Brazilian came to define selfish obsession and previously seldom-seen determination to win or bust, at anyone and everyone's expense. He and Prost were destructively alike, and caging them within the same team turned it into a pressure cooker. Senna was perhaps the first of the modern-era drivers who could bury the diminishing dangers confronting his profession and go for bust regardless. It is doubly ironic then that the three-time World Champion should have crashed fatally at Imola on May 1, 1994... again aged 34.



Michael Schumacher 1994-2006

The glittering example of the modern-era driver with transcendent talents, ring-fenced, promoted, and his career prolonged by safer circumstances, some fine cars and a well-organised and capable team. The immensely motivated German shared many of the most admirable characteristics of Prost and Senna – combined with what in his period proved consistently to be the quickest tactical mind. From a Daimler-Benz nursery of endurance sports car racing, Michael progressed through his twin Benetton F1 world titles in 1994-95, to those further five in succession 2000-2004 with Ferrari. His team's commitment to his title interests at the expense of his team-mates jarred for many – but what a racer, indeed...



Sebastian Vettel 2011-2013

The four-time World Champion certainly became as adept at brandishing his index finger after winning as he was behind the wheel of his Red Bulls through his successive Championship-winning seasons of 2010-2013. Despite demonstrating the modern-era selfishness of the great racing driver, he is an engaging, interesting personality – a 34-year-old superstar with a rare appreciation of those, and that, which has gone before.



Lewis Hamilton 2014-2019

Tutored, trained and promoted by his father Anthony, the kid from Stevenage has grown almost literally as a lifelong racer, and is very much in the Moss mould – never happier than in a battle on track. While the likes (especially) of Hamilton's hero Senna and Schumacher overstepped the limits of condonable on-track behaviour in their obsessive quest for personal achievement, the 34-year-old's six world titles have been accumulated through tough, uncompromising, but almost entirely sporting drives on track. Less engaging is the occasionally childish post-race reaction to defeat, but even this great standard-setter is not alone in that. And, let's face it, many of the greats that have gone before will look down, and they would understand...


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AERO

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Change is coming for Formula 1, and it'll be one of the biggest sporting overhauls of the modern age. But in such a technical playground, it can be easy to get lost in jargon. **Lawrence Butcher** delves into the 2021 regulations, and explains the effects of the sport's new direction

THE FORMULA 1 TECHNICAL AND sporting regulations for the 2021 season, announced at the Austin Grand Prix, represent the most significant changes to the sport's governance in decades. Liberty Media and the FIA hope that the new rules will revolutionise competition both on and off track.

Trying to improve overtaking in F1 is hardly a fresh idea. You only need look back to 2009, when new regulations, resulting from the findings of the Overtaking Working Group, were supposed to slash downforce and close the field up.

Most teams had nearly matched their 2008 downforce figures before the season even started, and Ross Brawn, then the man in charge of Honda's factory effort, had pointed this out to regulators well in advance. The problem was a lack of technical firepower on the rule makers' part, and the resulting regulations were riddled with loopholes, which teams exploited to the hilt.

Liberty and its FIA counterparts were determined not to make the same mistakes. Development of the new regulations has been characterised by an unprecedented level of research and development, looking specifically at reducing the performance loss suffered by one car following another.

A group of technical experts was assembled with Ross Brawn at the helm, a man whose engineering and management skills need no introduction. Pat Symonds was also enlisted while Nikolas Tombazis, former chief designer at Ferrari, headed the FIA's contribution. The whole operation came under the title of the Aero Working Group.

Rather than taking informed guesses and hoping things worked out, the new rules were to be developed through methodical analysis and testing, making extensive use of CFD (computational fluid dynamics) and other simulation tools as well as wind tunnel tests. The teams' resources were also utilised.

The AWG's starting point was to ascertain how a current car behaves aerodynamically, using the design assets of the defunct Manor team. F1 purchased the design of Manor's 2017 car when the team folded, including the wind tunnel model, giving it an accurate representation of a then-current car.

Analysis of this car allowed the exact aerodynamic mechanisms which create such difficult following-car conditions to be pinpointed. Brawn and Co knew the primary problem was the wake of air generated by a leading car. The research, which first sought to establish the accuracy of their simulated car's wake and then looked at its impact on a following car, gave clarity as to the areas that generated the most disturbance. Although an F1 car has a plethora of complex aero appendages, there are a few key parts that produce the bulk of downforce: the front and rear wings, the front edge of the floor and the rear diffuser. Almost every other part is there to condition the flow over these to make them perform as well as possible (maximum downforce for minimum drag).

The front floor, and further downstream the rear wing and diffuser, are driven by the flow coming off the central section of the front wing (often referred to as the Y250 vortex), which is fettled and refined by the many small turning vanes and other devices under the nose and in the barge board area, steering it either under the car or around the sidepods.

To keep these flows tidy, aerodynamicists do everything possible to push the messy wake from the front wheels outboard, rather than letting them get sucked inboard. This outboard wake was identified as the main culprit in disrupting flow over a following car.

Once the rules development team was happy that the results seen in CFD were an acceptable representation of reality, a concept model was designed that aimed to prevent the problems. Development and refinement of this model took place through the end of 2018 and into 2019, using input from the teams to assess its performance and also suggest alternative design solutions.

> "Locking down areas of car design that really matter will be a factor"



According to the AWG simulations, a 2019 car loses around 45 per cent of its downforce when following one car length behind another, and even five car lengths away concedes 30 per cent of its aero performance. The final iteration of the 2021 concept showed a loss of just 14 per cent when directly behind and minimal losses at greater distances.

An impressive result and one that should translate relatively well into reality. However, locking down areas of car design that really matter will still be a defining factor.

Engineers within the paddock were, by and large, impressed with the research. Speaking earlier in 2019, before the rules were officially unveiled, Racing Point technical director Andy Green said: "This is the first set of work I have seen [from F1] that has gone into so much detail on the following car, with a real focus on what is actually happening and how you go about mitigating the losses to the car behind. It looks like a great piece of work and is unprecedented."

Key changes explained:

Aero

The 2021 rules will demand a near total reset of teams' designs. For the last three decades aero development has been an evolutionary process, optimising the front and rear wings, a flat floor and diffuser.

In '21, the cars will move to a ground effect concept, with underfloor tunnels developing the lion's share of downforce (although a front and rear wing are still needed). Rather than pushing a wake to the side, the rules seek to drive the majority of it under the car or over the rear wing, ejecting it in a tall 'mushroom' at the rear, clear of a following car.

Coupled to this concept, most of the small aero adornments, that Mercedes' James Allison has referred to as 'aero porn', are gone. The new cars will have a much cleaner aerodynamic profile; all of the small flicks and vanes were deemed to be part of the messy wake problem. Allowing their proliferation on the new cars would provide too much opportunity to corrupt the concept.

Bargeboards will also vanish, but there will be some scope for teams to develop the shape of the inlet to the underfloor area. There will also be freedom around the nose, the number of front wing elements, the rear wing supports and areas such as the roll hoop.

The tightest controls are reserved for the space around the front wheels, incorporating the front wing, brake ducts and the brake 'drum' housing that sits inside the wheel.

The new Formula 1 regulations for 2021 will bring change to almost all areas of the cars, and it's not all purely for aerodynamic benefit. Here are the key areas where you can expect to see some big differences.

FRONT WING

The front wings will assume a swept-back shape. There is no scope for additional winglets and vanes as seen in the past, with the form an evolution of the 2019 profile. Any additions that would help force air outboard of the wake are banned and the profile of the end plate is tightly controlled.

FRONT SUSPENSION

Trick suspension components such as hydraulic springs and inerters are outlawed. The brake ducts and wheel 'drum' design will be constrained such that they cannot be used to push air outboard. A move to a spec brake system was dropped from the 2021 changes. Hubs and wheel nuts must be spec parts, as are the wheels, which will increase from 13 to 18 inches in diameter.



FRONT FLOOR

Bargeboards will be gone, instead, the front floor area will feature inlets for the underfloor tunnels. Teams will have some design freedom in this area. The shape of the cooling inlets on the sidepods will also be relatively open in their design.

COCKPIT

Additional safety features will be added to the main tub. The internal dimensions of the cockpit will increase so as not to penalise larger drivers. New side-impact structures will improve protection and a prescribed front floor structure will help reduce damage from kerb strikes.

POWER UNIT

The current hybrid turbo 1.6-litre V6 power units will remain almost in their current state. However, in order to limit development costs and make it harder for teams to exploit fuel flow rules, development of the fuel systems will be banned. Instead, spec high-pressure fuel pumps will be introduced.

CONTROLLED AERO, BUT STILL SOME FREEDOM

The FIA and Liberty wants cars to look different from 2021, so showed off three varied chassis designs that could be created under the new rules.



REAR WING

The most striking change to the rear wings will be the lack of traditional end plates. There will be design freedom in the area of the main wing elements and supports, but not so much as to allow any reduction in the wing's role in driving air from the underfloor high above any following cars.

TRANSMISSION

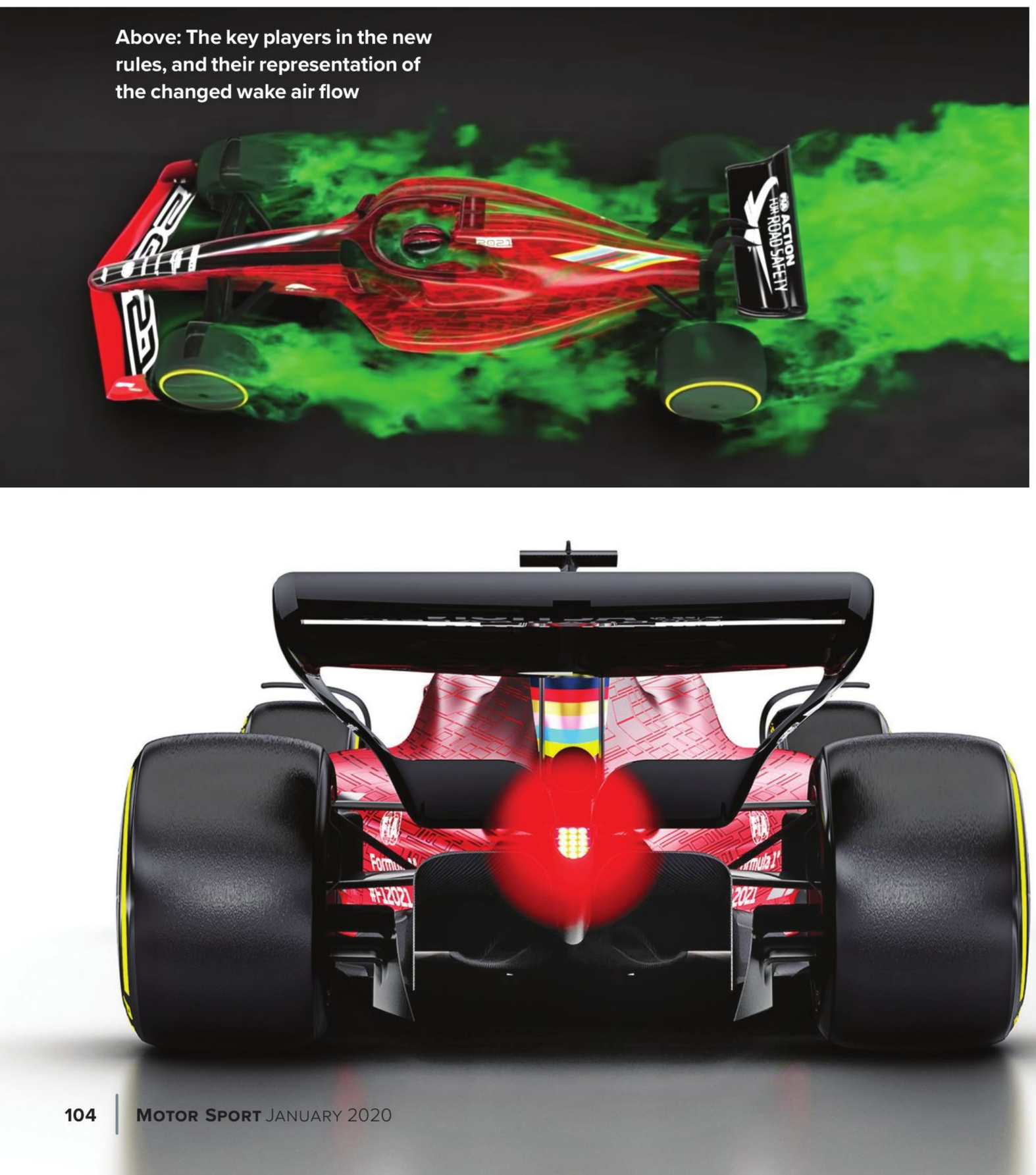
Gearbox development will all but end. Teams will only be permitted to change their transmission design once in a five-year period.



The 2021 aero concept will bring back the use of ground effect to create downforce



Above: The key players in the new rules, and their representation of the changed wake air flow



The latter will be a spec part, deemed too sensitive to the overall aero concept for teams to be allowed to alter, while the brake duct and wing have a much-simplified form, with geometric constraints that should stop aerodynamicists steering the air outboard.

Overall, and beyond the big-picture concept change to ground effect, the main visible impact of the new rules will be far fewer aero flourishes on the cars. Unless the rule makers have really slipped up, there will be no surprise aero add-ons appearing in the way, for example, T-wings did.

Aero development is going to be about massaging the surfaces of the car. Ben Agathangelou, head of aerodynamics at Haas, says: "That will force the hand of aerodynamicists to focus much more on macro surface evolution, rather like we do with the [2019] front wings we have now as opposed to just bolting parts on."

Ultimately, aerodynamicists are well versed in working the air to their benefit; there will be a learning curve, but they will find ways to gain performance just as they always have done. New caps on CFD and wind tunnel usage will make finding these gains trickier, but it will not be insurmountable.

PROS: The new aero rules will, in theory, create more 'raceable' cars, while the constraints on testing coupled to the budget cap should reduce the disparity between the haves and have-nots.

CONS: Less engineering freedom, which many argue is part of F1's DNA – any strokes of aerodynamic genius will likely be less obvious to fans. The better resourced teams will still find ways to chase a greater number of development avenues.

Power units

The power units will remain relatively untouched from their current form. However, there will be an imposition of some spec components, particularly in the fuel system; for example, the high-pressure fuel pump and associated parts. The rule-makers' reasoning is that preventing development of the fuel system should make circumventing the rules around fuel flow even harder than it already is, while also reducing costs. This may affect some engine suppliers more than others, as the combustion systems in the modern hybrid engines are so refined that even very subtle changes can have an effect on performance.

There are some additional stipulations around the use of 'exotic' materials in the power units, but many of these are simply evolutions of the current rules, an example being a requirement for any materials used

to be commercially available (although the wording appears to exempt any proprietary materials already in use prior to 2019).

It is a change in the sporting regs that will likely have the greatest impact on the power unit development race. For the first time, there will be a cap on dyno testing time as well as constraints on the type of equipment used. Currently, engine manufacturers can run as many development engines or MGUs as they like, allowing them to try out many different ideas simultaneously. Capping dyno time and the number of dynos in use will curtail this activity to a degree.

As evidence of the bartering process between the teams, Liberty Media and the FIA, the rules stepped back from a previous proposal to use a spec transmission system across the field. Instead, constraints will be placed on the minimum size and weight of the transmissions and teams will only be allowed one update in a five-year period from 2021, the intent being to remove the gearbox as a performance differentiator.

PROS: The move to spec parts in some areas and the limitations on development should reduce costs for customer teams.

CONS: As development of the power units begins to plateau, gains will become harder to find; manufacturers will still invest the same resource for lesser returns.

Chassis

The most visible change for 2021 will be a switch to 18-inch wheels, a long talked-about shift. This will alter the way engineers have to manage the detail of a car's suspension design, as the tyres (which act as an undamped spring) will have a lower profile. Meanwhile, there will be a significant simplification of the components used, with brake systems, suspension parts and other ancillaries all subject to tighter control.

For example, some teams currently use complex systems of hydraulic springs, interlinked dampers and devices such as inerters to help control the attitude of the car; a vital aspect of maximising aerodynamic performance. In 2021 these will be effectively banned, the rules explicitly stating that only traditional springs and dampers will be allowed, with their function being closely monitored. Therefore many of the tools chassis dynamicists and aerodynamicists use to control the car will be lost.

There will also be tighter constraints on using the suspension members, such as the wishbones and pushrods, to influence aerodynamics. As an example, the outboard suspension mounts will have to sit within the volume of the wheel rim, rather than outside. This will outlaw some of the current setups, where the upper wishbone mounts sit very high (for example, on the Mercedes W10) and limit the scope for clever placement of the suspension arms for aerodynamic gain.

PROS: The simplification of suspension should reduce cost and could lead to less control over setup. This may create greater unpredictability in performance between teams from race to race.

CONS: The reduced number of setup tools in teams' engineering arsenals will make it harder to work around potential flaws in their car designs – for example, underworking or overworking the tyres.



MOTORSPORTIMAGES

"Engineers' sole intent will be to bend the rules to maximise performance"

Breaking the rules

For teams' engineers (and despite PR announcements that may say the contrary) their sole intent will be to bend the new rules and maximise performance. That is their job and it would be a challenge to find any engineer in the paddock willing to say with a straight face they develop with equal competition between cars as their goal.

Those running the sport accept that this is the reality of competition and to be fair, the teams (particularly the big players) have made some significant compromises regarding the size of their collective creative playpen. In the development of the new rules, Liberty and the FIA have gone to great lengths to try and limit the sheer engineering level that Ferrari, Red Bull, Mercedes et al have to subvert the intent of the regulations.

The most important aspect here is that the aerodynamic concept only works in conjunction with new methods incorporated within the rules for defining bodywork dimensions. Previously, the majority of bodywork was dictated by square bounding boxes, within which parts had to fit.

Under the 2021 rules, the regulations prescribe much tighter constraints on both the size and the shape of parts, based on a new coordinate system and verified at the track using optical scanners to compare the real car to CAD data. Add in the use of spec parts in key areas and the hope is, while not watertight, that the main wake-influencing features will be unbreakable.

Additionally, the sporting regulations now incorporate mechanisms to allow easier alteration of the rules if someone does find a gaping loophole. Currently, if a team comes up with an idea that skirts the intent of a regulation it requires a unanimous vote on the teams' part to change the rules mid-season. From 2021, only an 80 per cent majority will be needed to pass a vote, making it much quicker and easier to outlaw solutions that aim to negate the benefits the new car designs should bring to the racing spectacle.

PROS: The underlying aerodynamic concept should remain intact through the teams' development process for 2021, which theoretically will translate into closer racing.

CONS: The tighter constraints cut down on engineering freedom, while the greater ease of mid-season rule changes means that if someone does have a clever idea, it will be easier for other teams to get it banned quickly. It won't matter if the team with the idea is large or small, reducing the chance for a surprise performance from a small outfit that has had a stroke of genius.

We can't know for certain how the new cars will really look until the start of launch season in 2021, but in all likelihood, the renderings shown in Austin will be a be a fairly close representation.

First and foremost, the new rules must contribute to closing up the field, and help create a level of even competition that has been absent from the sport in recent years. These rules alone will not flatten the playing field entirely, but at the very least, new regulations always provide the opportunity for some upset.

Quotes from the Paddock

The best lines from the drivers, officials and engineers who had their say in 2019

"I haven't given Chase's job any consideration."

Mercedes maestro Toto Wolf on rumours that he is in line to take over as head of F1



"Tom, do you know what that was? Smooth operatooooooor"...

"Carlos, check the radio, we seem to have picked up some dodgy music..."

Carlos Sainz serenades engineer Tom Stallard after finishing P5 at the Hungarian Grand Prix

"Well, if they claim to have 1000hp then they have a really bad car"

Max Verstappen on talk Renault had broken the 1000bhp barrier

"Bring back the f*****g V12s"

Sebastian Vettel has his say on future regs after his retirement from the Russian Grand Prix

"F1 is stronger with Silverstone and Silverstone, equally, is stronger with F1."

John Grant, chairman of the BRDC, on securing the British GP at the Northamptonshire track

"To all women on this planet: if he massages like he is treating his tyres in Mexico, then it's just pure magic!"

Sebastian Vettel on Lewis Hamilton's tyre management after the Mexican Grand Prix





"We have a Formula 1 superstar in England, but do we appreciate him? **Probably not.**"

Bernie Ecclestone on Lewis Hamilton's home popularity

"We must keep pushing because we have more championships to win, more races to win."

Lewis Hamilton after winning a record-breaking sixth consecutive constructors' title with Mercedes, and his sixth drivers' crown

"They can file for divorce straightaway if there's going to be any more"

Max Verstappen says mechanics' marriages will suffer with next year's 22-race calendar

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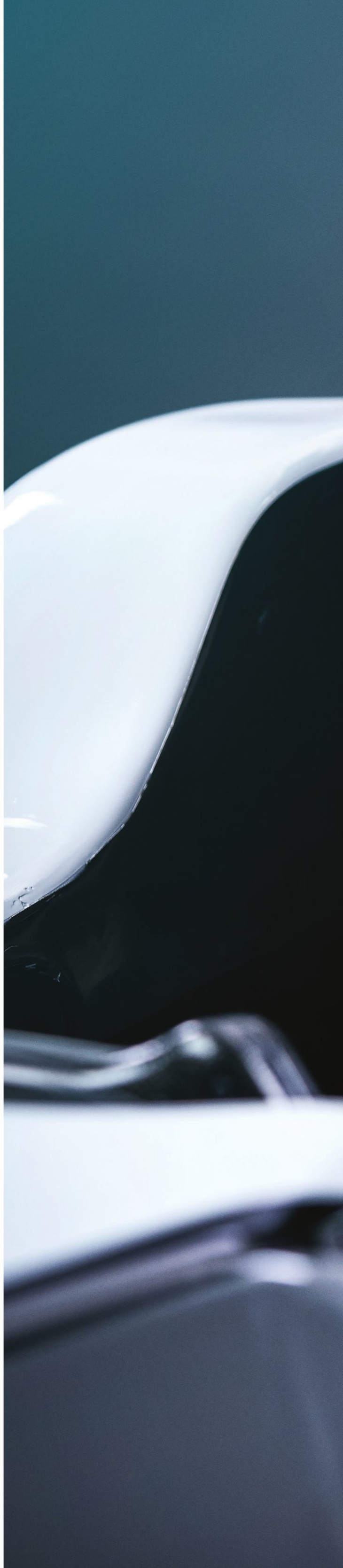
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BUTTON'S NEW BOOK

Life off the leash

F1 SPECIAL

Jenson Button learned a lot over his 18 years as a grand prix driver, and his new book reveals some home truths about a career in the sport. He speaks to **Robert Ladbrook** about F1, comebacks and panic attacks



TURNS OUT THAT AN 18-YEAR career spanning 306 grand prix starts, 15 victories, 1235 title points and a world championship also gives you plenty of prime material for future books.

