

F1 Crunch time for McLaren in Spain

GP3 The Brits set to battle for the crown

WEC Alonso takes victory on debut



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CAN VERSTAPPEN FIX THE FLAWS THAT ARE HURTING HIM?

Max Verstappen very nearly topped Autosport's Top 50 drivers of 2017, only losing out to world champion Lewis Hamilton thanks to the Mercedes driver's superb form after the summer break.

We all expected a lot from the young Dutchman this year, and so did he, which is perhaps part of the reason why he now finds himself in something of a rut. It's remarkable to note that he is currently bottom of Autosport's 2018 Formula 1 driver ratings after serious errors in all four grands prix so far.

This is not to say he can't live up to the hype — we've already seen enough to know that the three-time F1 winner is a potential future world champion. But, as Edd Straw shows in his cover interview with Red Bull boss Christian Horner, Verstappen needs to show an ability (or, perhaps, the humility) to learn from his mistakes.

If he can, then he and team-mate Daniel Ricciardo should be formidable Red Bull-shaped thorns in the sides of Mercedes and Ferrari this year and beyond.

McLaren has looked a long way from fulfilling that role for some years. A lot has been made of the upgrades to the MCL33, due to arrive at this weekend's Spanish GP (see page 4). It would be great for F1 if Fernando Alonso, fresh from his first car-racing victory in five years at Spa's World Endurance Championship opener last weekend, could once again mix it with Hamilton and Sebastian Vettel. But in reality, if McLaren can simply move to the front of the midfield pack that would show progress. There's probably a long way to go before it can *really* challenge the Big Three for regular victories.



Kevin Turner

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GEPA pictures/Red Bull Content Pool;
JEP/LAT

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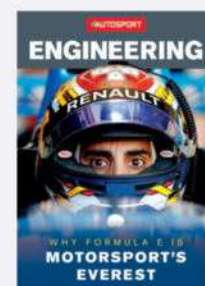
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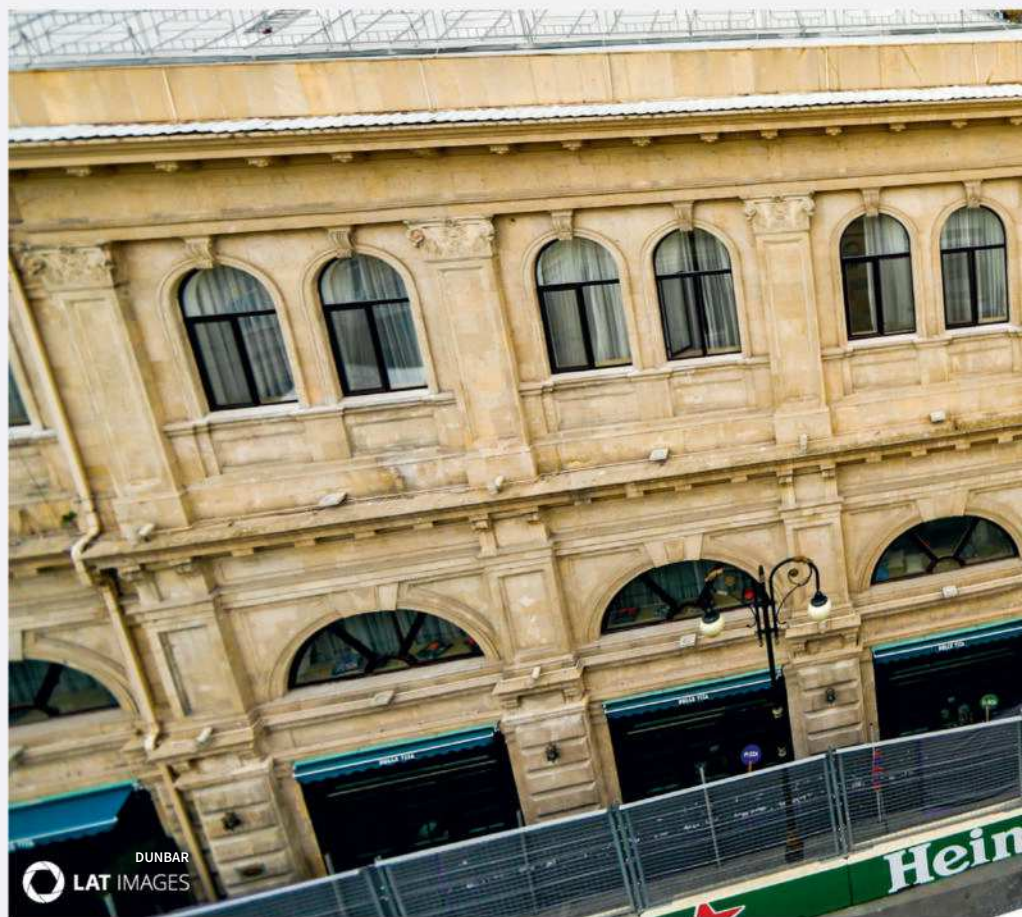
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FREE INSIDE

ENGINEERING SUPPLEMENT



Why Formula E is so tough and the regulations conundrum facing the sport are two of the key themes explored in this issue.



McLAREN: 'REAL' CAR, NEW

FORMULA 1

McLaren has promised that its 'real' 2018 car will make its debut at the Spanish Grand Prix this weekend, raising expectations that the team will turn around a season that has started poorly.

While McLaren has met its pre-season expectations by being fourth in the constructors' championship, that's a Band-Aid covering the deep wound caused by a car that has not been competitive enough. On average, the McLaren is only the seventh fastest car of 2018, and owes its lofty championship position to a run of seven out of eight possible points finishes.

Given that its performance on raw pace is almost identical to that of last season, despite the change from Honda to Renault propulsion, it's no surprise that technical director Tim Goss has been moved aside as part of what racing director Eric Boullier describes as an "ongoing investigation and restructuring".

Comments by Boullier at last month's Chinese GP raised hopes for a dramatic turnaround in Spain, when he said the specification of car that was originally planned for Australia would be introduced there. A combination of troubleshooting pre-season reliability problems and some overambitious schedules for signing off and

producing new parts is behind that delay.

"We're running with an evolution of last year and not the new car," said Boullier in China. He then downplayed hopes when talking about the expected step in Azerbaijan at the end of April.

"There is a new direction starting from Barcelona, and you cannot expect to jump everybody," he said. "Everybody is bringing a package, especially for the first European races. Monaco will be another upgrade, Canada will be another upgrade and Silverstone as well. It is every race."

McLaren has struggled for pace in qualifying trim in particular, and has regularly been at the bottom of the speed traps. This is partly down to the car carrying a little too much drag, but it is also understood that the gear ratios selected for the season are contributing to that. F1's technical regulations mean teams can select only eight forward ratios, which are frozen for the season.

McLaren's relatively healthy points tally

**"MAYBE THE GAP
REMAINS AS IT IS, WE
RECOVER A BIT, OR
WE LOSE GROUND"**



Birmingham aiming for FE 'Superprix'

FORMULA E

The Mayor of the West Midlands Andy Street says he is in "advanced" negotiations with Formula E about organising a street race that would revive the Birmingham Superprix.

The race would form part of FE's 2018-19 season, the first to feature the series' new Gen2 cars.

Street pledged to host a street race in Birmingham as part of his May 2017 election manifesto. The Birmingham Superprix was a Formula 3000 round (below) that took place between 1986-90 using roads around the south of the city centre.

"Over the last year, we have been in negotiations with the organisers of the FIA Formula E Championship about bringing a road race to Birmingham, effectively reviving the Superprix," said Street. "We are now in the advanced stages of these negotiations.

"Like many Brummies, I remember the original Superprix fondly. Photos and footage from those events have become almost part of folklore and remind us of how those events thrust the city firmly into the spotlight.

"So much of the engineering that goes into the cars already used in Formula E racing comes from the West Midlands, it makes perfect sense we should be hosting such events. If we are successful in concluding the deal, this Formula E race will take place next summer on a route similar to the one used in the original Superprix.

"Of course, there is still work to do. Birmingham City Council have been supportive in our discussions and we are working towards a deal based on commercial sponsorship."

FE evaluated adding a race in Birmingham to the end of the current season's calendar in place of the cancelled double-header in Montreal, but the championship was eventually capped at 10 cities hosting 12 races.

ALEX KALINAUCKAS



HOPE, SAME RESULTS?

of 36 is largely down to Fernando Alonso's strong performances and the ability of the team to execute races well. A McLaren has yet to reach Q3 in 2018, and Alonso's season-best fifth-place finish in Australia was assisted by the timing of the virtual safety car.

"Definitely not an easy start, especially on Saturdays," said Alonso of the season. "On Sundays, we did score a lot of points. In Barcelona, there is a new aero package coming, but I think 95% of the paddock is bringing a new aero package so maybe the gap remains as it is, or we just recover a little bit or we lose more ground. Who knows? It's up to us to make that package work to expectations and hopefully some others don't deliver — that is our hope."

Realistically, it's difficult to see a dramatic transformation in McLaren's form at Barcelona given such turnarounds are now rare, although if it can solve the car's instability problems and improve the aero efficiency this could allow the team to emerge as a stronger midfield competitor. There should also be a power upgrade thanks to a new BP/Castrol fuel specification that the works Renault team and McLaren will benefit from. The key point of comparison will be Renault, which has been ahead on pace this year.

Early in the season, McLaren set its

sights on catching Red Bull. During the second race weekend in Bahrain, Alonso suggested he wasn't thinking about the midfield and instead was focused on joining the big three. This now seems ludicrously optimistic, and McLaren's objective now must be to try to climb to the front of the midfield as the season progresses.

Not only will major technical-department changes be disruptive, but it will also be a long time before they deliver improved performance. That's what makes the Barcelona upgrade significant, if it can at least work as hoped, correlate well with the off-track expectations and ensure the team has something to work with.

That it proves McLaren is working in the right direction is almost more important than the overall performance step. Given the huge financial commitment involved in changing from Honda to Renault engines for 2018, the McLaren leadership will be under severe pressure.

A solid step in Spain won't transform the team's fortunes, but it is needed to steady the ship. Credibility and stability is what McLaren is looking for now. If it doesn't work, then there could be more ructions to come in Woking.

EDD STRAW

P13 OPINION



Miami plans Formula 1 street track for 2019 GP

FORMULA 1

The first images of the planned Miami Formula 1 track layout have been revealed, and it uses an area previously incorporated into IMSA, CART and Formula E circuits.

Plans for the race, targeted for October 2019, will be considered at a meeting of the city commission this week.

The track passes around the American Airlines Arena, which is the home of the

Miami Heat NBA team, and the pit and paddock area will be located adjacent to it. From the start/finish it runs down Biscayne Boulevard, before it loops around and returns on the same street. It then heads right towards a high-speed section along Port Boulevard, which crosses a bridge.

After a hairpin it returns on NE 6th Street via the same bridge to a second hairpin, before a run along the waterfront around the arena, through a series of 90-degree turns,

and back to the start/finish line.

A similar idea to the proposed bridge-hopping F1 layout was once discussed by Bernie Ecclestone and original Miami GP promoter Ralph Sanchez in the 1980s.

It is clear that the hope is that the two long straights, both of which are followed by heavy braking areas, will contribute to similar action to that seen on the Baku street track used for F1's Azerbaijan GP.

ADAM COOPER

TOP 3

MIAMI CIRCUITS

The South Florida city has a history of motorsport street racing in very different formats. Here are some of the events that have taken place since the 1980s



#1 THE FIRST IMSA TRACK

The original Miami layout, first employed by the IMSA sportscar series in 1983, also used

Biscayne Boulevard and ran around the area where the arena now stands. Al Holbert won the very wet race in his March-Chevrolet, with Bob Tullius (pictured) taking his Jaguar to fifth. Brian Redman/Doc Bundy scored a Jag win in '84; Holbert/Derek Bell won in a Porsche 962 in '85.



#2 THE INDYCAR RETURN

After IMSA and Indycar races at Bicentennial Park – further north than the original venue – the CART series brought racing back to the Biscayne Boulevard area for 2002 and '03, using some elements in common with the original IMSA track. Cristiano da Matta won in his Newman/Haas Lola in '02, with Mario Dominguez (Herdez Lola) on top in '03.



#3 SOLO FORMULA E VISIT

Motorsport returned in 2015 courtesy of Formula E, which raced on a short 1.4-mile course that went around the arena, but then swung north. Nicolas Prost scored the first of his three career FE victories in his e.dams Renault car, with Scott Speed flying the stars-and-stripes in second for Andretti Autosport, and Daniel Abt taking third.



SKIBINSKI/IMS

Fight to replace Fittipaldi

INDYCAR SERIES

Dale Coyne Racing hopes to make its decision on who will replace the injured Pietro Fittipaldi for the Indianapolis 500 later this month.

Fittipaldi was injured in qualifying for the World Endurance Championship round at Spa last weekend (see p8) and is expected to take eight weeks to recover, ruling him out of a maiden Indy 500 attempt.

While Fittipaldi's IndyCar rideshare with Indy Lights graduate Zachary Claman DeMelo means the Canadian will drive in this weekend's Indy road course race, DCR is hesitating over giving the Indy 500 drive to him. And the lowered costs of IndyCar, which have led to an entry list of 35 cars with multiple one-offs, make DCR's task of finding a replacement all the more difficult.

Whoever gets the nod will be allowed to do a rookie orientation programme – Fittipaldi's was slated for May 15.

Schmidt Peterson Motorsports star newcomer Robert Wickens completed his rookie programme last week after an unusual test that required a switch to James Hinchcliffe's car after a gearbox problem. That came after phase one of his test was interrupted by a Canada goose

that had wandered on to the circuit.

After those delays, Wickens passed the test along with AJ Foyt Racing's Matheus Leist and reigning Indy Lights champion Kyle Kaiser for Juncos Racing.

The trio was not allowed to undertake further track time in the afternoon's veteran refresher test, which featured the return of Danica Patrick (above). Like Wickens, Patrick had her fair share of problems. On her installation lap she suffered a water-temperature issue in the first running of her brand-new car. But she eventually returned to work her way through the three phases and set a best lap of 218.500mph, 1.148mph slower than SPM third entry Jay Howard's benchmark.

Dreyer & Reinbold Racing's Sage Karam also completed the test, with Foyt's James Davison a notable absentee.

The first days of IndyCar's 'Month of May' superspeedway testing ended last Wednesday with a manufacturer test for Honda and Chevrolet that was disrupted by high winds.

One-time Indy 500 winner Tony Kanaan (below) was fastest with a speed of 226.680mph, having also topped the first day's open test, which featured 21 cars.

TOM ERRINGTON



JONES/IMS

IN THE HEADLINES

YOUNG BRITS IN F1 TEST

Following Force India's confirmation of George Russell, the post-Spanish Grand Prix Formula 1 test at Barcelona is to feature more of the cream of current British up-and-coming talent. Formula 2 racers Lando Norris and Jack Aitken will drive for McLaren and Renault respectively, Aitken getting his first run in a current F1 car. Former F2 star Oliver Rowland gets a runout with Williams, alongside Robert Kubica. The not-anywhere-near-as-young Oliver Turvey also tests, alongside Norris at McLaren.

SAUBER TECH CHIEF OUT

Sauber technical director Jorg Zander has left the team. Zander, who worked at the squad in its BMW days, returned in 2017 after working as Audi's tech chief during its LMP1 programme. It comes weeks after Sauber hired former Toyota, Ferrari and Audi man Jan Monchaux as its new head of aero.

AGAG'S €600M BID

Formula E CEO Alejandro Agag has made a surprise €600million bid for outright ownership of the series. In a letter to the chairman of the FE board of directors, and seen by Autosport, series founder Agag wrote: "As an entrepreneur I would like to increase my interest in the business and influence in its future direction. I strongly believe in the future of Formula E and this offer is an expression of that confidence. For this reason I would like to make a proposal to buy all the shares in the company at a value of €600m equity value."

SARRAZIN BACK IN FE

Versatile Frenchman Stephane Sarrazin will return to the Formula E grid for this month's Berlin round with Andretti, and will complete the season with the squad. Sarrazin replaces Tom Blomqvist, who is focusing on his World Endurance programme with BMW. Meanwhile, Luca Filippi has been given a reprieve by NIO for Berlin, after losing his seat for the Paris round to reserve driver Ma Qing Hua.

PIQUET'S GP3 DEAL

Ex-Formula 3 European Championship racer Pedro Piquet has finally been confirmed by Italian team Trident for this year's GP3 Series. The son of Nelson Piquet completed post-2017-season testing and pre-season '18 runouts with the squad.

ZARCO GETS KTM BERTH

MotoGP starlet Johann Zarco has secured his first factory ride with KTM for 2019. The Frenchman, who switches from Tech3, joins Pol Espargaro at the Austrian team, and replaces Briton Bradley Smith.



Aston, Ferrari and Ford join discussion on future of LMP1

WEC

Aston Martin versus Ferrari versus Ford versus Toyota versus McLaren. That's the mouthwatering prospect of the new LMP1 class, dubbed GTP, due to arrive for the 2020-21 World Endurance Championship.

They are the five manufacturers around the table discussing a new set of rules designed to maintain the performance of the current generation of P1 cars at a much lower cost, at the same time as giving the manufacturers the chance to style their racing machinery in the image of their road cars. If those names weren't sexy enough, there's a sixth manufacturer in Porsche keeping a watching brief on what's going on as an observer.

How close each of the manufacturers is to making a commitment to develop a GTP car cannot be known at this point. The regulatory roadmap has yet to be totally defined and won't be announced until the week of the Le Mans 24 Hours in June.

Toyota and McLaren have already confirmed a firm interest in the new category, and now Aston has joined them.

"We are at the table because we are interested – there's no certainty that we will do it, but

there is a definite interest," said Aston Martin Racing president David King. "If the Automobile Club de l'Ouest and the FIA [which write the rules] allow us to compete at a cost that is not an order of magnitude more than a GTE programme, then we would look at it.

"We wouldn't be at the table to discuss LMP1 as it is now, because it's too expensive, as it was when we dabbled in it before [in 2009-11, above]. The conditions of our entry would be affordability, and the ability of a small company like ourselves to compete with someone like Toyota together with a relevance to road cars."

Ferrari and Ford, current players in GTE Pro like Aston, are playing their cards closer to their respective chests.

"We are around the table with the other manufacturers, but we can't say if we are interested or not interested," said the Italian manufacturer's GT racing boss, Antonello Coletta. "We need to understand what is happening, but if the new category is not so expensive, a lot of manufacturers could be interested."

Ford is at the table because it is trying to work out what to do after its existing commitment to the WEC finishes at the end of the 2018-19 superseason.

GARY WATKINS

Manor cash 'in place for Le Mans'

WORLD ENDURANCE CHAMPIONSHIP

The cashflow problems that prevented the Manor Ginetta LMP1 team from racing in last weekend's World Endurance Championship opener at Spa should be resolved in time for the Le Mans 24 Hours in June, the British constructor has been promised.

Funds due to the Manor-run CEFC TRSM Racing squad failed to arrive, and Ginetta prevented the cars from running in anger. The two G60s (below) each completed one in-out lap in each of the three practice sessions and took no part in qualifying or the race.

"The required funds for Ginetta were due some time ago, and while we understand that TRS has been working with its sponsors to sort the issues, Ginetta cannot allow the cars to race," a statement read.

"We have been informed by TRS [Talent Racing Sport] that the current situation is a short-term cashflow problem and that the main funds are in place for payment before Le Mans. Ginetta remains committed to working with CEFC TRSM Racing."

The funding issues come against a backdrop of uncertainty over the future of team sponsor CEFC China Energy conglomerate. Its staff have gone unpaid for two months and an investigation has been launched into the financial activities of chairman Ye Jianming.

Should these problems not be resolved, Ginetta could still be on the grid at Le Mans. The #5 car is understood to be largely funded by Ginetta, after it stepped up its involvement in the TRSM operation when another team that had ordered multiple cars was unable to put its programme together.

Speculation suggests that the first team on the Le Mans reserve list, 2015 LMP2 class winner KCMG, has been told to start preparing for the race.

The P1 Spa field was further depleted when Pietro Fittipaldi crashed heavily in the DragonSpeed BR Engineering-Gibson BR1 at Eau Rouge in qualifying. The 21-year-old sustained a compound fracture of his left leg and a broken right ankle, and was still in hospital in Liege at press time after successful surgery.

It appears that the power steering cut out when an electrical glitch hit and didn't turn itself back on. DragonSpeed boss Elton Julian would not comment on the future of his P1 programme until a thorough investigation into the accident had been concluded.

GARY WATKINS





BRABHAM When Brabham limped out of Formula 1 at the start of 1993, the BT61 was a work in progress. Step forward, the BT62! Built by Brabham Automotive under the headship of David Brabham, this supercar designed for the track uses a 5.4-litre engine producing 700bhp. Just 70 will be built in Australia, with the first 35 featuring special colour schemes to celebrate the marque's GP victories. All yours for £1million plus local taxes. "The goal is to go to Le Mans with our own race team, with our own car," said David Brabham. "There's a long-term plan and that's what I've worked on for 12 years."

Red Bull gives Ticktum Japanese chance

SUPER FORMULA

McLaren Autosport BRDC Award winner Dan Ticktum has been given two races in Japan's hotly contested Super Formula series with Team Mugen.

The Red Bull Junior, who took victory in last November's Macau Grand Prix, will replace Red Bull Athlete Nirei Fukuzumi at Sugo on May 27, and will then compete at Fuji on July 8. Fukuzumi has to miss both races because of his clashing Formula 2 programme with Arden International.

Ticktum was given the fill-in role by Red Bull driver chief Helmut Marko, who placed Pierre Gasly (below right) at the same team for the 2017 season – the Frenchman was narrowly pipped to the title and impressed enough to earn a Toro Rosso Formula 1 seat.

"It's something that Helmut told me to do," Ticktum told Autosport. "He's putting me there to see how I cope with jumping in something new and a bit quicker. The Super Formula car is one of the last proper racing cars there is, so I'm very much looking forward to it. I drove Formula 2 a month or so ago [when Ticktum replaced the unwell

Nicholas Latifi in a pre-season test], which is on a similar wavelength."

Ticktum's first laps behind the wheel of the Honda turbo-powered Mugen Dallara will come in free practice at Sugo. "I've never even driven it on the sim," he added. "I'm thrown in at the deep end as usual!"

Meanwhile, Ticktum begins his main 2018 programme – the Formula 3 European Championship – with this weekend's season opener at the Pau Grand Prix. He lines up with the German Motopark squad with which he won in Macau.

Series organisers are facing a conundrum, which will likely not be resolved until Thursday, over how the 23-car field will be divided into two for the first qualifying session. Usually this is decided by alternate championship positions, but with Pau hosting the first round a new method has to be adopted. The previous system of sifting the field by odd and even car numbers is also not possible, as 14 cars have odd numbers and only nine have even.

MARCUS SIMMONS

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F1 SPANISH GRAND PRIX PREVIEW



UK START TIMES

FRIDAY

FP1 1000 FP2 1400

SATURDAY

FP3 1100 QUALIFYING 1400

SUNDAY

RACE 1410

HIGHLIGHTS ON

CHANNEL 4

RACE 1800

LIVE ON SKY SPORTS F1
BBC RADIO 5 LIVE SPORTS EXTRA
1400

TYRE ALLOCATION



TRACK STATS

LENGTH 2.892 miles

NUMBER OF LAPS 66

2017 POLE POSITION

Lewis Hamilton 1m19.149s

POLE LAP RECORD

Lewis Hamilton 1m19.149s (2017)

RACE LAP RECORD

Kimi Raikkonen 1m21.670s (2008)

PREVIOUS WINNERS

2017	Lewis Hamilton	Mercedes
2016	Max Verstappen	Red Bull
2015	Nico Rosberg	Mercedes
2014	Lewis Hamilton	Mercedes
2013	Fernando Alonso	Ferrari
2012	Pastor Maldonado	Williams
2011	Sebastian Vettel	Red Bull
2010	Mark Webber	Red Bull
2009	Jenson Button	Brawn
2008	Kimi Raikkonen	Ferrari



The Circuit de Catalunya is the third Barcelona venue to host the Spanish GP, after Montjuich Park and Pedralbes, where Fangio took victory in 1951.

THEMES TO WATCH

BARCELONA IS CRUNCH TIME FOR McLAREN...

After struggling to unlock qualifying speed from its new car in the early races, thanks to mistaken aero targets, missed production deadlines and misjudged gear ratios, McLaren heads to Barcelona with a big update package it hopes will narrow the yawning chasm between it and F1's big three teams.

...BUT HOPEFULLY NOT FOR RED BULL

After hauling both drivers into the Milton Keynes factory to apologise after their mutual annihilation act in Baku, Red Bull is expecting Max Verstappen, in particular, to show he can drive with more poise and control.

CAN MERCEDES PLACATE ITS NEW DIVA?

The Catalunya circuit will offer all teams their first real reference point for progress made since winter testing. The W09 looked strong back then, but has been wayward in using the Pirelli tyres since. It's looking remarkably like 2017 all over again.

DUKE

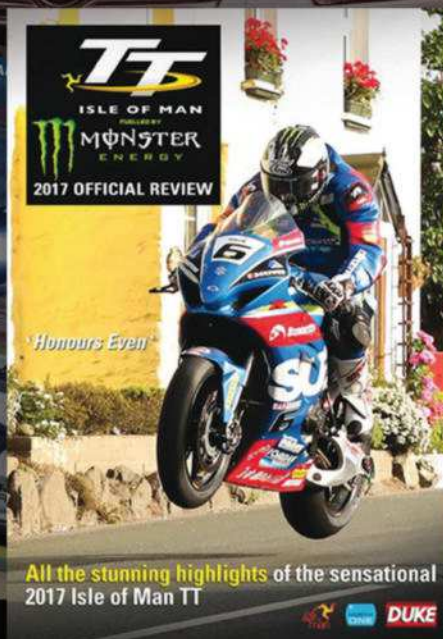
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SPANISH FLYERS: EXPLODING THE MYTH

McLaren has promised its 2018 car will finally arrive this weekend, but historic data exposes the 'magical' Spanish Grand Prix upgrade package as a fantasy

EDD STRAW

An illusory truth is one that's held to be self-evident because it has been repeated so many times that it becomes unchallengeable. Is there any more dependable trope of this kind in Formula 1 than the magical Spanish Grand Prix upgrade package?

McLaren's promise that "the 2018 car is coming to Barcelona" has raised expectations of a transformative weekend for the struggling team, despite other attempts out of Woking to downplay expectations. But history shows the game-changing Spanish GP update is more myth than matter.

There are valid reasons why Spain is a logical race for a big package to be introduced. Firstly, it's close to home for the European-based teams after what is usually a busy run of races. Secondly, Barcelona is a great test track. Pre-season testing took place there, so it's also the ideal place to compare your car against the benchmarks established ahead of the season.

It's also a more conventional track amid a sea of outliers. Early in the season, Bahrain's Sakhir circuit is perhaps the most

**"McLAREN IS RANKED SEVENTH
BASED ON THE AVERAGE OF
THE FIRST FOUR RACES"**

conventional layout, while Albert Park and Baku are highly unusual. And following Spain are Monaco and Canada, another two odd tracks. There will be Monaco and Montreal-specific parts, and there's six weeks until F1 visits its next 'orthodox' track for the return of the French GP at Paul Ricard.

So it's logical that teams will bring plenty of parts to Spain, even though all of them had already evaluated plenty of new components in the first four races of this year. The timing is right, the track configuration is right, the historical data for comparison is right. But a transformative package is not necessarily so easy to achieve. In order to gain ground, you not only need to improve your car, but also do that by more than your rivals.

But what does the historical data tell us about the chance of an upgrade transforming a season? Autosport's 'supertime' data is generated by taking each team's fastest single lap of a grand prix weekend and expressing it as a percentage of the outright

quickest. These can then be averaged out over sets of races, giving equal weighting to each weekend. Comparing the average performance over each season's first four races with that at Barcelona from 2010-17 gives 89 separate data points, and of those only 25 show a team being closer to the outright pace in Spain than over the first four races. That's 28% of the time.