Jenson Button's latest offering isn't your usual run-of-the-mill autobiography, plotting his career trajectory from the Formula Ford Festival to Brawn GP and everything in between. This work draws on almost every aspect of Button's life in and around Formula 1, often leaning toward how *not* to do things rather than being a straightforward and predictable user's guide.

Therefore, the title - '*How to be an F1 Driver*' - is rather misleading. Instead, the book is about highlighting the pitfalls of being suddenly world-famous and the stupid things that seemed like such a good idea to a young man with money to burn. It's about arguments with your engineers, playing nicely (or otherwise) with sponsors, travelling the world with your life in just your hand luggage and coping with the stresses and strains of the sport outside the cockpit as well as within it.

Following on from 2017's more formulaic *Life to the Limit* - Button's straight-edged autobiography - this book takes an entirely different direction. Whereas the first book covered the predictable stuff, this second work feels more like Button unchained. You can tell that certain binding contracts have lapsed, sponsorship agreements are

Jenson Button has opened up far more for his second book, covering a wide range of topics, both good and bad





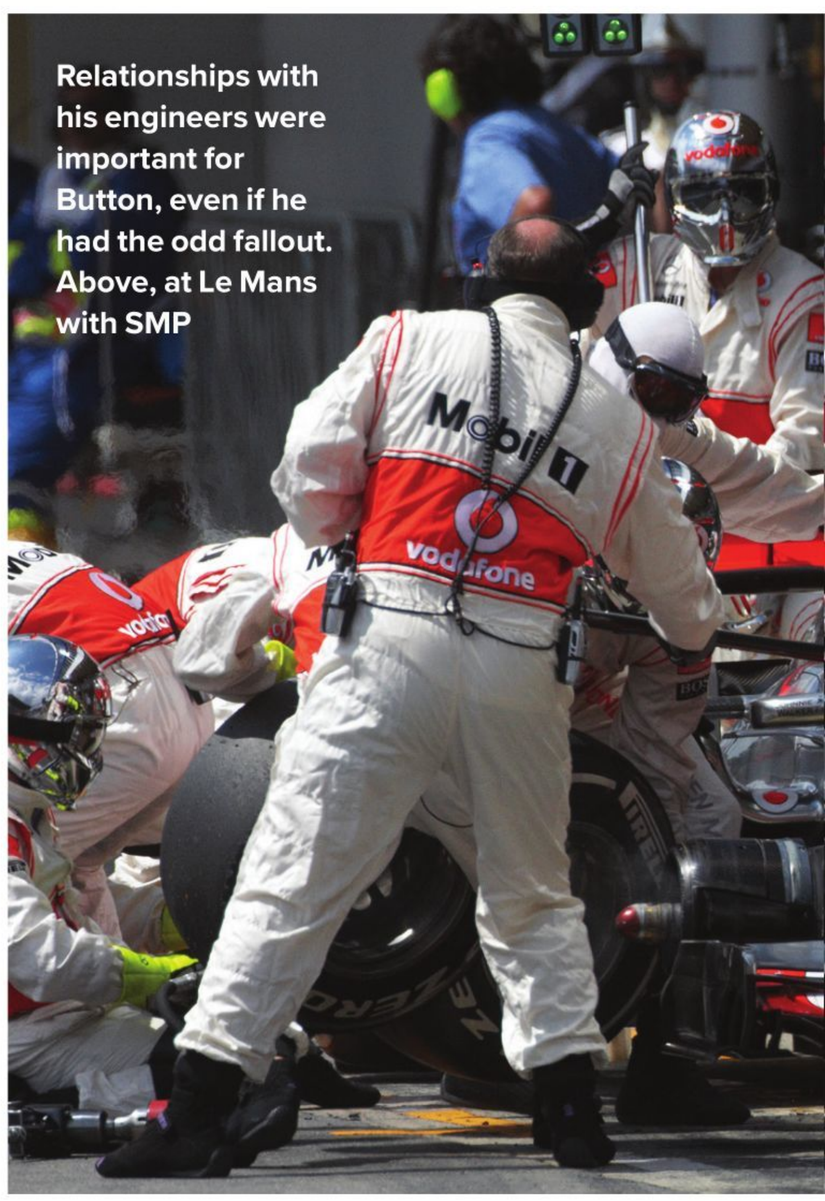
Button has won in Super GT (left) to add to his 2009 world title with Brawn. Left, as you'd expect keeping a boat in Monaco isn't cheap...







That Monaco comeback in 2017 took some self-persuasion



Relationships with his engineers were important for Button, even if he had the odd fallout. Above, at Le Mans with SMP



settled, and Button is finally free to say pretty much whatever he likes. That freedom leads to a spree of factual information and data, but delivered with an accessible and casual style that conveys the character of the cheerful, self-effacing Jenson we all know.

"If you're going to create something that people actually want to read, then it has to come from the heart, and it has to resemble who you are and what you do. It has to mean something," Button says when I ask about what makes this title stand out from his first.

"It was much more difficult to write than the first book. That was simply my life and career, and the story wrote itself. I had a much wider spread of topics with this book.

"The book had to be accessible and enjoyable, first and foremost. When you look at some F1 books out there they can be pretty heavy going and you do wonder how many people will have the drive to stick through them until the end. I didn't want a dry, technical book like that. I thought back about my career, and it turns out that I've done some really stupid things where I look back and wonder what the hell I was thinking. I think we all have those moments where current you looks back at younger you and wonders what you were thinking and how you should have done things differently. It's very personal, and going back through old photos was a very therapeutic process.

"I felt there was a lot of information that people hadn't read, but at the same time it couldn't be boring. I had to put my twist on it, which is why it perhaps reads a bit more like a chat down the pub. The first book was purely about my life, but this one is about life in F1, the small details behind the scenes that the fans don't get to see or hear about because the questions are so rarely asked about how a car actually feels through a corner, or how the balance shifts. I do go fairly in-depth with the technical stuff and the actual driving process of an F1 car. The title might make it sounds like it's a book for kids looking to work their way up the racing ladder, but it goes a lot deeper than that."

And one for the kids it certainly isn't. This is a book for those who want to see a different side of both F1 and Jenson Button. There are no startling revelations about his rivals, teams or contractual disputes, but instead there are surprises of a different sort. There are many colourful and often very funny private anecdotes - such as the crazy financial logistics of trying to save on hotels by owning a luxury motorhome, yet still having to fork out for somebody to drive it to and from tracks and then pay for them to stay in said hotels instead, which rather negates the point. Or the perils of buying a yacht that's almost twice your salary. But around those run a series of more uncomfortable truths.

Button opens up about his own anxieties, out-of-body experiences, how he suffered panic attacks and dealt with crippling anxiety early in his career that would leave him confined to his hotel room instead of testing. It paints a very different side to the man who always remained a bastion of calm within an otherwise turbulent paddock.

"Those elements may surprise some, because they're not things that F1 drivers talk about," Button adds. "But so many people do struggle with anxiety and mental health and I had to deal with those sorts of things during my career, too. I've turned up to races thinking 'Why am I doing this?' It's crazy what your mind can put you through. I wondered about whether to include them, but ultimately I felt they were important because it could help anybody in a similar situation to know that it's a normal

> "It paints a different side to the man who was always so calm in an otherwise turbulent paddock"





While 2009 was Button's pinnacle, he does admit to feeling drained by his years in F1

reaction, and we all have our moments. It's comforting to know it's not just you."

Even shortly before his 2017 Monaco comeback to deputise for Fernando Alonso, Button had second thoughts.

"There was genuinely that moment where I wondered if I really did have to drive an F1 car again," he says. "Being out of the car doesn't help, especially when things have moved on technology-wise. I wouldn't say I was nervous, but there was definitely that sense of 'do I really have to do this? Can't somebody else do it?' but it's hilarious how quickly it all comes back. Much like any of these things with anxiety, once you force yourself to do something the adrenaline kicks in and you remember why you love doing it. I was laughing my head off after two laps in that McLaren..."

"They told me not to stay too close to anyone as my car could lose downforce and take off..."

If there was one criticism that could be levelled at his first book, it was that the elements you really wanted to know about - such as the tempestuous McLaren-Honda rebirth - weren't covered in detail. This isn't an issue here. Button has been far more liberal with advice, criticism and opinion. He wades into 12-hour drinking benders in Monaco, reveals amusing clashes with team members, openly criticises V6 engines and DRS and talks about how his post-F1 career has rejuvenated his love for the sport.

"In F1, you do feel limited in what you can say - like the young drivers now who can find it very difficult to know how many truths or opinions they can share," he adds. "Post-F1 I've definitely been able to relax, but I think the whole sport is becoming more open. There's the [Netflix] series that shows the drivers' personalities more. I definitively felt more at ease to write some sections due to the way the sport is headed."

Chapters on Le Mans 24 Hours and Super GT, from which he has just retired, bring the book up to date, and there's even an insight into his forthcoming Baja 1000 off-road outing alongside long-time friend Chris Buncombe.

"Le Mans was a real eye-opener for a few reasons," Button says. "First, I hadn't really been in the car before the race, and it was the same car that had backflipped at Spa in the previous race. Then they told me not to stay within two lengths of the car in front as it might lose downforce and it could happen again! So you think 'Oh, OK... s**t!' and it doesn't inspire much confidence. The car was also very pointy, which made it a handful down the Mulsanne, which is a road with a centre line that cambers downward to the outside for drainage. Each time you crossed that centre line the car would pull to one direction, which was quite unsettling. But I loved the experience. It was stressful, but wonderful as the atmosphere is amazing. I will definitely be back, but first I have the Baja to look forward to.

"Off-road racing is a different world. They're crazy - they drive flat-out in the dust, and you can hardly see your own hands! Mentally I cannot do that, and that's great because I'm learning new things. If you're doing something and not learning from it, then what's the point in doing it? That's one of the messages I wanted to get out most from this book. You have to keep learning and wanting to improve and better yourself. It's an information book more than anything. To give fans a better understanding of what we do and what we go through both in and out of an F1 car."



How to be an F1 Driver
by Jenson Button
is available now in
all good retailers.
Blink Publishing, £20
ISBN 978-1-788-702-61-4

Button's Best Bits

Jenson Button's new book is littered with insight and sprinkled liberally with anecdotes. Here we select five of our highlights

1 Fearing his comeback

Button had no intentions of returning to F1 after his retirement – until Fernando Alonso got his Indy 500 deal, which meant then-McLaren Racing head Eric Boullier recalling him for Monaco in 2017.

'I want you to race at Monaco...'

'But I've not driven the car. I've been training and decorating. If you need advice on what shade to paint your wall I'm your man, but chucking me in at Monaco..?'

I was stalling, we both knew I was contractually obliged to drive. I called Richard Goddard, my manager. 'Can I get out of this?'

He said: 'Well, not really, no. I mean, they're paying you a lot of money to basically do nothing apart from be on call if they need you.'

'But I didn't think they'd need me.'

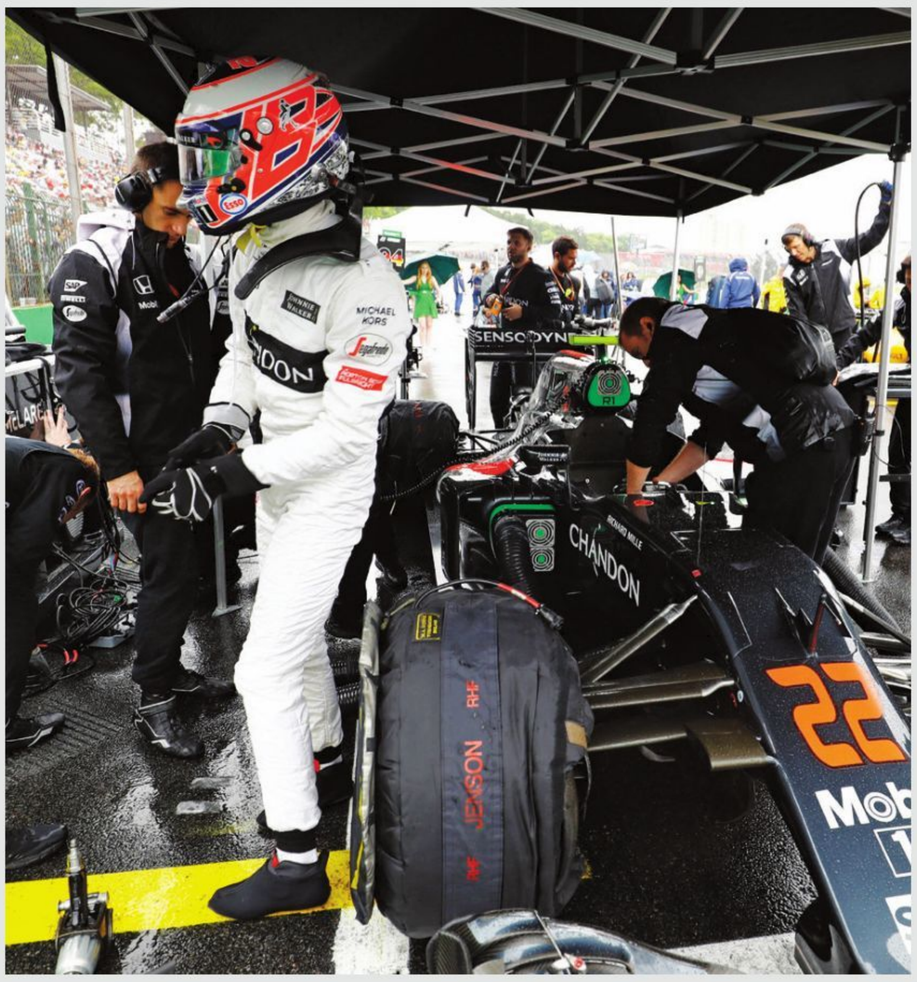
'Well, they do. They want you to drive their F1 car in the world's most prestigious grand prix. Hard life...'

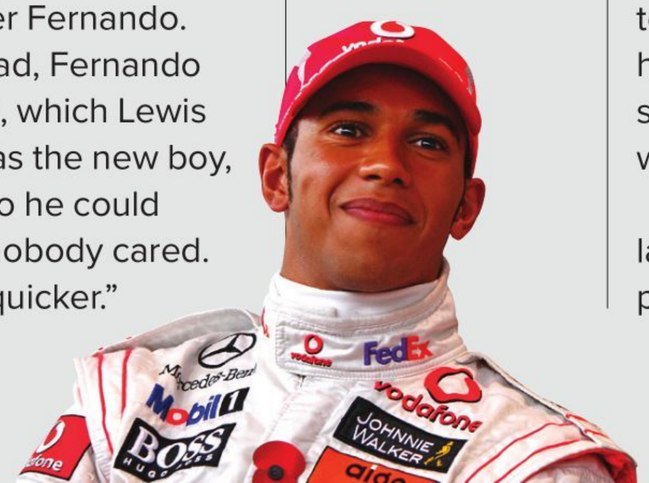
2 Lewis vs Fernando

It was one of the big 2000s rivalries, with young Briton Lewis Hamilton upstaging his two-time world champion team-mate Fernando Alonso at McLaren. Button gives his take on the situation.

"At the start, Fernando would destroy Lewis, but Lewis would look at the data and do a bit of Sherlock Hamilton: 'Oh, he's braking there. OK, I'll brake there.'

It shouldn't be as easy as that, but it somehow was for Lewis, so he'd hammer the brakes where he thought right and be as quick as Fernando. Not quicker. But *as* quick. And this would bother Fernando. Lewis got into his head, Fernando made more mistakes, which Lewis didn't because he was the new boy, under no pressure, so he could make mistakes and nobody cared. He ended up being quicker."





The 2016 Brazilian GP (top) was a turning point. Below, Lewis 'got inside' Alonso's head

3 Nerves and panic attacks

Mental health is in prime focus in modern society, and even F1 world champions aren't immune. The usually super-calm and collected Button confesses to having more than the odd moment of mental fragility. Especially during that soaking wet 2016 Brazilian GP.

"For the first time ever in an F1 car, I was scared.

I didn't tell anyone at the time. I've hardly told a soul since. But I suffered a loss of nerve that day. It was because I knew I was retiring, and as a result all I could think about was hurting myself.

I was thinking too much, and I was scaring myself. My head wasn't in the right place and that's the worst scenario as you tense up, and when you tense up it's so easy for the car to snap. You can go through a corner, hit a river and if you snatch at the steering it's bang! – you're into the wall at 150mph.

"...Of those who finished, I came last. I was embarrassed with my performance. I was gutted."



4 Racing at Le Mans

Button made his debut at La Sarthe as part of the Russian SMP Racing LMP2 team. While the race didn't go well – the car lost huge amounts of time with a technical issue, and then the engine blew up – Button writes about his first experience of a night stint.

"I ran into Chrissy [Buncombe] as I was taking my helmet off. He looked at me with an expression of complete shock. He said: 'Are you OK?'

'I think so,' as I stared at him with wired eyes that were as big as saucers.

'Well, it's just you're white. Like Persil white.'

I think it was the sheer effort of concentrating in the dark. They don't tell you how much racing at Le Mans takes out of you. I was all over the shop, like I'd had five shots of tequila for lunch, lurching drunkenly one way and then the other."

5 Leaving F1

Button reveals that his decision to quit F1 wasn't a spur of the moment one, and it actually came to his mind far earlier than many think.

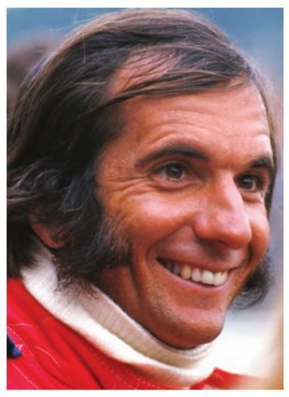
"It wasn't because I wasn't quick anymore, because I was. I still had the pace and felt I was still doing a good job.

It was just that life had taken its toll. The old boy [his father, John] not being there was a big part of it, but on top I was just tired. I mean *really* tired. Mentally drained, which drained me physically as well.

I got to the point three years before I retired when I said I couldn't do it anymore. 'I just want to stop racing'.

I'd had offers from other F1 teams – three different ones – but nobody was able to offer me a car that could win, so it wasn't worth it..."

Formula 1



Emerson Fittipaldi



Mika Häkkinen



Fernando Alonso



Gilles Villeneuve



Ronnie Peterson



Mike Hawthorn



Make your voice heard

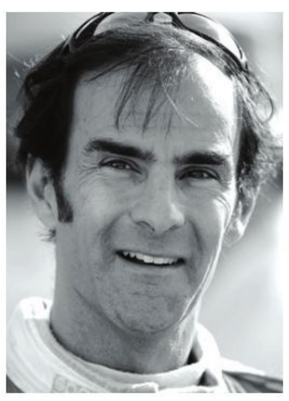
Time is running out to cast your vote in the 2019 Hall of Fame. Simply pick your favourite name from each of our three categories shown here and go to our website to make your choice. Voting closes on December 6 and the results will be announced before Christmas.

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Sports Cars



Olivier Gendebien



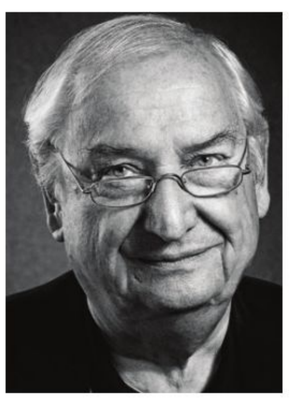
Emanuele Pirro



Stefan Bellof



Vic Elford



Norbert Singer



Pedro Rodríguez

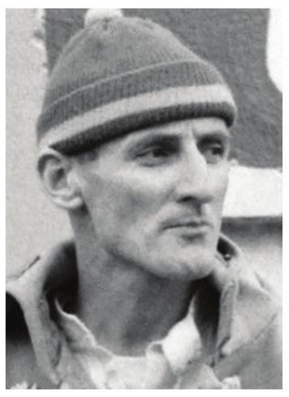
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THE STORY OF STAN BARRETT

Sonic B

BOOM

Forty years ago, a journeyman daredevil called Stan Barrett appeared to have broken the sound barrier, but ongoing disputes led to him being excommunicated from the speed record club. **Preston Lerner** hears his story

Facts are facts, but the truth can be ambiguous. That's the paradox underlying Stan Barrett's quixotic efforts to convince a disbelieving world that he was the first man to break the sound barrier in a wheeled vehicle.

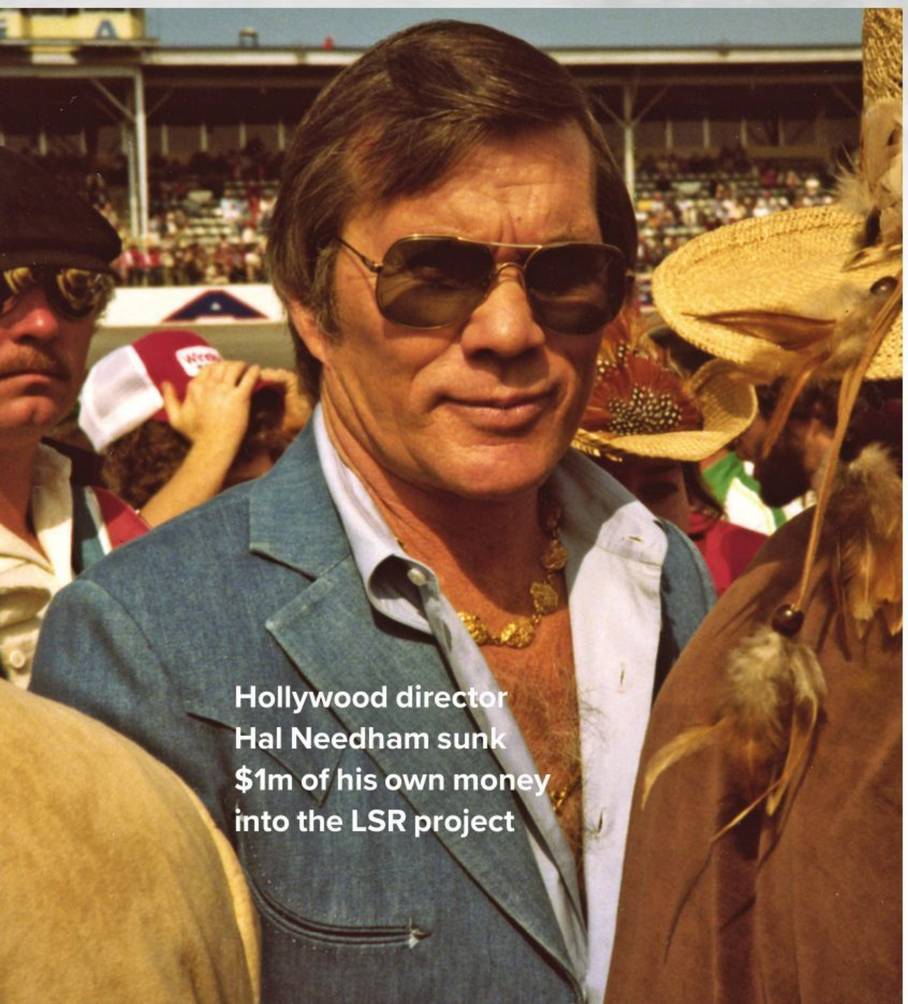
First, the facts: 40 years ago on 17 December, Barrett – a Hollywood stunt man with no motor sport experience – wriggled into the cramped cockpit of a long, slender rocket with a needle nose, a wicked dorsal fin, a single front wheel and spatted rear wheels mounted like outriggers on a Hawaiian canoe. Known as the Budweiser Rocket, the bright-red projectile was powered by a hydrogen-peroxide motor that produced 24,000 pounds of thrust. Shortly after dawn, at Edwards Air Force Base in Southern California, Barrett lit the fuse and hung onto the dragster-style butterfly steering wheel with his bare hands. Within four seconds, he was doing 250 miles per hour and leaving a huge cloud in his wake. Eight seconds later, he ignited a Sidewinder AIM-9 air-to-air missile – with the warhead removed, naturally – protruding from the tail. The extra 4,000 pounds of instantaneous thrust propelled him past 730 miles per hour and up to the threshold of Mach 1.