Barcelona is not always the fairest track for establishing the overall order, because it's a circuit where gaps can be distorted given the extreme downforce dependency even in F1 terms. So it's perhaps fairer to compare the four races before Spain with the four that follow. Even then, the figure only rises to 36, or 40% of the time. The average performance swing at Barcelona compared with the first four races of the season is just 0.294%. And when you compare the first four races with the four-race run starting with Spain, the average performance swing is close to zero.

Ignoring pure performance, it's also rare for there to be substantial changes in the order. McLaren is ranked seventh for performance based on the average of the first four races, so in order to move to the front of the midfield at the Spanish GP it requires a three-place jump. These are rare.

Encouragingly for McLaren, it did leap from ninth on average to fourth best in Spain last year. This was down to a combination of factors, including a Honda power-unit upgrade that included a new air intake, aerodynamic developments, and a track configuration that better suited the car.

This represented a remarkable gain of 1.093% relative to the front, and over the four races starting with Spain a gain of 0.818%. So there are cases when more significant gains can be made. Currently, the gap from McLaren to fourth-best Renault is 0.815%, so there is some cause for optimism there. But it should be added that it slipped down to eighth fastest on average during that four-race run, which supports the view that Barcelona was an outlier that suited McLaren's strengths.

If McLaren does make some small gains this weekend, say up to 0.5% compared with the front, then it will be to its credit and should make it a more capable midfield performer. But given that McLaren has pointed to Red Bull as its benchmark, it will be the gap to the big three that is more significant. Its 1.88% deficit to Red Bull over the first four races is a performance swing that has never been made in Spain from 2010 to '17.

Should McLaren make more spectacular gains, it will have bucked the overall trend and may be close enough to achieving the performance level required to be fourth in the constructors' championship on merit rather than by stealth. 🏆



BALANCING ACT

The World Endurance Championship requires a Balance of Performance quick-fix to make GTE Pro the five-way battle that the series so dearly needs

GARY WATKINS

The World Endurance Championship got the perfect result for what was – it's easy to overlook – its relaunch race at Spa last weekend. A Fernando Alonso victory put the series firmly in the headlines. But what wasn't quite so perfect for me were the happenings in GTE Pro.

Not that it wasn't a good race down in the premier GT class. Ford and Porsche battled hard most of the way, the pendulum swinging one way and then the other. My problem was that it was a two-way fight rather than one involving five manufacturers.

Aston Martin and BMW were nowhere, and even reigning class champion Ferrari wasn't really in the game. Its 488 GTE wasn't competitive in qualifying, though it was marginally closer in the race, sneaking a podium at the death.

That's a problem for the WEC, because the series needs GTE Pro to provide some cracking racing. It should be the championship's halo class in the absence of multiple manufacturers in LMP1 or, by the looks of it, any realistic opposition for Toyota from the privateers.

Alonso's victory brought the WEC to a wider audience on Saturday night and Sunday morning. But how long

"IN THE ABSENCE OF MULTIPLE LMP1 MANUFACTURERS, GTE PRO SHOULD BE THE HALO CLASS"

before the novelty wears off? Should the Spaniard and team-mates Sebastien Buemi and Kazuki Nakajima triumph at the Le Mans 24 Hours next month, will everyone still be excited by his sportscar exploits at Silverstone, Shanghai and Sebring? Not if the LMP1 battle turns into the Toyota whitewash that we all expect.

The inability of the new GTE cars from Aston Martin and BMW, and the evolution version of the Ferrari, to compete was placed firmly on the Balance of Performance by the manufacturers. They suggested that it was no coincidence that the three cars that proved uncompetitive were the three new cars, and the updated Ferrari counts as one of those.

The BoP debate has been burning itself out over the past 10 or so months. And that's because the automatic system – introduced last year – based on data collected from the races has made the bickering and lobbying of previous seasons

futile, at least as far as the six-hour WEC races go.

The reason why the debate has reignited is the arrival of the second-generation Aston Martin Vantage GTE, the BMW M8 GTE and the Ferrari 488 GTE evo. This is the first time that new machinery has been pitched against existing cars running to a BoP calculated by the algorithm at the heart of the automatic system. They have to be given a starting point, which clearly can't be based on event data.

The rulemakers – the FIA and the Automobile Club de l'Ouest – have to make a judgement call based on what they do know from BoP testing at the Ladoux Michelin proving ground, dyno and windtunnel testing, and data supplied by the manufacturers of the new cars. That reintroduces the human decision-making that the automatic system was devised to remove.

The allegation from Aston, BMW and Ferrari is that the starting points for their respective challengers are wrong. And big-time wrong.

The problem is that the auto BoP takes time to work itself out. A car can only have its performance adjusted every two races, and the changes allowed come in relatively small increments. That explains why the aggrieved manufacturers have been talking about writing off the 2018-19 WEC superseason.

Le Mans has its own BoP courtesy of the unique demands of the 8.47-mile Circuit de la Sarthe and the fact that each of the cars runs in different aerodynamic configuration to the six-hour races. It's distinct from the auto system because it relies on human interpretation of the data, including that gathered at the pre-Le Mans races.

There's always the worry that manufacturers will try to play a long game by not showing their hand before the 24 Hours, and those with new cars are well placed to do that. You'll find engineers in the paddock who will tell you that it's a trick that has been pulled successfully in the past, both before and after the introduction of the auto BoP.

It will become clear if anyone has been playing games at Le Mans, and there are lots of weapons in the rulemakers' armoury to penalise any offenders before and during the race. There is also a two-month gap between Le Mans and the next six-hour WEC race at Silverstone for some serious number-crunching.

The WEC must redress the problems we saw at Spa, presuming they aren't contradicted at Le Mans, and there's a mechanism in the BoP guidelines to do it. The so-called 'black-ball rule' allows for a round of non-automated changes once a season.

It surely needs to happen in time for Silverstone on the penultimate weekend of August. The WEC needs the GTE Pro boys to put on a show, because Toyota's superseason cakewalk is going to get boring pretty quickly. 🏁

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YOUR SAY

I asked a lot of people in racing about Rolf Stommelen, and their eyes lit up when talking about how much of a badass he was

ALEX BASSI

Thanks for the Rolf Stommelen memories

The Rolf Stommelen piece (April 26) was amazing! Thanks so much. I was at Riverside as an 11-year-old in 1983 when he was killed. As he was getting into the 935, my dad was telling me all about how crazy-fast the guy with the glasses was. We were behind the pitwall, making eye contact with him as he got in the car for the final time. My dad was telling me all the stories: 917, pole at Le Mans, Arrows F1, etc. We heard the crash as we walked towards the back straight and later saw the wreckage...

After I started reading racing mags in 1985 and really getting into racing, I was always looking for a story on Rolf (right). I asked a lot of people in racing about him, and their eyes lit up when talking about how much of a badass he was. I even asked Paul Newman about him at an IndyCar race at Long Beach and my question generated a good five minutes out of him. Which was cool, because he was busting my balls about not having the correct pass and all of a sudden he forgot and went on and on and ignored all the fans that wanted to talk movies and get autographs. (Things you can get away with as a teenager.) LOL

Alex Bassi

Los Angeles, California

Can Button beat Alonso to the triple crown?

Brilliant to see Jensen Button will be back racing in Europe in LMP1 WEC as well as his exploits in Japan. Do you think he can beat Fernando Alonso to the triple crown? Maybe Nico Rosberg will come out of retirement and Juan Pablo Montoya could sign up to race at Le Mans as well. Who would be best to follow in Graham Hill's footsteps?

Justin Lyle

Glasgow

Vettel needs to drive with his head not his heart

After Azerbaijan, it seems obvious Sebastian Vettel is incapable of winning the drivers' title unless he starts driving with his head instead of his heart. All he had to do was finish ahead of Lewis Hamilton to maintain the lead in the championship. But a bravado move cost him vital points.



It appears that he either thinks he has something to prove, or the pressures from above at Ferrari are weighing heavy on his shoulders. Wise up, Seb, or the title is yours to lose again!

Adrian Townsend

Retford, Nottinghamshire

New fencing spoils the view

Having experienced the 'minor adjustments' to the Brands Hatch Grand Prix loop during last weekend's Blancpain GT round, I would suggest it is now dead for spectators. What was once a pleasure to view out in the woods has now turned into a display of galvanised construction, with the sight of racing cars somewhere behind. Brands should not have gone to the trouble and expense of fence erection, just put barriers across the paths, with 'keep out' signs!

David Connert

By email

HAVE YOUR SAY, GET IN TOUCH

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Correction

Last week we claimed Tony Kanaan would make his Le Mans debut in 2018. He did, of course, race for Ford there last year, finishing sixth in GTE with Joey Hand and Dirk Muller.

INSIGHT

VERSTAPPEN'S WOES • GP3 PREVIEW • EUROPEAN F3 PREVIEW • VOLVO TRACK TEST



TIME FOR MAD MAX TO THROTTLE BACK

*Four erratic races have put Verstappen under pressure in 2018.
Can he learn from his mistakes?*

EDD STRAW

F1 POINTS AFTER
FOUR ROUNDS

1. HAMILTON	-	70
2. VETTEL	-	66
3. RAIKKONEN	-	48
8. VERSTAPPEN	-	18

MAX VERSTAPPEN stands at a fork in the road. One path leads to what he and many others who recognise a brilliant, irresistible talent regard as his manifest destiny of winning the world championship. Exactly what lies in the other direction — perhaps more wins but never the grand prize — is unclear, but Verstappen must turn away from the direction he's facing. He's always been a lightning rod for criticism, but 2018 is the first time Verstappen has made a sustained run of errors that has blighted a campaign.

In Australia, frustration at being mugged by Kevin Magnussen at the first corner turned to impatience as he struggled to get back past. This led to a messy exit and running a kerb, picking up the floor damage that led to his later spin. In Bahrain he crashed in Q1 and then, in forcing Lewis Hamilton needlessly wide at the exit of Turn 1 after losing the corner, hit the Mercedes and picked up terminal damage. In China he threw away victory by going off while trying an impatient around-the-outside pass on Hamilton and then clattering into Sebastian Vettel. In Azerbaijan he hit Red Bull team-mate Daniel Ricciardo and later moved twice in the braking area — earning himself, according to the stewards, an equal share in the team wiping itself out of the race. This cannot go on. That's why we need to talk about Max.

Verstappen has the air of belligerence that many, but not all, of the greats have. But he has been apologetic on two occasions this year — after hitting Vettel in China and the Baku collision. And he and Ricciardo also had to apologise to the entire Red Bull factory on Wednesday last week, a humbling experience. That's reflected in private too. The Chinese GP, where his blunders were compounded by team-mate Ricciardo's win — a textbook example of how to stay on the tightrope between aggression

“WHILE RICCIARDO HAD HIS STAKE IN THE INCIDENT, HIS JUDGEMENT WAS CLOUDED BY IRRITATION”

and over-aggression — is understood to have had a profound impact on him. How could it not, given that it drew criticism from both Red Bull's Helmut Marko, who said he must not overdo it, and his father Jos, who urged his son to think more in battle?

“My dad is the hardest critic of everyone in the whole world, so if I can handle him, I can handle anyone,” said Max before the Azerbaijan Grand Prix. “You're not perfect, nobody is perfect, you can always improve. I am very happy to listen and improve, like everyone else. The situation just makes you a better driver at the end of the day.”

Verstappen's contrition was genuine, hard as that may be to believe when you saw how he drove in Baku. There, it wasn't just his trademark moving in the braking area that led to the crash, but his aggression towards Ricciardo throughout the race that led to the frustration growing. While Ricciardo had his stake in the incident, because the gap on the inside was never there and his usual good judgement in battle seemed clouded by his irritation with his team-mate, it was Verstappen who contributed the greater part to the situation.

Another key player in helping Verstappen through this tricky spell is Red Bull team principal Christian Horner. You can only imagine the frustration he felt. Who knows how many conversations they must have had after China about Verstappen's need to cut out the mistakes, only for him to overstep the line once more in Baku?

“Ultimately, he will emerge from the other side of this,” says Horner. “The most important thing is to learn from mistakes. The start of this season has been tough for him. In many cases it's looked like he's overeager. The other thing he benefits from, or will benefit from, is that his team-mate is a very polished and finished article and obviously at a different stage in his development. He can, and will, learn a lot of lessons from Daniel because, even after the incident in Azerbaijan, there is a respect between them. Daniel provides a very good and rounded benchmark there.”

It's clear Red Bull sees the Verstappen/Ricciardo line-up as the ideal one for the team, hence the pressure it's applying to get the Australian to sign on the dotted line of a new deal that would keep >>



POTTS/SUTTON IMAGES





Stewards found both Red Bull drivers to blame in Baku accident



Red Bull team principal Horner believes Verstappen has looked "overeager"

CASE STUDY



Perez (left) got on the wrong side of team-mate Button

SERGIO PEREZ 2013

During his one and only season with what was then regarded as a top team, McLaren, Sergio Perez earned himself a reputation for getting into scrapes. After upsetting team-mate Jenson Button in Bahrain, Perez then had another run-in with him in Monaco, also winding up both Fernando Alonso and Kimi Raikkonen.



"That won't help, maybe someone should punch him in the face," was Raikkonen's suggestion when he was asked if the drivers would be speaking to Perez about his conduct. The Mexican, who has gone on to become one of the most dependable and consistent performers on the grid, has clearly learned from his experience.

"If I look back, that cost me quite a lot in terms of reputation," says Perez. "Everyone saw that Jenson beat me, but everyone forgets that I outqualified him [10-9 over the season]. Without those mistakes that I made because of being impatient..."

"I was quite frustrated that my McLaren was not as quick as they told me it was going to be. I think Max, in the last couple of races, has been quite impatient. He doesn't have the performance in his car that he is hoping to have and he is overdoing it."

Perez claims that the criticism he received in 2013 did not concern him. But he also warns that it's important for drivers to think about their driving when they are under fire.

"It's not something that worries me, or worried me at the time, because you just focus on your job," he says. "That said, when there is a lot of talk about your driving, you should think about it. Max is an intelligent boy and he will look at himself and see that he did wrong. He went straight to Sebastian [Vettel] after the race [in China] to apologise because he knew he made a mistake."

Having been in that situation himself, Perez is confident Verstappen will grow out of it – just as he did.

"Most of the time he has control, but he has lost that in the last couple of events," concludes Perez. "I'm sure he will grow up from this impatience."

**"I WAS QUITE
FRUSTRATED
THE CAR WAS
NOT AS QUICK
AS THEY SAID"**

him at Red Bull for next year and beyond. Ricciardo's ability to force the issue on track but not overreach (Baku excepted) is the template for Verstappen to learn from.

But why is Verstappen trying too hard? The most logical conclusion is that, in his fourth season in F1 and as a driver with three victories and 64 starts under his belt, he sees himself as ready for a world championship push. He certainly has the ability, but it's important to remember Verstappen is still only 20. Clearly, dealing with the reality that the Red Bull is generally fast enough to fight for victory in the races, but almost invariably starts with a track-position disadvantage, is a factor.

"Max's hunger and determination has hurt him this year, because each grand prix there's been an incident or a mistake," says Horner. "Some of the moves that he's pulled off, the first lap in China, are sensational. But for whatever reason the races haven't gone smoothly and haven't reached their potential. With Max, his raw ability is not in any doubt and he will learn from what's happened – and he needs to. It's a matter of closing the book on the first chapter, starting afresh now we've got to Europe and put it behind you."

The experience can't fail to change Verstappen. The question is whether it will change him enough for him to show patience at key moments in the intense pressure of battle. Out of the car, it's easy to accept that you have to play it cool sometimes and show better judgement. When you're flying towards a corner at breakneck speed with cars around you, that's when you have to rely on instinct and process decisions in split seconds. Some just don't have the temperament for it.

There's only so much that can be done to knock Verstappen into shape. It's down to him to take the problem seriously enough to take it onboard and not let his ego prevail, then to have the temperament to lock that more measured approach in his subconscious so that he processes these situations correctly in the heat of battle. You cannot teach this; you can only create the conditions to maximise the chances of it being learned. There's a risk it's a flaw that may never be defeated, but given Verstappen's age it is more likely that he will master it.

"The only person that can work it out is Max," agrees Horner. "We can all offer advice, feedback and guidance, but the only person that can ultimately come to those conclusions is Max himself. And he's smart enough to do that.

"He's been a lightning bolt from the moment he arrived in F1. He

"WHEN YOU'RE FLYING TOWARDS A CORNER, THAT'S WHEN YOU HAVE TO RELY ON INSTINCT"

turns up at Red Bull and wins his first grand prix; he's driven some fantastic races. This year, he's got off to a bad start, so now it's a matter of a clean start, put it behind you, learn from those incidents, focus on where your strengths are and know that some days you are going to have to concede.

"I don't think anything specifically has changed in his life or in his approach, it's just that a sequence of events has happened and sometimes when you get into a spiral nothing goes right for you. You have to break the mould in order to change, and I think that you often see it go the other way – once you get right on the crest of a wave, everything falls perfectly for you. He's got enormous ability and he can go on to achieve fantastic things in this sport, but only if he learns from the experiences that he's gone through."

The point about his bad start permeating into four bad races is a very significant one. One of the cornerstones of a strong psychology for any elite sportsperson is the ability to put errors behind them and keep focused. If you make a mistake in one corner, you can't make up for it in the next. Instead, you need to keep your mind clear, and ensure you simply drive the next turn at 100%. By trying to go beyond 100%, seemingly to make up for an earlier error (be it a bad start, a qualifying frustration or a previous race), Verstappen is not driving the race in front of him. It's always dull when drivers talk about taking things 'step by step', but that is exactly what he has to do. ➤➤

MAX VERSTAPPEN'S F1 RAP SHEET

In his 64-race grand prix career, Max Verstappen has been caught up in an increasing number of significant incidents. Here's a rundown of the various controversies, both those that were his fault and those that were not.

- 1 **MONACO 2015** Collides with Romain Grosjean at Ste Devote while trying to overtake.
- 2 **HUNGARY 2016** Is criticised heavily for weaving in defence of position against Kimi Raikkonen.
- 3 **BELGIUM 2016** Collides with the Ferraris at the start, then weaves against Raikkonen again.
- JAPAN 2016** Mercedes withdraws protest against Verstappen for forcing Lewis Hamilton down an escape road.
- MEXICO 2016** Sebastian Vettel attacks Verstappen, who goes off-track to defend, and criticises both Verstappen and the FIA race director.
- 4 **SPAIN 2017** Tries to go around the outside of Valtteri Bottas and Raikkonen at Turn 1 and is taken out in a three-way collision.
- 5 **BRITAIN 2017** Runs Vettel off the track, leading to criticism from the Ferrari driver over the radio.
- HUNGARY 2017** Is branded a 'sore loser' by Ricciardo after crashing into his team-mate at Turn 2.
- ITALY 2017** Collides with Felipe Massa trying to make an optimistic pass around the outside at the first chicane.
- SINGAPORE 2017** Wiped out in the three-way collision with the Ferraris at the start and is criticised by Ferrari, though is not to blame.
- USA 2017** Launches tirade at officials after being relegated from third to fourth for going off-track to pass Raikkonen.
- MEXICO 2017** Collides with Hamilton and Vettel during initial battle for the lead, but gets away without damaging his car.
- 6 **AUSTRALIA 2018** Blames car damage caused by hitting a kerb for Turn 1 spin.
- 7 **BAHRAIN 2018** Crashes in Q1 and blames an engine power spike, then runs Hamilton out of road in the race and retires with the resulting damage.
- CHINA 2018** Goes off trying to go around the outside of Hamilton, then clumsily hits Vettel at the hairpin, earning a 10-second penalty.
- AZERBAIJAN 2018** Is criticised by the stewards for weaving against Ricciardo moments before their spectacular collision. Red Bull also partly blames Verstappen for the incident that took both cars out of the race.



CASE STUDY

ROMAIN GROSJEAN
2012

Few drivers in the history of Formula 1 have come in for as much flak as Romain Grosjean did during his 'character-building' 2012 season with Renault.

But when he reflects on the impact that year had on him, it's not triggering a start crash in the Belgian Grand Prix (above, which earned him a one-race ban) that he considers the lowest point of that season.

"My biggest mistake was not at Spa-Francorchamps, it was in Japan when I hit Mark [Webber] in Turn 2," says Grosjean. "Spa you could always argue that if Lewis [Hamilton] had moved another 50cm right, and so on, but for me it was Japan and really, I was angry with myself."

"The worst thing is having criticism from the drivers you are racing against. The media and the fans, especially the fans, are going to like or dislike you whatever you do. But when it comes from other drivers it's harder because you compete against them and we know it's a dangerous game. It was quite hard to come onto the grid knowing others would criticise me. You really need to get a phase where you are out of the incidents and then you are fine again."

Webber's reaction to the Japan clash made things more difficult, not that Grosjean has any problem with it. After the race, Webber, his face like thunder, entered the Lotus hospitality through the back door and headed straight through the door of Grosjean's driver room – literally.

"He broke the door," recalls Grosjean. "He could've punched me right there and I wouldn't say anything. He was in the right. I was well aware I'd made a massive mistake."

"But after that, in Korea, at the start I lost three positions [from seventh on the grid] because everyone knew I was trying to stay out of trouble. I managed to do that, and then at the start of 2013 I could attack again. But the hardest thing is the other drivers' comments."

Grosjean did manage to turn things around, emerging in the second half of 2013 as one of the star drivers on the grid with a string of outstanding performances.



**"HE COULD'VE
PUNCHED ME
AND HE'D
HAVE BEEN IN
THE RIGHT"**

In Baku, for example, it's clear that having Ricciardo on his case got to Verstappen. He sees himself as Red Bull's lead driver, perhaps understandably so given he outperformed Ricciardo over the course of 2017. But his team-mate has once again raised his game. That's perhaps why what seemed to be the low point for Verstappen of China was extended to Azerbaijan. And it will have been compounded by a contract landscape that gives Ricciardo every reason to want to beat him.

Red Bull remains committed to allowing its drivers to race. While Verstappen's contract extension and the fact that Ricciardo is sniffing around other teams may suggest it's become Max's team, that's not what Red Bull intends. And understandably so, for while having a clear number one and number two in some ways makes life easier, it creates its own problems. The strongest team needs to have the strongest line-up. Provided the relationship between the two drivers does not become toxic – and even after Baku it's still good between Verstappen and Ricciardo – that puts the team in the strongest position. There was a point when Verstappen was seemingly indulged by Red Bull. He's not being let off the hook now though.

"They've been very expensive lessons for him, so I'm confident that he will recognise where the lines are," says Horner. "Racing your team-mate is very different to racing other competitors. You get criticised if you let them race, you get criticised even more if you give them team orders. One of the essences of Red Bull is we don't have a number one or number two."

"If you have a defined number one and number two you probably avoid some of the scenarios, such as what happened in Baku, but that's not the way that we go racing. We do not interfere in the way that the drivers race, other than that we request that they respect the team and respect each other, because they're representing every member of the team."

Red Bull has been here before. Verstappen's predecessor, Daniil Kvyat, fell apart mentally after a series of incidents culminating in Sebastian Vettel branding him a "torpedo" after two collisions in three corners at the start of the 2016 Russian Grand Prix. Coincidentally, this played a part in Kvyat being relegated to Toro Rosso and Verstappen's promotion. The team sees that as a very different scenario, though.

"TO BECOME A WORLD CHAMPION, YOU CANNOT JUST BE A MORE EXTREME VERSION OF MALDONADO"

Then there's Vettel, who had his fair share of incidents. He triggered the accident that put him and team-mate Mark Webber out of the Turkish GP in 2010 and later careered into Jenson Button at Spa, leading to McLaren team principal Martin Whitmarsh dubbing him the "crash kid". Vettel is perhaps the more relevant case study.

"They are different characters, different personalities," Horner says of Vettel and Verstappen. "They have to work it out for themselves and sometimes they've got to go through it in order to learn from it."

"With Sebastian, it was an evolution. There's no fast track to experience and he worked it out. He's far more rounded now than he was in the early days. He grew enormously through that time, from 2009 crashing into Robert Kubica in Australia, spinning off in the wet in Malaysia, crashing in Monaco. There were a lot of driver incidents that he learned from, and he applied that through the latter part of 2010, '11 and especially '12, when he was in a close fight with Fernando Alonso."

This is the hope – that having experienced the first four races of 2018, this is the moment when it all clicks for Verstappen. Most likely it will, as it usually does for top drivers. Lewis Hamilton, Vettel and Michael Schumacher all had their troubles earlier in their F1 careers and emerged from them to become three of grand prix racing's greatest drivers.

Whatever happens, there's a feeling that Verstappen's problems have built to critical mass and must either be controlled or they will destroy him. To become a world champion, you cannot just be a more extreme version of Pastor Maldonado.

"Maybe we'll look back on this one day, and maybe it'll be a defining moment," concludes Horner.

He's right, it will be. One way or another. ❧



WHO WILL PRODUCE ART'S MASTERPIECE?

The dominant GP3 team is well set for another strong season, but it's not yet clear who will lead the charge

JACK BENYON



The FIA's decision to impose a new car – and the addition of the Formula 3 name – for 2019 means change is afoot for the third tier on the Formula 1 support package. But that doesn't mean GP3 in '18, which kicks off at the Spanish Grand Prix this weekend, is a write-off. With a group of talented youngsters joining ART's ranks to replace the brilliant 2017 crop of Jack Aitken, George Russell and Nirei Fukuzumi, the fight at the front should still be intense. Callum Ilott and Jake Hughes appear on good terms in testing, but crashed into each other more than once in European F3. Will we have another intra-ART fight for best Brit and GP3 champion?

Not if MP Motorsport has anything to say about it – it's going to be a team to watch. And there are other drivers who have the capability to surprise.

There's not much change in terms of car or tyres in the final year of the series, but a trip to Paul Ricard is new for 2018 and Sochi is back on the calendar.

ANTHOINE HUBERT

THE RETURNING RACER

Let's get one thing straight: there's no reinventing the wheel this year in GP3. The current car has been in use since 2016, so any experience of it is a bonus.

There's unlikely to be massive time found in the car, so the best returning team-and-driver package has to be the favourite. This year that's Anthoine Hubert, back with ART Grand Prix for a second season.

Last year the team won seven of 15 races, taking the top four spots in the championship. Hubert will start the season with a huge target on his back. And he knows, for his career progression, that there's only one acceptable outcome: to win the title.

"That's my target," he says without a hint of pressure or concern at the scale of the task. "I know

I have to win if I want to get to Formula 2."

It sounds simple – he has to win. But how should he go about it?

"I think last year my weakness was qualifying pace," explains the 21-year old. "We didn't have a pole and in my opinion I was not enough in control. The race has always been the stronger part for me, but I just need to do better in qualifying and then I think it will be OK."

There's no doubt Hubert faces tough competition, and getting a pole and a win in early would be a welcome confidence boost.

With a premium on track time, he has the benefit of a year's experience with the best team. Time to deliver, and follow last year's teammates Jack Aitken and George Russell into F2.

STAT

1m31.751s

The fastest lap at the pre-season Barcelona test, set by Anthoine Hubert

Hubert needs to improve his qualifying performances if he's to beat strong team-mates



Ilott has the speed, but can he develop racecraft to match his fellow pacesetters?

CALLUM ILOTT

FERRARI'S NEW HOPEFUL

It's a big year for this driver. A European F3-topping 10 poles tells you all you need to know about Callum Ilott's speed. Consider also that that number trumps the likes of Lando Norris and Maximilian Gunther.

There's no doubt about his pace, but racecraft and results are where Ilott's season fell apart last year, his aggressive style often leaving him vulnerable.

This year the new Ferrari Academy recruit has stepped it up. Moving to Italy and completing a gruelling winter preparation programme shows that the 19-year old is maturing.

He joins GP3's best

team, ART Grand Prix, and was second quickest on both days of the last test. The confidence is flowing.

"Within the team I know I'm quite strong, and I could see myself improving through the tests," he says. "I think I adapted well to the car, but obviously it's more difficult when it comes to the races."

He joins a pair of drivers he knows very well at ART. He beat Van Amersfoort teammate Anthoine Hubert in F3 in 2016 – although Ilott did have a year on Hubert in the series – and Jake Hughes was also dispatched in the same championship last year. So what does Ilott make of his chances?

"It's quite crucial that I haven't had a championship win yet, when I feel like I've had the speed to," he says.

"A win makes a big, big difference to your career. F3 and GP3 are merging next year and that would make returning a backwards step. If I lost the championship but drove very well in the season, I think it would be viewed differently. The goal for me is to always win."

STAT

10

The number of poles Ilott scored to top the charts in European F3 last year

JAKE HUGHES

THE (SORT OF) EXPERIENCED HAND

Despite being an elder statesman in relative terms, 23-year-old Jake Hughes comes into his second stint in GP3 having only started karting just before he was 16. He took two wins with DAMS in 2016 and, after a year out in the F3 European Championship, now he's in GP3's premier squad. In his third year in the third tier, Hughes is ready to finally display his full potential.

"When anyone drives an ART GP3 car they should challenge for the title," says Hughes. "That should be no different for me. I'm very confident in the car and the team and I expect to be fighting at the front from the start."

Hughes had an up-and-down year with Hitech in European F3 last year. Why is it the right time for a return to GP3?

"Most of us need backing to go to F2 and F1," he says. "GP3 is the perfect place for me to demonstrate my talent as it's on the F1 bill."

"Mercedes and Red Bull in the past and now Renault are putting drivers onto the ladder, so GP3 is something they look out for."

"Whoever's job it is to look for new talent in the F1 teams, I think the first place they look is the support championships."

The place to look for rivals is within ART, but Hughes doesn't care about the competition. He's out to focus on his own racing.

"It's not my job to worry about anyone else," he says. "I have to push the car forward and help the team move forward as they want to win the teams' championship. I'm quite happy with where I'm at."



BEST OF THE REST

THE CHALLENGE TO THE BIG THREE

There's no doubting ART Grand Prix's credentials – you have to go back to 2014 to find a champion run by another team. It's going to take a seismic shift to topple ART, but there are some strong challengers.

A name that continues to crop up when talking to

teams and drivers is MP Motorsport. Already established in Formula 2, Formula Renault Eurocup, and the SMP and Spanish F4 championships, its new GP3 bid completes the Dutch team's presence on the single-seater ladder. But can MP really challenge?

"We are aiming to enter the series in style," says team manager Sander Dorsman. "It's always difficult to predict the season based on tests. I wasn't planning to run three cars at the back and this weekend I'm hoping we'll be fighting

for the podium."

He enters with three intriguing propositions in Niko Kari, Dorian Boccolacci and Will Palmer. Palmer, winner of the McLaren Autosport BRDC Award in 2015, graduates from FR Eurocup, so expectations should be

managed, but Boccolacci and Kari both won races in GP3 last year. Even so, the Ilott, Hubert, Hughes and Mazepin ART quartet still edges the predictions.

Like Ilott and Hughes, Mazepin also joins ART from F3. He finished far behind Ilott and Hughes in the points, but the Force India protege showed flashes of pace.

Outside of ART and MP, last year's teams' runner-up Trident will again run Giuliano Alesi, who was the top non-ART driver in the 2017 standings, plus Alessio Lorandi and Ryan Tvetter.

David Beckmann (Jenzer), Joey Mawson (Arden) and Pedro Piquet (Trident) are three more who transfer from the European F3 field and all are capable of good performances as rookies.





STAT

0

The number of non-reversed-grid races Alesi won in 2017

Alesi was best non-ART finisher in the 2017 season, and has the best helmet...

PORTLOCK
LAT IMAGES

CALENDAR

DATE	CIRCUIT
May 12-13	Barcelona (E)
June 23-24	Paul Ricard (F)
June 30-July 1	Red Bull Ring (A)
July 7-8	Silverstone (GB)
July 28-29	Hungaroring (H)
August 25-26	Spa (B)
September 1-2	Monza (I)
September 29-30	Sochi (RUS)
November 24-25	Yas Marina (UAE)



GP3 ENTRY LIST

DRIVER	TEAM
1 Callum Iott	ART Grand Prix
2 Anthoine Hubert	ART Grand Prix
3 Nikita Mazepin	ART Grand Prix
4 Jake Hughes	ART Grand Prix
5 Pedro Piquet	Trident
6 Giuliano Alesi	Trident
7 Ryan Tveter	Trident
8 Alessio Lorandi	Trident
9 Tatiana Calderon	Jenzer Motorsport
10 Juan Manuel Correa	Jenzer Motorsport
11 David Beckmann	Jenzer Motorsport
14 Gabriel Aubry	Arden
15 Julien Falchero	Arden
16 Joey Mawson	Arden
18 Leonardo Pulcini	Campos Racing



Mazepin is part of ART squad

PORTLOCK
LAT IMAGES

DRIVER	TEAM
19 Simo Laaksonen	Campos Racing
20 Diego Menchaca	Campos Racing
22 Dorian Boccia	MP Motorsport
23 Will Palmer	MP Motorsport
24 Niko Kari	MP Motorsport

PORTLOCK
LAT IMAGES



Mawson could surprise after showing flashes of pace in European F3

CAN ANYONE DO A NORRIS?

*European F3 begins this weekend with the Pau glamour round.
There are plenty of rookies in the field – all eyes are on
them in what should be a very open season*

MARCUS SIMMONS

Fenestraz, now in the
Renault Sport Academy,
is a hot tip for 2018

FIA F3/SUER

The Formula 3 European Championship, which kicks off with the historic Pau Grand Prix in South-West France this weekend, features an ultra-strong crop of rookies. But can anyone get close to emulating 2017 title winner Lando Norris?

Autosport got together with three of the trackside-corner-lurking vultures from the ranks of the F3 managers, driver coaches and mentors to get the lowdown on who's looked good in pre-season testing. Marko Asmer, mentor to Estonian pair Ralf Aron and Juri Vips, needs no introduction to F3 junkies as the 2007 British F3 champion. Ex-Formula Renault racer Pieter Belmans is a partner in the WinWay management and coaching company that has done a lot of work with Prema Powerteam over the years; the Belgian is now looking after second-year F3 racer Jehan Daruvala. And Fraser Shearer, a former fierce karting rival of Lewis Hamilton's back in the 1990s, is part of the ADD Motorsports management company that has masterminded Norris's career and is now taking care of Formula Renault Eurocup champion and leading F3 rookie tip Sacha Fenestraz.



DAN TICKTUM

The McLaren Autosport BRDC Award winner isn't eligible for the Euro F3 rookie crown, thanks mainly to his GP3 part-programme in 2017, but Motopark-run Red Bull Junior Ticktum has never done a

full season of racing at this level so he fits our criteria. Even if he's already a Macau Grand Prix winner...

MARKO ASMER He's won a big race already, so I'm sure he's very capable of doing well. But to go for a championship over the year, it's going to be a hard task. At Red Bull Ring [in testing] he was mega-quick, but at Misano he seemed to be off before they did something [to the car] and he ended up on top. He's not every time 100% – sometimes really good, other times not. It's going to be hard to be consistent.

FRASER SHEARER He's strong but it looks like it's been up and down. His team-mates are slightly stronger than I expected, and that's only going to help Dan – as long as he uses them."

PIETER BELMANS Over the course of the year we'll see whether he has what it takes to be there every round. Last year with Joel Eriksson, Motopark had moments where they were slightly less strong. I don't think he's a clear favourite. It's so close he could easily lead it, or be top four or five.



SACHA FENESTRAZ

He's the dark horse in some eyes. After all, you don't win the Eurocup without being seriously talented. Just as ADD management stablemate Norris did last year, he steps from Renault glory with Josef Kaufmann Racing into a Carlin F3 seat – and is an ace at Pau from his F4 and FRenault days.

MA From the driving side everything has been looking consistently good. From Carlin's pool of drivers he looks strong – he looks really good against Daruvala and [Ferdinand] Habsburg; if not the quickest, he's very close. The thing with winter tests is you don't know what the teams are doing. Carlin haven't looked really strong, but they could do when we get to Pau and so on."

FS The Sacha we started working with at the start of last year was used to flying solo and getting the job done by himself. Using the resource of the team and his team-mates is something he's had to work on, but he's getting quite good at it. Sacha's up against those guys with a year's experience on him, but I'm feeling pretty good about him.

PB Whoever comes from Kaufmann has a good package of understanding what needs to be done and what they need to be fast. My feeling is that he might be the strongest rookie, and he's a smart kid. He's fast, and I expect him to be a contender for race wins and, if he can do that, the championship.



ROBERT SHWARTZMAN

The Russian, a new recruit to the Ferrari Driver Academy, is the third of the Renault Eurocup stars stepping up, in his case to Prema. Testing form hasn't been startling, but he did win the Toyota Racing Series in New Zealand in a final-round battle with fellow Prema F3 rookie Marcus Armstrong.

MA He's quick, but he still has things to learn and I'm not sure he understands. During winter they try a lot of things at Prema in testing, he changes the driving and it goes wrong. But with a normal set-up on the car he will be fine.

FS He was as quick as anybody in Renault Eurocup last year, but he was a little bit too up and down and threw away a championship challenge to Sacha. Whether he's matured, we'll see. I see him as a real seat-of-the-pants driver and F3 doesn't really reward that.

PB If he can combine some consistency with his speed, he's capable of winning races. He's quite young [18] and needs to learn what's needed to be fast. >>



Ticktum has pressure to add to Macau win with Motopark squad



MARCUS ARMSTRONG

In his first full season of car racing, the Kiwi karting star and Ferrari protege won the Italian Formula 4 title and narrowly lost the German equivalent to Prema team-mate Juri Vips. Now he steps up with the Italian squad.

MA I know he's quick from last year. It's a big jump from F4, but the F4 level was very strong last year. When you jump into F3 there are things to learn, but I don't think it will take too long.

FS He comes with a punchy CV. He's not totally startling yet, but maybe he's not unleashed everything he's got.

PB I know Marcus from the Toyota Racing Series in 2017, when he was with Jehan at M2. He's a nice kid, he's fast and he can easily put it on pole and win. But a little bit like Shwartzman he can be off, and move towards being confused if that's happened. But that's normal for rookies. He's supported well by Ferrari and Prema and has a good team around him.



JURI VIPS

The Estonian won a hard-fought German F4 title last year, his second season in the category. After a one-off F3 debut at Hockenheim last October with Motopark, he joins the team full-time.

MA Juri was driving really well in testing, and sometimes he's been consistently quicker than his team-mates. He can shunt in testing, where he really finds the limit, but in races he doesn't make many mistakes. It may be different at Pau though — there are walls there!

FS I don't really know what to expect of him. Like always, Motopark are dangerous lap time-wise and they'll be aggressive in what they do. They can upset a few people.

PB It's sometimes weird to see him outpacing Ticktum. I take testing times with a pinch of salt. He's done a couple of good laps, but how has he done them? I do think he's likely to get a podium, but I don't see him winning.



THE BRITISH F3 BRIGADE

This BRDC British Formula 3 pair have both joined Hitech GP: Enaam Ahmed (left), who won the BF3 title convincingly in 2017, has been eye-catching in testing, while Ben Hingley was third in the same series.

MA Normally Ahmed gets better and better over the tests.



Ferrari prospect
Armstrong is an
F4 champ at Prema

His team-mate [Alex Palou] is a good reference, so if he's close to him then he's doing quite well. It's difficult to point out who's doing well among the rookies. Sometimes you can't even tell who are the rookies, because they're driving really well.

FS I rate Palou — he's a real pedaller, so for Enaam to be getting close to him is good. I suppose Hitech are a bit underdoggy, but Enaam will be in the mix. Ben is coming from a slightly different level, so he's where I'd expect him to be.

PB Ahmed and Palou have been quite fast out of the box. Enaam needs to try to get on the podium rather than challenge for the title. He can be fast, but he was in a low-par championship last year in terms of competitiveness. For Ben it's important that he has Palou to learn from. But Hitech don't have a driver who's run European F3 before and that has to be a disadvantage for them if things don't go 100% in free practice. Who's going to lead them to a solution?



THE EUROFORMULA TRIO

Nikita Troitskiy, Devlin DeFrancesco and Ameya Vaidyanathan all raced the current-generation Dallara F3 car in Euroformula Open last year, and each steps up with Carlin. Of the trio, only Troitskiy (left) didn't do any Euro F3 races last year.

FS I think Euroformula is a reasonable step below Renault Eurocup

CALENDAR

DATE	CIRCUIT
May 12-13	Pau (F)
June 2-3	Hungaroring (H)
June 23-24	Norising (D)
July 14-15	Zandvoort (NL)
July 27-28	Spa (B)
August 18-19	Silverstone (GB)
August 25-26	Misano (I)
September 8-9	Nurburgring (D)
September 22-23	Red Bull Ring (A)
October 13-14	Hockenheim (D)

NEXT WEEK: ALL THE PAU GP ACTION



Shwartzman is quick
but needs to find
consistency

FIA F3/SUER



in its level, so they've got a bit more learning to do. Some of them are good drivers but it'll be a reality check at this level. **PB** Out of the three, Nikita seems to be able to be quite close. Their goal has to be to get in the top 10 and see where they go from there. They're in a team with a lot of good drivers and information.



THE OTHER F4 GRADUATES

Motopark has Fabio Scherer and Jonathan Aberdein, both from German F4, on its books, together with Italian F4 ace Sebastian Fernandez. Two more F4 graduates are Artem Petrov (left, Van Amersfoort Racing)

and Julian Hanses (with minnow Ma-Con Motorsport) – both have won races in the German series.

MA Scherer can get a really good lap time from somewhere, and Fernandez is sometimes fast, but it's consistency with them. Even if they get a good lap time, it's knowing how they did it, and it can be difficult for them to do it again.

FS Scherer looks pretty handy – I call him Alan!

PB Sometimes Petrov seems to be on it. I see a VAR car come around and think, 'OK, that doesn't look too bad.' He definitely can drive. Fernandez has been up there, but how are they running the car? If he's quicker than Ticktum, that doesn't make sense, does it? 🌟

EXPERIENCE COULD WIN THROUGH

If the rookies are going to be beaten this year, then it would seem to make sense to look to the highest-placed drivers from 2017 who are staying on. Force India protege Jehan Daruvala (sixth last year) holds that mantle, and remains with Carlin, but it's tough to choose between him, team-mate Ferdinand Habsburg (seventh in '17), Prema's Ferrari prospect Guan Yu Zhou (eighth), and Ralf Aron (ninth), who returns to Prema.

But intrigue surrounds Mick Schumacher. He stays with Prema after finishing 12th last year, his season often scuppered by his poor qualifying form, but testing suggests he may have sorted this. "If you base it on what you see on track, on the first new-tyre runs each day, Schumacher has always been the most punchy of the Prema drivers in testing," says

Fraser Shearer. "At corners, he looks to be bringing the most to the table."

And perhaps the darkest of the dark horses is Hitech spearhead Alex Palou. The underfinanced Catalan has been around this level for a while now, and he raced last season primarily in Japanese F3, but a lot of people rate him. Furthermore, it appears that Hitech has got back on the right track after struggling in early-season 2017 rounds.

"The direction they had at the beginning of last year, it was wrong," says Marko Asmer, whose driver Aron was with Hitech in 2017. "They were relying too much on computer simulations, then they got back into race-car engineering and it got better and better. Ralf was really happy with the car at the end of the year, so if they've found more in that direction they're going to do well."



EUROPEAN F3 ENTRY LIST

	DRIVER	TEAM	CAR
1	Guan Yu Zhou	Prema Powerteam	Dallara-Mercedes
4	Mick Schumacher	Prema Powerteam	Dallara-Mercedes
7	Ralf Aron	Prema Powerteam	Dallara-Mercedes
8	Marcus Armstrong	Prema Powerteam	Dallara-Mercedes
10	Robert Schwartzman	Prema Powerteam	Dallara-Mercedes
3	Sebastian Fernandez	Motopark	Dallara-Volkswagen
13	Fabio Scherer	Motopark	Dallara-Volkswagen
23	Jonathan Aberdein	Motopark	Dallara-Volkswagen
27	Dan Ticktum	Motopark	Dallara-Volkswagen
33	Marino Sato	Motopark	Dallara-Volkswagen
44	Juri Vips	Motopark	Dallara-Volkswagen
9	Jehan Daruvala	Carlin	Dallara-Volkswagen

	DRIVER	TEAM	CAR
11	Sacha Fenestraz	Carlin	Dallara-Volkswagen
16	Nikita Troitskiy	Carlin	Dallara-Volkswagen
17	Devlin DeFrancesco	Carlin	Dallara-Volkswagen
24	Ameya Vaidyanathan	Carlin	Dallara-Volkswagen
62	Ferdinand Habsburg	Carlin	Dallara-Volkswagen
12	Artem Petrov	Van Amersfoort Racing	Dallara-Mercedes
15	Keyvan Andres	Van Amersfoort Racing	Dallara-Mercedes
18	Julian Hanses	Ma-Con Motorsport	Dallara-Volkswagen
39	Alex Palou	Hitech GP	Dallara-Mercedes
65	Enaam Ahmed	Hitech GP	Dallara-Mercedes
77	Ben Hingeley	Hitech GP	Dallara-Mercedes

Volvo S60
Polestar TC1

TRACK TEST



BEHIND THE WHEEL OF A

WORLD



BEATER

BEN ANDERSON

World championships are rarely, if ever, won by accident. They are achieved through complete dedication and painstaking attention to detail. Although it's going through a rocky patch at present, embodying this approach is what made Mercedes a quadruple double champion of Formula 1 – total, unerring focus on identifying weaknesses and obliterating them, and on doing the things you already do extremely well even better than before.

Of course, such methods do not reside only in F1. They are simply more visible there. But all who have tasted world championship success in one form or another will know the alchemy required to elevate themselves above all others.

It is something Volvo now understands, having joined the touring car world champion club in 2017, almost 20 years on from its British Touring Car title success with Rickard Rydell. The Volvo S60 Polestar TC1 that propelled Thed Bjork to last year's World Touring Car Championship is the culmination of exactly the sort of painstaking process that propelled the Mercedes F1 team to repeated glory.

Cyan Racing, formerly known as Polestar and effectively Volvo's official racing arm since the late 1990s, spent two years developing the S60 TC1 to take on the world. The car made its debut in the championship in 2016. Less than 24 months later, it was officially crowned the best in the business, with Bjork at the wheel. A Swedish car, built by a Swedish team, for a Swedish manufacturer, driven to glory by a Swedish driver.

"It's a very powerful front-wheel-drive race car, but I think you will agree when first going out with it it's quite easy. But if you push and want to go really fast, it starts to get difficult because you have to balance it with the braking how you handle it into the corners.

It's a tricky car to get on top of, so it takes some time."

This is the advice proffered by Bjork before handing the pride and joy of his racing career over to Autosport for a special commemorative track test at Magny-Cours. The S60 is no longer eligible for World Touring Car competition, thanks to the championship adopting new rules for 2018, so this car is embarking on a farewell tour that Autosport is privileged to be part of.

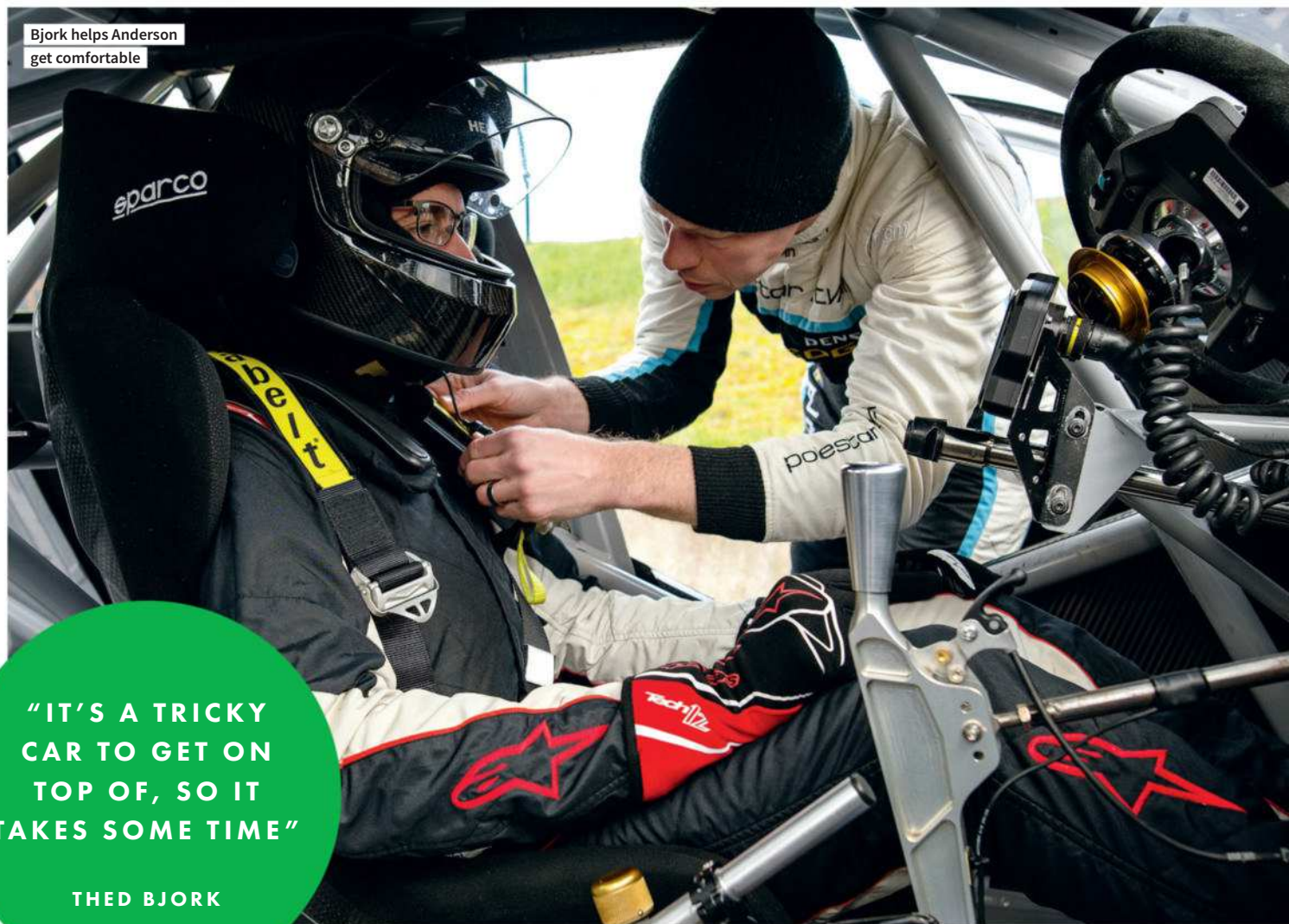
"When we started, it was a five-year commitment to the championship, and we said when we launched that we should be around for the first year, try to win races the second year, and then have three years to hopefully get the championship streak," explains Cyan Racing owner Christian Dahl.

"It's always like that in motorsport, like Red Bull or Ferrari had, or Mercedes now; it's been the same in touring cars. When you look at the trophies, it's not one BMW, it's three BMW championships. And then it's three Citroen and three Chevy – and one Polestar unfortunately.

"The plan was of course to get into a rhythm and have two or three of them. But that chance was fading away when new [TCR] regulations were communicated. We knew we only had two years, so of course we had to make changes, speed up development and make changes in the approach."

It is clear from glancing at the details of the S60 that everything was carefully considered and refined, despite the need for breakneck speed, to the point where even the seatbelts sport Velcro to pin them to the seat and prevent obstruction to the driver when they get in and out of the car. It's a minor point of course, but there are many such details – seating position, the make-up of the pedal box, the data-logging display, as well as the meatier elements of braking performance and suspension settings – that all add up to better performance.

Bjork helps Anderson get comfortable



"IT'S A TRICKY CAR TO GET ON TOP OF, SO IT TAKES SOME TIME"

THED BJORK



MULLER TIME

HOW VOLVO BROUGHT OUT THE BIG GUNS TO GET THE JOB DONE

ALTHOUGH THIS STARTED VERY much an in-house Swedish project, Volvo was not too proud to absorb a lesson that Honda's Formula 1 engine programme took a long time to digest – use outside expertise to accelerate development, rather than rely solely on internal knowhow to get you there eventually.

“For 10 years we’ve been running Swedish drivers for 90% [of the time] in Sweden, and completely Swedish in terms of engineers,” explains Cyan Racing owner Christian Dahl. “We always said we wanted to build something for ourselves and long-term, so you don’t get Englishmen moving here for two years, then go back and you lose the continuity.

“But when we only had two years instead of five [to win the championship], we had to do it like this and bring in Yvan Muller, and I think we had four nationalities out of four drivers, three nationalities out of three race engineers. Instead of being completely Swedish – we didn’t have a single person outside Sweden in 2016 – I think we had six or seven nationalities in ’17.”

Cyan brought in “a Spanish engineer from the Lada project”, a “French performance engineer from the Citroen project”, a

“British engineer who worked with us in Sweden before the world touring car [project]”, and recruited Ron Hartvelt, a former Red Bull F1 engineer and leading light in the glory days of RML’s factory Chevrolet WTCC programme, as well as drafting in four-time WTCC champion Muller to help develop the car.

“He’s so experienced,” says Dahl, who describes Muller as “a very impressive guy”. “He’s not very high-tech, to be honest – he’s quite old-school, but if you’ve done it for a gazillion years, you know from experience ‘this is the way we do it’.

“We saw a huge impact immediately. The biggest impact Yvan had was confidence. Having him on voicemail after a test saying, ‘I feel more comfortable in this car than in the Citroen’ is quite good for the people to hear.

“That was his third test day in the car, and he said that it’s a capable car we can win with. It’s a good confidence boost, because we didn’t know what was needed to win, but he did it four times, so when he says that you think, ‘OK, speed up now, we have a good chance.’”

A chance that Volvo and its cosmopolitan crew ultimately grasped with both hands.

Crucially, Volvo also drafted in quadruple WTCC champion Yvan Muller to help narrow its focus in developing the S60. And when Cyan Racing explains how it went about refining the car’s suspension, you get a better idea of how much energy was needed to transform this car into a genuine world beater.

Muller helped identify the car’s start system, its lack of traction and its inability to take kerbs as the key areas of weakness to focus on. “We did kerbing for two test sessions, so two test weeks, and then it was sorted,” explains Dahl. “Basically, Yvan said, ‘If you can’t hit the kerb then you’re going 5km/h too slow through the corner – we must be able to kerb.’”

To sort this major weakness, the team installed its own temporary kerbs (brought over from Sweden) onto the circuits at Algarve, Estoril and Magny-Cours, to mimic the extreme kerbing challenges faced by the WTCC at street tracks such as Vila Real and Marrakech.

Refining the start system involved developing “foot clutch, hand clutch, handbrake on the clutch and the start button”, according to Bjork, who reckons being able to ace starts consistently was a key element of his championship charge. “And you know by digits where your clutch is, so you put your clutch on the exact position,” adds Dahl. “You fine-tune your clutch position down to a tenth of a millimetre, and then you lock it.”

Autosport is not required to perform a racing start at this test, which is just as well given the combination of stiffly-sprung carbon clutch and long-ratio first gear. But with a helpful push from the mechanics we’re away down the Magny-Cours pitlane, careful to flick the engine into ‘map 2’ to get full power once we’re up and running.

Apart from the high-downforce models found in DTM and the ripsnorting V8 monsters of Australian Supercars, modern touring >>



S60 TC1 rides kerbs beautifully



Rivals Honda and Volvo pulled out all the stops



Attention to detail
and thoroughness of
engineering stand out

cars are usually fairly tame beasts — heavily restricted by regulation, designed to be raced hard wheel to wheel and not become too far removed from their automotive cousins.

The initial confidence the S60 inspires in the driver has a similarity to the 2013 British Touring Car Championship-winning Honda Civic that Autosport tested. It's comfortable, the controls are ergonomic, the brakes produce impressive stopping power, and the lever-operated sequential gearbox is sophisticated enough that you don't have to heel-and-toe when downshifting.

All of which allows the driver to focus more intently on the bits that matter, and you do have to pay attention, because any greediness in trying to incorrectly use what Cyan calls "north of 400bhp" from that (restricted) 1.6-litre, turbocharged Volvo engine is properly punished by speed-sapping power-on understeer. It is heartening to find that a car so well engineered — Bjork says much effort was expended on developing the engine's anti-lag systems to aid driveability — still won't do all the work for you.