Then came the ambiguity.

Some observers said they heard a sonic boom, a sign that the sound barrier had been breached, but others didn't hear anything. Although Barrett said the ride suddenly smoothed out near the end of the powered run, suggesting that he'd gone supersonic, naysayers claimed that this was merely because his wheels briefly left the ground. The pitot tubes mounted in the nose to measure air speed malfunctioned. Even worse, the crew had miscalculated the rocket's fuel consumption, so Barrett was slowing rapidly when he blasted through the timing lights at 'only' 666.234mph.

GETTY

The Budweiser Rocket's controversial land speed record run at Edwards Air Force Base made the *Guinness Book of World Records* before later being stripped of that honour



Hollywood director Hal Needham sunk $1m of his own money into the LSR project

Fortunately, Air Force technicians had tracked the run with military equipment.

"Here's what we've got so far," car builder/designer Bill Fredrick shouted as Barrett was levered out of the cockpit. "We ran out of fuel between 200 and 400 feet before the timing lights. But we got 734 on radar and 739 on air speed." Then, to wild cheering from the crew, he added: "We probably broke the speed of sound!"

'Probably' broke the speed of sound?

Breaking the sound barrier is like getting pregnant: either Barrett did or he didn't. And going supersonic was the whole reason that car owner Hal Needham, the director of movies such as *Smokey and the Bandit*, had sunk $1 million of his own money into what he dubbed Project SOS, for Sound Of Speed.

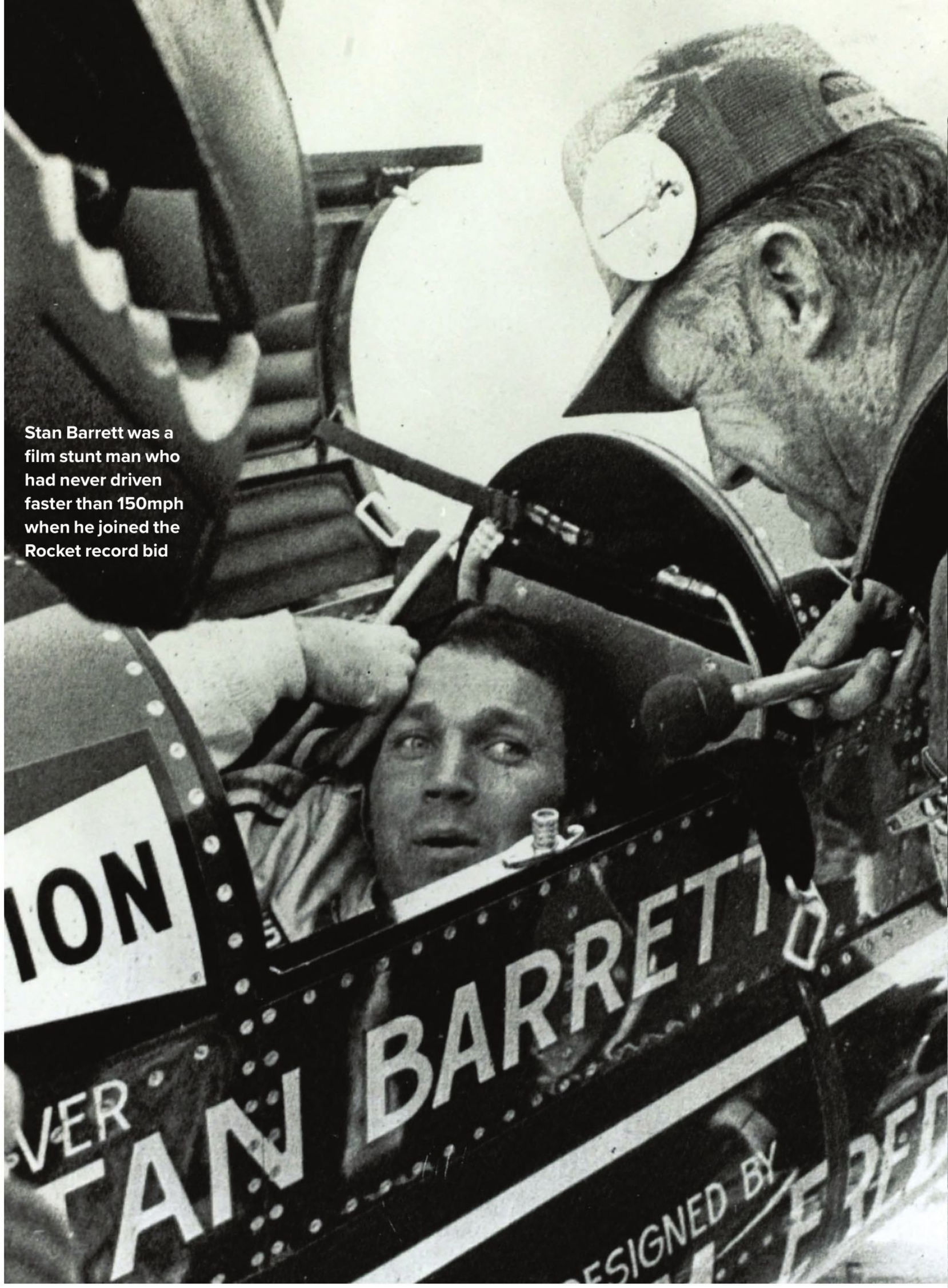
Needham and Barrett had to endure 11 hours of nail biting while Air Force engineers analysed the data. It wasn't until after dark that the Project SOS team announced that the Budweiser Rocket had maxed out at 739.666mph, 8mph faster than the speed of sound (which fluctuates according to altitude and temperature).

'Radar Confirms Supersonic Run', screamed a banner headline on the front page of the local newspaper. In the story beneath it, Needham declared mission accomplished. "If [Air Force engineers and technicians] are accurate enough to tell the speed of an airplane at 10,000 feet 20 miles away, I'll take their word on the car's speed down here," he crowed. "If they won't believe the Air Force, who will they believe?"

Sure enough, the Budweiser Rocket graced the cover of the next edition of the *Guinness Book of World Records*. But the backlash started immediately. Sceptics – which included pretty much everybody in the close-knit land speed record community – pointed out that the Air Force never confirmed Barrett had exceeded the speed of sound. All the military did was provide raw data, which was converted into a top-speed number by the Project SOS team. Initially, at least, the Air Force declined to take a position on the sound of speed controversy. As a spokesman explained: "In our judgment this data would not be certified."

The Budweiser Rocket's most prominent critic was former land speed record holder Craig Breedlove, whose opinion carried extra weight because he was the most famous American in LSR lore. "Frankly, it just didn't happen," he said. "It was a marvellous car, and it was a tremendous effort, but it didn't go supersonic. That claim, in my opinion, was fraudulent."

Over time, Breedlove's take hardened into conventional wisdom. The Budweiser Rocket was erased from subsequent editions of the *Guinness Book of World Records*, and Andy Green is almost universally lauded as the man who broke the sound barrier in ThrustSSC in 1997. The Budweiser Rocket was reduced to the answer of a trivia question, and Needham died in 2013 as a pariah to the LSR community.



Stan Barrett was a film stunt man who had never driven faster than 150mph when he joined the Rocket record bid

Barrett is another story. Now 76, he's still as affable and engaging as ever. A long-time boon companion of the late Paul Newman, Barrett is a devout Christian who's travelled the world many times over doing good works. Even sceptics who've got no time for the Budweiser Rocket stop short of throwing Barrett under the bus. This, after all, is a man who went at least 730mph, which is hauling the mail whether the ground speed translated into Mach 1.01 or Mach 0.99.

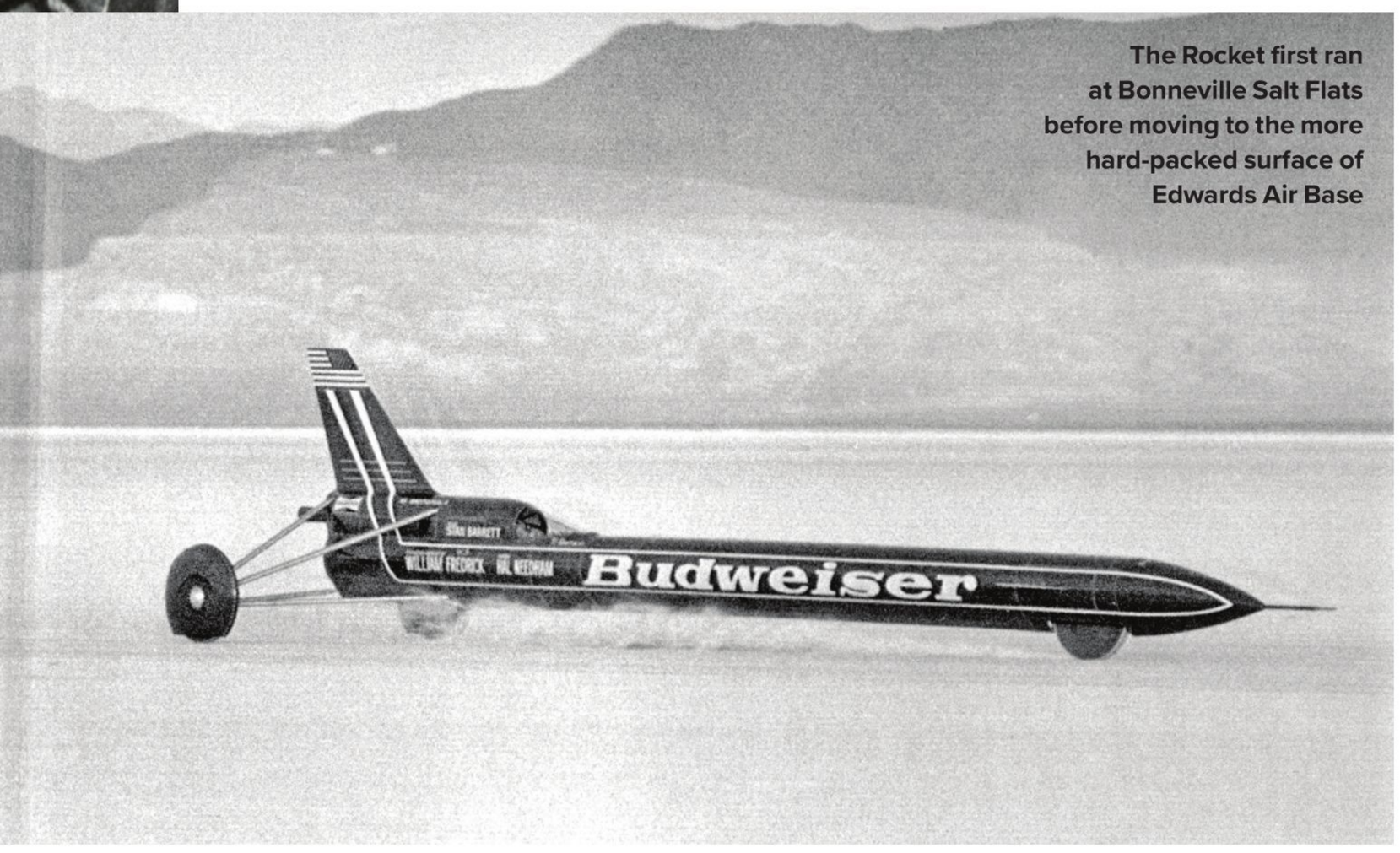
Project SOS was often mocked as a stunt – a charge that resonated on several levels. To begin with, Needham had no interest in following the arcane and challenging protocols necessary to set a land speed record. Among other requirements, the rules require two runs in opposite directions within an hour, then averaging the speeds through a measured mile or kilometre. All Needham wanted to do was break the sound barrier and call it a day.

Speaking of stunts, Needham himself had come to fame as a stuntman, while Fredrick designed equipment for movie stunts. But Fredrick moonlighted as the builder of ingenious LSR and drag racing machinery. In 1962, he created one of the first jet-powered cars, the Valkyrie I, and he soon progressed to rocket motors. In 1977, stunt woman Kitty O'Neil drove his SMI Motivator to a woman's speed record of 512.710mph. Needham later achieved 620mph in the same car before his parachutes failed and he embarked on history's fastest off-road excursion. Although he wasn't hurt, the mishap inspired Needham to retire from driving. But he was still committed to breaking the sound barrier. So he hired his protégé, Stan Barrett, to drive a new car he had commissioned from Fredrick.

A former Gold Gloves boxing champion and black belt in two forms of karate, Barrett was fearless by definition and as precise as a high-wire trapeze artist. But he'd never driven faster than 150mph before, and he

"It was a tremendous effort, but that car didn't go supersonic"





The Rocket first ran at Bonneville Salt Flats before moving to the more hard-packed surface of Edwards Air Base

was shaken by the molar-rattling violence of the ride during his first run in the Budweiser Rocket at the Bonneville Salt Flats.

"Everybody was so excited when I got out the car," Barrett recalls. "They asked me, 'Do you have any idea how fast you went?' I almost said, 'Did I just break the land speed record?'" Actually, he'd gone only 350mph, and the speed of sound seemed light years away. "Ain't no way!" he thought. "I may have written a cheque that I can't cash!"

It didn't take long for Barrett to find his groove. On his ninth run at Bonneville, he hit 638.637mph. But the forged-aluminium wheels of the rocket car dug deeply into the salt, nearly causing him to wreck. Needham realised he needed a stouter surface to go supersonic. So he leaned on his friend Chuck Yeager - yes, that Chuck Yeager - to get the team access to Edwards Air Force Base, the hallowed home of the Right Stuff, where Yeager had broken the sound barrier in '47.

Rocket's 'records'

Figures gained from the Budweiser Rocket run

739.666

The mph Project SOS said the Rocket reached, breaking the sound barrier...

Mach 1.01

...which equated to this Mach figure, which was also later disputed.

24,000 lbs

of thrust was produced by the Rocket's hydrogen-peroxide motor.

18 years

later, Thrust SSC and Andy Green officially broke the sound barrier

4,000 lbs

extra thrust from a Sidewinder AIM-9 missile pushed the car past 730mph

1979

It was 40 years ago, on December 17, that Stan Barrett made his Rocket run

Barrett and the Rocket's run (*right*) might have been dismissed by critics, but he still thinks of himself as the first man to break the sound barrier







GETTY

"The data looked like what you'd expect – ugly and primitive"

The hard-packed surface of Rogers Dry Lake was perfect, but the hydrogen-peroxide motor ran out of oomph at 677mph. Needham bought six Sidewinder missiles, and Fredrick jury-rigged a mount for one of them in the tail of the Budweiser Rocket. During the first twin-rocket pass, Barrett reached 714mph. And on his 18th and final run, he exceeded the sound barrier.

Or did he?

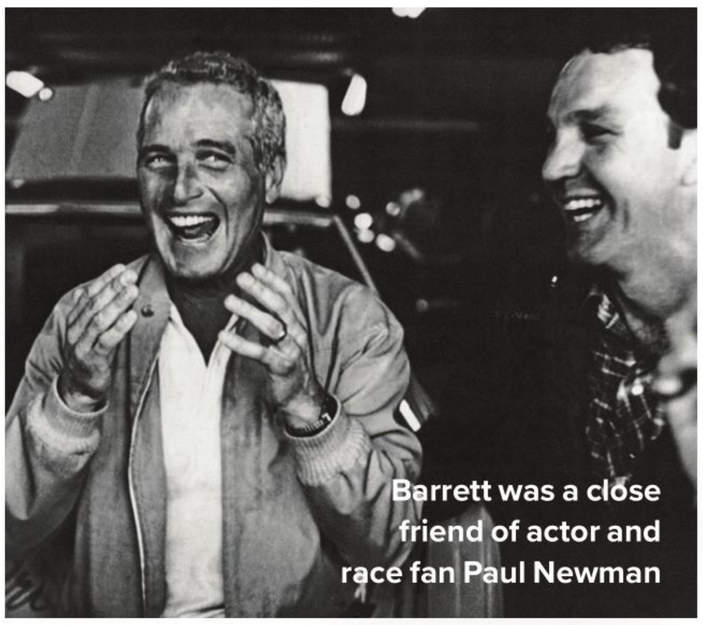
Dick Keller is the most persistent and persuasive non-believer. An engineer by training, Keller was one of the creators of the Blue Flame, which Gary Gabelich had driven to the land speed record of 622.407mph in 1970 (and which was the template for the Budweiser Rocket). After enlisting the aid of a US senator, Keller was able to get his hands on the raw data the Air Force had provided to the Project SOS team.

Keller discovered that the range data provided by the radar tracking the Budweiser Rocket had been compromised by all the other activity at the base. (It was later reconstructed by driving a heavily instrumented truck along the path followed by Barrett.) Also, since the radar had been operated manually, the azimuth – or angle to the object being tracked – wasn't perfectly consistent. "[The data] looked like what you'd expect – ugly and kind of primitive," says David Audley, who was then a captain at Edwards.

After laborious calculations and mathematical gymnastics, Audley and his cohorts came up with three data points where the car appeared to have exceeded the speed of sound. The Project SOS team then averaged these three data points, which yielded a speed of 739.666mph, or Mach 1.0106.

Keller dismisses the numbers as fantasies. "Typical calculated speeds alternately increased and decreased continuously by as much as 100mph 20 times per second during the 1.4 seconds of released data!" he wrote in a detailed analysis. "The obvious lack of precision suggests that the calculated speed cannot be known at the one per cent level. Not even close! So a claim of Mach 1.01 is even more ridiculous than the claim the car was 'timed' by radar."

The Air Force also had doubts of its own. But it also had access to additional resources. An accelerometer was removed from the car and sent to the instrument calibration laboratory of Northrop Corp. By comparing acceleration with two known speeds and distance points – 0 at the start and 666.234mph at the timing lights – the device was accurately calibrated.



Barrett was a close friend of actor and race fan Paul Newman

After that, it was a straightforward matter of using calculus to translate acceleration into velocity. This prompted the Air Force to officially adjust the speed to 736.4mph, or Mach 1.006.

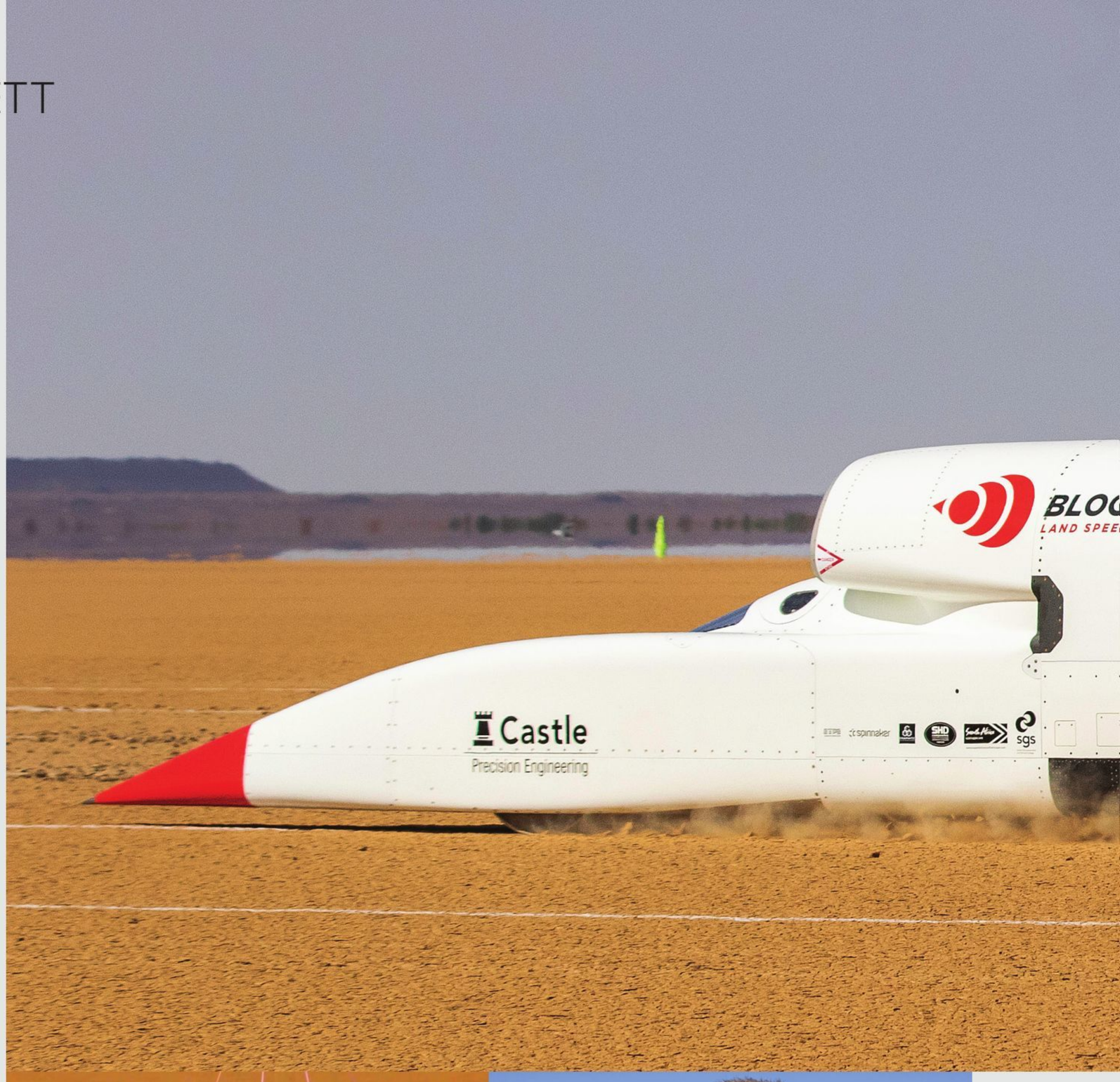
Even so, Audley wasn't absolutely convinced. A few years later, while teaching at the Air Force Institute of Technology, he was the advisor to a student – Captain David Reinholz – who was looking for a subject for his master's thesis. At Audley's suggestion, Reinholz wrote a 183-page paper memorably titled '*Stochastic Estimation Applied to the Land Speed of Sound Record Attempt by a Rocket Car*'. According to two alternate but equally valid forms of analysis, he concluded that Barrett had gone either 740.94mph, or Mach 1.0123, or 737.75mph, Mach 1.008.