Lapping at speed, the effort Muller put into driving suspension development becomes clear, because the car rides kerbs beautifully — and there are a couple of pretty nasty ones at Magny-Cours. You can feel the car's set-up has migrated to the softer end of the spectrum, to aid this function and to improve traction, which comes at a cost to stability at high speed.

The car is poised through the short, quick left at Turn 1, but through the long arcing right of Turn 3 (Estoril), the rear end starts to move as you accelerate and load up the outside left tyre. The collapse in support doesn't inspire confidence, but this is where the car asks the driver to earn their money, because there is generally far more time to be found by getting it to work most efficiently at low speeds. That is why the car also runs with a raised rear rideheight — make the car as

agile as possible in the tight turns and the driver can deal with the rest.

Motorsport is always a compromise between competing physical elements, but it's abundantly clear from Autosport's short time in the S60 that Cyan Racing has achieved a compelling balance. But what would you expect? They are world beaters after all.

Cyan threw everything it had at achieving that status, taking on entries from Citroen, Honda and Lada, as well as ex-works Chevrolet Cruzes. Only Honda remained as direct manufacturer opposition for Volvo in 2017, as the Citroens and Ladas were devolved into privateer hands, but Volvo still had to push extremely hard to fettle the S60 into a car that could defeat the mighty Japanese marque.

"We spent maybe €15million [in 2017] with a lot of development, and I would guess Honda did the same," says Dahl. "Of course the width of the competition wasn't as big as before, where you had four brands competing officially, but the exciting thing was Honda had been around for ages not winning, so when Citroen left they thought, 'Shit! This is our opportunity to step up,' and of course we had a five-year programme that turned out to be only two years in these regulations

STAT

€15M

The amount Cyan Racing spent on development in 2017 to turn the S60 TC1 into a world championship winner





TECH SPEC VOLVO S60 POLESTAR TC1

Engine	Four-cylinder, 1595cc, turbocharged, Drive-E Volvo
Drive	FWD
Power	400bhp
Max rpm	8500rpm
Gearbox	Six-speed sequential, Xtrac
Suspension	MacPherson front and rear, adjustable Ohlins dampers
Brakes front	Four-piston caliper, 390mm ventilated discs
Brakes rear	Two-piston caliper, 280mm ventilated discs
Wheels	18in with five-bolt pattern
Body	Steel and carbonfibre
Weight	1100kg

SONOLOSKI

and stepped up too. It was a bit like match racing in sailing – it was only two boats but it was really intense.”

Dahl says Cyan was “happy like hell” when it undertook a dedicated aero programme, using the Williams F1 team’s 40%-scale windtunnel in Oxfordshire, to escalate its fight with Honda. It turns out around €2m of that €15m budget was spent on developing the wheelarches alone.

“We had a full-scale programme at Volvo that we did CFD together with Williams,” says Dahl. “I think aero was the most intense programme. If you look at the Citroen, it’s not very complex in terms of the aero inside the wheelarches and things like that, and when we decided to do a really big aero programme and go into that, we thought, ‘OK we’ve taken a big step.’”

“Unfortunately Honda in Italy [through the factory JAS Motorsport team] made the same thing, but it was a really, really exciting championship, having two manufacturers that basically put all in.”

Volvo threw the kitchen sink at the championship run-in, bringing “632 new components on the car”, according to Dahl – though neither manufacturer brought an all-new car to the final round

of the season in Qatar, where Muller stood in for Nestor Girolami and Bjork triumphed over Honda’s Norbert Michelisz by 28.5 points.

“Last year was the most development-intense season ever in the World Touring Car Championship,” reflects Dahl. “If you look at lap times, we were quickest on most of the tracks compared to the early seasons, regardless of manufacturers. But of course, when you only have two of them...”

“But you can say that of most championships, I mean, Mercedes... is Formula 1 less competitive now? No. Mercedes does a really, really good job, but I don’t think Red Bull is any worse than it was before. Was World Rally low competition because Citroen won nine times? No, I think they did a really, really good job. Of course, they had good years and bad years, but if you win for nine years, I think you’re quite sure you’re doing a good job.”

Which is true even if you ‘only’ win for one year. Winning a world championship requires nothing short of excellence in all areas, which is something Volvo now happily knows as intimately as anyone. The S60 TC1 will stand as a lasting monument to that. 🏆

THED BJORK

VOLVO’S UNLIKELY SWEDISH WORLD CHAMPION

CHANCES ARE MOST motorsport fans won’t have known of Thed Bjork until he became World Touring Car champion for Volvo in 2017. Bjork’s rivals weren’t all that familiar with him either.

“When I came in, in 2016, I came in to all these famous touring car drivers – [Gabriele] Tarquini, Yvan Muller, [Jose Maria] Lopez, [Tom] Coronel,

[Tom] Chilton, [Rob] Huff,” says Bjork. “I watched many WTCC races when I was running in Sweden. It was so nice because I felt like I knew these guys.

“I was looking around and I said, ‘I can be as fast as them,’ but I had to learn a lot. I knew I could be among the top of them, driving-wise, but they didn’t know who I was!”

Bjork boasts a wealth of experience – two decades’ worth in fact – but mostly from his native Sweden, where he is hailed a quadruple Scandinavian champion. He’s also raced in the US, at Le Mans, and in the DTM (for two races with Audi in 2006). Those touring car aces who didn’t know of him before certainly do now.

“It was so funny in the beginning of 2016 when we came [into WTCC],” says Cyan Racing owner Christian Dahl. “I think it was quite well-communicated that it was a long-term project and we had a decent budget, and everyone from the drivers to the drivers’ fathers and engineers came up and congratulated us on the

programme and the budget and the long-term [plan] – ‘but the drivers, are you sure?’”

“I think it was Huff in the first test in Italy, we heard him talking like, ‘No, no, no, that guy is never going to be on top.’ And one year later, he was. It’s good that Thed won and not one of the more established international drivers.”

RACE CENTRE

WEC • MOTOGP • DTM • SUPER GT • BLANCPAIN GT • IMSA
• AUSSIE SUPERCARS • NASCAR



Alonso's Toyota wins a race that wasn't

The sister TSo50 HYBRID of Mike Conway got right onto the F1 legend's tail after starting a lap down. And then the team called off the chase

GARY WATKINS

ALL PHOTOGRAPHY  LAT IMAGES

Fernando Alonso made a winning start to his World Endurance Championship campaign with Toyota at Spa last Saturday as he notched up his first race victory in nearly five years. But the two-time Formula 1 world champion is unlikely to have it quite

so easy again over the course of the 2018-19 WEC superseason.

Alonso, Sebastien Buemi and Kazuki Nakajima started with a one-lap advantage over their team-mates in the Toyota camp. And just when it looked like they might have a race on their hands with the second TSo50 HYBRID at the death, team orders ensured

the result was frozen.

Toyota was always in control of the Spa-Francorchamps 6 Hours on a day when the new wave of LMP1 privateers were predictably never in the hunt. The same could be said of the second of the two TSo50 HYBRIDs, apart from a brief 15-minute period in the final hour of the race. >>



A procedural error concerning the fuel-flow meter of the sister Toyota, in which Mike Conway and Kamui Kobayashi had beaten Alonso and Nakajima to pole, meant its times were scrubbed and the car forced to start one lap down from the pitlane. A messy race interrupted by four safety cars, including one of the virtual kind, helped Conway, Nakajima and Jose Maria Lopez get back on the lead lap inside three hours.

But they weren't really in contention, despite an unscheduled pitstop for Nakajima courtesy of a problem with the belts and then a quick spin at La Source for the Japanese driver. That all changed with the final safety car with an hour to go.

Conway had been edging towards Alonso, bringing the gap down from just over a minute to just under. But that buffer had all but disappeared when the race went green for the final 49 minutes.

The Briton quickly closed down a five-second gap and was almost on the tail of the leader when the Toyotas made their final pitstops with just over 20 minutes to go. This was the point at which the outcome of the race was frozen by Toyota.

Conway was in the pits for 10 seconds longer than the leader, partly because the nose section of his TS050 was replaced. He did close on Alonso once more, finishing only 1.4s in arrears, but it turned out that the outcome of the race was never in doubt.

"The agreement was that the cars could race until the last pitstop," said Toyota Motorsport GmbH technical director Pascal Vasselon. "We told the drivers they could race only to the last pitstop because we did not want to have the last laps with a lot of tension."

Vasselon admitted, however, that Conway and his team-mates had the edge on the drivers of the winning car in the race, just as they had done in qualifying.

"The lap times show that car #7 was marginally faster, by just one or two tenths," he explained, "but it came back basically



Alonso in a place where he isn't used to standing these days

because of the safety car."

Conway said he believed #7 "was clearly the quicker car, especially when it was hooked up". He explained that an aerodynamic inconsistency was the reason for the change of nose at the car's final pitstop.

Alonso admitted that he and his team-mates were always going to be conservative given their head start. "We took quite a safe approach to the race, knowing that we were in a good advantage, but it wasn't the quickest, probably," said the Spaniard, who celebrated his first victory in a racing car since he won the 2013 Spanish Grand Prix

for Ferrari. "I was saying to the guys this is so nice to feel the podium. Pick me up tomorrow morning, I will try to sleep here!"

Top of a privateer field – which was depleted by the withdrawal of the Manor Ginetta-Mecachrome G60-LT-P1s for financial reasons and DragonSpeed BRE Engineering-Gibson BR1 after Pietro Fittipaldi crashed and broke both legs in qualifying – was Rebellion Racing. Its pair of new ORECA-developed Rebellion-Gibson R-13s finished third and fourth on the road, albeit two laps down on the Toyotas.

Andre Lotterer, Neel Jani and Bruno Senna took the final spot on the podium, only to be thrown out at scrutineering when the underfloor skid plank was found to be worn beyond the prescribed limits. They had been ahead of team-mates Thomas Laurent, Mathias Beche and Gustavo Menezes until problems with the communication system that sends information back to race control. One stop to change the antenna didn't fix the issue, which meant the car returned to the pits where a detached cable was diagnosed.

The delays appeared to have left them no way to get back on terms with the sister Rebellion entry, until a lucky break near the end. The car was in the pits when the safety car was called, and the time gained leapfrogged Lotterer ahead of Laurent.

The best of SMP Racing's AER-powered BR Engineering BR1s had emerged as a contender for a podium after the Lotterer car's issues, despite an early-race



#7 Toyota was kept in pits at the start, then raced onto leader's tail

drivethrough. The car shared by Stéphane Sarrazin, Egor Orudzhev and Matevos Isaakyan was battling with Laurent when it sustained a puncture.

Three laps later Isaakyan was in the barrier after going off track at Eau Rouge in avoidance of a GTE Am car and losing it on the rumble strips.

SMP's second BR1, driven by Vitaly Petrov and Mikhail Aleshin, ended up fifth behind the ByKolles ENSO CLM P1/01 after an early-race puncture, though it didn't have the pace of the sister car. The ByKolles machine, shared by Tom Dillmann, Dominik Kraihamer and Oliver Webb, might have been nearer to the third-placed Rebellion but for two big chunks of time it lost through the vagaries of the safety car.

Rebellion was pleased with the way its cars ran, given that the team arrived with one brand-new chassis and one that had tested just twice. Team manager Bart Hayden described the race as "encouraging considering our lack of mileage", pointing out that the only problem it encountered was the loose antenna cable.

What wasn't so encouraging for Rebellion or any of the other privateers who made the race was their lack of performance in comparison with the Toyotas. "The disappointing part of the day is that we were so far off the Toyotas," said Lotterer. "Two laps down isn't good, but that was the best we could do."

Whether or not the privateers get any help under the Equivalence of Technology for the Le Mans 24 Hours WEC round next month, they should edge closer to their only factory rival. The Toyotas will have less hybrid boost per kilometre around the long French circuit and there are still gains to be made by all the independents. "We've all got new cars," said Gaetan Jégo, technical director of the ART Grand Prix-run SMP squad, "so there's room for all of us to get more out of packages. I'm confident we will be more competitive at Le Mans." »

"I said to the guys it's so nice to feel the podium. Pick me up tomorrow, I will try to sleep here!"



Second Rebellion inherited podium with sister car's exclusion

GTE: A PLA TONIC AFFAIR



Pla, Mucke and Johnson won out in a race against the Porsches

Stefan Mucke and Olivier Pla finally chalked up their first GTE Pro victory with Ford, though it looked for much of the race that they and team-mate Billy Johnson were going to be undone again by the kind of luck that has blighted their previous two World Endurance Championship campaigns. Fortune turned in their favour with the final safety car, and Mucke had more than enough in the tank to come through to take victory.

Mucke had nipped ahead of the polewinning sister Ganassi Ford GT at the start and held a narrow lead, first ahead of team-mate Harry Tincknell and then the factory Porsche 911 RSR of Richard Lietz, through much of the first two hours. The race started to unravel for Mucke and Pla when the leader was forced wide by an overtaking LMP2 car at the first left at Pouhon and dropped behind the German GT shortly before the second round of pitstops.

Worse still, when Mucke pitted to hand over to Johnson there was a slight delay with a stall and an unspecified technical issue that allowed the second works Porsche to get ahead. While Johnson battled to find a way past Michael Christensen, he could only watch Gianmaria Bruni disappear up the road in the leading 911 RSR.

Johnson spent seven laps behind the second Porsche, during which time Bruni pulled out a 14-second advantage and then continued to ease away. The gap stood at more than 20s when the Italian got out of the car.

Pla edged back towards Bruni in the penultimate hour, but was still 15s in arrears when the final safety car was called. Lietz, however, had nothing for his adversary when they rejoined after the final

round of stops when the race went green.

The Ford had been given two new Michelins, whereas the Porsche was on old rubber all round. Lietz quickly lost out to Pla and then the sister car of Christensen, whose team-mate Kevin Estre had been penalised in the fourth hour for spinning up his rear wheels after his pitstop. The Austrian haemorrhaged time on spent rubber and lost the final podium spot to Davide Rigon in the AF Corse Ferrari he shared with Sam Bird with two laps to go.

The second Ford, in which Andy Priaulx and Harry Tincknell had qualified on pole, crashed out after just over an hour. Tincknell appeared to suffer a left-front puncture at Eau Rouge, although the team wouldn't confirm it, and hit the tyres in a 29G impact from which he escaped unharmed.

The Ford and Porsche had a clear advantage over the new cars that have arrived in GTE Pro for the superseason, and Ferrari's evo version of the 488 GTE counts as one of those. Ferrari, BMW and Aston Martin all complained about the 'starting BoP' of their respective machines.

Ferrari was definitely closer in the race, whereas BMW trailed home two laps down with the best of its MTEK-run M8 GTEs in fifth place. The only solace Aston Martin took from Spa was the fact that its pair of new Vantage GTEs ran without problems.

Aston Martin picked up a one-two result in GTE Am, reigning champions Pedro Lamy, Mathias Lauda and Paul Dalla Lana scoring a narrow victory in the works-run old-style Vantage from the customer TF Sport car of Euan Hankey, Charlie Eastwood and Salih Yoluc. Hankey, on a set of fresh Michelins at the end, was all over Lamy in the final laps, but couldn't quite find a way past.



LMP2: Vergne leads G-Drive to victory

G-Drive Racing pretty much dominated LMP2 at Spa on one of its two planned outings in the World Endurance Championship this year. Roman Rusinov, Jean-Eric Vergne and Andrea Pizzitola were ahead for most of the way aboard the Russian entrant's ORECA-Gibson 07, run again under the TDS Racing umbrella, though the late safety car resulted in an unrepresentative margin of victory.

Vergne built up a big lead over the course of a double stint from the end of the first hour, passing Weiron Tan in the #37 Jackie Chan DC Racing ORECA at the start and finishing it a minute up the road. Pizzitola was able to continue Vergne's good work, stretching the lead over Andre Negrao in the Signatech Alpine ORECA. G-Drive's lead was back at well over the one-minute mark at the safety car.

Vergne was able to control a reduced margin, first over Negrao and then over

Ho-Pin Tung in the #38 Chan/DC entry, to make it two WEC wins in two years at Spa for G-Drive, whose focus this year is on the European Le Mans Series.

Tung and team-mates Gabriel Aubry and Stephane Richelmi battled with the all-Malaysian crew of Tan, Jazeman Jaafar and Nabil Jeffri for much of the race, the two Jota-run Chan/DC ORECA's running very different tyre strategies. The fight turned in the favour of Tung when Jaafar took over with an hour to go.

Jaafar had just stopped when the safety car was called, and was held at the end of the pitlane while the rest of the field, which had yet to close up, passed by. The three and a half minutes the car spent in the pits dropped the car to sixth, though Jaafar was able to recover to fourth.

The Signatech Alpine trio of Negrao, Nicolas Lapierre and Pierre Thiriet ended up third, half a minute down on the best of the

Chan/DC cars. They had to fight back from an early-race stop-go after Lapierre was penalised for disregarding instructions about rejoining the circuit after a trip across the kerbs at La Source on the opening lap.

He was just ahead of the #38 Chan/DC car when the cars pitted for the final time, but a slower turnaround for the French team reversed the positions. Negrao, on old tyres, could do nothing about Tung over the final laps and fell away.

The revised Dallara P217 showed its pace in the hands of Racing Team Nederland driver Giedo van der Garde. He jumped from seventh on the grid – otherwise known as second to last – to the front of the P2 pack in the space of five laps.

Van der Garde held an 18s lead over Pastor Maldonado in the DragonSpeed ORECA – both cars on Michelin tyres rather than the Dunlops that traditionally dominate the class – before the safety car triggered by Ford driver Harry Tincknell's shunt. A 24-minute stop when Jan Lammers climbed aboard shortly afterwards to address alternator issues, and a second spell in the pits to fix a related problem with a gearbox seal, put the car way out of contention.

The Dutch entry, co-driven by Frits van Eerd, ended up last at the finish, but van der Garde underlined the potency of the Dallara/Michelin package with another impressive double stint at the end of the race. *W*



RESULTS ROUND 1/8, SPA (B), MAY 5 (163 LAPS – 709.380 MILES)

POS	DRIVERS	TEAM	CAR	CLASS	TIME
1	Sebastien Buemi (CH) Kazuki Nakajima (J) Fernando Alonso (E)	Toyota Gazoo Racing	Toyota TS050 HYBRID	LMP1	6h00m50.702s
2	Mike Conway (GB) Kamui Kobayashi (J) Jose Maria Lopez (RA)	Toyota Gazoo Racing	Toyota TS050 HYBRID	LMP1	+1.444s
3	Thomas Laurent (F) Mathias Beche (CH) Gustavo Menezes (USA)	Rebellion Racing	Rebellion-Gibson R13	LMP1	-2 laps
4	Tom Dillmann (F) Oliver Webb (GB) Dominik Kraihamer (A)	ByKolles Racing Team	ENSO CLM-NISMO P1/01	LMP1	-5 laps
5	Vitaly Petrov (RUS) Mikhail Aleshin (RUS)	SMP Racing (ART)	BR Engineering-AER BR1	LMP1	-5 laps
6	Roman Rusinov (RUS) Jean-Eric Vergne (F) Andrea Pizzitola (F)	G-Drive Racing (TDS)	ORECA-Gibson 07	LMP2	-7 laps
7	Ho-Pin Tung (NL) Gabriel Aubry (F) Stephane Richelmi (MC)	Jackie Chan DC Racing (Jota)	ORECA-Gibson 07	LMP2	-7 laps
8	Nicolas Lapierre (F) Andre Negrao (BR) Pierre Thiriet (F)	Signatech Alpine Matmut	ORECA-Gibson 07	LMP2	-7 laps
9	Jazeman Jaafar (MAL) Weiron Tan (MAL) Nabil Jeffri (MAL)	Jackie Chan DC Racing (Jota)	ORECA-Gibson 07	LMP2	-8 laps
10	Matthieu Vaxiviere (F) Francois Perrodo (F) Loic Duval (F)	TDS Racing	ORECA-Gibson 07	LMP2	-8 laps
11	Pastor Maldonado (YV) Roberto Gonzalez (MEX) Nathanael Berthon (F)	DragonSpeed	ORECA-Gibson 07	LMP2	-8 laps
12	Julien Canal (F) Erwin Creed (F) Romano Ricci (F)	Larbre Competition	Ligier-Gibson JSP217	LMP2	-11 laps
13	Stefan Mucke (D) Olivier Pla (F) Billy Johnson (USA)	Ford Chip Ganassi Team UK	Ford GT	GTE Pro	-15 laps
14	Kevin Estre (F) Michael Christensen (DK)	Porsche GT Team	Porsche 911 RSR	GTE Pro	-15 laps
15	Davide Rigon (I) Sam Bird (GB)	AF Corse	Ferrari 488 GTE Evo	GTE Pro	-16 laps
16	Gianmaria Bruni (I) Richard Lietz (A)	Porsche GT Team	Porsche 911 RSR	GTE Pro	-16 laps
17	Antonio Felix da Costa (P) Tom Blomqvist (GB)	BMW Team MTEK	BMW M8 GTE	GTE Pro	-17 laps
18	Alex Lynn (GB) Maxime Martin (B) Jonny Adam (GB)	Aston Martin Racing (Prodrive)	Aston Martin Vantage AMR	GTE Pro	-17 laps
19	Nicki Thiim (DK) Marco Sorensen (DK) Darren Turner (GB)	Aston Martin Racing (Prodrive)	Aston Martin Vantage AMR	GTE Pro	-17 laps
20	Martin Tomczyk (D) Nicky Catsburg (NL)	BMW Team MTEK	BMW M8 GTE	GTE Pro	-18 laps
21	Mathias Lauda (A) Paul Dalla Lana (CDN) Pedro Lamy (P)	Aston Martin Racing (Prodrive)	Aston Martin Vantage GTE	GTE Am	-19 laps
22	Salih Yoluc (TR) Euan Hankey (GB) Charlie Eastwood (GB)	TF Sport	Aston Martin Vantage GTE	GTE Am	-19 laps
23	Keita Sawa (J) Mok Weng Sun (MAL) Matt Griffin (IRL)	Clearwater Racing	Ferrari 488 GTE	GTE Am	-20 laps
24	Christian Ried (D) Julien Andlauer (F) Matt Campbell (AUS)	Dempsey-Proton Racing	Porsche 911 RSR	GTE Am	-21 laps
25	Motoaki Ishikawa (J) Olivier Beretta (MC) Eddie Cheever (I)	MR Racing	Ferrari 488 GTE	GTE Am	-21 laps
26	Khaled Al Qubaisi (UAE) Giorgio Roda (I) Matteo Cairolì (I)	Dempsey-Proton Racing	Porsche 911 RSR	GTE Am	-22 laps
27	Alessandro Pier Guidi (I) James Calado (GB)	AF Corse	Ferrari 488 GTE Evo	GTE Pro	-24 laps
28	Giedo van der Garde (NL) Frits van Eerd (NL) Jan Lammers (NL)	Racing Team Nederland	Dallara-Gibson P217	LMP2	-24 laps
29	Mike Wainwright (GB) Ben Barker (GB) Alex Davison (AUS)	Gulf Racing	Porsche 911 RSR	GTE Am	-26 laps
30	Francesco Castellacci (I) Thomas Flohr (CH) Giancarlo Fisichella (I)	Spirit of Race	Ferrari 488 GTE	GTE Am	-27 laps
31	Egidio Perfetti (N) Jorg Bergmeister (D) Patrick Lindsey (USA)	Team Project 1	Porsche 911 RSR	GTE Am	-32 laps
EX	Andre Lotterer (D) Neel Jani (CH) Bruno Senna (BR)	Rebellion Racing	Rebellion-Gibson R13	LMP1	-2 laps
R	Stephane Sarrazin (F) Egor Orudzhev (RUS) Matevos Isaakyan (RUS)	SMP Racing (ART)	BR Engineering-AER BR1	LMP1	132 laps-accident
R	Harry Tincknell (GB) Andy Priaux (GB) Tony Kanaan (BR)	Ford Chip Ganassi Team UK	Ford GT	GTE Pro	26 laps-accident
NS	Charlie Robertson (GB) Dean Stoneman (GB)	CEFC TRSM Racing (Manor)	Ginetta-Mecachrome G60-LT-P1	LMP1	withdrawn
NS	Oliver Rowland (GB) Alex Brundle (GB) Oliver Turvey (GB)	CEFC TRSM Racing (Manor)	Ginetta-Mecachrome G60-LT-P1	LMP1	withdrawn
NS	Henrik Hedman (S) Ben Hanley (GB) Pietro Fittipaldi (BR)	DragonSpeed	BR Engineering-Gibson BR1	LMP1	accident

In each car, first-named driver started race.

Winners' average speed 117.953mph.

Fastest lap

LMP1 Conway 1m57.442s, 133.404mph.

LMP2 Vaxiviere 2m05.324s, 125.014mph.

GTE Pro Bruni 2m15.667s, 115.483mph.

GTE Am Cairolì 2m17.069s, 114.302mph.

QUALIFYING

1 Nakajima/Alonso 1m54.962s;

2 Senna/Jani 1m56.425s;

3 Laurent/Menezes 1m56.992s;

4 Petrov/Aleshin 1m58.247s;

5 Dillmann/Webb 1m58.697s;

6 Lapierre/Thiriet 2m02.405s;

7 Vergne/Pizzitola 2m02.429s;

8 Tung/Aubry 2m02.824s;

9 Jaafar/Jeffri 2m03.023s;

10 Maldonado/Gonzalez 2m03.420s;

11 Vaxiviere/Perrodo 2m04.703s;

12 van der Garde/van Eerd 2m05.502s;

13 Canal/Ricci 2m05.739s;

14 Priaux/Tincknell 2m12.947s;

15 Pla/Mucke 2m13.030s;

16 Lietz/Bruni 2m13.034s;

17 Christensen/Estre 2m13.352s;

18 Blomqvist/da Costa 2m14.017s;

19 Calado/Pier Guidi 2m14.385s;

20 Rigon/Bird 2m15.104s;

21 Martin/Lynn 2m15.127s;

22 Tomczyk/Catsburg 2m15.142s;

23 Sorensen/Thiim 2m16.004s;

24 Campbell/Ried 2m16.357s;

25 Lamy/Dalla Lana 2m16.359s;

26 Bergmeister/Perfetti 2m16.637s;

27 Cairolì/Al Qubaisi 2m16.768s;

28 Hankey/Yoluc 2m17.627s;

29 Beretta/Ishikawa 2m18.512s;

30 Fisichella/Flohr 2m18.917s;

31 Griffin/Mok 2m19.445s;

32 Barker 2m15.332s*;

33 Sarrazin/Orudzhev no time;

34 Kobayashi/Conway 1m54.583s**;

NS Fittipaldi 1m59.158s*.

* only one driver set a time. ** excluded.

Fastest in each class:

LMP1 Nakajima 1m54.781s;

LMP2 Lapierre 2m01.476s;

GTE Pro Pla 2m12.420s;

GTE Am Cairolì 2m14.766s.

CHAMPIONSHIP

LMP drivers 1 Buemi/Alonso/Nakajima 26;

2 Conway/Kobayashi/Lopez 18; 3 Menezes/

Laurent/Beche 15; 4 Webb/Dillmann/

Kraihamer 12; 5 Petrov/Aleshin 10;

6 Tung/Richelmi/Aubry 8.

LMP1 manufacturers/teams 1 Toyota

Gazoo Racing 26; 2 Rebellion Racing 15;

3 ByKOLLES Racing Team 12; 4 SMP Racing

10.

LMP2 drivers 1 Aubry/Tung/Richelmi 25;

2 Negrao/Lapierre/Thiriet 19; 3 Jaafar/

Jeffri/Tan 15; 4 Perrodo/Duval/Vaxiviere 12.

GTE drivers 1 Johnson/Pla/Mucke 25;

2 Estre/Christensen 18; 3 Rigon/Bird 15;

4 Bruni/Lietz 12; 5 da Costa/Blomqvist 10;

6 Lynn/Adam/Martin 8.

GTE manufacturers 1 Porsche 30; 2 Ford 26;

3 Ferrari 15.5; 4 BMW 14; 5 Aston Martin 14.

GTE Am drivers 1 Lauda/Dalla Lana/Lamy

25; 2 Eastwood/Hankey/Yoluc 18;

3 Sawa/Griffin/Mok 15; 4 Ried/Andlauer/

Campbell 13.