"I've got a very high level of confidence that the car was barely – barely – over the speed of sound," Reinholz says. "We had really good accelerometer data. Without that, the USAF never would have claimed anything." Audley, who is now a professor of applied mathematics and statistics at Johns Hopkins University, stands by his one-time student's findings. "I don't have any skin in the game," he says, "and I'm convinced that they did it."

But there's one final wrinkle. The speed of sound fluctuates according to air density, and density is affected by temperature and altitude. The calculations for the Budweiser Rocket were based on an ambient temperature of 20 degrees. But what if it had been a few degrees warmer? "Nobody knows how fast the Budweiser Rocket went, nor what the target ground speed was for Mach 1.0," Keller says. "I would suggest a hung jury at best regarding the sound barrier."

Your mileage may vary, of course. Still, Barrett is entitled to the last word. "I know what I did, and the prayer I prayed was that God would get the glory, not me," he says. Then his blue eyes twinkle, and he adds, "I welcomed Mr Green to the club. But he was not the first member." ○

RANDY TAYLOR/AP/SHUTTERSTOCK, BLOODHOUND









Dab of oppo: Andy Green's mobile office



Bloodhound in full flow with afterburner engaged to increase thrust. Its best run of 628mph is 135mph shy of the current record

Rocket men still going for glory

A successful desert testing programme has breathed new life into the British attempt to set a new Land Speed Record – all they need now is more thrust...

The Bloodhound speed team has gone from bankruptcy to brilliance in record time with a successful testing programme that has put the entire project back on track. Just 12 months ago the team was facing the prospect of administrators taking angle grinders to the jet-propelled vehicle and the future of the project and the dream of bettering the current world land speed record looked bleak. Fast forward to November and the group – under new ownership – is now feeling confident of a successful attempt on the outright Land Speed Record (LSR) as early as this time next year.

The renewed confidence comes after a testing programme in Hakskeen Pan desert in Northern Cape, South Africa, that featured Bloodhound reaching incrementally higher speeds over a period of two weeks. From an initial test speed of around 500mph it accelerated steadily to a final top speed of 628mph (1,010km/h).

There is more to come: Bloodhound was running with only the thrust of a jet engine – an EJ200 jet engine normally found in a Eurofighter Typhoon combat aircraft. The car's design allows for a rocket motor to be fitted, too.

When this is installed next year the team is planning on making its assault on the current world record of 763mph (1,228km/h), which was set 22 years ago.



The high-speed test programme aimed to examine how much drag the car created in a number of different scenarios and at various speeds.

Data from 192 pressure sensors on the car has been monitored and compared with the predicted CFD (computational fluid dynamics) models to check whether they correspond. Bloodhound's engineers are working with academics from Swansea University to examine the data. During the last run analysis showed airflow beneath the car went supersonic and stripped the paint from an area three meters back from the front wheels. The data generated from the runs will reveal the amount of drag experienced by the car on each run, which in-turn will determine the size of the rocket that will be fitted to the car for the attempt on a new LSR. For comparison the EJ200 generates 9kN of thrust, roughly equal to 54,000bhp, while the additional rocket will add an extra 60kN of thrust.

RAF pilot Andy Green, who also holds the current record with the ThrustSSC car, paid tribute to the perseverance of the team. "The stability and confidence the car gives me as a driver is testament to the years of world-class engineering that have been invested in her by team members past and present. With all the data generated by reaching 628mph, we're in a great position to focus on setting a new world land speed record in the next year or so."

Bloodhound's new owner, Ian Warhurst, said: "We've demonstrated that the car is eminently capable of setting a new world land speed record."

Niki Lauda: The early years



Before he rose to the world stage with Ferrari, Niki Lauda had an eclectic early career. A brilliant new book by **John Saltinstall** charts the great Austrian's formative exploits race by race and paints a remarkable portrait of the artist as a young man



SUTTON IMAGES



Lauda's first race car was this humble Mini Cooper S, which he bought from touring car racer Fritz Baumgärtner. He traded his road-going version in the deal

Bad Mühllacken hillclimb

15 April 1968, **Group 1,** Mini Cooper S
Result: 2nd in class

In the entry as 'A N Lauder', this was the young Austrian's first motor sport event. He took part in his ex-Fritz Baumgärtner Mini that he and the car's former owner had fettled to deliver some 100bhp. The purchase price had included a few exploratory laps at the Semperit tyre company's Kottingbrünn test track, where, to the surprise of the Mini's vendor, Lauda had immediately found the ideal line, showing none of the hasty over-excitement so often displayed by newcomers. Baumgärtner, one of the best touring car drivers in Austria at the time, was impressed, but cautioned the youngster that as these few laps represented his only experience of the car, for his first competitive outing he should use no more than 8000rpm rather than the 9000rpm max.

Lauda surprised with his self-discipline as he stuck to his self-imposed limit — also avoiding any damage that he could ill afford to pay for. A clean, steady first ascent was good enough for third-quickest. Using another 500rpm, his second run was fastest outright and gave him second place in his class, 1.5sec off the overall victor.

Tauplitz hillclimb

4 August 1968, **Group 2,** Porsche 911S
Result: 1st in class, 7th overall

This was an event near Graz on the 6.1-mile (9.8km) Tauplitzalm Alpine Toll Road, a challenging mountain course that was used on the European Hillclimb Championship trail. While practice took place in bad weather, the day of timed runs dawned fine.

Early on, however, proceedings were marred when the popular Kary Seitz crashed his Porsche RSK fatally.

Pushing aside any misgivings about the narrow mountain road and its unprotected drops, Lauda took a comfortable class win and seventh place overall. Impressively, his time was quicker than those achieved by the winners of the classes for over-2-litre Sports & Special Touring, GT and Formula Vee cars.

Continental Preis

3 August 1969, **Formula Vee,** Kaimann Mk4
Result: 2nd

Helmut Marko and Lauda were in a class of their own in this German GP support race on the Nürburgring Nordschleife. The battle between the two Austrians had added spice as Marko was paid by McNamara while Lauda – five years his junior – was unpaid at Kaimann, and the F1 bosses were watching. Lauda was the first to break the 10min FVee lap record in practice, but Marko was only a fraction slower. Both started on the front row in a field of 50 cars.

The lead changed constantly and their duel lasted the whole race: every one of the six laps was faster than their qualifying pace, and Marko established the new lap record as the battle reached its climax. Down the Döttinger-Höhe straight for the last time, Marko forced Lauda onto the grass and took the win. They finished nearly a minute ahead of the field. The atmosphere on the podium was icy.

Lauda's first single-seater exploits came in a works Kaimann Formula Vee, where he battled hard with Helmut Marko



The 'Black Widow' was a modified Opel Rekord Series C, which Lauda rated as the worst car he ever drove

Internationales Flugplatzrennen

13 July 1969, **Group 2,** Opel Rekord 1900 'Black Widow'

Result: Retired (engine)

The infamous 'Black Widow' was Opel's unofficial works car that had been given to Kaimann boss Kurt Bergmann (minus its 180bhp engine) when the programme was abandoned at the end of 1968. It was an aluminium-bodied Rekord Series C that had been built out-of-hours at the Opel factory. Created as a 'ringer' to challenge the works BMWs, in various hands it regularly outran Porsche 911s as well.

After acquiring the car, Bergmann installed a new Kaimann-tuned engine and entered it at Tulln-Langenlebarn for his young Formula Vee driver, Lauda. Starting from 11th on the grid and having made a rather poor getaway, Lauda was soon the fastest man in the 20-lap race, passing car after car until he was stopped by engine failure midway through. He later remarked that it was the worst car he ever drove; there is no evidence that it ever won a race, so it certainly did not live up to its hype.

Nürburgring Six Hours

12 July 1970, **Group 2,** BMW 1602

Result: Retired (distributor)

Lauda had intended to make his first racing appearance in Britain for the third round of the Interserie at Croft, but instead took up the offer of a paid seat with the Alpina BMW team in the more prestigious Nürburgring Six Hours the same weekend. Originally the Alpina team had planned to pair Paul Bergner and René Herzog in a 1602 model in its bid for the 1600cc Division 2 crown against 93 other hopefuls, but after a series of breakages in practice Bergner switched to a private 2002Ti and Lauda was installed in his place.

The race was run at record speed and was dominated by works Alfa Romeos after the failure of all the best BMWs, that of Lauda/Herzog included. After a fairly nondescript run, their engine expired before half distance due to distributor failure and they posted the race's 37th retirement. Coincidentally, the sister Alpina entry of Lauda's Formula 3 racing buddy Gerold Pankl stopped on the same lap with a broken engine mounting.

Österreichring 1000km

10 August 1969, **Group 4,** Porsche 910
Result: 21st

The Österreichring's first full international meeting was a prestigious one as the spectacular new circuit hosted the final round of the International Championship of Makes, the name by which the world championship for sports cars was then known. For this 1000km race, styled the Grosser Preiss von Österreich, the Bosch Racing Team gave Lauda a one-off drive in its Porsche 910, partnered by Otto Stuppacher, the car's owner. The combination qualified fastest of the 2-litre runners, although some doubts were raised over the accuracy of the official practice timekeeping and times were only given for each car and not for individual drivers.

Stuppacher took the start and handled the first stint of this 170-lap contest, although his efforts were unremarkable and left Lauda with some work to do when he took over. After two stints each, the duo finished ninth in their class and 21st overall, the last finisher still running, 37 laps behind the winning Porsche 917 driven by Jo Siffert and Kurt Ahrens. This was, incidentally, the legendary 917's first victory.



Lauda leads Karl von Wendt's similar Porsche 908/2 at the Norisring. Below: sampling rival Marko's Formula Vee

200 Meilen von Nürnberg

27 June 1970, **Interserie,** Porsche 908/2
Result: 3rd in class, 5th overall

Lauda took part in the Can-Am-inspired Interserie with a second-hand Porsche 908/2 – a 3-litre Spyder that Porsche had developed for 1969 – and ran it with Austria's Bosch Racing Team. Lauda was only able to afford the car thanks to help from a Swiss businessman seeking an association with his father: Niki agreed to intervene on the man's behalf in return for funding, naturally without Lauda Sr being aware of the arrangement.

The first round was a 200-mile contest split into two parts at the Norisring, each comprising 41 laps, with results determined on aggregate. While big-engined Group 5 and Group 7 machines such as Porsche 917s and Lola T70s filled the top eight places on the grid, Lauda was third-quickest of the 3-litre Group 6 runners, lining up 11th. His 908/2 was among five such cars in the field, but only one of them, driven by Pedro Rodríguez, out-qualified him.

Lauda was involved in a close battle for seventh in the race with three 908/2s, driven by Karl von Wendt, Helmut Marko and Helmut Leuze. He had got the better of both von Wendt and Leuze when, on lap 19, Marko collided with a Porsche 907 they were lapping. Lauda finished sixth.

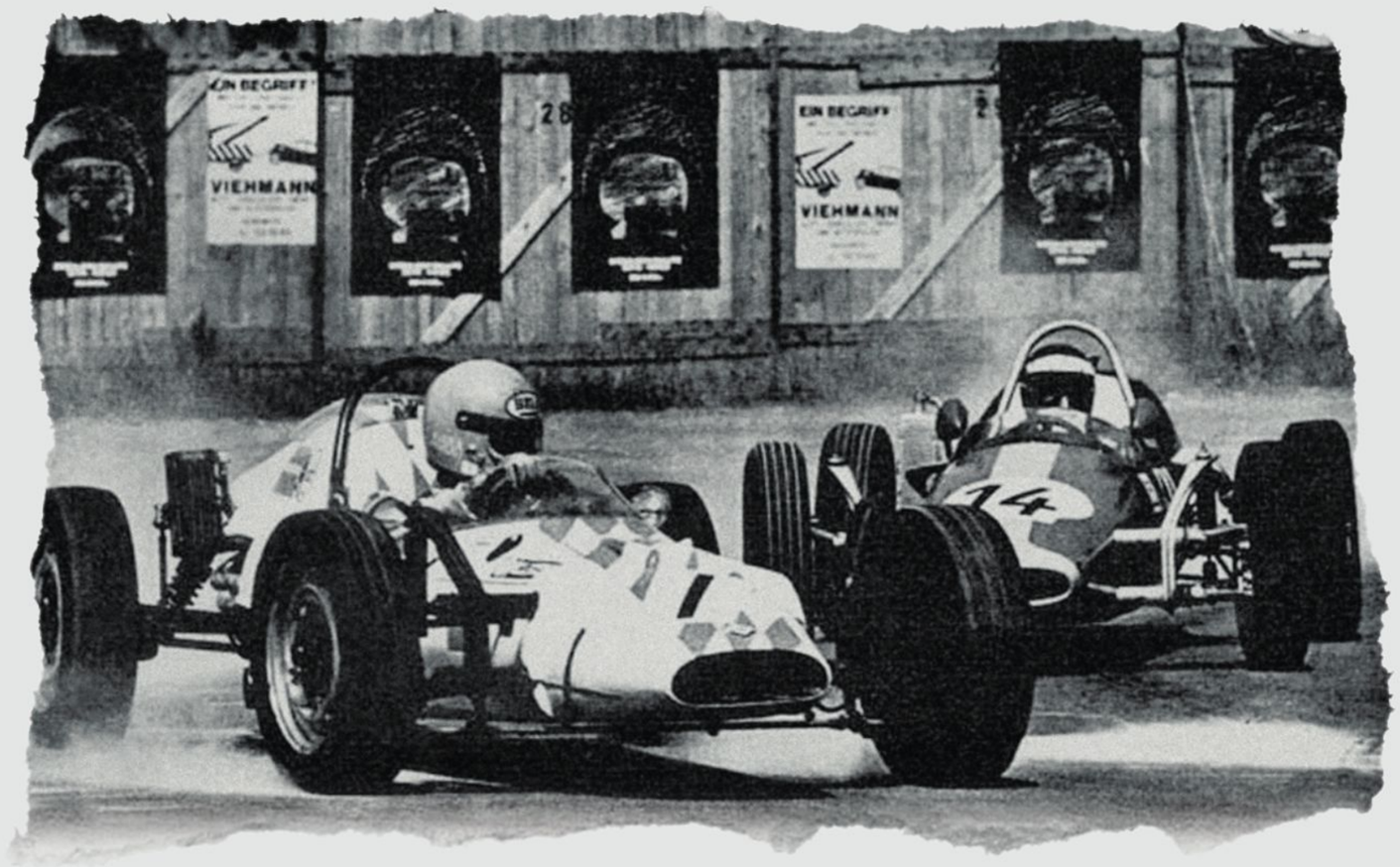
Lauda was sixth in race two, his same three 908/2 rivals occupying the next three places. His aggregate result was fifth, and an impressive third in the 3-litre category.

Lauda said the 908/2 was the car that impressed him the most in his early career.

Norisring testing

27 June 1970, **Formula Vee,** Olympic
Result: Tweaks for his rival

While at the Norisring, Lauda briefly drove his compatriot Helmut Marko's Olympic during practice for the Formula Vee race. Marko had switched from McNamara for the 1970 season, but by now was finding that the MAHAG-Olympic team seemed to be losing its motivation. Having long since buried the hatchet with Lauda after their fracas at the Nürburgring the previous summer, Marko – aware of his countryman's growing reputation for mechanical understanding – sought his opinion of the German car. Lauda's feedback must have been useful, for Marko went on to win the following day. In this photo, Niki rounds the old Grundig Hairpin, a corner that would disappear from use when the circuit was shortened after Pedro Rodríguez's fatal accident a year later.



LAUDA'S FIRST RACES

Formula 3 in 1970 wasn't an easy season for the young Lauda, who struggled to make an impact with the un-winged McNamara chassis

Kanonloppet

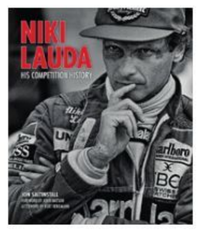
9 August 1970, **Formula 3,** McNamara Mk3B
Result: 3rd in Heat 2 (fastest lap), 5th in Final

Lauda's repaired McNamara was now back in action [after a heavy crash at Brands Hatch in July], wearing new pale blue bodywork in place of its usual green. As at Brands Hatch, the size of the entry meant the event was run as two 16-lap heats and a single 32-lap final.

Lauda took part in Heat 2 and qualified fifth. Although he got away slowly, dropping to 10th, he was soon duelling hard with David Purley (Brabham), the pair slicing through the field. Lauda passed five cars, including his team-mate's, and on lap 11 lay fourth, right behind the leading trio, Purley among them. When Purley's car lost its nose on the last lap, the Austrian was elevated to third place and also took fastest lap; he finished only 12 seconds adrift of Gerry Birrell's dominant wing-assisted Brabham.

As his heat had been a little slower than the first, he started eighth on the grid for the final. Driving carefully on a track made slippery with oil, he ran seventh from the start but lost a place to Sten Gunnarson's Brabham on lap three. Promoted by a couple of spinners, he fought with Gustav Dieden (Brabham) for sixth and by lap 18 both had moved up again so he was then fifth, a position he held to the flag.





WHAT HAPPENED NEXT?

After his difficult 1970 season in Formula 3, Lauda found himself broke and with little in the way of career momentum. To kick-start things for him again, he gambled by taking out a £30,000 bank loan, secured against a life insurance policy, to buy his way into the March team for Formula 2 for 1971. Already against his racing dreams, Lauda's family were enraged, leading to him cutting many ties to focus fully on the sport. In the middle of that year, March promoted him to his first grand prix start in his home race – the Austrian GP at Spielberg. He qualified on the back row and retired with steering problems, but his potential was clear. The rest, as they say, is history...

Niki Lauda: His Competition History by John Saltinstall is available now from Evro Publishing.
£60 ISBN 978-1-910505-46-5

This book is available from the Motor Sport shop *shop.motorsportmagazine.com*

What could have been: Alex Caffi's eclectic career didn't include much F1 success. Right: In action for Scuderia Italia in 1988





The curious case of Alex Caffi

History records that he finished no higher than fourth in a world championship grand prix, but that masks what might have been. **Simon Arron** tells his tale

IT REMAINS A STATISTICAL QUIRK that Italy produced two drivers who between them won three of motor racing's first four world championships but has yet to conjure another, despite frequent strength in depth borne of the nation's deep-rooted passion for the sport.

Take the 1980s...

It was a time when such as Michele Alboreto, Mauro Baldi, Ivan Capelli, Pier-Luigi Martini, Enrico Bertaggia and Stefano Modena showed sparkling form on the sport's nursery slopes, yet only the first named would advance to become a grand prix winner. Alex Caffi was part of that potentially golden generation, but faded almost as quickly as he had flourished, his Formula 1 career over before he'd turned 28.

Caffi could have been forgiven for turning his back on the sport, but at 55 he's still active, competing occasionally, running his own car and motorcycle racing teams and relishing every second.

"I'm still around," he says, "because I absolutely love the sport."

There was an inevitability about the direction Caffi's life would take, because his father Angelo was a regular hillclimb competitor, as were two uncles, so he grew

up amid sound and spectacle. "I began riding a motocross bike at seven and was racing from the age of 10," he says. "I could perhaps have made that my career, but I was more interested in four wheels and transferred to karts at 16. I did that for just one year, then switched to Formula 4, an entry-level single-seater with a four-stroke Benelli engine and chain drive - almost a cross between a car and a bike." He then graduated to Formula Fiat Abarth - featuring curious, wedge-shaped single-seaters in which most of Italy's period hopefuls cut their teeth - and did well enough to land an Italian F3 seat for 1984.

Caffi won twice on his way to second in the championship - a result he repeated the following year - but the end of that campaign was to prove particularly significant.

The original European F3 Championship had been canned at the end of '84 and replaced by a single, winner-takes-all event - in this instance at Paul Ricard. Caffi dominated from pole, earning himself an F1 superlicence in the process, although at the time he didn't appreciate the full significance.

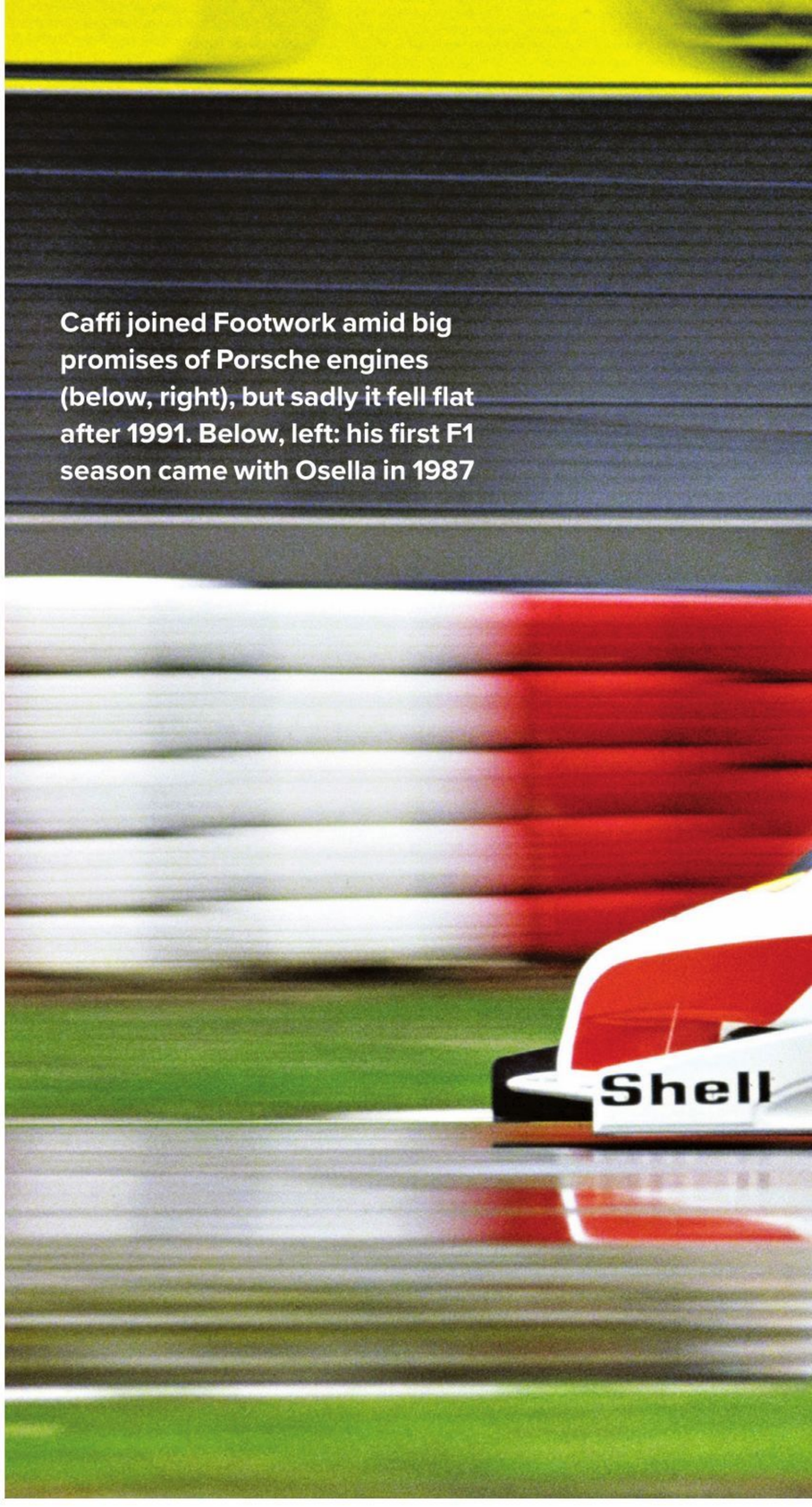
"Logically, my next step should have been F3000," he says, "but I simply didn't have a budget. I accepted an offer to remain in F3 [slipping to third this time], but then Osella needed a driver to replace Allen Berg in the Italian GP - and because of my Ricard victory I had the right licence.

"From the moment I started racing the only idea I had in my mind was to become a professional - my target was Formula 1, obviously, because that's what everybody wanted to do, but I didn't expect it to take only five years.

"I knew the Osella was uncompetitive, but that didn't matter because it was the realisation of a dream. With hindsight, though, it was absolutely crazy. It was the turbo era - with maximum boost on ultra-soft tyres during qualifying - and even Osella's Alfa Romeo engine was capable of producing about 1200bhp, at least for a few laps. That was less than the others had, of course, but still felt like a lot.

"Today drivers do endless simulator work and back then there was lots of actual testing, but I turned up at Monza on the Thursday, had a seat made and then went out during Friday practice with absolutely no previous experience. I did OK. I accepted that the car wasn't quick and just tried to avoid mistakes - and to keep out of the way."

He finished 11th, six laps down and unclassified, but was best of the Italians (the other seven all retired) and had done enough to earn a full-time Osella seat for 1987.



Caffi joined Footwork amid big promises of Porsche engines (below, right), but sadly it fell flat after 1991. Below, left: his first F1 season came with Osella in 1987

"There was no way Williams would pay my $1m release clause"

He would be classified as a finisher only once that year - 12th place, at Imola - because of a rule change. "The FIA reduced fuel allowance to 180 litres per race," he says, "and right from the start we knew that the Alfa would be unable to last a full race distance. I ran dry with a couple of laps to go at Imola, but only lasted that long because I'd been driving deliberately slowly for about half the race."

There were highlights, though, including 16th on the grid at Monaco, ahead of a Brabham, a Lotus, a Ligier and various other things that should not have been in his mirrors. On that occasion, the electrics packed up long before his fuel ran out.

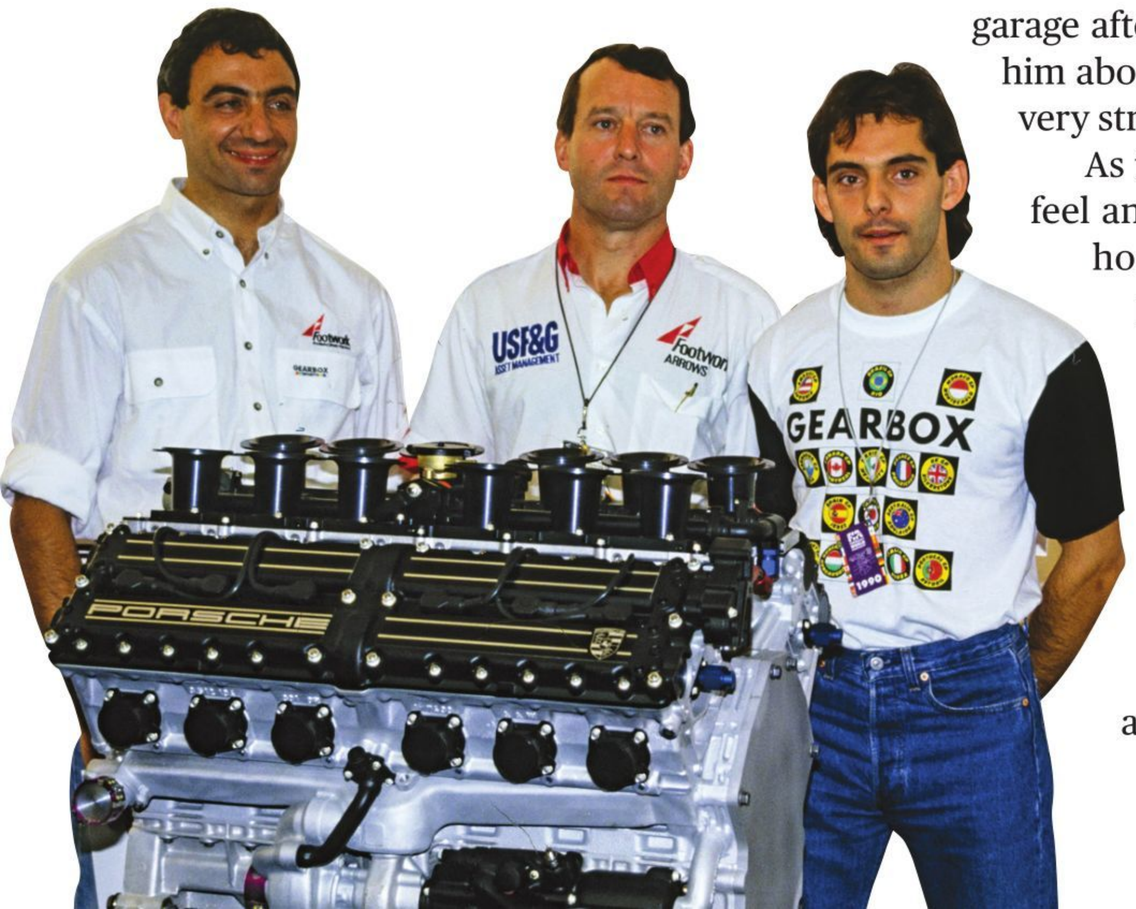
Such flourishes did not go unnoticed. When wealthy Italian businessman Giuseppe Lucchini decided to set up his own F1 team - BMW Scuderia Italia - in Caffi's home town of Brescia, Alex got the call. "There were other Italian drivers in the frame," he says, "but Gian Paolo Dallara designed the car and put in a good word for me - he knew me from that F3 victory at Ricard, one of his company's first international successes. It was also the first time I'd been paid to drive."

Being a new team, and with 31 cars



entered, Scuderia Italia was subject to the rigours of Friday morning's 60-minute pre-qualifying session (the end of the weekend for those that failed to make the cut). Caffi performed well enough to be promoted above such hassles from mid-season and took a best finish of seventh in Portugal – before such accomplishments earned points.

In 1989 the team decided to add a second entry, which would be subject to pre-qualifying. "I had rather assumed that wouldn't be me," Caffi says, "but Andrea de Cesaris was in the other car, we were sponsored by Marlboro and he had good Marlboro connections, so..."



CAFFI REVERTED TO HIS pre-qualifying role, usually emerged unscathed and finished a career-best fourth in Monaco – but then came Phoenix, where he was on course for what would almost certainly have been third place until he was taken out while lapping a backmarker... who happened to be his team-mate. "Everybody could see what had happened," he says, "but in the garage afterwards nobody said a word to him about what he'd done. I found that very strange."

As the year wore on Caffi began to feel an increasing need to find a new home – and a stellar qualifying performance in Hungary, where he lined up third, put him firmly in the spotlight.

"That created a lot of interest," he says. "Firstly, Marlboro summoned me to the McLaren motorhome, because Ron Dennis wanted to meet me. That was really just a chat – I think he was curious to know more about the guy who had been fighting Ayrton Senna for second on the grid. I had a formal approach from Lotus, but at that time the team was not as competitive as it had been. I came to England to talk to Flavio Briatore and Rory Byrne, at Benetton, but my really, really big chance was with Williams. I met Frank Williams and Patrick Head in their motorhome at Monza, but my contract with Scuderia Italia contained a $1 million release clause – and there was no way a team like Williams was going to pay that when it could have chosen almost any driver on the grid.

"Footwork was happy to pay it, though – and at the time it seemed like a good option. I was offered a two-year deal and they'd shown me a contract to confirm that Porsche was coming on board to supply engines. I might be Italian, but my father always liked Porsches rather than Ferraris and I had grown up around that, so for me the chance to drive with Porsche was a bit like racing with Ferrari would be for most Italians.

"Porsche hadn't been in F1 for a few years, but its previous [TAG turbo-branded] engine had won everything with Niki Lauda and Alain Prost at McLaren, so in my mind I was going there to challenge for the world championship."

ITALY'S STUNTED STAR

After an interim campaign with Cosworth (when he again scored his best result in Monaco, this time fifth place), on-track development of the new Porsche engine began during the winter of 1990/91.

"It wasn't immediately apparent that the engine wouldn't be competitive," Caffi says, "because in the first test at Silverstone it blew up on its third lap, so I didn't learn very much. But we soon realised that it had lots of power at the top end but hardly any torque - and the worst thing was the weight. It was about 40kgs heavier than a Ferrari or a Honda, a bit like driving a 911 with all that mass at the rear..."

He failed to qualify for the opening four grands prix - and split his car in three when he crashed while trying to wrestle it into the race in Monaco, although he escaped without injury. A few days later, however, he was out with friends in Italy when he was involved in a serious accident that left him with a broken jaw.

"I was a rear-seat passenger," he says, "but I got a lot of criticism because the team said I shouldn't have put myself in that kind of situation. I had a feeling that the team was using my situation to deflect attention from some of its own problems."







Caffi was a winner in the 2016 Monaco Historique. Below, Le Mans with Spyker in 2007 and Intercontinental Rally Challenge with Škoda

BY THE TIME HE RETURNED, Porsche had gone, Footwork had reverted to Cosworth and he endured a string of non-qualifications before achieving a couple of modest results in Japan and Australia. "I'd really had enough of all the F1 politics by then," he says. "I'm a simple soul, really, and just wanted to get on with racing."

For 1992 he was offered a seat by the new Andrea Moda team, but he walked away after a single test - "It wasn't as though I'd been driving for McLaren," he says, "but I had been with solid, well-structured teams and this was just a mess" - and little more than two years after being courted by Williams, his F1 career was over.

He spent part of the summer with Mazda, racing in Group C - "I really enjoyed that, but they killed off the championship just as I was getting started" - and then took a 12-month sabbatical while wondering what to do with himself next.

"I realised that I didn't know anything else," he says, "and just decided to race whatever and whenever I could." Thus began phase two of his career, an enduring cycle of sports and touring car races with occasional diversions into alien territory. He has contested the Daytona 24 Hours, Sebring 12 Hours, Le Mans (three times, sharing the sixth-placed Courage in 1999), taken class victory in the Spa 24 Hours, won GT titles in France and Italy, guided a Škoda Fabia to 11th overall on the 2011 Monte Carlo Rally and contested successive Dakar Rallies in a Fiat Panda 4x4... then a Unimog-Mercedes truck. In 2016 he took Ronnie Kessel's Ensign N176 to victory in the GP de Monaco Historique and in recent seasons he has developed his own team, Alex Caffi Motorsports, the main arm of which runs in EuroNASCAR.

"You know," he says, "I really believe that if Porsche had produced a good engine at the right time then my career could have been very different, but I have no complaints. My proudest achievement has nothing to do with F1, though. In 2011 I entered the Trofeo Vallecamonica hillclimb, an event my father had won in 1965, at the wheel of an Osella FA30. F1 is incredibly safe nowadays, but events like that... trees on one side, ravines on the other. Drivers are risking their lives for no reward. Nobody knows who they are, they do it for the challenge - it's a bit like the Isle of Man TT for cars, the essence and soul of our sport."

He completed the course in 7min 26.6sec, a record that remains unbroken.

"I felt the team was using me to deflect from its own problems"

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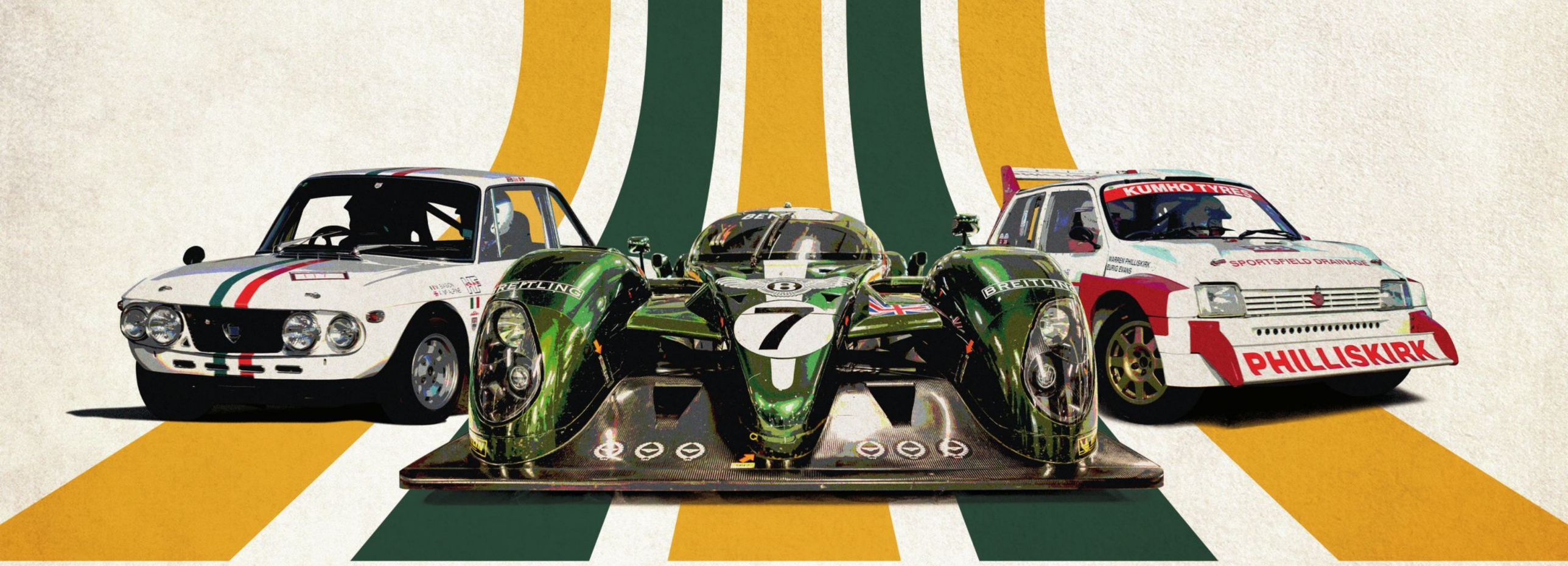
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The Six was gloriously simple, and was the first Lotus to be offered as a kit to club racers

A blooming Lotus

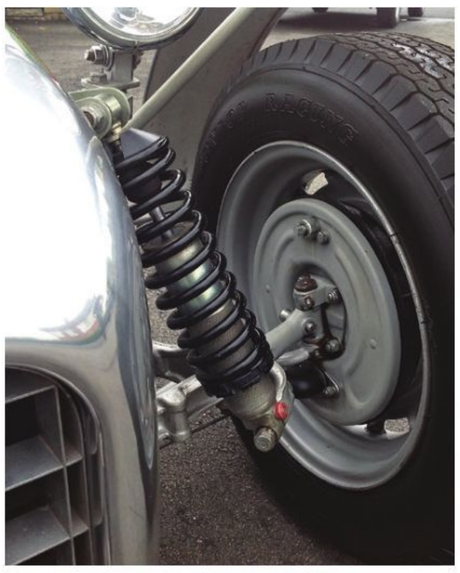
Before the seminal Seven arrived, Colin Chapman's Mark Six laid the company's foundations, says **Simon de Burton**

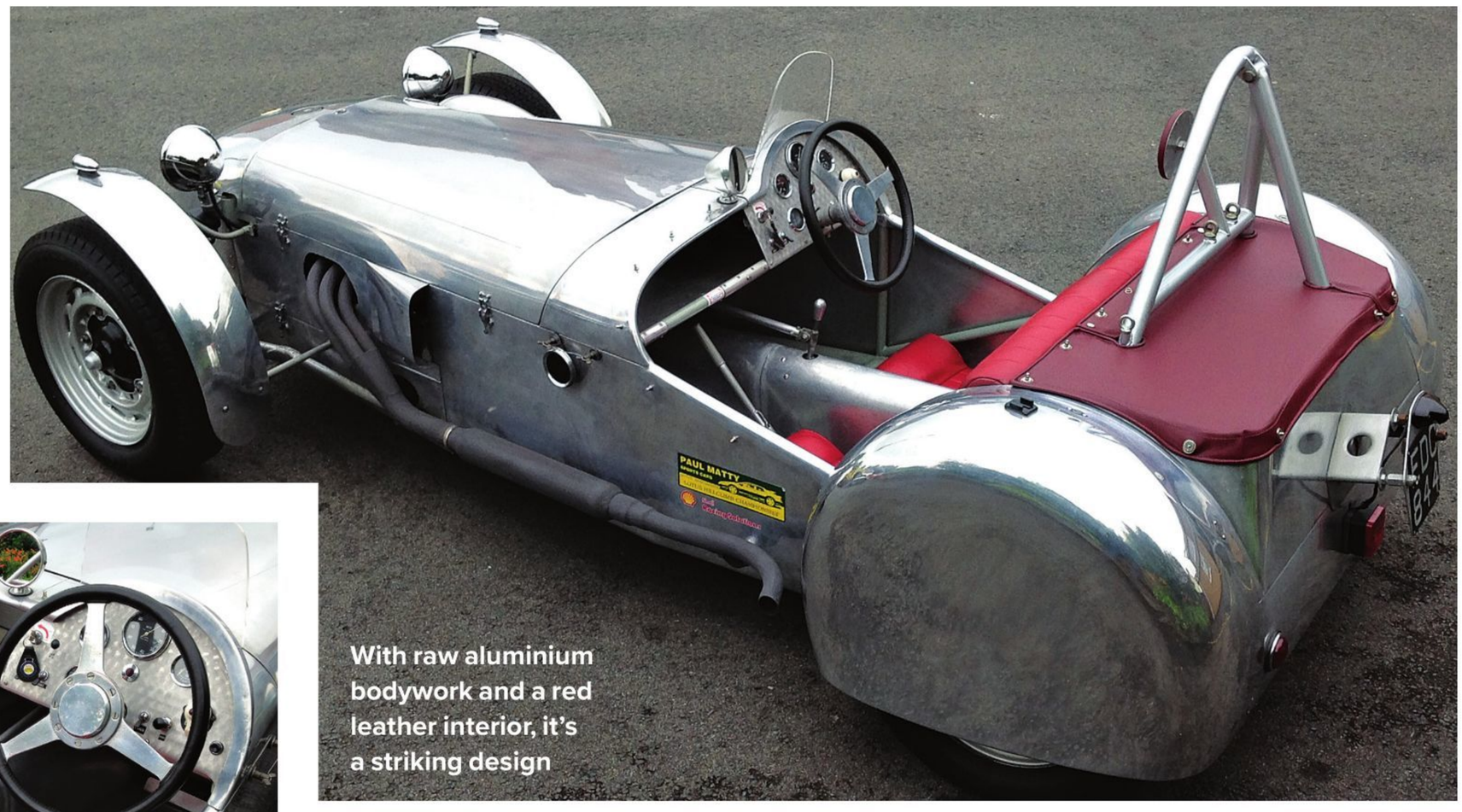
Non-Lotus aficionados could be forgiven for thinking that the story of Colin Chapman's celebrated marque began with the famous Seven, but there were, inevitably, a few numbers that preceded it - and those forerunners are really the cars that give the best insight into Chapman's thinking.

The north London hotelier's son had a lifelong interest in aircraft that led to him flunking out of his structural engineering degree in 1948 to pursue a brief career in the RAF (having learned to fly at university), during which he absorbed more of the principles of aero engineering that he would later adapt to his cars.

Post-studies, Chapman worked as an aluminium salesman, touting the lightweight metal as a viable material for building construction. By then, however, he had already begun to race cars of his own design in his spare time, starting with a modified Austin Seven dubbed the MK1 with which he enjoyed moderate success before developing the MK2, the first car to bear the Lotus name.

Prize money collected with the MK2 enabled Lotus Engineering, which Chapman established in 1952 with fellow engineer Colin Dare, to create MK3, 4 and 5 versions prior to commercialising the MK6, around





With raw aluminium bodywork and a red leather interior, it's a striking design



110 examples of which were sold before Chapman launched the product that really put him on the map as a car designer: the legendary Seven.

It was the concept of the Six, however, that made it all happen. The first Lotus to be offered as a kit aimed at so-called clubmen racers, it was also the first to be offered with a spaceframe chassis that epitomised Chapman's well-known philosophy of adding lightness – it was six feet long and weighed a mere 25 kilos.

Bodywork was, of course, made from the engineer's beloved, weight-saving aluminium and hand-crafted by north London panel-beating firm Williams and Pritchard, the founders of which had worked on building Spitfire aircraft during the war.