WORLD OF SPORT



This time Marquez is ahead of the chaos

MOTOGP
JEREZ (E)
MAY 6
ROUND 4/19

Every MotoGP race pays the same in points, but there was a feeling that Jerez would be more important than most. After three different race winners, three different polesitters and three vastly different races to kick off the season, the top five in the standings were split by just eight points. And the Spanish venue, marking the beginning of the European leg of the campaign, was supposed to

offer some clarity after a frantic start.

Ultimately, the post-race conversation was dominated by a huge shunt that ruled out the three factory riders chasing Marc Márquez. But the Spaniard's form, and what it could mean for the championship, should not be overlooked.

He crashed his Honda three times during practice, and was strangely subdued en route to fifth in qualifying, but he already looked to have the win sewn up by the time the pile-up occurred behind. Márquez did not need the help.

It could have played out differently had Ducati's Jorge Lorenzo not stormed

from fourth on the grid to first at the start, aided by the unorthodox choice of the soft front tyre. He proceeded to hold off Dani Pedrosa, who Márquez admitted post-race had been his main "worry". Márquez thus lost no time in traffic relative to his Honda team-mate, and he picked off Pedrosa with a forceful move at the Turn 11 right-hander.

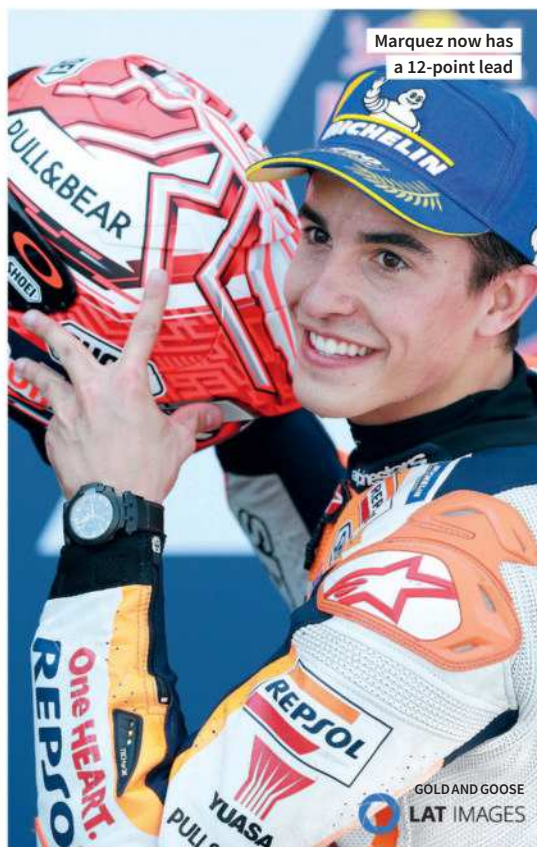
Lorenzo stood his ground valiantly for a few laps more, only to eventually cede position at the final corner.

By one-third distance it was Márquez's race to lose, but there was another hurdle to overcome — a heap of gravel chucked onto the racing line by Tom Luthi's crashing Marc VDS Honda. Márquez saw it "too late" to take evasive action. As his bike stepped out of line, he held on tight, slid, barely lost any time and continued undeterred.

By this point Lorenzo was an ally once more, holding up Pedrosa and his own Ducati team-mate Andrea Dovizioso, lap after lap, as Márquez escaped into the distance. Dovizioso, who has never finished higher than fifth in MotoGP at Jerez, was suddenly looking fast. So fast, in fact, that he believed he could have followed Márquez — but for Lorenzo.

Having passed Pedrosa, Dovizioso followed Lorenzo for many laps and eventually tried to force the issue at the Dry Sac corner. He dived down the inside but overshot his braking, running himself and his team-mate out wide. Lorenzo cut





back sharply, and would normally have reclaimed position. Unfortunately, Pedrosa was already there on the inside, trying to capitalise. They collided, Pedrosa was thrown off his bike while Lorenzo went into Dovizioso. All three were unhurt but out.

As Tech3 Yamaha's Johann Zarco rode past the site of the incident, he was now up to second in the race – and second in the championship. It was a fortuitous finish for him, but then again Zarco had been the only Yamaha rider mixing it out front. Fifth for Valentino Rossi and seventh for Maverick Vinales desperately flattered the woeful form of the works bikes, which once more struggled for grip in daytime heat.

In finishing third, Suzuki's Andrea Iannone was perhaps flattered too, but it matters not. His seat looked as good as gone a few weeks ago, yet he responded with back-to-back podiums. He is now right up there in the standings, whereas his team-mate Alex Rins is emphatically not, having crashed for the third time in four races.

LCR Honda's Cal Crutchlow crashed, too, and this one will have been especially painful. Imperious in qualifying with a record-breaking pole lap, he lost ground early on and pushed too hard to recover. The Briton has been quick, so maybe he can still feature in the championship battle. Maybe Zarco can, or Dovizioso, or the works Yamahas. All of them are a 'maybe' – the only certainty is Marquez. The title race is in his hands once more.

VALENTIN KHOROUNZHIY

RESULTS ROUND 4/19, JEREZ (E), MAY 6 (25 LAPS – 68.708 MILES)

POS	RIDER	TEAM	TIME
1	Marc Marquez (E)	Honda	41m39.678s
2	Johann Zarco (F)	Tech3 Yamaha	+5.241s
3	Andrea Iannone (I)	Suzuki	+8.214s
4	Daniilo Petrucci (I)	Pramac Ducati	+8.617s
5	Valentino Rossi (I)	Yamaha	+8.743s
6	Jack Miller (AUS)	Pramac Ducati	+9.768s
7	Maverick Vinales (E)	Yamaha	+13.543s
8	Alvaro Bautista (E)	Aspar Ducati	+14.076s
9	Franco Morbidelli (I)	Marc VDS Honda	+16.822s
10	Mika Kallio (FIN)	KTM	+19.405s
11	Pol Espargaro (E)	KTM	+21.149s
12	Takaaki Nakagami (J)	LCR Honda	+21.174s
13	Bradley Smith (GB)	KTM	+21.765s
14	Tito Rabat (E)	Avintia Ducati	+22.103s
15	Scott Redding (GB)	Aprilia	+36.755s
16	Hafizh Syahrin (MAL)	Tech3 Yamaha	+41.861s
17	Xavier Simeon (B)	Avintia Ducati	+49.241s
18	Karel Abraham (CZ)	Aspar Ducati	-1 lap
R	Jorge Lorenzo (E)	Ducati	17 laps-accident
R	Andrea Dovizioso (I)	Ducati	17 laps-accident
R	Dani Pedrosa (E)	Honda	17 laps-accident
R	Cal Crutchlow (GB)	LCR Honda	16 laps-accident
R	Thomas Luthi (CH)	Marc VDS Honda	11 laps-accident
R	Alex Rins (E)	Suzuki	5 laps-accident
R	Aleix Espargaro (E)	Aprilia	0 laps-mechanical

WINNER'S AVERAGE SPEED 98.952mph. **FASTEST LAP** Marquez 1m39.159s, 99.778mph.

QUALIFYING 2 1 Crutchlow 1m37.653s; 2 Pedrosa 1m37.912s; 3 Zarco 1m37.956s; 4 Lorenzo 1m37.969s; 5 Marquez 1m37.977s; 6 Rins 1m37.984s; 7 Iannone 1m37.987s; 8 Dovizioso 1m38.029s; 9 Petrucci 1m38.086s; 10 Rossi 1m38.267s; 11 Vinales 1m38.281s; 12 Miller 1m38.522s.

QUALIFYING 1 1 Dovizioso 1m38.074s; 2 Vinales 1m38.349s; 3 A Espargaro 1m38.389s; 4 Nakagami 1m38.481s; 5 Morbidelli 1m38.544s; 6 P Espargaro 1m38.598s; 7 Rabat 1m38.610s; 8 Luthi 1m38.752s; 9 Kallio 1m38.759s; 10 Bautista 1m38.838s; 11 Smith 1m38.961s; 12 Syahrin 1m39.135s; 13 Abraham 1m39.146s; 14 Simeon 1m39.708s; 15 Redding 1m39.918s.

RIDERS' CHAMPIONSHIP 1 Marquez 70; 2 Zarco 58; 3 Vinales 50; 4 Iannone 47; 5 Dovizioso 46; 6 Rossi 40; 7 Crutchlow 38; 8 Miller 36; 9 Petrucci 34; 10 Rabat 24; 11 Pedrosa 18; 12 Rins 16; 13 Morbidelli 13; 14 P Espargaro 13; 15 Bautista 12; 16 Syahrin 9; 17 Nakagami 9; 18 A Espargaro 6; 19 Kallio 6; 20 Lorenzo 6; 21 Redding 5; 22 Smith 3; 23 Abraham 1; 24 Luthi 0; 25 Simeon 0.

MANUFACTURERS' CHAMPIONSHIP 1 Honda 95; 2 Yamaha 76; 3 Ducati 62; 4 Suzuki 55; 5 KTM 14; 6 Aprilia 11.



WEEKEND WINNERS

MOTO2

JEREZ

- 1 Lorenzo Baldassarri
Kalex
- 2 Miguel Oliveira
KTM
- 3 Francesco Bagnaia
Kalex

MOTO3

JEREZ

- 1 Philipp Ottl
KTM
- 2 Marco Bezzecchi
KTM
- 3 Marcos Ramirez
KTM



Moto2 winner
Baldassarri

HARFORD
LAT IMAGES

Glock's spiel follows mega Paffett scrap



Glock and Paffett
battled for lap
after lap on Sunday

DTM
HOCKENHEIM (D)
MAY 5-6
ROUND 1/10

Timo Glock had perfectly summarised the opening weekend of the most important year for the DTM in recent memory. Having finally taken a decisive edge in a race that will be remembered as one of the series' best ever, Glock entered the final lap and began to consider his celebration.

It was an unusual one. "The best fucking racing," exclaimed Glock. "Fucking hell Mercedes, this is why you should not leave this championship, you fucking idiots."

Disregard the profanity. BMW star Glock's words captured the mood around a series that feels to be heading in the right direction on track, only to be hampered by

its unclear future thanks to Mercedes' impending exit for Formula E.

That Mercedes proved to be the class of the field last weekend only added a further twist and, helpfully, Glock's win prevented an awkward Merc clean sweep, after Gary Paffett had triumphed on Saturday.

Glock set the winning foundation for Sunday by taking pole ahead of Audi's reigning champion Rene Rast, who soon fell to third behind Lucas Auer's rapid-starting Merc. Paffett had qualified 10th and, despite the evidence that the DTM's new reduced-downforce aero package has helped overtaking, his climb through the field – straight away he got up to fifth – was unexpected. "Suddenly the whole race changed for me," recalled Paffett, who was up to third by the time the pitstops began.

The Briton's stop came one lap after

Glock's, and Paffett's quickfire in and out-laps meant he returned to the track with a one-second deficit to the BMW ahead. "I started to catch Timo and my thought was, 'I'm going to catch him and disappear,'" said Paffett. "It didn't happen like that."

That proved to be an understatement. Almost immediately, a truly breathtaking battle began between Glock and Paffett as neither driver could find a one-second buffer to break out of DRS range. Any time Paffett found a way past during their 10-lap duel – usually with the help of greater traction, DRS and straightline speed – Glock would respond instantly through the tighter corners.

Some doorbanging and strong defensive driving only wowed onlookers further and, as Glock put it, "it felt like two fighters in a ring punching each other and no-one really says, 'OK, I'm close to the knockout'"

Rather than a referee to end the bout, it was deeply impressive BMW DTM debutant Joel Eriksson who closed in on Paffett in the final laps, having qualified third. Paffett's experience showed when the two touched wheels as the Mercedes closed the door on Eriksson through the final sector, enabling Audi veteran Mike Rockenfeller to jump the young Swede and take the fight to Paffett.

Rockenfeller looked set to miss out on second after hitting a piece of debris during an attempted pass through the inside of the penultimate corner but, instead, he found a way to steal a last-gasp second on the final lap. Even so, this was a rare high point for Audi, which took a clean sweep of the 2017



Glock finds a
way to stop
himself swearing

DTM

HOCKENHEIM

Race 1 Gary Paffett

HWA Mercedes C63 DTM

Race 2 Timo Glock

Team RMR BMW M4 DTM

ADAC F4

HOCKENHEIM

Race 1 Lirim Zendeli

US Racing

Race 2 Lirim Zendeli

US Racing

Race 3 Mick Wishofer

US Racing

SUPER GT

FUJI

Ronnie Quintarelli/Tsugio Matsuda

NISMO Nissan GT-R

JAPANESE F4

FUJI

Race 1 Yuki Tsunoda

HFDP (Kochira Racing)

Race 2 Yuki Tsunoda

HFDP (Kochira Racing)

DTM

titles. Having excelled in the era of downforce, Audi last weekend battled oversteer and tyre degradation. The problem was so bad in practice that only Rast was able to qualify in the top 10 on Saturday, and Rast's ninth place was the marque's best race-one finish.

Audi spent Sunday practice experimenting on set-up changes. And although Rockenfeller – 14th on Saturday – saw the benefit with his podium, Audi admitted it was perplexed as to where the improvement came from.

By contrast, Mercedes enjoyed being free of a development war, and Paffett took pole on Saturday by the large-by-DTM-standards gap of 0.199 seconds. While Glock would go on to defeat Paffett on Sunday, his starring role as Mercedes disruptor-in-chief began a day earlier. He was able to challenge the long-time Mercedes one-two of Paffett and Auer, his pace enough to force the 2005 champion into an early stop to cover the BMW off.

A late half-hearted move on Auer through the Spitzkehre hairpin was as close as Glock got to making a dent in Merc's stranglehold of the race, and he settled for third.

It was enough for Mercedes DTM boss Ulrich Fritz to defend his manufacturer's ambitions. "They [the drivers] really showed [up] some of the messages given from other people saying, 'Mercedes would not put all the effort into DTM,'" he said.

Mercedes added it was flattered by Glock's radio outburst, but for now it appears his winning will have to be on track, rather than in changing the hearts in the boardroom of a rival manufacturer.

TOM ERRINGTON



NISMO gets Quintarelli out in front for success

SUPER GT

FUJI (J)

MAY 4

ROUND 2/8

The NISMO Nissan GT-R proved the class of the field on the Japanese Bank Holiday last Friday to give Ronnie Quintarelli and Tsugio Matsuda victory, and move them into the championship lead. The success also allowed Matsuda to increase his record as the all-time record holder of Super GT wins, with 20 victories to his name.

With Fuji covered in heavy fog on Thursday's qualifying day, the usual two-stage format was abandoned and instead a single session was held. Yuji Tachikawa planted the Cerumo Lexus on pole position, with Kazuya Oshima – in the LeMans Lexus he shares with Felix Rosenqvist – alongside.

Tachikawa took the start for Cerumo, but quickly fell down the order. It was the fast-starting Quintarelli who

moved into the lead, chased by James Rossiter (substituting for the WEC-committed Kazuki Nakajima with the TOM'S Lexus team), Heikki Kovalainen (SARD Lexus) and Oshima.

Kovalainen won a fantastic battle with Rossiter for second, and then moved past Quintarelli into the lead. After the first round of pitstops, Formula 3 star Sho Tsuboi – subbing for Kamui Kobayashi, who like Nakajima was racing at Spa – impressively maintained the SARD Lexus's lead from Matsuda as he completed a sparkling GT500 debut.

At the final round of stops, super-quick pit work from NISMO got Quintarelli out in front of Kovalainen, and the Italian pulled away. Kovalainen did his best to cut the gap, but there was no stopping the Nissan.

The pole-winning Cerumo car of Tachikawa and Hiroaki Ishiura finished third, with Rossiter and Yuhi Sekiguchi fourth for TOM'S, Oshima and Rosenqvist fifth, and Daiki Sasaki and Jann Mardenborough sixth in the Team Impul Nissan. Hamstrung by their success ballast from their second place in round one, Naoki Yamamoto and Jensen Button took their Team Kunimitsu Honda to ninth position after Yamamoto had qualified 10th.

There was British success in the GT300 class, with Sean Walkinshaw combining with mid-1990s Formula Vauxhall Lotus racer Shinichi Takagi to win in Aguri Suzuki's ARTA BMW M6 GT3. With Takagi's pole and fastest lap, it was a perfect race for the team.

JIRO TAKAHASHI



Vervisch and Leonard lead Audi 1-2-3



**BLANCPAIN SPRINT
BRANDS HATCH (GB)
MAY 5-6
ROUND 2/5**

The most unusual aspect of Frederic Vervisch and Stuart Leonard's Blancpain GT Series Sprint Cup victory for WRT in the second race at Brands Hatch was the controlled nature in which their Audi won.

An eventual cushion of only 0.6 seconds to team-mates Alex Riberas and Christopher Mies, and the fact that there's yet to be a repeat winner after four races, bely their smooth run to the chequered flag.

After topping a Sprint qualifying session for the first time, Vervisch acknowledged that "pole position was definitely the key" at what was "an Audi track". And so it proved

to be when Dries Vanthoor and ex-Formula 1 driver Will Stevens converted pole to one half of WRT's weekend spoils in the first race, following a heroic defensive drive from Stevens to keep a train of four cars at bay.

Both races could have been a 1-2-3 for Audi had it not been for a cruel last-lap puncture that meant Kelvin van der Linde's superb drive for Attempto in the opening race was only rewarded with eighth.

In race two, Vervisch made a flying start (above) and led into Paddock Hill Bend, while Raffaele Marciello was caught napping from second on the grid in the AKKA-ASP Mercedes-AMG GT3 by the R8 of Mies. A lunge down the inside into Paddock relegated Marciello to third, and he then compounded his error by running wide and allowing van der Linde an easy ride through too.

The race was then neutralised behind the safety car so that both Team Parker Bentley Continental GT3s could be recovered. A congested first-lap run out of Druids resulted in the Mercedes of Jack Manchester tagging and spinning Callum Macleod's Bentley; Macleod's team-mate Aron Taylor-Smith was left with nowhere to go and shunted into Macleod's door. His stationary car was then hit by Alexey Korneev, ending a woeful weekend in which the Russian crashed in practice, finished last in qualifying and spun in race one.

When the safety car pulled in, Vervisch again made a stellar getaway and remained well clear as the pit window opened.

Mies headed straight in to swap for co-driver Riberas in an effort to undercut the #17 Audi. Van der Linde followed suit and, despite a momentary delay when Riberas struggled to restart his R8's engine, the order remained as Leonard picked up Vervisch's lead after pitting three laps later.

Marciello ran deep into his stint in an effort to undo his troubles, but he carried too much speed into the pits and hit the barrier. He was able to continue and hand over to Michael Meadows. They took fourth.

This time last season it was Grasser Racing's Mirko Bortolotti celebrating victory. But additional Balance of Performance ballast helped ensure the Lamborghini Huracan GT3 he shared with Christian Engelhart was down in fifth.

MATT KEW



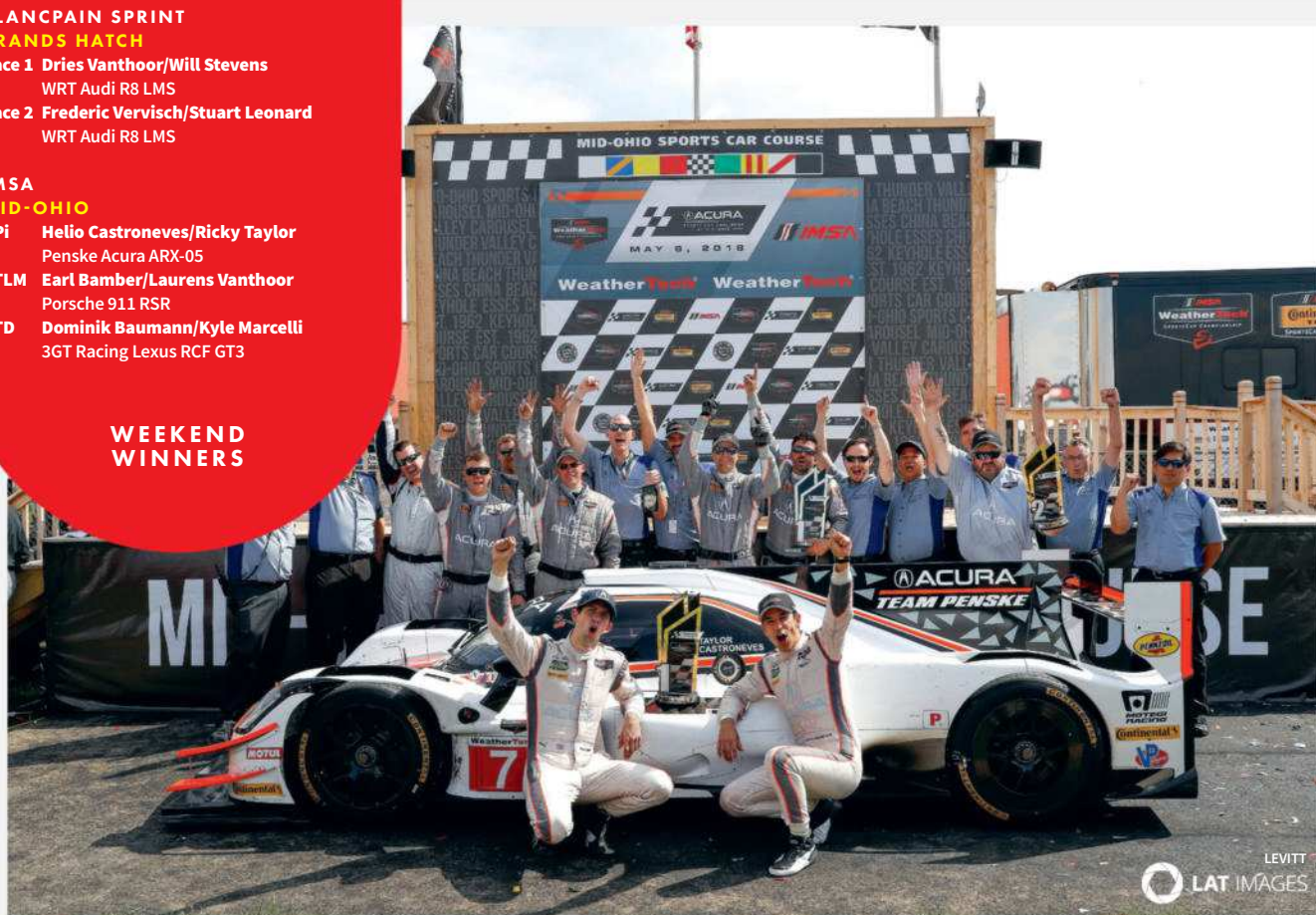
**BLANCPAIN SPRINT
BRANDS HATCH**
Race 1 Dries Vanthoor/Will Stevens
WRT Audi R8 LMS

Race 2 Frederic Vervisch/Stuart Leonard
WRT Audi R8 LMS

IMSA
MID-OHIO
DPI Helio Castroneves/Ricky Taylor
Penske Acura ARX-05

GTL Earl Bamber/Laurens Vanthoor
Porsche 911 RSR

GTD Dominik Baumann/Kyle Marcelli
3GT Racing Lexus RCF GT3

**WEEKEND
WINNERS**


Penske and Acura hit the front in America

IMSA
MID-OHIO (USA)
MAY 6
ROUND 4/12

Helio Castroneves and reigning series champion Ricky Taylor combined to claim an emphatic first IMSA SportsCar victory for Acura Team Penske last Sunday at Mid-Ohio. Yet perhaps the biggest winners were the fans, who turned out in droves to celebrate the return of top-line prototypes to the challenging 2.258-mile

road course after a five-year absence.

Unencumbered by caution periods, the 160-minute race provided some spectacular entertainment in ideal weather conditions. The wide-open nature of this year's championship was exemplified as first-time winners emerged in all three classes. At the front of the field, nine different prototypes representing six distinct chassis-engine combinations posted lap times within 0.3 seconds of Stephen Simpson's fastest race lap in one the JDC Miller MotorSports team's ORECA-Gibson 'global' P2 cars.

But let there be no doubt that Roger Penske's Acura ARX-05 DPi cars were in charge. After displaying their potency in the first three races, they were fastest in every session and never relinquished their position atop the leader board.

Penske's cars were kept honest by the pair of Mazda Team Joest entries. Jonathan Bomarito and Spencer Pigot (standing in for Harry Tincknell, who was already committed to the WEC race at Spa) fell by the wayside at half-distance after Pigot made contact with a GTD car, but team-mates Oliver Jarvis and Tristan Nunez remained in contention to secure the combination's first podium finish.

The two Mazdas actually split the

Acuras shortly after the first round of pitstops, when Taylor encountered some difficulty in getting up to speed on a fresh set of tyres after taking over from Castroneves. He slipped briefly to fourth but was soon into his groove. Taylor regained the upper hand following the second round of pitstops, when Juan Pablo Montoya relieved Dane Cameron, and claimed a relatively comfortable victory.

The pursuing Cadillacs of Wayne Taylor Racing and Action Express chased gamely but were unable to match the turbo cars in terms of top speed.

GTL provided the usual drama as one representative each of Porsche, BMW, Corvette and Ford filled the top four places, separated by less than 20 seconds. The Porsche of Earl Bamber and Laurens Vanthoor led most of the way, although the BMW of Alexander Sims and Connor De Phillippi stayed out much longer than the other contenders before making its final pitstop for fuel, after which De Phillippi took advantage of fresher tyres to whittle a deficit of almost 10s to Vanthoor to just a few car lengths at the finish.

Kyle Marcelli and Dominik Baumann secured a well-deserved maiden GTD victory for Lexus and 3GT Racing.

JEREMY SHAW





McLaughlin scored double to extend Supercars points lead

KLYNSMITH
LAT IMAGES

McLaughlin on stunning form in the west

AUSTRALIAN SUPERCARS

BARBAGALLO (AUS)

MAY 5-6

ROUND 5/16

Scott McLaughlin took a sublime pair of wins in Perth to extend his points lead, and the second came after a stunning drive from the 10th row of the grid.

The DJR Team Penske Ford driver made light work of Saturday's 120km race, using his superior car speed to run a standard single-stop strategy from pole position.

McLaughlin's cause was helped by having team-mate Fabian Coulthard play an excellent rear-gunner role during the first stint, which meant McLaughlin had the best part of six seconds up his sleeve when he made his sole pitstop. From there he was able to control the gap on the high-deg surface, cruising to a comfortable 5.6s win.

Mark Winterbottom and Shane van Gisbergen completed the Saturday podium,

having both run a different style of one-stopper. They opted to make their single stop much later, which meant being severely undercut by most of the field early on, but having buckets of tyre grip for a short second stint to the flag.

Winning on Sunday was more complicated for McLaughlin, after an uncharacteristically poor showing in qualifying left him 19th on the grid.

It started when he missed out on an automatic Q2 spot in Sunday morning practice, before a mistake on his sole soft-tyre run in Q1 meant he didn't even make it through the hard way.

His saving grace in the 200km race turned out to be an early safety car. Having worked his way up to 12th at the start, the caution and subsequent round of stops helped McLaughlin pop out in fifth, on the same strategy as the guys around him.

He then moved into the effective lead during the second round of stops, before

staving off a brief challenge from David Reynolds after the third round of stops to set up one of the most impressive wins of his Supercars career.

"I couldn't believe it," said McLaughlin. "The strategy was on point. We made it difficult for ourselves [with qualifying], but we brought it back. I joked to [Dick Johnson] before we went out. I said, 'I reckon we could win this thing'. But I didn't bloody think I was going to do it!"

Reynolds finished second in his Erebus Holden, despite running off the road at the last corner on the final lap, which he later labelled as a "dick move".

Craig Lowndes finished third, pulling off an even greater escape than McLaughlin. The veteran started way back on the last row of the grid, but the frantic opening stint and an overcut-heavy three-stop strategy helped him come home on the podium.

"I said to [race engineer John McGregor], 'You call the shots, I'll drive the wheels off it,'" said Lowndes. "I think we did that today."

Jamie Whincup's title hopes took another knock, starting with an 11th on Saturday. The reigning champion actually finished sixth on the road, but was slapped with a five-second penalty for turning Chaz Mostert around when the Tickford driver tried to get into the pits midway through the race.