Although the Six kit was supplied without a powertrain, it did come with alternative mounting points designed for different engine choices. Ford units were the most popular, but MG and Coventry Climax motors could also be used to produce a car that weighed less than 440 kilos, was capable of more than 90mph and also offered superb handling.

The car on sale at Lotus specialist Paul Matty Sports Cars is chassis number 60 and comes with a large and comprehensive history file that shows it was driven by none other than Sir John Whitmore early on in his racing career.

Fitted with a Ford 100E side-valve engine and Buckler three-speed gearbox, the car features a rare Elva overhead inlet conversion providing a few extra horsepower, and recently proved competitive in the Paul Matty Hillclimb Championship.

Its aluminium bodywork – complete with aerodynamic rear wheel spats – looks superb, as does the red-trimmed interior with engine-turned dash. But, best of all, it's all road legal.

And a bit less obvious than a Seven.

1955 LOTUS 6

Paul Matty Sports Cars, Bromsgrove, Worcs. paulmattysportscars.co.uk. £57,500

In the market for a cool kit car?

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hallmark-cars.com



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trevorfarrington.co.uk



PILGRIM 356 SPEEDSTER £39,950 A recreation of one of Porsche's most desirable models, with a version of the 1651cc twin-carb VW engine of the original.
pilgrim-motorsports.co.uk



CATERHAM SEVEN SPRINT £28,995 The king of kit cars, and relatively exclusive, too. This retro special edition was limited to 60 to mark the model's 60th birthday.
carandclassic.co.uk



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WALERO



The Mustang fastback was a film star, a daily drive, and then a hermit, before being brought back to light

AUCTION HERO

Bullitt with a name on it

As sales of movie cars go, this one should fly, and not just over the streets of San Francisco, says **Simon de Burton**

MECUM IS CERTAINLY NOT exaggerating when it claims to stage 'the world's largest collector car auction' – its January sale will feature a mind-boggling 3500 vehicles, ranging from the 1968 Challenger Streamliner 450mph land speed record breaker to a McLaren Senna.

But there's really only one car that people will be following as it crosses the block, and that's a ratty-looking '68 Mustang fastback in Highland Green. Yes, that one, the actual car from *Bullitt*, driven by Steve McQueen in what has been dubbed the greatest movie car chase of all time.

Its whereabouts having been unknown for decades, the car broke cover last year when owner Sean Kiernan of New Jersey displayed it on the Ford stand at the Detroit Auto Show alongside the manufacturer's latest Bullitt edition Mustang.

It was the start of a carefully orchestrated marketing process that included showing the car at that year's Goodwood Festival of



Speed and that will end at Mecum when it comes under the hammer at no reserve – words that they usually hint at the possibility of picking up a bargain. However, in the case of the *Bullitt* Mustang they are more a way of saying that those involved are so confident of the car fetching an eye-watering price that neither a reserve nor a pre-sale estimate are really called for. There has been much speculation around what the car will fetch, with Kiernan – who inherited it five years ago following the death of his father, Robert – himself hinting at hopes of $4-6m.

But bearing in mind that this can claim to be one of the most famous cars in movie history – up there with Bond's DB5, *Chitty Chitty Bang Bang* and Doc Brown's Delorean – there are plenty who believe the final figure is more likely to comprise eight figures.

In any event, Kiernan's certainly going to walk away with considerably more than his father bought the car for in 1974 after spotting a four-line advertisement in *Road & Track* magazine. He paid $6000 to New Jersey detective Frank Marranca, who had acquired it four years earlier for exactly the same amount from Warner Brothers employee Robert Ross.

The Kiernans used the fastback as their daily driver until the clutch packed up in 1980, even refusing several offers from McQueen to buy it back (it was originally owned by the actor's production company, Solar). By then, however, Kiernan senior fully appreciated its significance and it was kept largely hidden away for 38 years.

In between times, the Kiernans had the 390ci V8 rebuilt, replaced brake and fuel lines and generally put the car into decent running order.

Sensibly, however, they didn't fully restore it, keeping the patina it had acquired during filming, along with things like the original camera mounts welded to the chassis, the modified exhaust system and those grey Torq-Thrust wheels.

1968 Ford Mustang GT Fastback – the *Bullitt* car. On sale at Mecum. Kissimmee, Florida. January 2. *Mecum.com*

1969 LAMBORGHINI MIURA P400S. SOLD FOR £1.2M. RM SOTHEBY'S Barn finds don't come much better than this Miura P400S. First owner Walter Becker was a flamboyant advertising agency boss who kept the car for three years before selling it to fellow German Hans Weber – with whom it remained for four decades until his death in 2015. It was then put into storage by his brother before being brought out for the RM sale, unrestored, original and ready to be sympathetically re-commissioned.



1934 LAGONDA RAPIER. SOLD FOR £40,400. H & H Originally supplied to Leeds County Council as an Abbott-bodied tourer, this car was sold to Maurice Zwick, who took it to podium finishes in the Land's End, Exeter and Edinburgh trial all in the same year (1937). It was later re-bodied and supercharged for circuit racing.



1971 HEUER CARRERA. SOLD FOR £56,312. BONHAMS This rare 18-carat gold Heuer was a gift from Jack Heuer (great grandson of the firm's founder) to the late Mike Hailwood. Bonhams claim Heuer gave him it as a thank you for dragging Clay Regazzoni from his burning Ferrari during the 1973 South African GP.



1943 WHITE M16 HALF-TRACK. SOLD FOR £37,375. RM SOTHEBY'S Fancy avoiding the London Ultra Low Emission Zone charge? This White half-track would do the trick, thanks to its historic vehicle status. Weighing 9.9 tons and measuring more than 21 feet in length, it's a great machine for ploughing through traffic.



A bringer of more bad news?

While sales have slumped, there is light at the end of the tunnel for auction houses

WE'RE AWARE THAT the introduction to this saleroom review section has been somewhat gloomy for the past couple of issues – but the recent publication of the *2018-2019 Classic Car Auction Yearbook* does little to justify an upbeat tone.

For co-authors Adolfo Orsi and Raffaele Gazzi, this is the 24th edition of the annual tome that is put together using statistics relating to a mind-boggling 85,000 individual vehicle sales compiled over 26 auction seasons and this time they have extrapolated the fact that there has been a startling 23 per cent decrease in overall sales since last year.

This Lamborghini Miura proved the perfect barn find project, but sold for a packet

"Since the 2008-2009 season there has been a very strong upward trend in the classic car market," says Orsi. "This increase attracted many investors, and low interest rates also contributed to this. Some optimists could dream of a yearly 20-30 per cent price increase but this cannot happen for many years in row. A stop was natural and necessary," he adds sagely.

There is some good news, however: we have now entered a full-on buyers' market and, as Orsi observes, "...real collectors should look with attention at what is being offered... there could be some interesting opportunities in the months to come."



1981 RENAULT 5 TURBO. SOLD FOR €101,320 ARTCURIAL Who'd have thought they'd ever see a €100k Renault 5? This restored version had been owned from new by a collector in Italy and boasted a full refresh inside and out, plus engine upgrades to boost it to 220bhp. Just 22 were made in this colour combination.



1977 TRIUMPH 750 FLAT TRACKER. SOLD FOR £33,350. BONHAMS In the '70s Strongbow sponsored a UK flat track series. The firm commissioned half-a-dozen of these tuned-up Triumphs with high-compression heads and big carbs before inviting speedway stars like Barry Briggs, Ole Olsen and Ivan Mauger to race.



Buying guide

Rover SD1

It set the bar high, and bent the rules, during the 1980s

THE ROVER SD1 SUPPLANTED the Ford Capri as the dominant car at the front of the British Saloon Car Championship in the early 1980s. Just as a period of Capri hegemony began with a change in engine rules, so another signalled the start of a new era with the SD1 at the forefront.

The introduction of a 3-litre engine capacity limit for 1976 outlawed the American big-bangers, such as the likes of Chevrolet's Camaro, and made the Ford the car to have in the series that is known today as the British Touring Car Championship. An increase in maximum capacity to 3.5 litres for 1980 altered the landscape of the BSCC again.

British Leyland motor sport boss John Davenport had lobbied for the increase, and in the face of 38 Capri wins in the 46 races since the start of 1976, his request was accepted. It still required some sleight of hand to get the SD1 into the series: the production version was 3531cc, yet the car was homologated at 3495cc.

ROVER SD1

- **Price new** £n/a
- **Price now** £100,000-£250,000
- **Engine** 3.5-litre normally aspirated V8
- **Rivals** Ford Capri III 3.0, BMW 635CSi, Volvo 240 Turbo, Jaguar XJS
- **Verdict** A classic tin-top racer that is increasingly a regular sight out on track today

The big Rover would go on to become one of the mainstays of the BSCC for more than half a decade. There were highs and lows on the way, and controversy by the bucketload. The SD1 was very much a winner, though. A first victory came at the Brands Hatch British Grand Prix support race in 1980 and its last in 1987. There were a pair of class titles and one overall crown - two if you count the Steve Soper victory in 1983 that was eventually wiped out in court nine months after the end of the season.

Davenport stayed close to home when he picked a team to take BL into the top class of the BSCC. David Price Racing, which had been running its Formula 3 programme with the Dolomite Sprint engine, was chosen to build and run the Group 1½ cars.

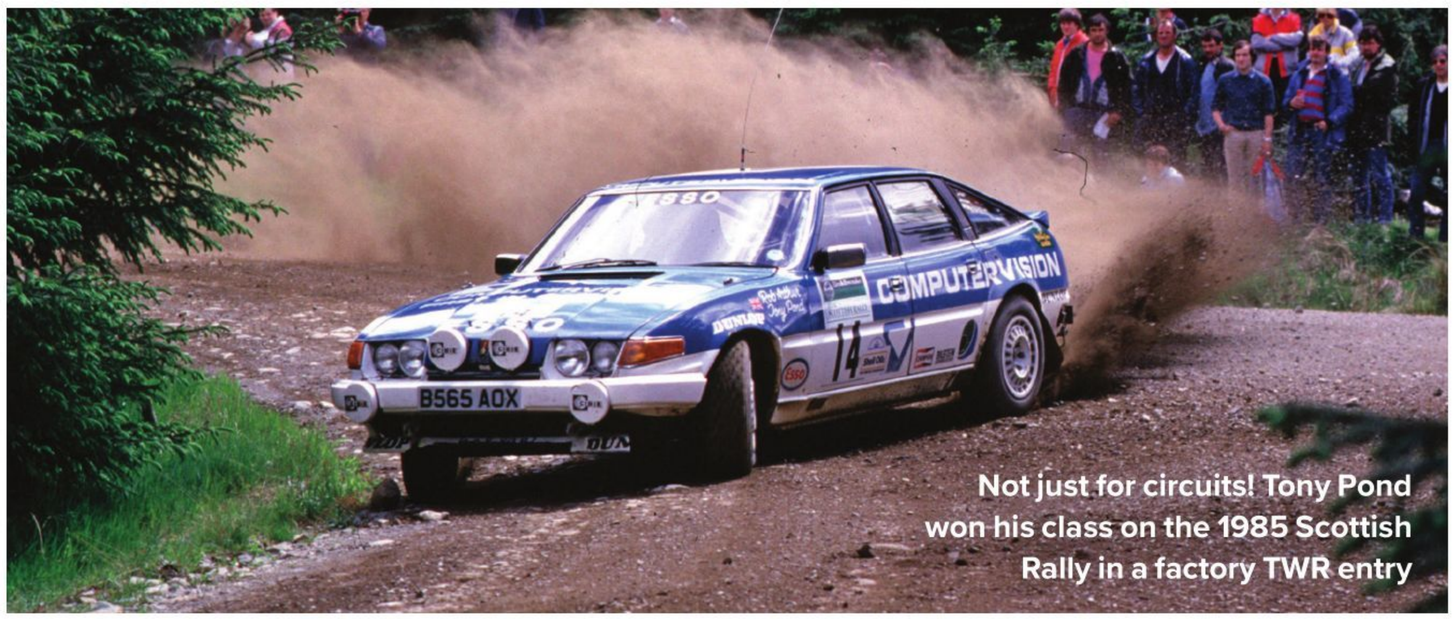
The Rover was far from an instant



The Rover SD1, and the later Vitesse model, were hugely popular in 1980s touring car competition



Andy Rouse claimed the SD1's only outright BSCC title in 1984



Not just for circuits! Tony Pond won his class on the 1985 Scottish Rally in a factory TWR entry

MOTORSPORT IMAGES

success, however. Tyre and engine problems blighted the Rover's maiden season, though Jeff Allam took victory number one at Brands in July thanks to a strategic call that would be impossible today. On a damp track, DPR sent him out on Michelin intermediates in place of the troublesome Dunlop covers the team was contracted to run.

Tom Walkinshaw Racing took over the programme for 1981, with Allam and Pete Lovett winning five races between them and the latter the class crown. Allam made it two titles in two years for TWR in '82.

"There were highs and lows, and controversy by the bucketload"

In 1983 Soper took the overall title at the end of a first season run to Group A regs, which was marked by protest, counter-protest and legal action. The final ruling to disqualify the SD1s on counts of bodywork and engine irregularities didn't arrive until July, by which time the renamed Austin Rover Group had made a pre-emptive strike to withdraw from the BSCC and focus on the European Touring Car Championship.

Rover did finally win the overall title in 1984 with the Vitesse version of the SD1. Andy Rouse, who inherited the '83 crown in his class B Alfa Romeo GTV6, had developed his own Rover and won seven championship rounds on the way to a repeat triumph.

The Rover continued its success in Europe. The TWR team would triumph in 11 races in 1985-86.

TWR built 18 Rovers for its various programmes, a number that included the conversion of a pair handed over by DPR, which also constructed two Group 2 cars. Multiple privateers also built Rovers, the likes of Patrick Motorsport, Andy Rouse Engineering and Dennis Leech, a crowd favourite with his black-and-orange liveried machines.

SD1s produced to Group 1½, Group 2 and Group A regulations now have homes in a burgeoning tin-top historic scene. They are welcomed in Peter Auto's Heritage Touring Cup for cars built between 1966 and '84 and the Motor Racing Legends organisation's Historic Touring Car Challenge, which has a later cut-off of 1990.



RÉMI DARGEGEN

ONE CURRENTLY FOR SALE

1984 Rover 3500 Vitesse

On the forecourt

A short period race history down under leaves this refreshed SD1 in highly original condition

Few Rover SD1 racers have seen as little action as the car offered by Jarrah Venables on behalf of a customer. A 1984 TWR Vitesse, chassis 011, it made its debut at that year's Bathurst 1000 and then raced only twice more – both times Down Under early the following year – during its period career.

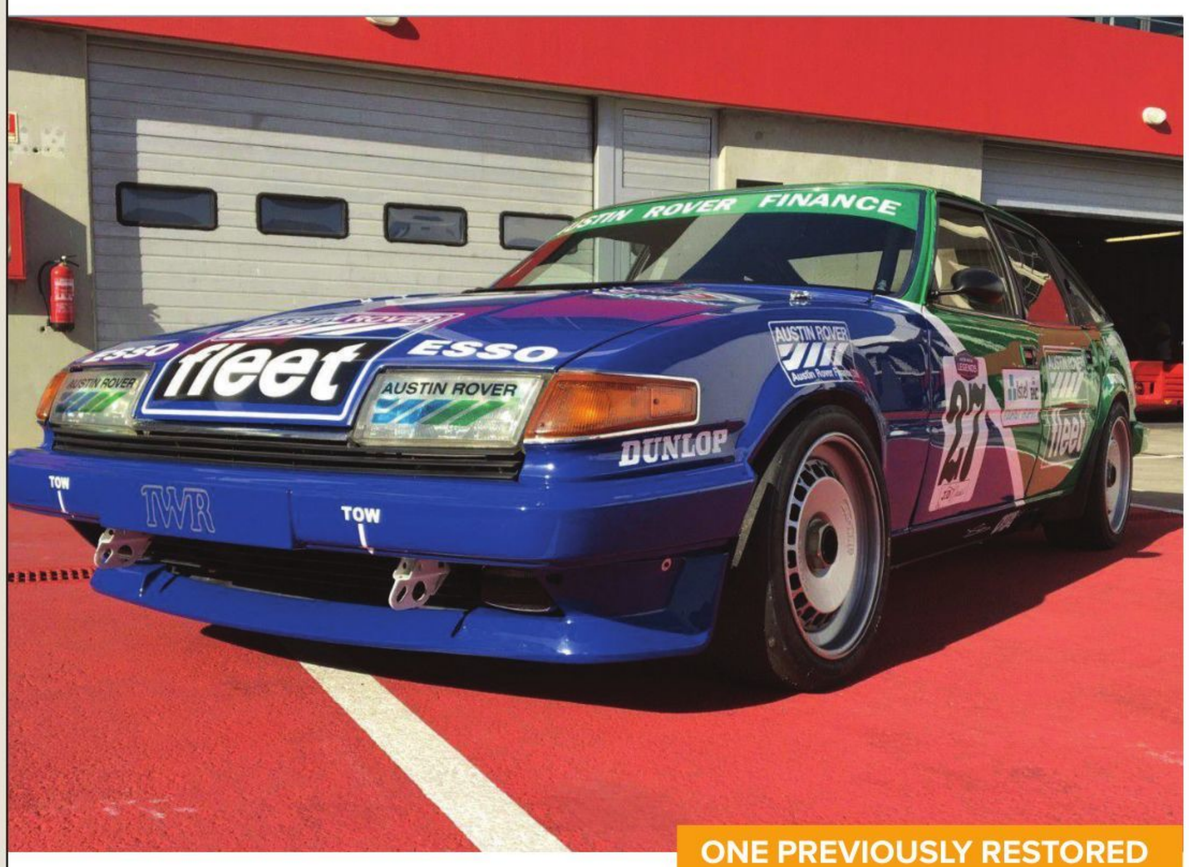
The car was raced by both Steve Soper and TWR boss Tom Walkinshaw during its short career. Soper drove at Bathurst together with Ron Dickson, while Walkinshaw teamed up with the local ace at the Wellington street race and then the Pukekohe 500 in New Zealand. They finished down the order at Bathurst, though Soper did set fastest lap for a Group A car, and then the car took second from pole position at Pukekohe.

The car was subsequently sold to Portugal where it competed in local events, although it remains a highly original car. The car has been returned to the Mobil livery in which it raced at the end of 1984 and early in '85, but the interior evokes memories of a bygone age.

"The owner was keen to keep the interior as it was because it was so original — it's still got TWR stickers on the dash," says Venables. "This car has the correct livery on the outside and the correct feel on the inside."

The Rover, which is priced at £170,000, has been raced in historic events sporadically by its previous and current owners and is ready to go with current HTP papers, an in-date fuel cell and a rebuilt engine.

Jarrah Venables, Chichester, West Sussex.
Tel:07814 185549, jarrahvenables.com



ONE PREVIOUSLY RESTORED

Recreation 1984 Rover Vitesse

In the workshop

The SD1 made a big enough mark to warrant several accurate recreations. AWS built this one with exact parts

The TWR Rover Vitesse crashed and destroyed by Marc Duez in torrential rain at the Silverstone Tourist Trophy in 1984 has been recreated by AWS Engineering. The car, reckons AWS boss Alan Strachan, is "as original as you can get without being the real thing".

The recreation of TWR's 10th Rover chassis has been built up around a complete set of genuine running gear.

"It has a period engine, and all the suspension, the gearbox and the rear axle are genuine TWR parts," explains Strachan. "Over time we have been able to acquire a lot of spares from all over the place. We've always struck while the iron's hot when bits have become available."

The car isn't the first Rover recreation by AWS. It bought chassis 11 (*see above*), which it reverse engineered to complete its first SD1 commission. That knowledge subsequently went into the new chassis 13.

Sourcing some of the standard parts needed to build up a Group A racer is becoming increasingly difficult, says Strachan.

"Getting hold of a 'shell that you would want to turn into a racing car is getting more expensive, but it is the odd-ball parts that are the hardest to find," he explains. "Group A regs demanded that you had to run a lot of the original interior: the race cars ran wind-up windows."

The recreation of the Duez/Jeff Allam TT car has yet to race. AWS plans to get it out soon, if it's not sold beforehand.

AWS Engineering, Shipston-on-Stour, Warwickshire.
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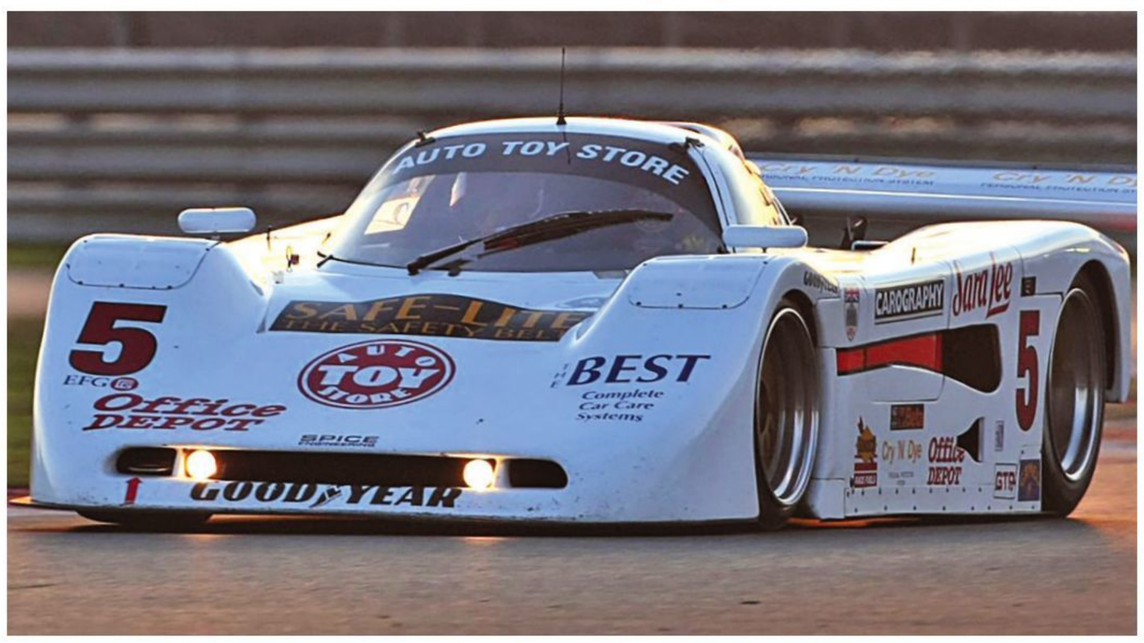
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Buying guide

Lotus Elan

Rated as one of the best-handling cars ever, the Elan is a classic

COLIN CHAPMAN WAS VERY clear to potential customers in early sales literature for the Lotus Elan, proclaiming simply: "We wanted to build you a fun car." There can be no doubting that the founder of the British marque and the team he had gathered around him hit that target.