On Sunday Whincup led before the safety car, only to then slip back through the field as the race wore on. He was ultimately passed by Triple Eight/Red Bull Holden team-mate van Gisbergen on a four-stopper late in the race, finishing sixth.

McLaughlin now leads van Gisbergen by 158 points, with Reynolds a further 10 back.

ANDREW VAN LEEUWEN



Reynolds did his best to stop McLaughlin in the second race

KLYNSMITH
LAT IMAGES

AUSTRALIAN SUPERCARS

BARBAGALLO

Race 1 Scott McLaughlin

DJR Team Penske Ford Falcon

Race 2 Scott McLaughlin

DJR Team Penske Ford Falcon

NASCAR CUP

DOVER

Kevin Harvick

Stewart-Haas Racing Ford Fusion

NASCAR XFINITY

DOVER

Justin Allgaier

JR Motorsports Chevrolet Camaro

EUROFORMULA OPEN

PAUL RICARD

Race 1 Felipe Drugovich

RP Motorsport

Race 2 Felipe Drugovich

RP Motorsport

INTERNATIONAL GT OPEN

PAUL RICARD

Race 1 Fran Rueda/Andres Saravia

Teo Martin Motorsport BMW M6 GT3

Race 2 Andrea Montermini/Daniele di Amato

RS Racing Ferrari 488 GT3

TCR EUROPE

PAUL RICARD

Race 1 Dusan Borkovic

Target Competition Hyundai i30 N TCR

Race 2 Dusan Borkovic

Target Competition Hyundai i30 N TCR

BRAZILIAN V8 STOCK CARS

LONDRINA

Race 1 Max Wilson

Eurofarma RC

Race 2 Lucas di Grassi

Hero Motorsport

EUROPEAN GT4

BRANDS HATCH

Race 1 Nicolaj Moller Madsen/Milan Dontje

Phoenix Racing Audi R8 LMS GT4

Race 2 Will Tregurtha/Stuart Middleton

HHC Motorsport Ginetta G55 GT4

Harvick leads Kyle Busch
on the Dover ovalHARRELSON
LAT IMAGES

Harvick wins the SHR battle

NASCAR CUP
DOVER (USA)
MAY 6
ROUND 11/36

The NASCAR Cup series pendulum swung back the way of Stewart-Haas Racing as it put in another dominant showing.

After a 49-minute delay for rain, the race became a two-car battle between the sister SHR Fords of Martinsville winner Clint Bowyer and team leader Kevin Harvick.

Bowyer had been sent to the back of the grid and slowly worked his way up the field after a series of car adjustments. By the middle of the race, he was into the top five and moved into the lead with 103 laps of 400 remaining just before the rain fell.

When racing resumed, Bowyer and the leading pack, which included second-placed Harvick, pitted for new tyres and fuel.

It was when he rejoined the track that Bowyer felt his lead was most under threat.

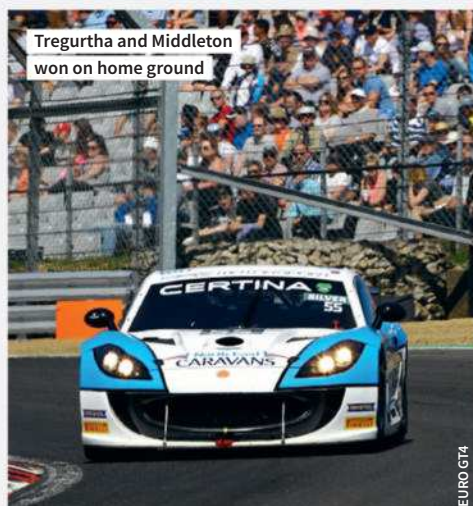
"Clearly, Kevin was up front and was the car to beat most of the day," said Bowyer. "[That last pitstop] was our first shot at tyres and taking off in clean air. It makes a big difference. I knew when it [Harvick's car] took off as good as it did and rotated as good as it did, I was in trouble."

Thirteen laps later he was. Harvick finally found the space to make a move stick on team-mate Bowyer, and his advantage showed once again as he won by seven seconds after the remaining 60 laps.

It was enough for the impressive Daniel Suarez, who equalled his best Cup result of third in his Joe Gibbs Racing Toyota, to consider Harvick as "in his own league".

That was often how fellow Toyota driver Martin Truex Jr was described last year, but he could only take fourth having wrecked out of three of the last four races.

Points leader Kyle Busch had a suspected driveshaft failure, having battled vibration from the worsening part, and was 35th.

Tregurtha and Middleton
won on home ground

EURO GT4

Brits take it with Ginetta

GT4 EUROPEAN SERIES
BRANDS HATCH (GB)
MAY 6
ROUND 2/6

A stop-go penalty for a pitstop under the minimum time was all that prevented Stuart Middleton and Will Tregurtha from establishing themselves as series leaders.

Following on from their Zolder win, the HHC Ginetta duo led race one as the red flag was produced – contact with the KTM X-Bow of Laura Kraihamer had sent Ricardo van der Ende's McLaren crashing over the

tyre wall on the exit of Hawthorns.

As a result, the safety car was deployed for the third time in a race marred by poor driving standards until the race ticked over to 75% completion, after which Milan Dontje and Nicolaj Moller Madsen inherited victory in their Phoenix Racing Audi.

Tregurtha led from pole in race two before he struggled with his tyres and fell down the order. But a slick pitstop followed by a strong stint from Middleton was enough to overcome the Ginetta's extra ballast, and he powered on to an eight-second win.

MATT KEW

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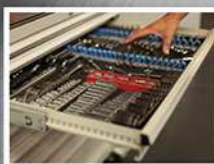


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Many more C1s will be at Rockingham than here at Snetterton last year

EXTRA C1 RACE AT ROCKINGHAM GETS LARGE ENTRY TOO

CITROËN C1 CHALLENGE

Just over a year ago, the inaugural Citroën C1 Challenge race attracted a modest grid of 14 cars. This weekend, more than double that number will take part in the 'reserve' race for the first Rockingham C1 24 Hours.

Organisers have expressed disbelief at the pace of the rise. The 53 places on the 24-hour grid for Rockingham were filled in a matter of days, leading to a three-hour race being put on beforehand to accommodate those who haven't got an entry to the main contest. That race is now set to feature 35 cars.

Harper wants end to bad luck

PORSCHE CARRERA CUP GB

Porsche GB Junior Dan Harper is targeting a turnaround in fortunes at Monza this weekend after a difficult start to his Carrera Cup season.

The 17-year-old JTR driver is currently sixth in the standings after suffering bad luck in three of the opening four races of the year.

He qualified an impressive third for the first race at Brands Hatch but dropped to 13th after contact with George Gamble caused a puncture. His fightback in race two was then limited by a red flag shortening the race.

He finished third in the first race at Donington Park and was on course for a strong result in race two when he suffered a broken radiator.

"I've not really had the best luck but I've showed the speed, which is the most important thing," said Harper. "If the speed is there, then the luck will come."

"A stone flicked up by my team-mate Lewis Plato broke the radiator. But that's racing, it's annoying but I know we can be up there."

"It was a massive jump up [to Carrera Cup from Ginetta Junior] and I didn't expect to be quick so soon."

The Carrera Cup will visit Monza for the first time in support of the European Le Mans Series this weekend.

"I think Monza will be very exciting," added Harper. "A lot of drivers have never been before so it will even things out."

Title rivals Dino Zamparelli and Tio Ellinas have both raced at the Italian circuit in single-seaters.

"I won at Monza in GP3 so hopefully I will carry on with the same pace," said Ellinas, who trails Zamparelli by just two points ahead of the two Monza races.

STEPHEN LICKORISH



"If we were speaking this time last year after our first proper race, when we had 14 cars, and someone had told us then we were going to Rockingham next weekend with a full grid for the main race and 35 cars in the three-hour race we are putting on for cars who couldn't get into the main race, we would never have believed it," said Philip Myatt, director of the C1 Racing Club.

"During last year we knew they were selling kits for cars to be built, but during the year we had no more than 18 cars in any of the races before Spa.

"We've got the complete spectrum [in terms of driver ability] from people like Andy Priaulx, who are respected professional drivers, to the guy who has just done his

ARDS test and this is his first race."

As well as Priaulx — who is sharing a car with his son Seb and British Touring Car series director Alan Gow — a number of past and present BTCC drivers are taking part.

Among those on the entry list are BTCC title contender Josh Cook, fresh from his maiden win in the series at Donington Park last month. Former BTCC drivers Anthony Reid, Lea Wood and Jim Edwards Jr are also on the grid and Richard Austin — father of Rob — will make his racing return in the event. Rob could take part in the second C1 24-hour race at Rockingham in September.

Successful club racers from a diverse range of series also feature, including

Castle Combe ace Gary Prebble, ex-Classic Stock Hatch champion Pip Hammond and Pickups regular Nic Grindrod.

Myatt attributes a number of factors for the surge of interest in C1s, including cost-effectiveness and closeness of the racing.

"People spend more money on hospitality than we spend on a season's racing," he said. "The cars are very evenly matched and good fun to drive. You look at it and think you're just going to drive to the supermarket in it, but make a few differences to the suspension and it's ready to race for under £4000. Endurance racing is another factor — a lot of people have only done 15 or 20 minutes and people want to get more track time."

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Photographs by Gary Hawkins

BTCC driver Price to join TCR UK grid for Knockhill



Twelve entries are expected for TCR UK at Knockhill

TCR UK

Josh Price will become the second current British Touring Car driver on the TCR UK grid when he contests the second round at Knockhill this weekend.

The 19-year-old, who drives a Team BMR Subaru Levorg in the BTCC, will compete in a first-generation Honda Civic under the BMR banner and may contest

the rest of the season.

He had already tested the car during the winter and joins fellow BTCC racer Aiden Moffat in the series.

"I watched the opening round at Silverstone and the fact that we'd already got a TCR car meant it was an easy decision to do Knockhill," said Price. "I'm not making any predictions, but the racing at Silverstone looked to be

pretty close and I'm excited to be joining TCR UK for one of the early rounds."

Points leader Dan Lloyd is also going to be in the Knockhill field this weekend. He won both of the opening races of the series at Silverstone but only had a deal to contest the first weekend with the WestCoast Racing squad in a Volkswagen Golf. That has now been extended for Knockhill and could continue further into the season.

The other two WestCoast entries at Silverstone, for siblings Andreas and Jessica Backman, will also be back on the grid in Scotland.

Despite the arrival of Price, numbers are expected to drop from 13 at Silverstone to 12, but organisers are unconcerned by the slight drop in entries, suggesting they always expected a decrease for Knockhill.

"The numbers will be lower at Knockhill because of the sheer cost and the geography but we have a lot of people interested [later in the year]," said TCR UK's promotor Jonathan Ashman.

"You know the numbers are going to be small in year one but TCR is a credible proposition and it will grow and grow. We're happy for it to sit in the UK and let it develop. We always knew the UK would be toughest [market for TCR to crack] and that's why we left it to last. I think Silverstone was positive and the atmosphere was good."

STEPHEN LICKORISH

Hoy to race in Masters Endurance Legends

MASTERS

Olympic cycling champion Sir Chris Hoy will compete in the new Masters Endurance Legends series this season.

Hoy — who has raced in a number of different categories and events in recent years, including in British GT and at the Le Mans 24 Hours — will drive a Courage LC75 in the Masters series for recent GTs and sports-racers. He is expected to make his debut at the Silverstone Classic in July.

The LMP2 Courage contested the 2007 Le Mans, with Vitaly Petrov — before his F1 career began — sharing with Liz Halliday and Romain Iannetta.

"I'm very excited to get back into a proper race car with a bit of downforce," said Hoy, who will share the car with Mike Furness. "I'm doing a few things at the moment but this is going to be really exciting. I used to follow Le Mans as a kid — I had a little toy set with two Le Mans cars."

STEPHEN LICKORISH



Hoy will compete in Endurance Legends in a Courage LC75

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Atkinson tested the Hesketh at Silverstone last week

LAWRENCE

From muddy trial to Monaco

HISTORICS

Isle of Wight driver Chris Atkinson will realise a boyhood dream when he races a Formula 1 car at Monaco this weekend.

Atkinson, 51, will drive the Hesketh 308 owned by Irish racer James Hagan while the owner recovers from a skiing accident. Atkinson usually competes in the ex-Mike Hailwood Surtees TS8 Formula 5000 machine but will step up to Cosworth DFV power for the street race.

"I've been to Monaco before but never to race, instead I drove the truck there for [historic racer] Frank Lyons!" said Atkinson. "James has a skiing injury and asked me if I wanted to do it. It is one of my boyhood dreams, to race a proper F1 car, and to do it at Monaco is amazing."

"I just want to finish the race and

bring the car back home in one piece."

Atkinson has raced on the street circuit at Pau and had a shakedown test in the Hesketh on the Silverstone Grand Prix circuit last week. "It's certainly lighter and more nimble than the Formula 5000," he added.

Ten days ago, Atkinson and his father Ken competed in a Historic Sporting Trial in his Cannon. "That's the two extremes of motorsport: from a muddy trial to racing an F1 car at Monaco in two weeks," said Atkinson. He also contested the 2017 London-Brighton veteran car run in his 1903 De Dion Bouton.

Atkinson warmed up for Monaco by racing the Surtees in the Derek Bell Trophy event at Donington last weekend, taking a best result of fifth.

PAUL LAWRENCE

OSS gets bumper entry

BRSCC

Forty-six cars will be on the grid for the opening round of the OSS Championship on the Silverstone GP layout – with a further four places still available.

The British Racing & Sports Car Club category will hold three races on the Northamptonshire circuit this weekend.

Created in 2009 for sports-prototypes, the eight different classes and relatively open regulations mean that it has continued to grow in popularity.

Alan Jenkins, coordinator of the

championship, said: "We averaged about 28 cars last year and we've got a number of new guys joining us this year."

"I think the number is so high this weekend because it's the full Silverstone layout. It's a really good opportunity."

"We can take 50 cars but four people withdrew because of car problems, otherwise we would have been 50."

"The championship has flourished in the last three years, we've become established, people like the format; it works."

STEFAN MACKLEY

IN THE HEADLINES

EUROPEAN GT4 DEBUTS

Will Burns and Mike Newbould made their GT4 European Series debut at Brands Hatch in an effort to learn the full Grand Prix circuit ahead of its use by British GT in August. It seemed to have been a wasted journey when Newbould suffered a first-lap retirement in race one following contact with Nathan Wolf in the V8 Racing Chevrolet Camaro GT4.R. Burns then led early on in race two but, after the driver changes, they wound up 34th.

EDWARDS TO RETURN

Two-time Welsh Sports & Saloon Car champion Blake Edwards will return to the series and competitive racing for the first time in 23 years this weekend. Edwards won a single-race shootout in 1990 to become champion, and retained the title in '91 – before retiring in '95. He will drive a Renault Clio in this weekend's Oulton Park races and also contest other rounds this season.

CENTURY TO GT CUP

Century Motorsport will enter a Ginetta G55 GT4 in the rest of the GT Cup season. The car will be shared by former GRDC and G40 Cup racers David Holloway and Phil Ingram, along with GT regular Piers Johnson. Holloway and Ingram are also set to tackle the British GT finale at Donington Park in September in the car.

GERAGHTY TO HOT HATCH

Reigning Scottish Mini Cooper Cup champion Mark Geraghty made his SMTA Hot Hatch Fiesta debut at Knockhill last weekend, claiming a brace of second places. The Perthshire driver has decided to switch focus from the one-make series for 2018, instead opting to take part in the 750 Motor Club Enduro series in his Mini Cooper S.

EXTRA EQUIPE GRID

The Equipe GTS series has secured additional track time at the MG Live meeting at Silverstone after its initial 58-car grid was filled within 15 minutes. Organisers expect the second grid is likely to be full, too, by the June 2/3 meeting. The series (below) often attracts large entries and always gets particularly high interest in its races at the MG Live event.



IN THE HEADLINES

'AND IT'S WALKER...'

The organisers of the Silverstone Classic presented Murray Walker with a Lifetime Achievement Award last week to mark 70 years since he attended the first Silverstone grand prix in 1948. In a ceremony hosted by fellow broadcaster Tiff Needell in the pitlane, the accolade was presented by Silverstone Classic's Nick Wigley.

BAILLIE'S BAPTISM

BRDC veteran Alan Baillie's Lola Mk2 debut in the Donington Historic Festival's Formula Junior races brought mixed emotions. "It had been in a corner of my workshop for 25 years, awaiting restoration, but needs a proper [Ford] engine," he said. Sadly, Baillie collected Andrew Tart's Bond, tapped into a spin at Redgate, in Sunday's start.

TILLEY'S SWITCH TO LOLA

Benn Tilley, class-winning runner-up to Peter de la Roche in last year's FJHRA Historic Formula Junior championship, switched from Paul Smeeth's Lotus 22 to a Lola Mk5 last weekend at the Donington Historic Festival. Having not sat in the Lola until qualifying, the 18-year old finished ninth and eighth in the races.

ESCORT TURNS HEADS

The immaculate Ford Escort RS1600 of Terry Caton and engine builder Tim Swadkin turned heads in the Historic Touring Car Challenge at Donington. Built by Greg Caton's G-CAT Racing team, the two-litre BDG-powered car is a faithful replica of Spaniard Rafael Barrios's Garvey sherry-backed Broadspeed original of the early 1970s.

DEBUT PODIUM DELIGHT

John Pearson was delighted to finish third on his debut in his ex-Emanuele Pirro Audi A4 Quattro (below) in Saturday's HSCC Super Touring series opener at the Donington Historic Festival. "Chassis 31 was the last Quattro built and it's fabulous," said Dunlop's motorsport tyre distributor, who bought the car at the RM Sotheby's London auction in 2016.



Hamilton was back at the wheel of Le Mans Aston

Hamilton reunited with Aston DBS at Donington

LE MANS CLASSIC

Former Le Mans 24 Hours privateer Robin Hamilton was reunited with his Aston Martin DBS V8 at Donington Park last week.

Hamilton developed the car over several years and finished 17th in the 1977 French enduro, sharing with Mike Salmon and David Preece.

In modified twin-turbo form, the car also contested the 24 Hours in 1979. Hamilton and Preece shared RHAM/1 with Derek Bell, but retired due to engine failure.

Its last race in period was the 1980 Silverstone 6 Hours, which it failed to finish, but it did hold the world land-speed record for towing a caravan!

The car has been rebuilt by Aston Engineering and restored to its non-turbo form, and owner Paul Chase-Gardner

plans to race it this season.

David Jack from Aston Engineering said: "I worked on the car when it was originally built and it's been put back to as near the '77 Le Mans spec as we can. Paul bought the car in 1979 spec, but we decided to change it back, so it has a 500bhp V8, and period brakes, gearbox and diff."

Chase-Gardner, who drove the car at the 2016 Le Mans Classic, added: "The whole project has been a wonderful journey and I am looking forward to racing at Spa and the Le Mans Classic."

Hamilton's Donington run was his first time in a race car for 37 years. "The brakes were good and it felt very stable, but I was rather nervous about driving it again," he said. "It felt very much like the original, still difficult to drive — especially for 24 hours. It's a real credit to Paul, David and Aston Engineering for the superb build."

PETER SCHERER

Racer stopped at border

DONINGTON HISTORIC

Svein Aannestad was unable to race in his first Donington Historic Festival last weekend after the trailer carrying his race car was detained at the UK border.

The Norwegian had been due to enter his 1963 Alfa Romeo Giulia GT under invitation in the Historic Racing Drivers Club's Touring Greats for Pre-'60 Touring Cars race. But a weighing error by the shipping company meant he was unable to leave the docks.

Aannestad said: "Our total weight

came to 10 tonnes but DFDS put the cargo only down as 10 tonnes. At Customs the automatic barrier wouldn't let us out because the computer hadn't recognised what we had declared."

To add insult to injury, because Aannestad had left his racing licence in the trailer, he had to pay for tickets on the gate in order to watch the race he should have been a part of.

The carrier did pay the £1000 fine and will return Aannestad's car free of charge.

MATT KEW



WHAT'S THE CATCH?

Regular spectators at Brands Hatch may not welcome the new safety measures. But if they attract series such as the DTM and new fans, can they be a good thing?

MATT KEW

All was not well among the spectators at Brands Hatch last weekend. That was despite the glorious Bank Holiday weather, two entertaining headline races courtesy of the Blancpain GT Series Sprint Cup, and the first competition usage of the Grand Prix Circuit layout this season.

The reason for their upset was the changes made to the back of the circuit on the Grand Prix loop: the use of more and higher catch fencing, and the closure of a small trackside section between Sheene Curve and Stirling's Bend.

Alterations coincide with the planned arrival of the DTM at the venue in August – its first time at the track since 2013 when it, crucially, used the Indy Circuit configuration. Although Brands was apparently investigating safety upgrades before the DTM showed interest, the arrival of the German tin-top series later this year reportedly sped up proceedings.

On the surface, it looks like mission accomplished for MSV chief executive Jonathan Palmer as his flagship circuit attains its highest-profile car-racing event of the year.

The Historic Sports Car Club's Legends Superprix, the Masters Historic Festival, the British GT and BRDC British Formula 3

"NOT A SINGLE FAN AUTOSPORT SPOKE TO APPROVED OF THE REVISIONS TO THE FENCING"

meeting, plus two MSV Racing Club events are also on the Grand Prix Circuit's car-racing calendar for 2018. As is the traditional final round of the British Touring Car Championship – the other big four-wheeled crowd-puller – at the end of September.

But – and this is perhaps to be expected – not a single fan Autosport spoke to at the weekend approved of the revisions to the fencing. "I've been coming here since 1964 and it's always been beautiful out the back," said 69-year old Roger Barwell. "But this is just horrendous. Awful, I can't see anything. It's vandalism. I used to come and watch the grand prix here because it was so nice. But to see this today, I don't think I'll bother coming back."

In a similar vein, Simon Perry, 67, said: "It's stupid. One thing I've learned since getting older is that nothing stays the same. It's health and safety gone mad. You're taking away from what it's supposed to be all about."

Respondents covered a wide range of demographics, with some being more regular attendees of the circuit than others. These are the kinds of people who should be returning to the track and are expecting a clear view of some of club racing's finest on maximum attack through Hawthorns and Westfield.

Despite the thoughts of some of the spectators, it would be easy to argue that the circuit actually hasn't gone far enough in its quest for greater safety, especially considering the loop has given rise to some scary offs. A freak accident during a 2010 SEAT Leon Eurocup race resulted in Francisco Carvalho's car rolling into an exposed spectator bank – incidentally on the straight between Sheene Curve and Stirling's.

On Sunday a marshal was left diving for cover during the first race of the GT4 European Series. When Ricardo van der Ende's McLaren 570S GT4 made contact with a KTM X-Bow GT4, the Dutchman was sent crashing over a tyre wall on the exit of Hawthorns. Why was there not catch fencing there?

Walking the circuit, you discover that the disparity of the fencing itself is unusual. Some sections remained with the old-style, lower and more-open protection, while the new fencing would start immediately after. If you're going to commit to greater spectator safety, shouldn't it be a uniform measure?

When asked for comment, MSV replied: "Decisions to make changes are the result of careful consideration and detailed risk assessment by experts in the field from within MSV and the regulatory bodies, and it is not necessary or appropriate to provide the detailed explanation for every decision."

What stood out too was that most of the newly built fencing was on the inside of the circuit, typically away from where incidents would likely end up. But, as a preventative measure, it's entirely understandable.

If the improvements to the circuit were terms made by the ITR in order to finalise an agreement to host the DTM, then the MSV's work is ultimately commendable. It's a safe bet that the DTM will attract many new fans to the circuit – spectators who won't know any different – and that's surely a good thing.

Most importantly, if the worst was to happen and a car was to get airborne again, then more protective fencing is a necessary evil. Fans still enter, accepting the risk, but any actions to reduce such dangers have to be welcomed.

The resulting pressure and accountability should any serious incident occur far outweigh the initial backlash that MSV, or any other organiser, may face from spectators. While it's impossible to entirely eliminate the danger of racing, the importance of pre-empting such events cannot be overlooked. 🏁

Friedrichs' narrow victory was closest ever at Historic Festival



Alvis Firefly shines brightest in Pre-War race

**DONINGTON PARK
MSVR HISTORIC FESTIVAL
MAY 4-6**

Evoking 1935 Donington Grand Prix winner Richard 'Mad Jack' Shuttleworth's spirit, Alvis Firefly ace Rudiger Friedrichs' scintillating half-second victory over the Frazer Nash Supersports of Patrick Blakeney-Edwards was the closest finish across all eight Historic Festivals to date.

"Not one lap more could I have kept him behind," said Friedrichs, having been hounded down by his adversary and then multiple winner of the race, Fred Wakeman.

Gareth Burnett, driving John Ruston's naturally aspirated Alta in its first race since 1939, completed the podium. Glorious cars

representing different marques – notably Bentley, Alfa Romeo and Maserati – filled the final results in the colourful catchweight contest last Sunday.

On pole by 0.190s, Austrian Lukas Halusa led the photogenic Pre-'63 GT race until his snarling Ferrari 250GT Breadvan started to smoke and he parked it at Starkey's Bridge. That triggered a safety car, by which time Simon Hadfield was already flying in Wolfgang Friedrichs' Aston Martin DB4 GT.

Andrew Kirkaldy, in Sandy Watson's Jaguar E-type fixed head coupe, and Phil Keen in Jon Minshaw's wire-wheeled roadster took up the cudgels before the former's gear linkage disintegrated.

Passing James Cottingham's E-type roadster and Blakeney-Edwards in the AC

Cobra started by Mike Grant Peterkin meant Hadfield was in range at half-distance.

The Aston closed on Keen, then out of brakes, which forced Minshaw to abandon it. Hadfield duly howled to victory from Blakeney-Edwards and Cottingham.

Gary and John Pearson were overjoyed to win Sunday's two-hour GT & Sports Car Cup enduro in their E-type. John led to the first stops, Gary (having started Carlos Monteverde's car) went top again as a safety car was called. With the Leo Voyazides/Hadfield Cobra fading, Keen brought double-stinter John Clark's rebuilt E-type up to second, 12.6s shy.

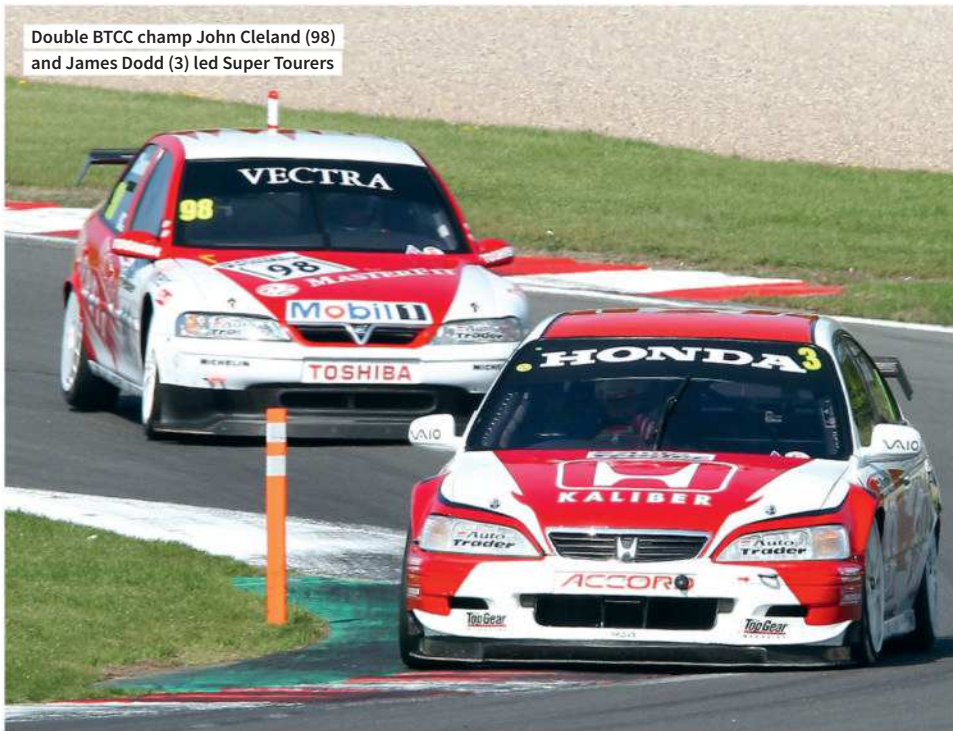
Wakeman and Blakeney-Edwards finished a strong third in the unique Lister-Jaguar Coupe. Martyn Corfield and Jeremy Welch's Austin Healey 3000 outdistanced earlier-spec Jaguars for a resounding class win, with Guy Peeters and Louis Zurstrassen's Lotus 11 the first sports-racer in seventh.