Lotus delivered what has come to be regarded as one of the best-handling sports cars ever when its Type 26 went on sale late in 1962. Light and small as per Chapman's design philosophy, a two-seater drop-top measuring just 12ft in length was powered by a jewel of an engine, a new twin-cam unit based on Ford's over-square four-cylinder Kent block. And, of course, it came with disc brakes all round, as well as rack and pinion steering. The design of the original Elan was led by Ron Hickman, who would go on to find fortune and a bit more fame with the *Workmate* tool bench that he licensed to Black & Decker. He styled the initial Drop Head Coupé (DHC) roadster version of the car and came up with the folded backbone chassis onto which the fibreglass body was bolted.

This steel backbone, which replaced the troublesome fibreglass monocoque of the Elite, would become the building block of so many Lotus models that followed. Legend has it that the idea was conceived purely as test bed for the car's long-travel suspension, but Chapman loved its simplicity and pushed it into production.

Launched in October 1962, the Elan story began with a short run of 1500cc cars before a 1.6-litre engine was introduced when full production started the following year. Like previous Lotus cars, the Elan was available built-up and ready to go, or in kit form.

Revised versions followed quickly: the Elan Series 2 came on stream in '64 and the

LOTUS ELAN

- **Price new** £1686 in kit form
- **Price now** £20,000-£55,000
- **Engine** 1.6-litre DOHC straight four
- **Power** 126bhp
- **0-60mph** 6.2sec **Top speed** 121mph
- **Rivals** Triumph TR5 & TR6, Morgan +8, Alfa Romeo Spider
- **Verdict** A great-handling sports car with eternal good looks



The Lotus Elan came in many forms, including this four-seater Plus S2, which was once owned by Ronnie Peterson



The later Sprint model had two-tone paintwork and enjoyed near-perfect handling balance



Fixed Head Coupé closed-top car was launched in October '65.

The Elan continued to evolve – and become ever more powerful – through to the end of production in 1974. That included development of the wider and longer fixed head-only Plus 2 with a pair of small rear seats for 1967. The 1966 Series 3 was replaced two years later by the biggest evolution of the design in the Series 4, which came with flared arches to accommodate wider tyres.

"The steel backbone chassis was the basis of so many Lotus cars to follow"

There was a racing version of the Elan, though competition wasn't on Chapman's mind during the conception of the car, a first for Lotus. Early privately developed race cars were the inspiration for the lightweight Type 26R Elan built for 1964. With revised suspension, which included strengthened mounting points, the racer went on to enjoy success on the domestic sports car scene and raced at the Le Mans 24 Hours.

The definitive Elan for many is the Series 4 Sprint of 1970. The car came with a big-valve engine that pushed power output up to 126bhp – a significant increase on the 1962 original's 105bhp – and the two-tone bodywork that is so evocative of the Elan. A five-speed gearbox was offered in the final months of Sprint production in 1973.

The Sprint DHC is the most desirable Elan today, and commands the highest values, save for the rare 26R racer. Asking prices of £55,000 for mint cars are not unknown. The bigger Plus 2s don't have the same cachet or value.

The folded-steel backbone was prone to rust, so few remain on their period chassis. Replacement items remained available through Lotus until their manufacture was taken over by Gartrac Motorsport. Lotus purists want Elans with this chassis today rather than cars with aftermarket units built by specialists such as Spyder Cars.

Just over 12,000 Elans were built and the majority, perhaps more than 10,000, survive. That's a testament to Chapman's promise to build a fun sports car, and to Hickman's classic styling.



ONE CURRENTLY FOR SALE

1971 Lotus Elan Sprint DHC

On the forecourt

It may have had a chassis update, but this car is still highly original, and highly desirable

This Lotus Elan Sprint DHC is just as it was when new back in 1971, save for an aftermarket chassis upgrade. Its level of originality is what makes it so desirable, according to the vendor, Barry Ely Sports Cars.

"This car left the factory as a Sprint DHC in Lotus yellow over white, and that's what it still is today," says Barry Ely, the company owner. "It is as it should be and not a made-up car in any way. There are a lot of FHCs with the roofs cut off out there masquerading as DHCs, but they are not worth the same sort of money.

"It is a nice period-correct car with the original Colin Chapman Signature steering wheel, which is an important detail on these cars. All the numbers match up and it also comes with a certificate of provenance from Lotus Cars.

"Originality is the key to value with Elans – this one would be worth more if it was on an Lotus chassis rather than a Spyder updated one. If it were, it would probably have flown out the door."

"The car drives beautifully, just as an Elan should," adds Ely. "A pal of mine is restoring a Sprint and had a go in this one when we took it to a show. He said that if his drives as well as this when it is finished, he'll be over the moon."

The K-reg car has 54,000 miles on the clock, which is believed to be genuine, and has been recommissioned and serviced by Barry Ely Sports Cars. The asking price is £44,950.

Barry Ely Sports Cars, Maldon, Essex
Tel: 01621 330285, barryelysportscars.co.uk



ONE PREVIOUSLY RESTORED

1972 Lotus Elan Sprint FHC

In the workshop

Refreshed back to its 1972 factory specification, this Elan is a shining example of the model

There wasn't a lot wrong with this pistachio-over-white Elan Sprint FHC when it arrived at Paul Matty Sports Cars half a dozen years ago. But its owner is a stickler for originality and the car underwent a full restoration to its original 1972 spec.

"It was actually a nice car," says Paul Matty, "but our job was to take it to bits and build it up as near as possible to the specification in which it would have left the factory.

"It was completely stripped to the bare body, a new Lotus chassis fitted, a new wiring loom put in, the bodywork repainted and the doors rebuilt and re-chromed with new hinges. It was a 100 per cent rebuild.

"We put in a new dash, though the seats didn't need retrimming. It really is a beautiful, original-spec car now."

The car incorporates a number of key Matty upgrades in the name of drivability and usability. Engine power had been upped slightly to 140bhp and mid-range torque increased, a larger radiator with twin fans fitted, the starter motor changed for a pre-engaged inertia unit, and the rear axle converted to solid universal joint driveshafts.

"The people buying Elans today actually want to drive them, so we make them more usable," explains Matty. "We have customers who tour Europe in them. But the best handling Elans are the ones that are as close as possible to standard. Colin Chapman did an amazing job of getting the handling of the car spot on."

Paul Matty Sports Cars, Bromsgrove, Warwickshire
Tel: 01527 835 656, paulmattysportscars.co.uk

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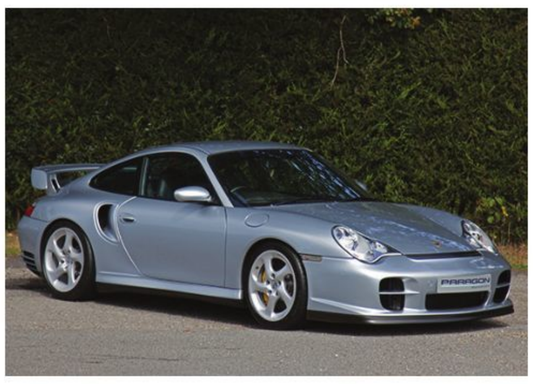
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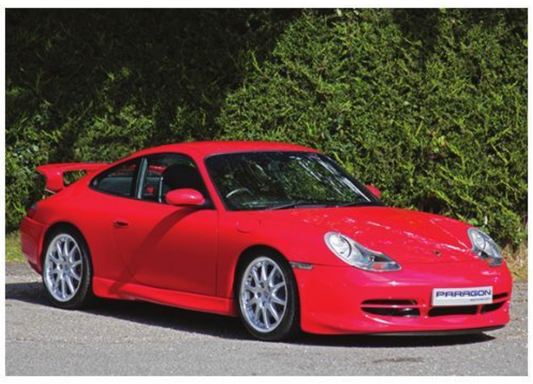
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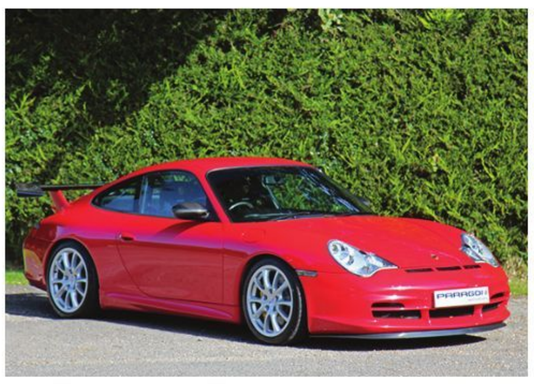
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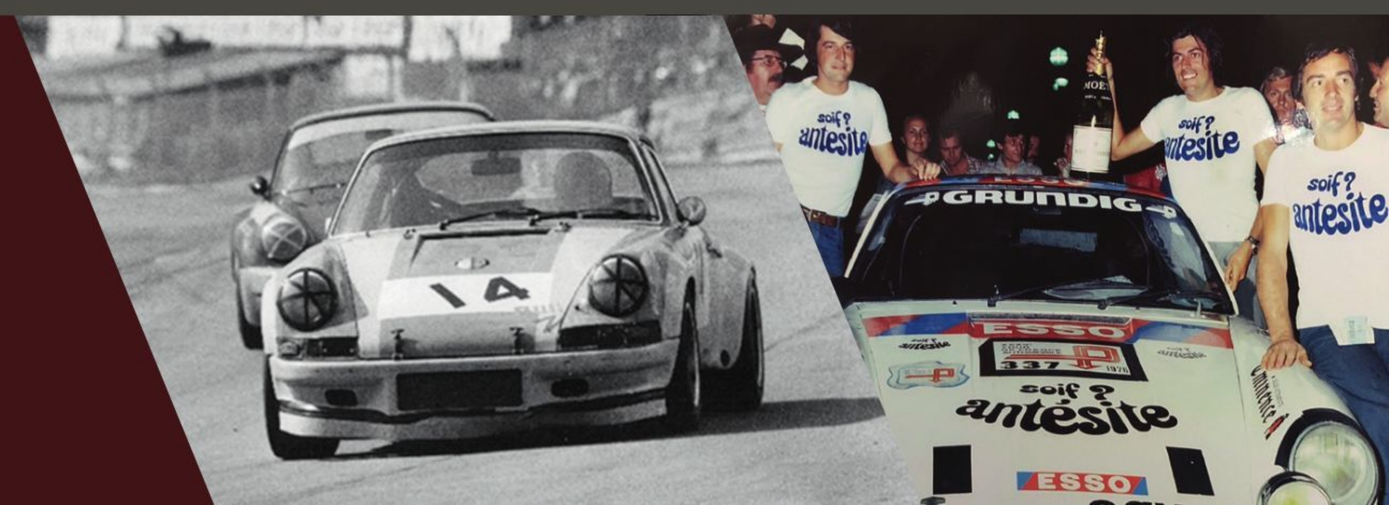
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10 REMAINING



9 REMAINING

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16th March	GOODWOOD	HRDC 105 dbl TRACK DAY	ALL HRDC
19th April	SILVERSTONE	VSCC EASTER MEETING	COYS 100 TROPHY / DUNLOP ALLSTARS / CLASSIC ALFA CHALLENGE
1st - 3rd May	DONINGTON	DONINGTON HISTORIC FESTIVAL	COYS 100 TROPHY / DUNLOP ALLSTARS
6th - 7th June	THRUXTON	THRUXTON HISTORIC	COYS 100 TROPHY / DUNLOP ALLSTARS / CLASSIC ALFA CHALLENGE
4th July	LYDDEN HILL	HRDC HISTORICS ON THE HILL	ALL HRDC
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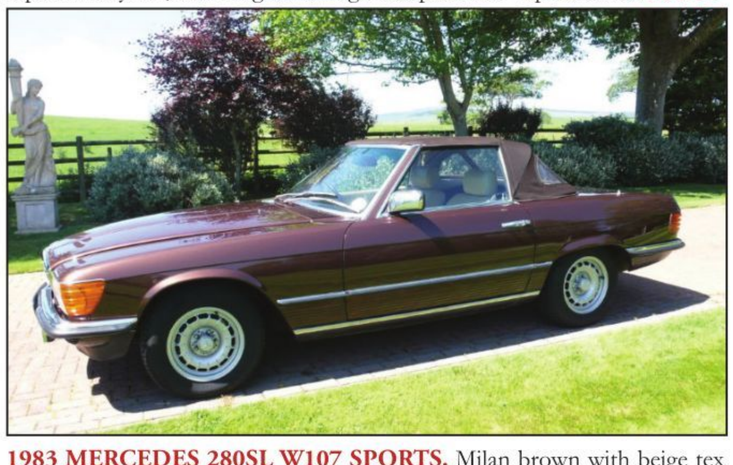
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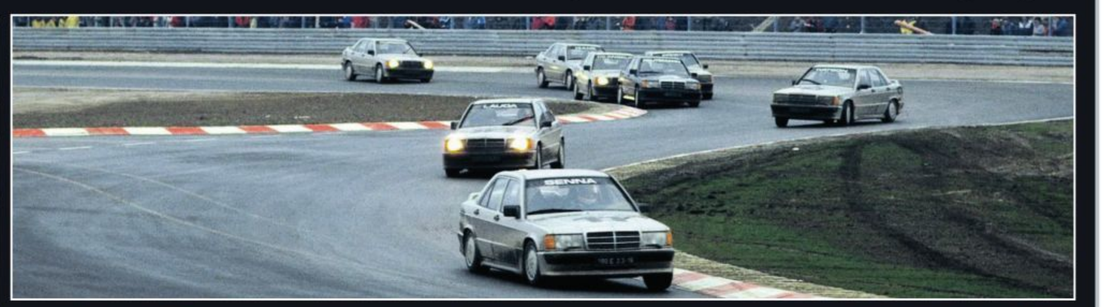


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FOR SALE – Mercedes Benz 190 (W201) 2.3 16v – 1984 Race of Champions

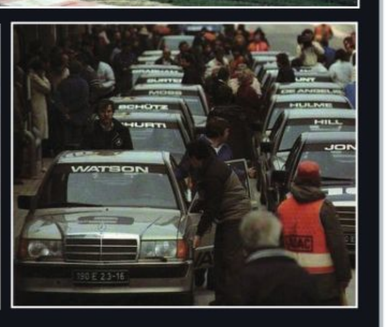
#9 of 20 purpose built cars to take part of the launch of the sport version of the 190 model and to the re-inauguration of the new Nürburgring.











The Car: The model W201, better known as 190, is one of the most iconic and versatile cars ever made by Mercedes Benz (in cooperation with Cosworth that built the head of all the engines of the 034 project). The sport version launched in 1983 Frankfurt IAA Motor Show was distinguished with the badge 2.3 16v, even though, in the beginning of the project, MB thought to call it 190E Sport, but was discarded just before the Frankfurt Exhibition.

This Unit : As per documents, this particular car was the number 10 of 19.487 units built of the 2.3 16v ever made and its construction, hand made, was ordered on October 11th 1983 and, was still called "Typpfrügwagen W201 Sport E 23" with a project number W201034-10 (W201034 is the model and 10 is the serial). The original purpose was experimental car as the model was launched to public almost one year later, in september of 1984. It fits engine #7 and gearbox #27. On the 27th of january 1984, the car was finally registered to be on the road, received the plate S-HH 7826 and was used for press and marketing purposes until it was chosen to be modified as one of the 20 units that were gonna take part in the "Race of Champions" which will be used, not only to launch the model in a race with F1 stars, also to re inaugurate the new GP Track of the Nürburgring.

Driver: On May 12th, the car was driven by John Watson (5 times GP Winner), with the number #9, to finish 5th in a race that saw and unknown driver of that time called Ayrton Senna Da Silva, beat for the first time, not only his current rivals in Formula 1 (Niki Lauda, Alain Prost, Elio de Angelis, Jacques Lafitte and Keke Rosberg), but also glories and former champions like Carlos Reutemann, Jody Scheckter, Jack Brabham, Denny Hulme, Alan Jones, John Surtees, James Hunt, Phil Hill and Stirling Moss.
Senna, Lauda and Watson fought for the podium most of the race, until the moment when Watson tried to overtake Lauda for P2 in turn 1 and, according to John's explanation "the ABS of the car came on and he lost the turning point". After this failed attempt, Reutemann overtook Watson and, in the last corner, Rosberg did the same leaving Watson on P5

Car for Sale: This unique car is for sale and, from the 20 cars that took part of the race, is only 1 of 4 in known existence alongside the one used by Senna (Mercedes Museum), Lauda (Vienna Collection) and Schurti (German Collector).

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RESULTS

MAY 25/26 2019 BRANDS HATCH GP MASTERS CHAMPIONSHIP OVERALL POLE POSITION AHEAD OF ALL THE COBRAS & E TYPES.

JUNE 8/9 2019 DONINGTON PARK MASTERS CHAMPIONSHIP QUALIFYING 1st IN CLASS AND 4th OVERALL.

JULY 27/28 2019 SILVERSTONE CLASSICS MASTERS CHAMPIONSHIP QUALIFYING 2nd OVERALL (FRONT ROW) AND 1st IN CLASS.

SEPT 6/8 2019 HISTORIC GP ZANDVOORT MASTERS CHAMPIONSHIP QUALIFYING 4th OVERALL 1st IN CLASS / RACE 3rd OVERALL & 1st IN CLASS.