The Pearsons' triumph followed a baffling third place for the duo in Saturday's Jaguar Classic Challenge. They ended up behind Julian Thomas' low-drag coupe – despite a 10s jump-start penalty and a drivethrough for speeding in the pits, served by Calum Lockie – and Ben Short, who had led the first 27 laps.

In the RAC Woodcote Trophy, Wakeman/Blakeney-Edwards won in the former's Cooper-Jaguar from the glorious ex-Carroll Shelby/Jim Hall Maserati 250S of Richard Wilson and Martin Stretton – despite a liberal coating in gearbox oil. Gary Pearson, in Monteverde's ex-Jim Clark Jaguar D-type, overhauled the long-nosed D that he had handed to brother John for third seven laps from the flag. A superb fifth overall, Rick Bourne/Malcolm Paul in their Lotus-Bristol



A safety car allowed Hadfield to profit in the Pre-'63 GT race



Double BTCC champ John Cleland (98) and James Dodd (3) led Super Tourers

X topped the two-litre class.

Suspension failure robbed Olly Bryant's Lotus 15 of Stirling Moss Trophy race glory, leaving a Lister-Jaguar clean sweep. Chris Ward, in a Knobbly, lucked in, with pursuers Minshaw/Keen and Will Nuthall/Tony Wood hindered by drivethroughs for pitlane speeding. A safety car reprieved the latter duo after Nuthall stopped with a puncture. The Lola Mk1 of Keith Ahlers/Billy Bellinger finished a great fifth, ahead of Malcolm Harrison/Patrick Watts' Rejo and Costas Michael, who shot his Lotus 11 from 19th to a class-winning seventh.

Chris Drake unleashed his Terrier for the first time since 2016 to pip Ray Mallock's U2 for victory in the front-engine Formula Junior opener. In his late father and marque founder Arthur's centenary year, Mallock turned the tables on Drake in the ex-Brian Hart T4 on Sunday. Alex Morton didn't squander excellent starts in his Condor, netting third both days.

Both rear-engine races were dominated by Cameron Jackson in his Brabham. Jack Woodhouse and Sam Wilson, driving Lotus 20/22s completed the podium – their order reversed on Sunday when Wilson prevailed and the clutchless Woodhouse repassed Andrew Hibberd for third.

Lotus Cortina stars Andy Wolfe and Steve Soper won a U2TC race apiece. "Every time I got close to Andy I made a mistake," rued Soper on Saturday. But he retaliated on Sunday as Nick Swift and the impressive Tom Bell shared Mini spoils.

The Historic Touring Car Challenge rewarded Nick and Harry Whale with a wonderful victory in the former's BMW M3 over Mark Smith/Arran Moulton-Smith's similar E30. As the fast Ford Sierra

Cosworth of Dave Coyne/Mark Wright wilted, Steve Soper/Chris Ward's Rover Vitesse overcame suspension and braking issues to demote Eric Mestdag's magnificent BMW CSL to fourth. Shane Bland/Andre d'Cruze, in a BMW 635, placed fifth ahead of the Chevy Camaro of Alex Thistlethwayte who, without pitcrew, timed his own stop.

Double British Touring Car champion John Cleland returned in his Vauxhall Vectra and played second fiddle to James Dodd's Honda Accord in both Super Touring bouts. John Pearson was overjoyed with third on his debut in the ex-Emanuele Pirro Audi A4 Quattro. It broke on brother Gary on Sunday, when Whale grabbed third after Group A rival Wright's recalcitrant Sierra Cosworth stopped again.

Having lent each other gearbox parts, Michael Lyons thundered his Lola T400 to a Derek Bell Trophy double over Jamie Brashaw's March 73A. Best of the Formula 2 brigade was David Tomlin in his immaculate BDG-powered Motul Rondel M1, third overall on Saturday.

Only Neil Brown's Austin A35 kept Mike and Andy Jordan's A40 in sight in Saturday's Touring Car Greats encounter, following a lengthy interlude while marshals cleared up first-lap mayhem at McLeans.

A massive oil slick coupled with blocked pit entry for frontrunners shuffled the Pre-'66 HRDC Coys Trophy order. Long-time leader Julian Thomas relayed Calum Lockie into his Ford Falcon, but its engine grenaded, leaving Graham Pattle's Lotus Cortina and Nick Swift – who started his Cooper S from the pits after its battery went down – to bump Richard Fores in David Alexander's Alfa Giulia Sprint to third.

MARCUS PYE

WEEKEND WINNERS

DONINGTON PARK

FJHRA/HSCC PRE-'61 FORMULA JUNIOR FRONT-ENGINE

Race 1 Chris Drake (Terrier-Ford Mk4 S1)

Race 2 Ray Mallock (U2-Ford Mk2)

FJHRA/HSCC PRE-'64 FORMULA JUNIOR FRONT & REAR-ENGINE

Race 1 Cameron Jackson

(Brabham-Ford BT2)

Race 2 Cameron Jackson

(Brabham-Ford BT2)

GT & SPORTS CAR CUP

John Pearson/Gary Pearson (Jaguar E-type)

HISTORIC TOURING CAR CHALLENGE

Nick Whale/Harry Whale (BMW E30 M3)

HRDC COYS TROPHY FOR 1958-66 BTCC

Graham Pattle (Ford Lotus Cortina)

HRDC PRE-'60 TOURING CAR GREATS

Mike Jordan/Andrew Jordan (Austin A40)

HSCC DEREK BELL TROPHY

Race 1 Michael Lyons (Lola-Chevrolet T400)

Race 2 Michael Lyons (Lola-Chevrolet T400)

HSCC SUPER TOURING

Race 1 James Dodd (Honda Accord)

Race 2 James Dodd (Honda Accord)

JAGUAR CLASSIC CHALLENGE

Julian Thomas/Calum Lockie

(E-type 'low-drag coupe')

'MAD JACK' PRE-WAR SPORTSCARS

Rudiger Friedrichs (Alvis Firefly SA)

PRE-'63 GT CARS

Wolfgang Friedrichs/Simon Hadfield

(Aston Martin DB4 GT)

RAC WOODCOTE TROPHY FOR

PRE-'56 SPORTSCARS

Fred Wakeman/Patrick Blakeney-Edwards

(Cooper-Jaguar T39)

STIRLING MOSS TROPHY FOR

PRE-'61 SPORTSCARS

Chris Ward (Lister-Jaguar Knobbly)

U2TC

Race 1 Andy Wolfe (Ford Lotus Cortina)

Race 2 Steve Soper (Ford Lotus Cortina)

For full results visit:
tsl-timing.com



Mallock's U2 (left) diced with Drake's Terrier



Reuben TVR wins race of family fortunes

SILVERSTONE INTERNATIONAL CSCC
MAY 5-6

The TVR Griffith of Nigel and Oliver Reuben came out on top in an all-father-and-son duel with the Morgan +8 of Richard and William Plant in the Classic Sports Car Club's Swinging Sixties Group 2 race.

Reuben Jr stayed quite close to the younger Plant in the early laps on Silverstone's International Circuit, until a ninth-lap spin at Becketts. He was still second at the handover as both young drivers made way for their fathers. Plant Sr retained the lead, but had the elder Reuben rapidly closing in. "I was running out of fuel, so I couldn't defend as it was cutting out," said Plant.

Reuben surged past into Village three laps from home and was eight seconds clear at the flag. James Keevill was a distant third in his Lotus Elan, following an earlier duel with Nick and Eddie Powell's similar car.

Andy Southcott's MG Modsport was a double winner in the first Special Saloons and Modsports event of the season. Southcott led race one from the start, but he ceded to Ian Hall (Darrian Wildcat) on the fifth lap. Hall ran out of brakes on the last lap, though, allowing Southcott to snatch the win, with Danny Morris a race-long third in his Peugeot 309 GTI.

Hall had the advantage from the opening lap of race two, while Southcott made up for a poor start to regain second by lap four. Hall kept his rival at bay for another six

tours, until backmarker traffic at Stowe returned Southcott his second victory, despite his own clutch and brake problems.

The Future Classics contest had to be restarted after a shunt at the first corner wiped out four cars, including the TVR Tuscan Challenge car of poleman Bill Lancashire. Aston and Tony Blake left the rest in their wake in their Porsche 911 RS, with fellow Porsche drivers James Neal and Neil Harvey securing second in the closing laps when Tom Brenton ran wide at Stowe. Despite a further spin at Village, Brenton retained third in his Ford Sierra XR8 ahead of Perry Waddams in another Tuscan.

In the Swinging Sixties Group 1 race, Ian Everett's BMW 1502 shadowed the Lotus Cortina of Richard Belcher until the stops, when Everett had to serve his win penalty from the previous round. Having recovered to second, Everett was forced to retire with gearbox problems, leaving Belcher well clear. Tom Parsons and Richard Mitchell in their Alfa Romeo GTV and Gordon Elwell's Frogeye Sprite completed the podium.

With Nathan and Peter Dod's TVR Griffith retiring from the lead after only six laps of the Classic K race, Peter Thompson's similar car led for the remainder of the hour-long race. Alasdair Coates was a



SILVERSTONE CSCC
WEEKEND WINNERS**CLASSIC K**

Peter Thompson (TVR Griffith)

FUTURE CLASSICS

Aston Blake/Tony Blake (Porsche 911 RSR)

MAGNIFICENT SEVENS

Christian Pittard (Caterham CSR)

MODERN CLASSICS

Dave Griffin (BMW M3 E36)

NEW MILLENNIUM

Graham Charman (Ginetta G55)

OPEN SERIES

Tim Davis (Caterham C400)

SPECIAL SALOONS & MODSPORTS**Race 1** Andy Southcott (MG Modsport)**Race 2** Andy Southcott (MG Modsport)**SWINGING SIXTIES - GROUP 1**

Richard Belcher (Lotus Cortina)

SWINGING SIXTIES - GROUP 2

Oliver Reuben/Nigel Reuben (TVR Griffith)

TIN TOPS

Lee Williams (Honda Civic Type R)

TURBO TIN TOPS & SMART 4TWO CUP

Keith Issatt/Joshua Fulbrook (Mini Cooper)

For full results visit:
www.tsl-timing.com

solitary second in his AC Cobra for the most part, with the Marcos 1800 GT of Allen Tice and Chris Conoley retaining third from the closing Lotus Elan of Nick Randall and Fabio Randaccio.

Caterham team-mates Tim Davis and Christian Pittard had a terrific duel in the Open series until Pittard dropped back, stuck in fifth gear. Davis's car started cutting out as he pursued the Ginetta G55 of Lee Frost in the second half, but he still managed to oust the GT4 Supercup racer to take a comfortable win. Pittard finally came home fourth, losing out to Lucky Khera and Declan Jones in another Ginetta G55.

Davis and Pittard were able to continue their duel in the Magnificent Sevens, with Pittard clinching victory after several close place swaps. "I got a bit wild near the end, though," Davis admitted, settling for second, well clear of Nic Grindrod.

Ginetta G55 driver Graham Charman grabbed a late win in the New Millennium race, diving past the SEAT Leon of Jamie Sturges, on the inside of Stowe, with a lap to go. Lee Frost had been in contention too, until his G55 expired at Club with Declan Jones at the wheel. This left Gary Hufford and Ali Bray third in their BMW M3, only a whisker away from >>



BAHRAIN TO SILVERSTONE Simon Harrison's 6.2-litre Holden VXR8 has made the transition from racing in a Middle Eastern one-make championship to the CSCC's New Millennium series. He has only owned the car for a couple of months. Overheating and a spin hampered his results.



PINT-SIZED RACER A Renault Twingo RS is a rarity on the Tin Tops grid, which was partly the appeal for novice racer Allan Walker. As part of a self-confessed midlife crisis, he's worked on the car himself, having polished the cams and lightened it where possible. Sixth in class was the reward.



A NEW PROJECT Gary Goodyear opted to change to a BMW Z3M for this season. It's been in his ownership for a couple of years but only over the winter did it get converted to race specification. Valve timing, the ECU and brake vibrations have all been cause for concern, but it's still early days.

challenging Sturges on the last lap.

Dave Griffin converted a first-lap lead into a 51-second victory during the BMW-dominated Modern Classics race. Initial leader Kirk Armitage went off at the Vale early on, leaving Griffin well ahead of Gavin Dunn and Douglas Simmen/Roland Jones.

There was little to split William Hardy's Vauxhall Corsa and Nigel Tongue's Peugeot 306 in the initial stages of the Tin Tops race. But soon after the stops, Hardy was back in the pitlane retiring with a misfire, putting Tongue clear until his engine let go after 19 laps. Lee Williams could only look on in his Honda Civic Type R, as Tom Mensley's Renault Clio cut out, leaving him out on his own to take the victory. Peugeot 206 crew Colin and Steven Simpson settled in second, while Ryan Colvey's Clio ousted the Honda Integra of Russell Hird for third with three laps to go.

PETER SCHERER



Dave Griffin (34) didn't have challengers for long, eventually winning by over 50 seconds

JONES

TURBO TIN TOPS INDUCTED INTO CSCC LINE-UP



New series has attracted a diverse entry, with cars such as a Renault Megane on the grid

JONES

The Classic Sports Car Club has always been keen to bring new initiatives to club motorsport. Nowhere is that more evident than with its introduction of the new-for-2018 Turbo Tin Tops Series into an ever-growing portfolio.

"It's a natural evolution as there are less and less normally aspirated hot hatches about," said CSCC director David Smitheram. "We had some turbo versions in our other championships, so we decided that the time was right to launch this series. Our grids are about where we would expect [numbers to be] and it's encouraging that we have some newly built cars joining too. I expect and hope that this will grow."

At Silverstone, the 13-car grid was joined by the Smart 4Two Cup, and it was a 1.6-litre Mini Cooper S that dominated the 40-minute race. With experienced Mini racer Keith Issatt behind the wheel, the car qualified on pole, lapping some 1.5 seconds clear of second, and then

was never headed in the race. "It's a good series and although we are not the most powerful car on the grid, the Mini is so well suited to this," Issatt said. "We will continue to support the series as much as we can."

They did have a slight problem, however, when Joshua Fulbrook took over driving duties at the pitstops. "It had fuel starvation and didn't clear until the Hangar Straight," he explained. But team boss Kev Fulbrook feels that it's the preparation rather than power that provided their success. "It's no good having loads of power if you can't use it – we made sure we had good set-up and it handled well," he said.

Oliver Clarke's Ford Fiesta ST had hung on to Bob Hosier's second-placed SEAT Leon for most of the first half. But having damaged the rear of his car rejoining after his pitstop, he hunted down the Peugeot 208 GTI of Carl Chambers and got by with six laps remaining. Clarke was then

excluded for unsafe driving, handing second back to Chambers, with Hosier completing the podium. The Simon and John Mawdsley Volkswagen Golf GTI ousted Adam Chamberlain and Pete Edwards in the brakeless Vauxhall Astra for fifth on the road on lap 19. But Edwards did manage to hold on to finish next up.

As well as racing in the series, Edwards is also the sponsor through his Motorsport School. "This has always been a good club and we just happened to have a car that fit the regs to run in this series," he said. "It made sense that, to make it stronger and help bring new cars into it, we should back it as a sponsor too."

The consensus among the drivers tended to agree with the organisers, that this inaugural year, and stability in the regulations, will encourage others to prepare cars and join in too – if not this year then certainly in 2019.

PETER SCHERER



SILVERSTONE 750MC WEEKEND WINNERS

ARMED FORCES RACE CHALLENGE

Race 1 Will Ashmore (Honda Civic VTi)

Race 2 Ian Fletcher (Fletcher Hornet Mk4)

BERNIE'S V8/SRGT CHALLENGE/ CROSSLE RACING DRIVERS CLUB

Race 1 Steve Ough (Crossle 9S)

Race 2 Steve Ough (Crossle 9S)

BMW CAR CLUB RACING SERIES

Race 1 Luke Sedzikowski (E92 M3)

Race 2 Luke Sedzikowski (E92 M3)

CLIO 182 CHAMPIONSHIP

Race 1 Patrick Fletcher

Race 2 Ryan Polley

M3 CUP/330 CHALLENGE

Race 1 David Whitmore (E46 M3)

Race 2 Nick Williamson (E46 M3)

For full results visit:
www.750mc.co.uk

750MC's Clio 182 title race building into three-way bout

SILVERSTONE NATIONAL 750MC MAY 5

Patrick Fletcher and Ryan Polley took a Clio 182 victory apiece at Silverstone in the 750 Motor Club's meeting. But with Oulton Park winner Jack Kingsbury twice on the podium, the championship is developing into a three-way fight.

Reigning double champion Fletcher struck first on the National circuit, capitalising on a good start and the battles in his wake. Polley left himself with a lot to do, dropping from the front row to sixth on lap one and later admitting, "I need to learn to stop the wheels spinning."

He recovered well from the setback and, at the second attempt, passed Kingsbury for third at Becketts. This soon became second when Andrew Tibbs retired with power-steering failure in the closing stages.

Having improved his getaway in race two,

Polley looked comfortable out front until a patch of fluid spilled by Simon Harrison forced him wide, allowing Fletcher through. But Polley drew back alongside exiting Luffield on the penultimate lap, ultimately taking the lead and victory.

Kingsbury recovered to third, ahead of Tibbs and Simon Donoghue. Don de Graaff was sixth for a second time, coming from the back of the grid in race one after crank-sensor failure put him out of qualifying.

Points for the Armed Forces Race Challenge may be awarded on performance index, but there were still furious scraps at the front of the field. Regular winner Darren Berris has moved on – having further modified his V8 Westfield – leaving the competition wide open.

Farard Darver led a five-car lead group in his BMW E46 M3 initially, with Chris Camp picking his way through them in his Nissan Skyline. Camp eventually outbraked Darver for the lead at Brooklands. Will Ashmore

soon followed Camp through at Copse, taking the lead at Brooklands with just over a lap to go.

"That was completely unexpected, I didn't think the car had the legs for this circuit," said the Honda Civic driver after his win. Camp, whose car developed fuel-surge issues, lost out to Ian Fletcher's Hornet, with Darver just off the podium.

In race two, Darver again led for the first half, but a gravelly excursion at Luffield at the mid-point allowed Ashmore through. The Civic held off the rasping Suzuki V-Twin-engined Hornet until the exit of Copse on the penultimate lap, with Fletcher "relying on other people's mistakes" to take the win. Darver was third, ahead of Mark Inman's supercharged Vauxhall VX220.

The BMW Car Club Racing Series entry boasted 32 cars, including Luke Sedzikowski's invitation class E92 M3. Sedzikowski twice won on the road, with the first victory coming after a very slow start. Mike Cutt also scored an outright podium double in his E36, but registered E46 driver Gary Hufford split them in the earlier race to claim the spoils. Michael Vitulli, who spun to the back of the first race after second-corner contact, later wrestled his E46 through from row five to claim the series win, passing Richard Marsh at Copse on lap 10.

The M3 Cup produced two new winners in David Whitmore and Nick Williamson. Both led from lights to flag, but Williamson faced stiffer competition, having to fend off three cars to triumph in race two. Matt Maxted did the double in the concurrent 330 Challenge.

IAN SOWMAN



Martin extends Scottish FF1600 winning streak



KNOCKHILL
SMRC
MAY 6

Ross Martin continued his domination of the Scottish Formula Ford 1600 season thanks to another victory. But he was made to work hard by an array of British Racing & Sports Car Club National interlopers at Knockhill's first reverse-layout meeting of the year.

Martin shared the overall wins with Matt

Round-Garrido as the pair proved the class of the field all weekend. In completing his second Scottish-points clean sweep of the year, Martin extended his series lead over full-season challenger Jordan Gronkowski to 55 as National guest drivers were ineligible for points.

Separated by just 0.002 seconds after qualifying, Martin's Ray and Round-Garrido's Medina Sport battled doggedly during race one. But the Kevin Mills Racing Spectrums of Hugo Bentley-Ellis and

Michael Eastwell soon joined them to create an epic four-way lead battle.

Bentley-Ellis took second off Round-Garrido with an audacious lunge under braking for the Hairpin and harried Martin to the line, just losing out by 0.5s.

Round-Garrido got revenge in race two, slipstreaming past Martin on the third lap and racing clear to claim victory. Bentley-Ellis used all his karting skills to dummy his way past Martin into the Hairpin, but lost second place on countback after Gary Sykes's

First Combe Saloon success of the season for Prebble

CASTLE COMBE
CCRC
MAY 7

Gary Prebble overcame the fast-starting James Winter to take his first outright victory of the season in the Castle Combe Saloon Car Championship.

Winter led for the first two laps in his Renault Megane, before Prebble sliced through on the inside at Camp in his SEAT Leon Cupra. Easter Monday winner Simon Thornton-Norris followed but made a couple of mistakes over the remainder of the race and could not match the SEAT, but won Class B.

Prebble's younger brother Adam briefly made it to third on his first outing in a Vauxhall Astra before the temperature gauge rocketed, leaving a misfiring

Winter to fend off Charles Hyde-Andrews-Bird (out for the first time in his father's Nissan 200SX) for the final podium position until the problem became too much and he dropped back. Alex Kite had made it a three-way fight until his Audi TT's clutch master cylinder failed.

Craig Dolby dominated the Combe GT race, taking Nigel Mustill's ex-Dutch Supercar Volvo S60 to victory by 15 seconds. Oliver Bull was best of the regulars, finishing runner-up in his Vauxhall Tigra, although Andy Southcott got so close in his MG Midget that he didn't see the chequered flag. With Southcott defeating Tony Bennett's Caterham in their class, Ilsa Cox took the lead of the championship by winning hers.

Luke Cooper was allowed to escape in the Combe Formula Ford 1600 race to record a



third successive victory in his Swift SC16, with Josh Fisher's Van Diemen passed by David Vivian's Spectrum on the opening lap to hit his hopes. Fisher took second back at the Esses on lap four, a corner that was the scene on the final tour of Fisher's younger sibling Felix spinning his Ray as he mounted a last-lap attack on his brother, Vivian's car having expired. The 2006 champion, Matt Rivett (Ray GR10), was promoted to his first Combe podium in nine years.

Driving their Ginetta GT4 for the first time, Simon and Lucky Khera took the Dave Allan Trophy mini-enduro, run in memory of the Synchro Motorsport co-founder. Fittingly, the Synchro Honda Civic of Dan

stricken Ray caused a final-lap red flag.

Cliff Dempsey Racing's Jamie Thorburn and Nico Gruber opted to keep out of trouble via pitlane starts, while Jack Wolfenden cracked a sump over a kerb in qualifying to rule him out of all three races.

John Duncan catapulted himself to the top of the Scottish Mini Cooper Cup table after a near-perfect weekend. Running fourth for most of the opening race, Duncan made the most of a safety car and on the restart made assertive moves on Dominic Wheatley and Michael Weddell into Clark's to take second behind winner David Sleigh.

The positions were reversed in race two after Sleigh bogged down off pole. Duncan started the reversed-grid final race fifth but wasted little time in making it to the front. He beat Ian Munro and Sleigh to the line, with Craig Blake backing up his race-two podium by taking fourth.

Scottish Legends veteran Ivor Greenwood scored his first victory of the season by beating Jordan Hodgson in a frantic final. The Northern Irishman seized the lead from early leader Steven McGill exiting the Hairpin, opening a healthy margin despite Duncan Vincent's scary brake failure-induced crash bringing out the safety car. Race-one winner Dave Hunter's hopes were dashed when contact with Colin McNeil and race-two victor John Paterson sent all three into retirement.

A serious crash for Ron Cumming (Nemesis Kit Car) and a further incident involving Mark Dawson's SEAT Leon Supercopa and Colin Simpson's Marcos Mantis limited running in the opening



Scottish Sports & Saloons race. Dawson and Simpson emerged unscathed, while Cumming was treated at the medical centre. Robert Drummond (Escort Cosworth) and Andrew Morrison (SEAT TCR) took subdued victories as Oliver Mortimer remained unbeaten in the R53 Class.

John Kinmond's Rover 3500 took honours in the first Classic Sports & Saloons race, but was later stopped by gearbox issues, Andrew Graham profiting in his Triumph TR8.

STEPHEN BRUNSDON



Wheeler took second, the younger sister car having led earlier but suffered suspension issues, with Alyn James eventually finishing a lap down. The unrelated Martin James retired his Civic with oil-temperature concerns after inheriting the lead from Endaf Owens, who crashed his SEAT Leon at Quarry when wrong-footed by traffic.

Polesitter Greg Jenkins bogged down at the start of the Super Mighty Minis opener, but retrieved the lead from Connor O'Brien before the first lap was out. He held on until the charging Alex Comis grabbed the initiative at Quarry on lap 10, before reasserting his authority on proceedings. Comis finished second, with O'Brien



snatching third from new championship leader Jo Polley on the final lap.

Comis went one better in the second race, taking the lead for the second time at Quarry on the final lap. Jenkins lost out, having climbed from eighth on the reversed grid, while Polley claimed the final podium spot.

James Ramm's Jaguar Saloon and GT qualifying session was truncated by a fuel blockage, but he climbed through the field to win by over 30s in his XJS, aided when erstwhile leader Alasdair Macgregor lost control of his X300 at Tower and connected with the barriers.

IAN SOWMAN

WEEKEND WINNERS

KNOCKHILL

CELTIC SPEED MINI COOPER CUP

Race 1 David Sleigh

Race 2 John Duncan

Race 3 John Duncan

SCOTTISH CLASSIC SPORTS & SALOONS

Race 1 John Kinmond (Rover 3500)

Race 2 Andrew Graham (Triumph TR8)

SCOTTISH FORMULA FORD 1600

Race 1 Ross Martin (Ray GR17)

Race 2 Matt Round-Garrido (Medina Sport JL17)

SCOTTISH LEGENDS CHAMPIONSHIP

Heat 1 Dave Hunter

Heat 2 John Paterson

Final Ivor Greenwood

SCOTTISH SPORTS & SALOONS

CHAMPIONSHIP

Race 1 Robert Drummond (Ford Escort Cosworth)

Race 2 Andrew Morrison (SEAT Cupra TCR)

SMTA FIESTA, HOT HATCH

CHAMPIONSHIP/SCOTTISH BMWs

Race 1 Wayne MacCaulay (Fiesta ST)

Race 2 Wayne MacCaulay (Fiesta ST)

For full results visit:

www.smart-timing.co.uk

CASTLE COMBE

CASTLE COMBE FF1600

Luke Cooper (Swift SC16)

CASTLE COMBE GT

Craig Dolby (Volvo S60)

CASTLE COMBE HOT HATCH

Chris Southcott (Peugeot 205 GTI)

CASTLE COMBE SALOONS

Gary Prebble (SEAT Leon Cupra)

DAVE ALLAN TROPHY

Simon Singh Khara/Lucky Khara (Ginetta GT4)

JAGUAR SALOON & GT CHAMPIONSHIP

James Ramm (XJS)

MIGHTY MINI CHAMPIONSHIP

Race 1 Greg Jenkins (Super Mighty Mini)

Race 2 Alex Comis (Super Mighty Mini)

TRACK ATTACK RACING CLUB

Race 1 Will di Claudio (Peugeot 106 GTI)

Race 2 Will di Claudio (Peugeot 106 GTI)

For full results visit:

tsl-timing.com



HAVE-A-GO HERO

WHEN DRIVERS CROP UP IN UNEXPECTED PLACES

MARCO
ANDRETTI*Nineteen-year-old IndyCar sensation gets
a (slightly sour) taste of Formula 1*

JAMES NEWBOLD



The winter of 2006-07 was a fascinating period for Formula 1. Five years after announcing his sabbatical, Mika Hakkinen returned to test for McLaren at Barcelona. Meanwhile, at Jerez, a 19-year-old Marco Andretti became the third generation of his family to drive an F1 car – the Honda RA106 that Jensen Button had taken to victory in the '06 Hungarian Grand Prix.