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A



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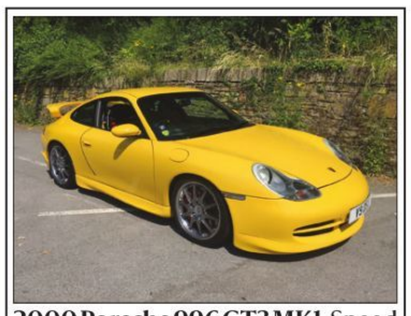
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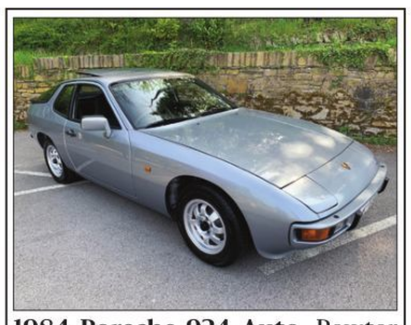
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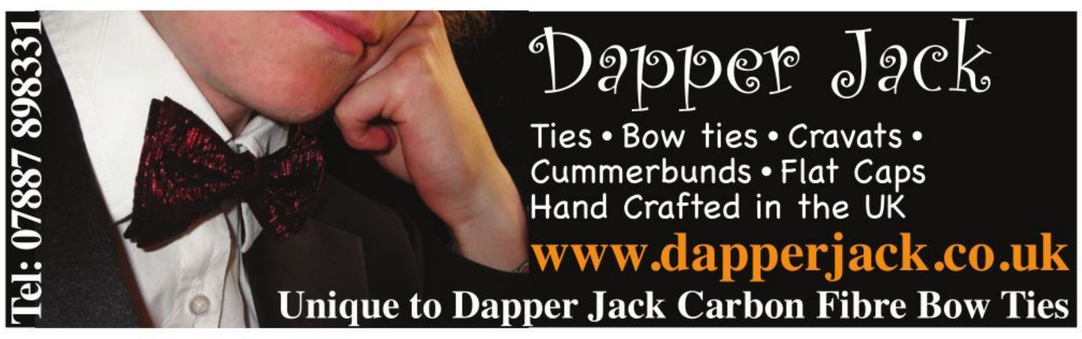
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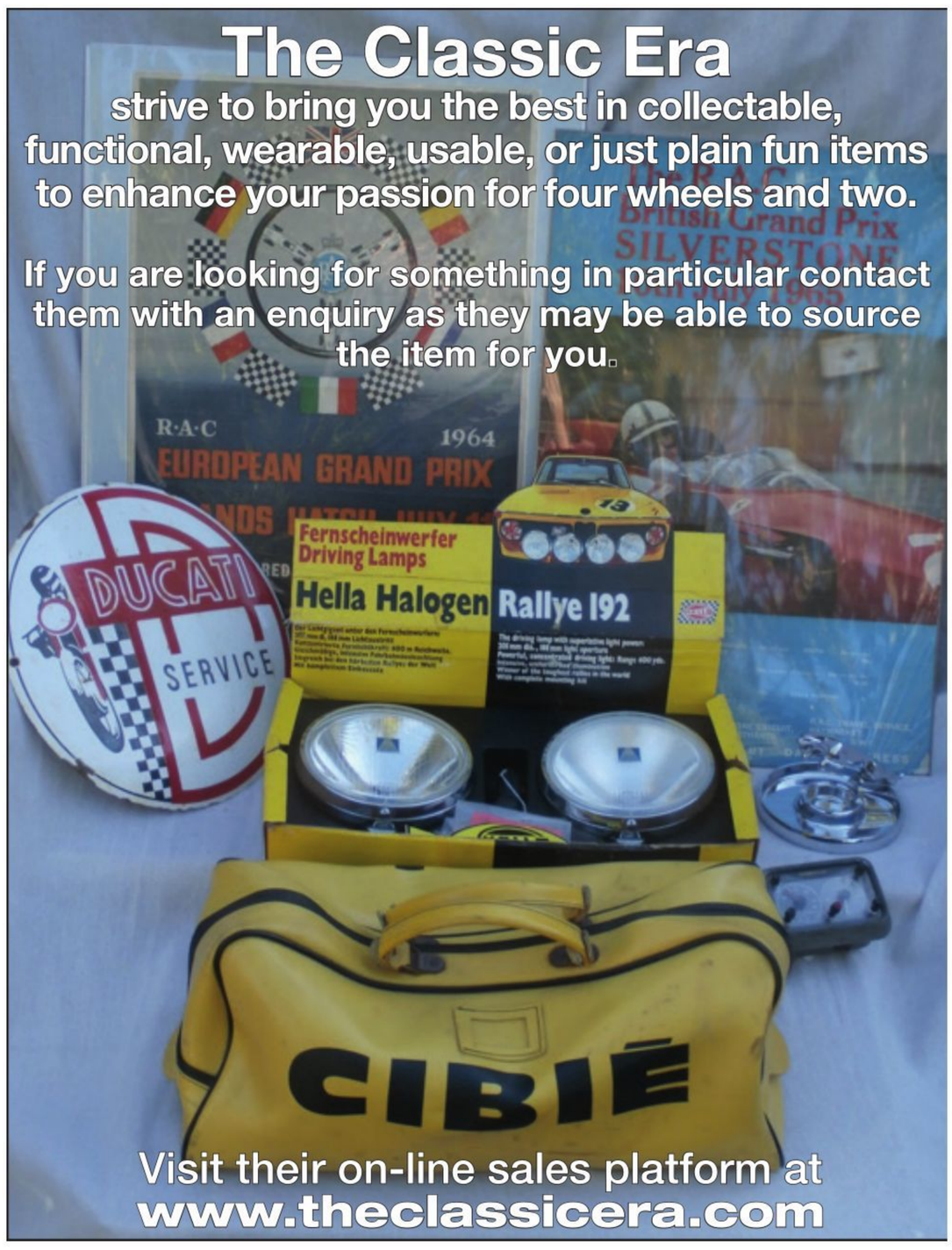
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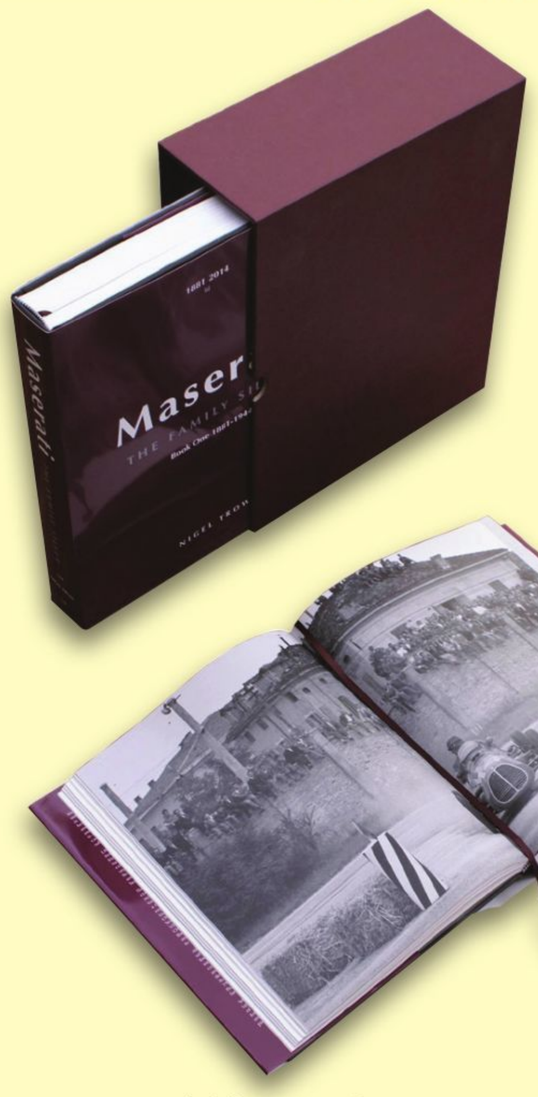
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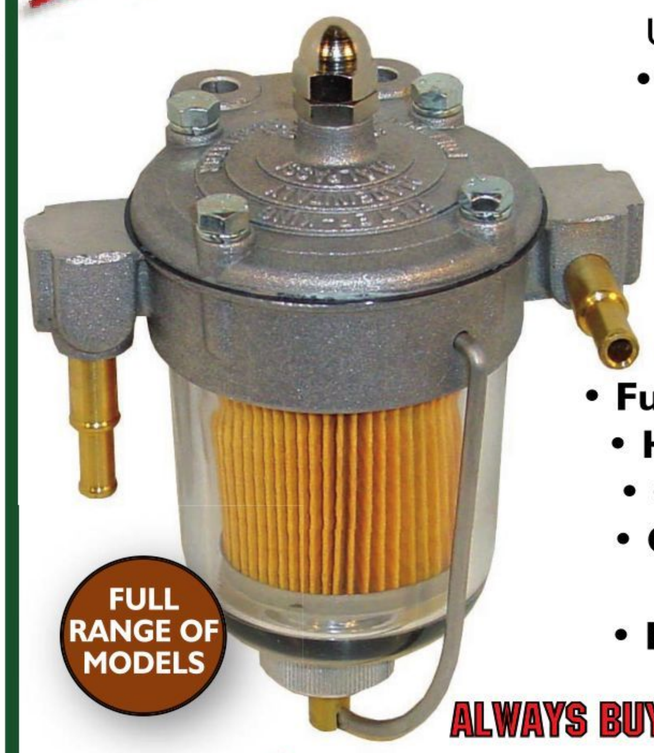
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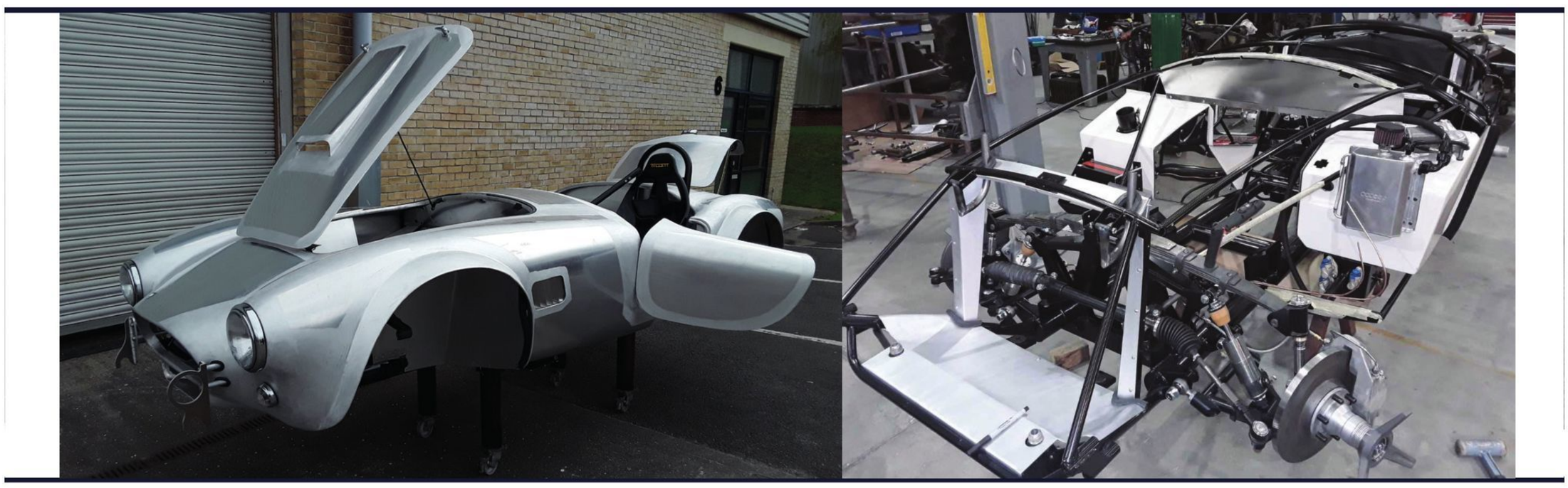
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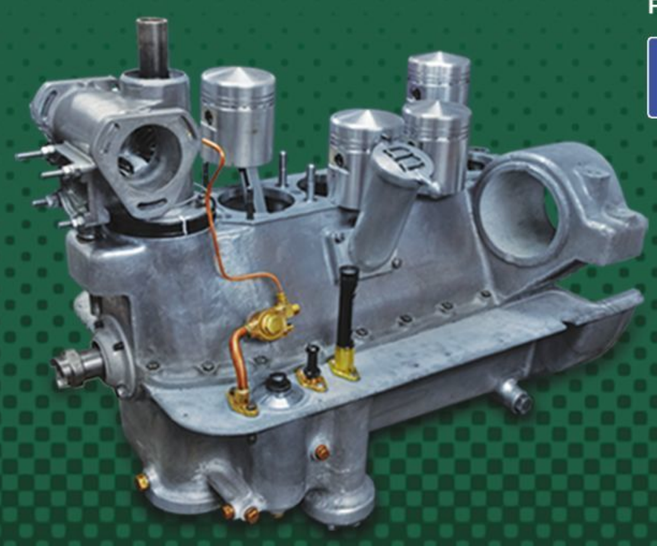
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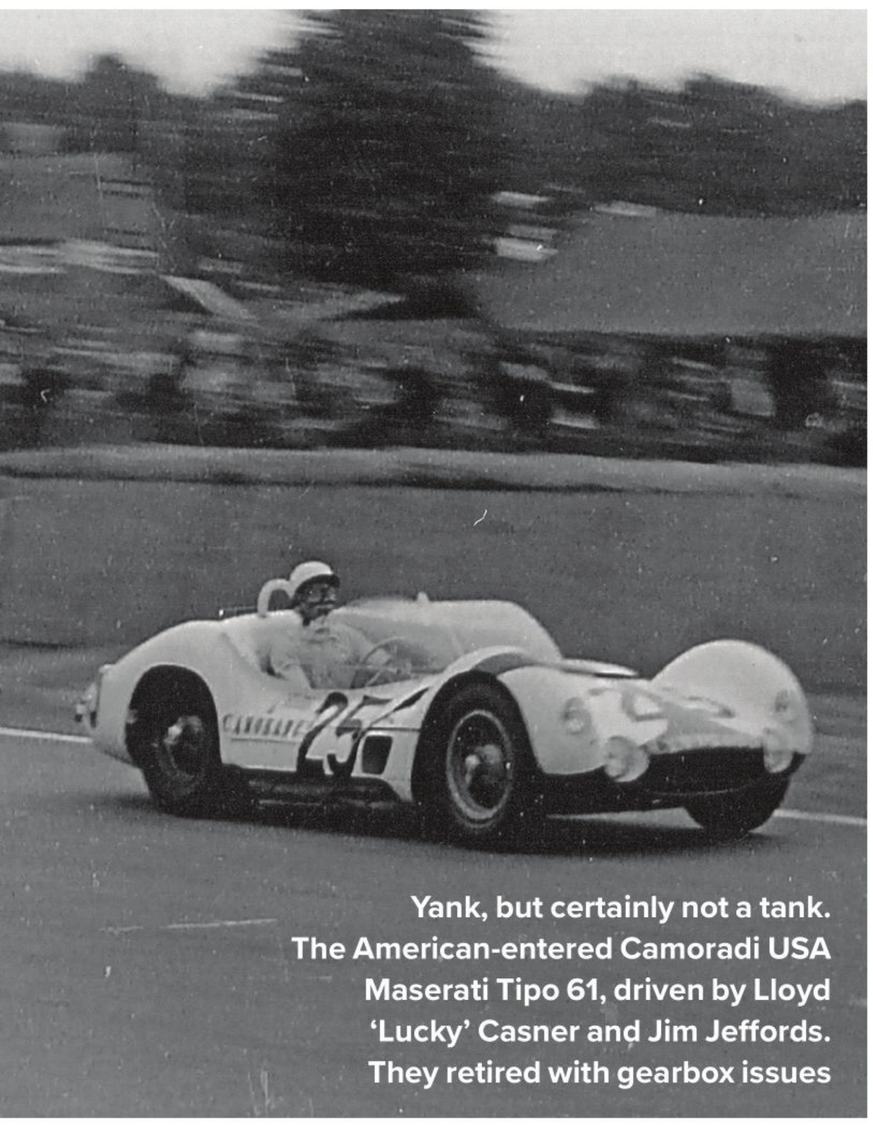
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Yank, but certainly not a tank. The American-entered Camoradi USA Maserati Tipo 61, driven by Lloyd 'Lucky' Casner and Jim Jeffords. They retired with gearbox issues



A feast of endurance

Le Mans was a very different place in the 1960s. After six decades in storage, **Tony Gardiner** sent us these images of the 1960 race, taken by a friend of his who was a guest of Lotus



Triumph ran three TRs and staged a formation finish, but none did the mandatory distance

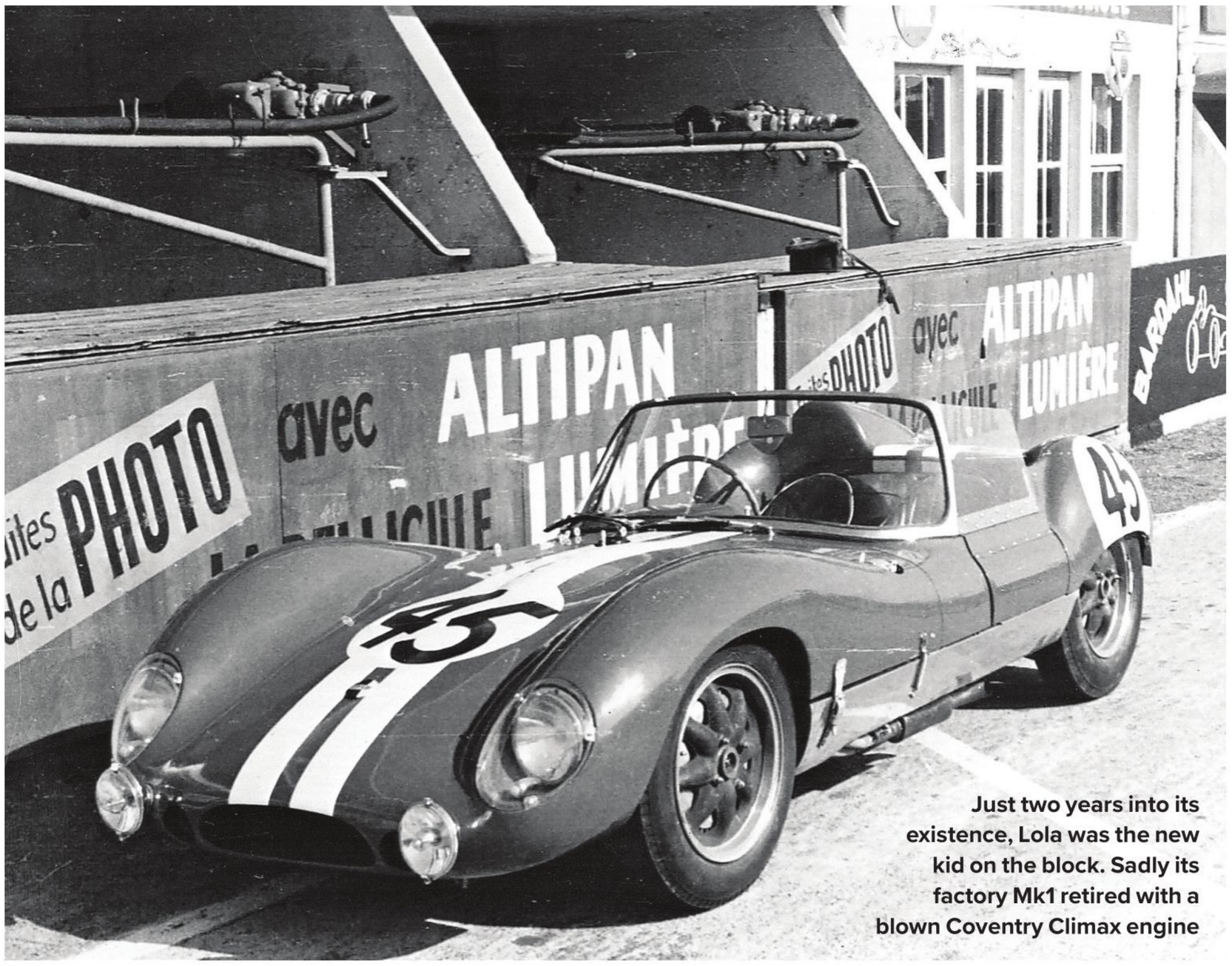
The Aston Martin DBR1 of Ian Baillie and Jack Fairman hits trouble, but was dug out in time to finish ninth



Ecurie Ecosse's transporter was arguably as famous as its cars. Here's the period team setup



The Austin-Healey Sprite Spider, entered by the tuning firm's chief, Donald, takes the finish in 16th



Just two years into its existence, Lola was the new kid on the block. Sadly its factory Mk1 retired with a blown Coventry Climax engine

John Wagstaff and Tony Marsh's Lotus Elite at the finish. They battled to 14th, but did win the Thermal Efficiency Award for best fuel economy, scooping the 30,000 Franc (£6750) prize

SEND US YOUR IMAGES

If you have any photographs that might be suitable for *You Were There*, please send them to: Motor Sport, 18-20 Rosemont Road, London, NW3 6NE or e-mail them to: editorial@motorsportmagazine.co.uk

MAY 3, 1970
TARGA FLORIO, ITALY

This month we asked our out-going art editor, Damon Cogman, to choose his favourite competition car ever in recognition of his 12 years of service to this magazine. He picked the Ferrari 512 S, so here it is in full flight on the Targa Florio in 1970, with Nino Vaccarella/Ignazio Giunti at the wheel. The graffiti on the corner exit suggests that the locals were just as big a fan... of Vaccarella at least.

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1970 Jaguar E type series II, 4.2 Fixed Head Coupe finished in Gunmetal with Burgundy hide. Fully restored **£94,950**



1964 Jaguar E type series I Roadster finished in Carmen Red with Black hide interior, Fully restored, **£139,950**



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1958 Austin Healey 100/6, Beautiful Throughout and only 2 owners in the last 40 years. Completely rust free, **£49,950**



1973 Aston Martin fuel injected V8 finished in Midnight blue with sand beige hide interior, Fully restored, **£99,950**



1963 Austin Healey 3000 BN7 MkII finished in Colorado Red over Black with Red interior. Originally supplied in Germany but converted over 20 years ago to Right Hand drive. A good solid example in need of minor improvement, hence respectably priced at **£39,950.**



1967 Aston Martin DB6 finished in Silver Birch with Black hide interior. Fully restored by us about 10 years ago. **£325,000**



1968 Aston Martin DB6 automatic, Finished in Dubonnet Rosso with Cream hide interior, 40 years with the same owner. Perfect throughout. **£225,000**



1958 Aston Martin DB MkIII finished in Pale Blue with Grey hide interior. Undoubtedly the best driving MkIII we have ever driven. Offers over **£200,000**



1992 Jaguar XJS 4 litre Convertible, finished in Signal Red with Cream hide interior. Very economic classic motoring at only **£15,950**



2000 Aston Martin DB7 Vantage Coupe in Blue with Cream hide interior. Choice of 2 immaculate cars at **£26,950** and a manual version at **£42,750**



1967 MGB roadster finished in Tartan red with black hide interior. An older restoration with a Heritage Bodyshell and perfect throughout. **£19,950**



2004 Bentley GT Continental finished in Midnight Blue with pale grey hide interior. 34,000 miles only with a perfect service history. **£28,950**



2002 Aston Martin DB7 Vantage Coupe in Stronsay Silver with navy blue and pale grey hide interior. 72,000 miles but in fabulous condition. **£28,950**



2008 Jaguar XKR Coupe finished in Lunar Silver with charcoal hide interior, only 2 owners and 33,000 miles with complete service history, **£16,950**



2001 Aston Martin DB7 Vantage Volante, LEFT HAND DRIVE. In Aston Racing Green with contrasting Parchment hide interior. 47,000 miles only, UK registered. **£37,950**



1998 Aston Martin DB7 i6 Volante finished in Cleveland red with Parchment hide interior. 2 owners and only 33,000 miles with full service history. **£32,950**

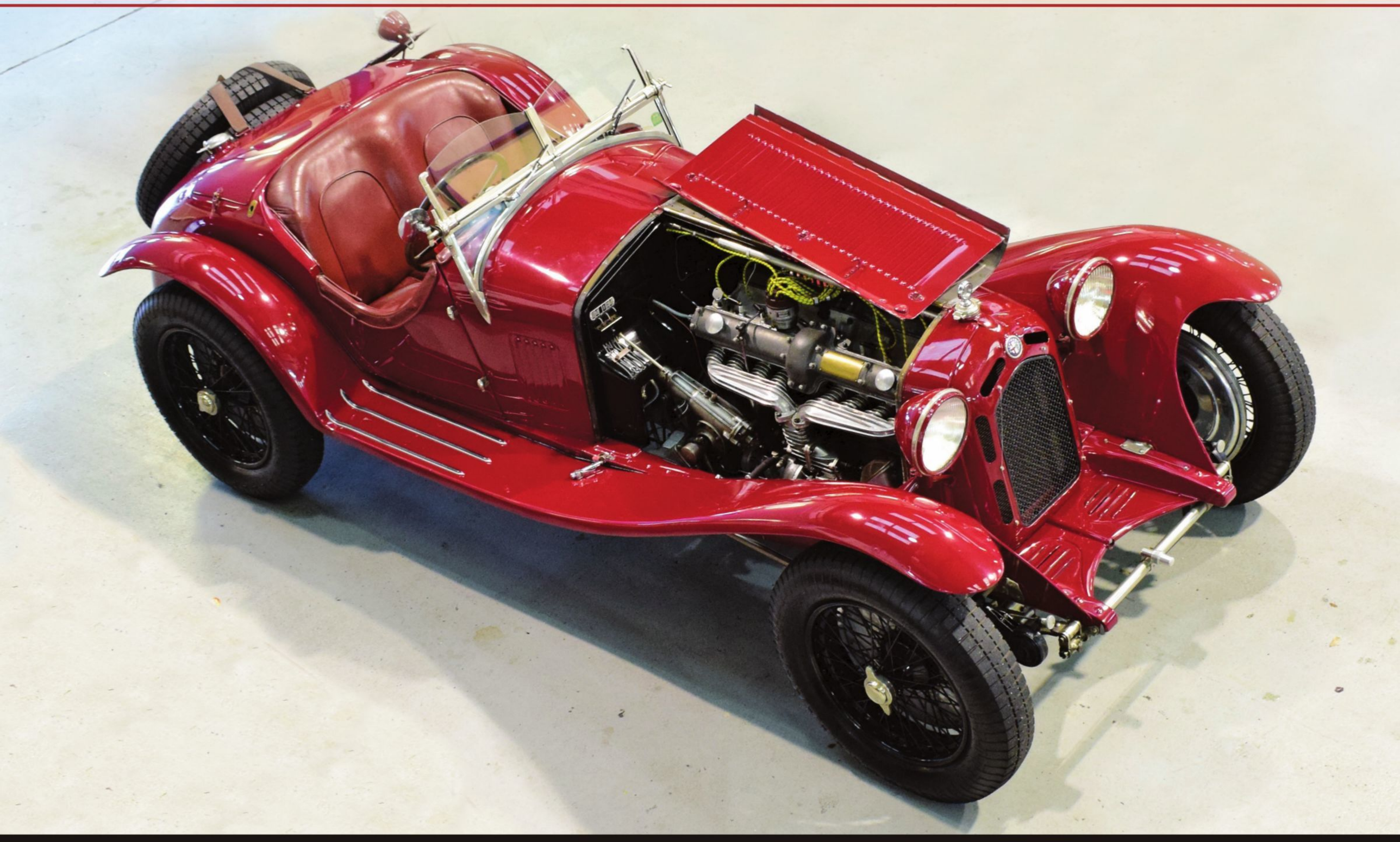


1999 Aston Martin DB7i6 Volante finished in Champagne with cream hide interior. 59,000 miles with full service history and in stunning condition. **£29,950**

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