Andretti felt he had “overdelivered” in his rookie year in IndyCar, winning at Sonoma for his father’s Andretti Green concern and coming within 0.0635 seconds of victory at the Indianapolis 500, where Sam Hornish Jr denied him at the line. With Honda engines powering his charge and the manufacturer’s sporting director Gil de Ferran pulling the strings, Andretti describes the tie-up as “organic”.

“The bigger eye-opener for me wasn’t just driving the car; in the wet I remember those cars having way more grip than my brain could understand,” he recalls. “That was so fun because you had to train your brain to believe that it was going to stick.”

“Obviously there was a ton of aero on those cars, but the toughest part was getting all the steering-wheel stuff – that’s the last

tenth-and-a-half, two-tenths, I think.”

After his father Michael’s unhappy spell with McLaren in 1993, Andretti felt he had a point to prove. But when his new-tyre runs were compromised, he came away disappointed to learn the gamesmanship had not changed in the intervening years.

“I had some unfortunate things that politically happened to me with the new tyres – all of a sudden, I’m in the car that’s going to test these wheel weights and, oh, the wheel weights are eight tenths slower,” he says. “It was little things like that that don’t give you an awesome taste in your mouth after. You want to be able to have fun in your job and when there are games being played, you just can’t.”

“When you look at the outright pace, it’s obviously not very impressive, but my long-run pace was bang on and the

**“IN THE WET I
REMEMBER THOSE
CARS HAD WAY MORE
GRIP THAN MY BRAIN
COULD UNDERSTAND”**

STAT
204

Andretti's number
of IndyCar starts
to date



DUNBAR
LAT IMAGES

wet pace was pretty awesome."

Andretti admits that F1 "was something that I really aspired for and wanted at the time", but would he like another go? "Oh, 100%. Any driver who doesn't want to drive an F1 car, I don't know if you could call them a driver..."



Grandad Mario
has seen it
all before...

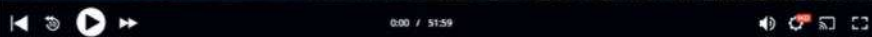
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HIGHLIGHT OF THE WEEK

GR TOYOTA GAZOO Racing

BUILDING A TEAM



TOYOTA WRC: BUILDING A TEAM

This 52-minute documentary takes us behind the scenes of Toyota GAZOO Racing boss Tommi Makinen's Finnish-based outfit over the 500 days leading up to the Japanese manufacturer's return to World Rally Championship competition after an 18-year hiatus. Go to <http://bit.ly/TGR-Doc>

THIS WEEKEND'S EVENTS

INTERNATIONAL MOTORSPORT

SPANISH GRAND PRIX

Formula 1 World Championship

Rd 5/21

Barcelona, Spain

May 13

TV Live Sky Sports

F1, Sunday 1230.

Radio BBC Radio 5

Live, Sunday 1400.

Highlights Channel 4,

Sunday 1800

Formula 2

Rd 3/12

Barcelona, Spain

May 12-13

TV Live Sky Sports

F1, Saturday 0910,

Sunday 1025

GP3 Series

Rd 1/9

Barcelona, Spain

May 12-13

TV Live Sky Sports

F1, Saturday 0910,

Sunday 0920

Porsche Supercup

Rd 1/9

Barcelona, Spain

May 13

IndyCar Series

Rd 5/16

Indianapolis,

Indiana, USA

May 12

TV Live BT Sport

ESPN, Saturday 2030

Indy Lights

Rd 3/10

Indianapolis,

Indiana, USA

May 11-12

European Formula 3

Rd 1/10

Pau, France

May 12-13

TV Live BT Sport 1,

Saturday 1000,

Sunday 1000

Formula Renault

NEC

Rd 1/6

Pau, France

May 12-13

Nurburgring

24 Hours

Nurburgring, Germany

May 12-13

World Touring Car

Cup

Rd 3/10

Nurburgring, Germany

May 11-12

TV Live Eurosport 2,

Friday 1730. Eurosport

1, Saturday 1100

European

Le Mans Series

Rd 2/6

Monza, Italy

May 13

TV Delayed

Motorsport.tv,

Sunday 1705

Super Formula

Rd 2/7

Autopolis, Japan

May 13

World Rallycross

Rd 3/12

Mettet, Belgium

May 12-13

NASCAR Cup

Rd 12/36

Kansas Speedway,

USA

May 12

TV Live Premier

Sports, Sunday 0030

Brands Hatch BARC

May 12-13

2CV, Racing Fords,

BARC Saloons/Classic

VWs, Tin Tops,

Clubmans, Junior

Saloons, Renault

Clios, Honda VTEC,

Modified Saloons,

Intermarque

Silverstone BARC

May 12-13

Britcar, Open Sports,

Kumho BMW, Karts,

Caterham Graduates,

Classic FF1600

Knockhill BRSCC

May 12-13

TCR, FF1600, Porsche,

Caterham Seven 420R,

Caterham Seven 310R,

Caterham Seven 270R,

Caterham Roadsport,

Mazda MX-5

Bishops Cleeve BARC

May 12-13

Formula Vee, Formula

Libre, Stryker

Sportscar, SEAT,

Historic Racing Cars,

Future Classics,

Ford Fiesta Zetec,

Fiesta ST, Supercars

UK MOTORSPORT

Rockingham BARC

May 11-13

Citroen C1 24 Hours,

Pickups

Oulton Park MSVR

May 12

Welsh Sports/Saloons,

Jaguar XK, Pre-'66

Jaguars, Equipe GTS,

Equipe Pre-'63, AMOC

GT, Intermarque, '50s

Sports and XK

Snetterton MSVR

May 12-13

Mini Festival: Mini

Challenge, Mini

Se7en, Mini Miglia,

Monoposto, Radical

SR1, Trackday

Championship,

Trackday Trophy



FROM THE ARCHIVE

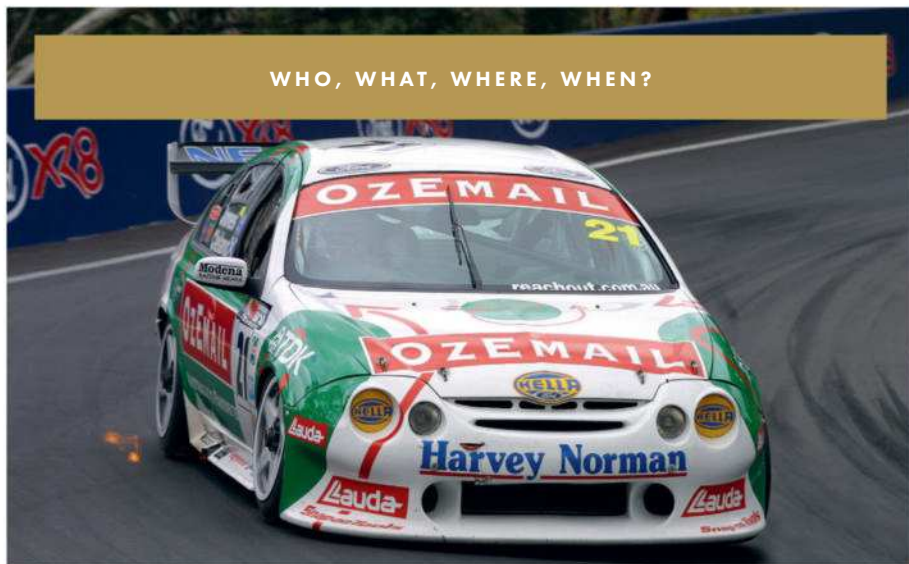
The JW Automotive Porsche 917Ks of Derek Bell, Richard Attwood and Gijs van Lennep are prepped in the Watkins Glen pitlane ahead of round four of the 1971 Can-Am Challenge Cup, the day after they had contested the world sportscar encounter at the same venue. The drivers finished 11th, 13th and ninth respectively in a race won by Peter Revson in a McLaren-Chevrolet M8F.



TEST YOUR KNOWLEDGE

QUIZ

WHO, WHAT, WHERE, WHEN?



WHO IS THIS?

This hot dog came from strong racing stock, but was the equal of what came before him.

After helping to show the potential of the people's car, he used a cross-border jamboree as a springboard to greater things.

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He was set for the biggest prize when he made a high-profile error, but he would have his day when a three-pointed star sprung a huge surprise and caught the rest off-guard. His performances led to him trying out the precursor to an all-conquering beast, but it went no further.

Never happier than when in the presence of Queen Mary, his powers withered as he battled his demons. After calling time as a Pro, he returned to his favouring hunting ground to win as an improbable Am.

ON THIS DAY

1 Today is Nick Heidfeld's birthday. Across his F1 and Formula E careers, how many podiums has he scored without a win?

2 Which superstar made his F1 debut on this day in the 1970 Monaco GP?

3 Which future NASCAR Cup champion claimed his first win on this day in 1975 at Nashville?

4 It's Helio Castroneves's birthday today. In which year did the four-time IndyCar Series runner-up come closest to the title?

5 Who took the first F1 pole for Cooper on this day in 1959?

NAME THE HELMET



LAST WEEK'S ANSWERS

Who, what, where, when Valentino Rossi/Carlo Cassina, Ford Focus WRC, Rally GB, December 5-7 2008.

Who is this? Roberto Guerrero. **On this day** 1) Michele Alboreto. 2) 5th. 3) Zakspeed. 4) Ken Tyrrell. 5) Keke Rosberg.

Name the helmet Bruno Giacomelli.

IN NEXT WEEK'S ISSUE



**F1 BACK IN EUROPE:
SPANISH GP ACTION**

HONE
LAT IMAGES

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UK +44 (0) 344 848 8817 **Overseas** +44 (0) 1604 251451
Email help@asm.secureorder.co.uk **Back issues** 0344 8488817
Laura Paterson +44 (0) 20 3405 8129

Autosport, ISSN number 0269946X, is published weekly by Autosport Media UK Ltd, 1 Eton Street, Richmond, TW9 1AG, United Kingdom. Airfreight and mailing in the USA by agent named Air Business Ltd, c/o Worldnet Shipping Inc., 156-15, 146th Avenue, 2nd Floor, Jamaica, NY 11434, USA. Periodicals postage paid at Jamaica NY 11431. Subscription records are maintained at Autosport Media UK Ltd, 1 Eton Street, Richmond, TW9 1AG. Air Business Ltd is acting as our mailing agent.

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Seymour Distribution Ltd,
2 East Poultry Avenue,
London, EC1A 9PT.
Tel: +44 (0) 20 7429 4000.
Printed by William Gibbons
& Sons Ltd, 28 Planetary
Road, Willenhall,
Wolverhampton WV13 3XT.
ISSN 0269-946X. Autosport
is published weekly by
Autosport Media UK Ltd,
1 Eton Street, Richmond,
TW9 1AG.

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It's all about you



RACING'S TOUGHEST CHALLENGE?

G

uinness World Records credits Proust's *In Search of Lost Time* with being the world's longest novel at 9,609,000 characters, albeit only because it doesn't recognise that

well-known book of racing driver excuses. We've heard them all down the years; from traffic in qualifying, to a lack of temperature in the brakes and a mysterious loss of 'feeling', there are few that haven't been tried in the vain hope of avoiding a stern dressing down from their team boss.

Racing driver excuses are alive and well in Formula E too, but they can at least fall back on the rationale that you have to go a long way to find a more technically complex racing series out there.

As Scott Mitchell brilliantly explains in his swansong as Autosport's Formula E correspondent on page 12, the multitude of factors that drivers have to juggle at once – giving energy readouts to the engineers, managing the brake balance and adapting to changeable grip levels – all while racing between concrete walls and with very little time to prepare, makes it a unique challenge with a knack for catching out the very best.

You don't have to look back very far to a point when it seemed inconceivable that

Sebastien Buemi would not go down in history as FE's first double champion, but the Swiss paid a high price for his 2017 Montreal free-practice shunt that left insufficient time to rebuild the car for it to be weighed, resulting in his exclusion from race one.

Talk is gathering momentum that FE needs to spice up the action next season when mid-race car swaps are rendered unnecessary by the improved range of the battery, but if the new car is anything like as difficult to master as the current one, then we should be in for a real treat.

Among others, one of the traits that has made Formula E a success is its lack of reliance on aerodynamics, a point Lucas di Grassi raises in his second column for Engineering on page 11. And if you're left in any doubt about the impact it has had on motorsport, then look no further than

Alex Kalinauckas's interview with Peter Wright on page 34 to see what the pioneer of ground-effect has to say for himself...



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MANUFACTURING IMPORTANCE

MTA report highlights the real contribution of manufacturing to UK economy

The manufacturing sector accounts for almost a quarter of the UK's economy, more than double the figure that is routinely quoted, according to a recent report commissioned by the Manufacturing Trade Association (MTA).

Entitled 'The True Impact of UK Manufacturing', the report was compiled by forecasting expert Oxford Economics and states that 23% of the UK GDP and over 7million jobs are dependent on the UK's manufacturing economy.

In addition to considering businesses that are traditionally considered as manufacturers – which equates to 9% of GDP and 2.6million jobs – the

report also includes the indirect effect of supply chains that serve manufacturing businesses and the induced effect of the spending by people employed directly and indirectly in manufacturing.

Research also found that the sector contributes 43% of UK exports and that another 1.8 jobs are supported for every direct job within the sector.

James Selka, CEO of the MTA, said: "This report clearly demonstrates that anyone who says that manufacturing doesn't matter much to the UK's economy is badly mistaken. The figures that people often quote setting manufacturing alongside the service sector miss the point that a huge part of

the service sector – from logistics to research to catering – serves manufacturing. The impact is felt far outside factory gates in offices, laboratories, shops and warehouses right across the country.

"Manufacturing creates a wealth that is irreplaceable and we need to make sure that government policies promote and grow it."

The figures were released at the MTA's flagship industrial event, the MACH Exhibition, which was attended by over 500 exhibitors including Jaguar Land Rover, Formula E title sponsor ABB Group and Haas Automation UK, the Norwich-based arm of Haas F1 boss Gene Haas' machine tool empire.

WILLIAMS BATTERIES RECOGNISED WITH AWARD

Williams Advanced Engineering might have lost the Formula E battery tender to McLaren Applied Technologies for season five, but the company's contribution to the championship has earned it the coveted Queen's Award for Enterprise in Innovation.

WAE has designed, developed and delivered the batteries for every Formula E car since the championship began in 2014, and has adapted the technologies involved in racing for various applications, including Airbus's Zephyr drone,

the NETfficient energy storage system for homes and its lightweight EV concept, the FW-EVX.

The battery was the first lithium-ion device to pass stringent FIA crash testing regulations and was required to last two full seasons.

"We are honoured to have been recognised by Her Majesty with this award for the industry-leading work of Williams Advanced Engineering in delivering a world first that will light the way for future sustainable transport," said managing director Craig Wilson.





MECACHROME EXPLORES LMP1 HYBRID EXPANSION

French engine builder Mecachrome wants to supply manufacturer and private LMP1 teams with hybrid powertrains to compete on an even keel with Toyota in the World Endurance Championship.

Mecachrome, which powers the Ginetta G60-LT-P1s due to be run by Manor in the WEC, has developed a hybrid-powered motor yacht in partnership with ENATA Marine and believes the technology can be adopted for motorsport applications. It has an eye on the 2020/21 LMP1 regulations, which will be announced at Le Mans.

“Mecachrome’s expertise with hybrid systems

would allow us to work with manufacturers, who might not have the facilities to produce their own hybrid powertrains, but would be open to a potential partnership for its implementation,” said Mecachrome Motorsport director Bruno Engelric.

“Our other objective with hybrid technology is to make it accessible for privateer teams. Currently there is no option for teams with smaller budgets in the hybrid market and Mecachrome wants to work on producing a package that is affordable and also offers worthwhile performance advantages.”



ALL-ELECTRIC AUDI GETS FE RACE TAXI OUTINGS

Audi publicly showcased its futuristic e-tron Vision Gran Turismo at the Rome and Paris Formula E rounds, with three-time Le Mans winner Rinaldo Capello on chauffeuring duties.

The electric concept car was originally developed for virtual races on the popular PlayStation game, but has been brought to life in the space of 11 months as a prototype model. It will reprise race taxi duties at the Berlin and Zurich rounds of the Formula E championship.

“Although the design of a virtual vehicle allows much greater freedom and the creation of concepts that are only hard to implement in reality, we did not want to put a purely fictitious concept on wheels,” said Audi chief designer Marc Lichte. “Our aim was a fully functional car. The Audi e-tron Vision Gran Turismo shows that electric mobility at Audi is very emotive.”

Powered by three electric motors, each with an output of 200kW, the four-wheel-drive machine pays homage with its livery to the Audi 90 quattro that Hans Stuck and Walter Rohl took to seven IMSA GTO wins in 1989.

Among the passengers in Rome were Formula E CEO Alejandro Agag and Audi CEO Rupert Stadler.

WATKINS SCHOLARSHIP WINNER ANNOUNCED

Dr Naomi Deakin has won the 2018 Watkins Scholarship, which offers a one-year funded research position with the Global Institute for Motorsport Safety, the FIA’s research partner.

Deakin, a clinical research associate in the Department of Neurosurgery at the University of Cambridge, is the first doctor to be awarded the prize in its three-year history. Previous winners Sameer Patel and Nikil Abraham were both engineers.

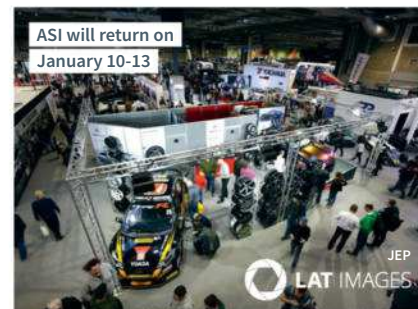
Deakin has extensive experience of motorsport medicine, having been involved in research at Silverstone since 2012 and worked as part of the TOCA Safety Team at British Touring Car Championship meetings last year.

She hopes the Scholarship will improve understanding about the threshold value for concussions, an area about which comparatively little is known.

Deakin said: “What this project will hopefully achieve is to help provide insight into that engineering data and link it to the medical data that we collect.”



IN BRIEF



ASI TICKET SALE DATE

Pre-sale tickets for the 2019 Autosport International show will be available from June 18. The show, which has been held every year since 1991, will retain its customary pre-season slot at the Birmingham NEC from January 10-13.

FORMULA STUDENT TO INTRODUCE AI CATEGORY

The annual Formula Student challenge for teams of university students will expand to include a new driverless category this year, providing students with experience of integrated electronics, software and systems engineering. Teams will design a cost-effective software package to enable an Artificial Intelligence (AI) car to make decisions and evolve to improve its performance. A total of 130 teams from over 30 countries have signed up for the event at Silverstone on July 13-15.

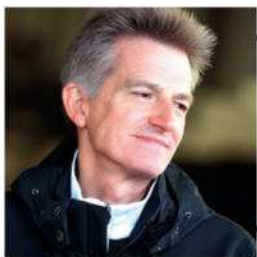
NEW V2V APPLICATION TESTED ON TRACK

Fledgling single-seater manufacturer Griip has tested what it claims to be the world’s first motorsport Vehicle-to-Vehicle (V2V) application on a race track. The technology was developed by Autotalks, a global leader in V2X chipsets, and is intended to improve motorsport safety by alerting the driver with a flashing yellow light and buzzer sound when on-track hazards are detected.

‘MAC’ TILTON (1937-2018)

Tilton Engineering founder McLane ‘Mac’ Tilton died in April at the age of 80. Tilton is best known for producing the first carbon/carbon racing clutch used in Formula 1. It took its first win at Detroit in 1987 with Ayrton Senna’s Lotus. Tilton had been a crew chief for the 1971-72 Trans-Am class title-winning Brock Racing Enterprises outfit before starting up his own business specialising in driveline and braking components, which are widely used across all forms of motorsport.





EXPERT VIEW MARK WILLIAMS

WHY F1 DESIGNERS CAN'T BE BRAVE

The ex-McLaren Formula 1 engineer on why the current racers look so similar

As each new season arrives, many bemoan the fact that Formula 1 cars look the same, only distinguishable by their liveries. Is it because of the extremely prescriptive regulations, or is there more to it? The former has clearly been responsible for a general coalescence of aerodynamic trends but I believe the real reasons go deeper. In my opinion, F1 has an added dimension – risk management.

When I started in F1, sponsorship was dominated by tobacco advertising and the value of that increased as other avenues of exposure were removed one by one. Teams were awash with cash and it was ploughed into product. In the late 1990s, McLaren would make up to eight chassis per year. The race team had three complete cars and a chassis in a box; there were two cars for the test team, and one in paint. That's a lot of money just tied up in chassis. Now they are down to three. If you had a good idea and could justify it in terms of increased vehicle performance, it got made, no matter how extravagant the idea was. The test cars did more than double the race-car mileage. Now there are only two in-season tests and the race cars have to be used for those.

If you ever found yourself falling behind in terms of aerodynamic performance, you simply hired another windtunnel and a whole team to run it. We typically ran three shifts in our tunnel, simply to get through the volume of ideas we could generate. F1 was an arms race and your budget would dictate your pace.

When tobacco advertising was banned at the end of 2006, budgets had to get realistic. Then in 2010 came the cost cap, Max Mosley's proposal to entice new squads and clip the spending of the grandee teams.

The most far-reaching change to come out

of this, and, in my opinion, have a significant effect on the way Formula 1 cars are designed, was the windtunnel cap. It limited the amount of time you could spend in the windtunnel and thereby the number of runs you could do in a day. On the basis that Computational Fluid Dynamics is used to filter parts before they go to the windtunnel, this was also capped. Teams could trade windtunnel hours against CFD usage.

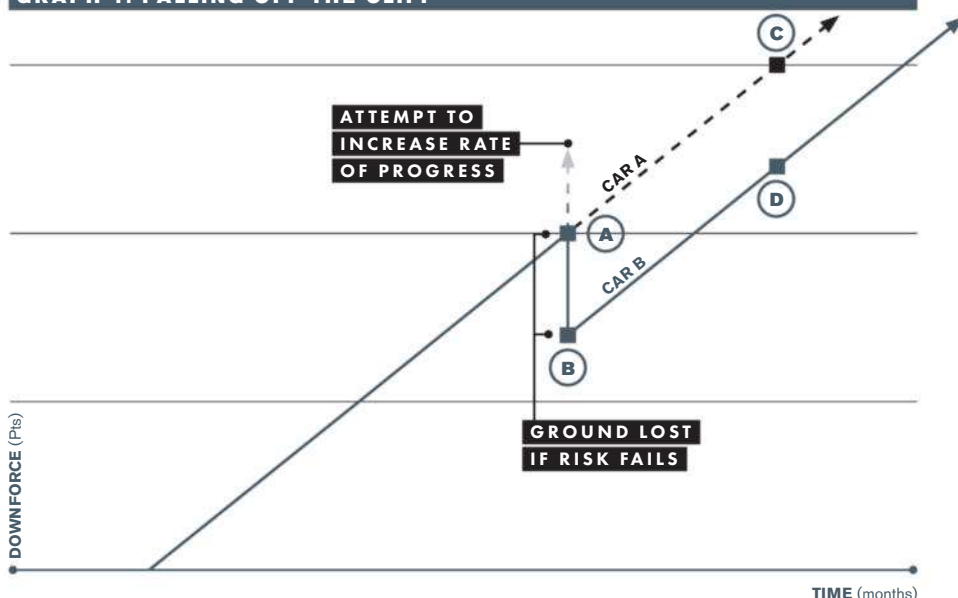
Now evolution rather than revolution became the way forward. Quite simply, if you got it wrong and slipped back in performance terms you couldn't catch back up again. Let me explain why.

Let us assume a typical average aero-development rate of two points per week during the season. Some will be slightly better and others worse. But let's say your closest competitors are doing this, so they



Current F1 cars look similar for a reason – and it's not as simple as you may think

GRAPH 1: FALLING OFF THE CLIFF





track up the development line shown (see graph 1). While aero development averages two points per week, there will be fluctuations based on how well you generate new ideas. You can only dip into your new parts bin every few races, so aero performance will vary between the teams at each event – hence performance changes race by race – and this makes the racing interesting for the viewers. I’ve shown it as a straight line for simplicity.

So one day, while trawling through your post-GP ‘spy photos’, you decide you like the look of another team’s aero-development direction and test a few of these ideas in CFD, a few parts in the windtunnel, and they look promising. So now you start to develop a whole new car concept. But what if that new concept fails to deliver when you finally put all the bits together? What if your new car has significantly less downforce than your old car? ►





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Well, you drop from point A to point B. Horrors of horrors. Now, do you carry on developing this awful car, hoping to find the error of your ways, or do you cut your losses and run the old car? A similar dilemma was faced by McLaren in 2013.

If you don't find the problem, you track from B to D – instead of C – and remain underperforming all season. You can't increase your aero return beyond two points per week, as your resource has limited you to that rate of development. Ouch. So the moral of the story is evolution rather than revolution. It's akin to playing 'Snakes and Ladders' without any ladders. Just make sure you avoid the snakes.

The only other way out of such a nightmare is a rule change. Graph 2 shows a hypothetical circuit safety limit set in

terms of a downforce cap. There are other factors you can tune to limit performance – power and tyres – but for the moment let's just consider downforce.

Capping absolute downforce is one way to prevent the cars exceeding the safety limit of the circuits and a lot easier than redesigning tracks or moving the spectators further away. That's why every few years the aero rules are normally rewritten to reduce aero performance.

This is when evolution is rarely an option and a new concept is called for. It's also a great opportunity to stop developing the current car and focus on the new one, which can give you a head start on your rivals and perhaps help you close any deficit.

But the people most likely to do this are those with current performance in hand –

they can still race competitively and get ahead on the new car. The team that fell off the cliff, desperate to get better results in the current championship, often can't bring itself to switch development to the new car, so falls further behind for the new season.

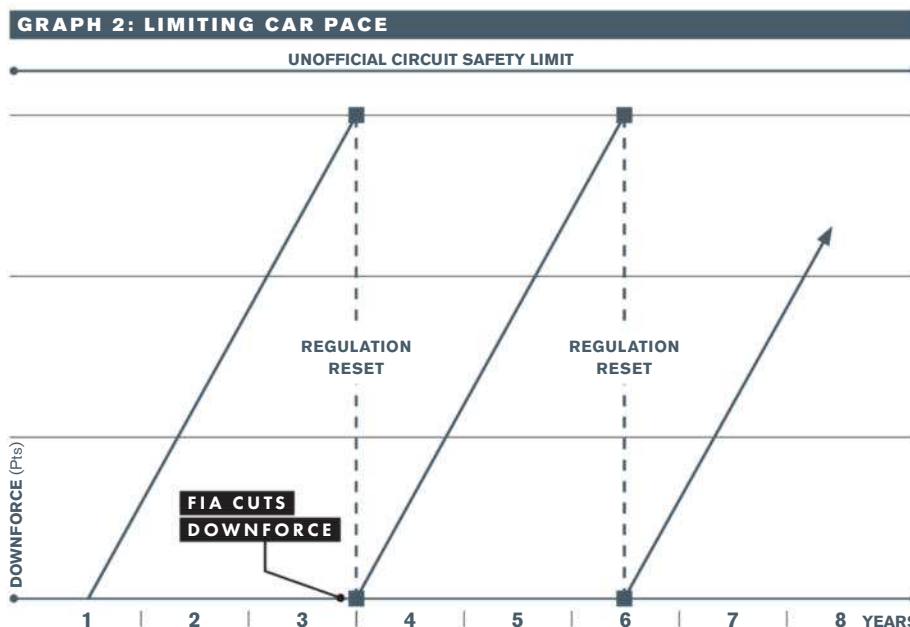
To avoid falling off the cliff, it is better to concentrate on making sure you always get those two points per week, never 1.8.

Don't try and make that big jump – unless you find a loophole in the rules, such as the double diffuser in 2009. But it's not going to happen now – the rules and knowledge of F1 teams mean that there are fewer loopholes than before. When nobody had optimised their development – and it was more hit and miss – you could afford to take a chance, and the rewards were bigger when you could come up with something such as ground-effect.

What you *may* be able to do is to make the progress slightly steeper – perhaps 2.1 points per week – by being efficient and improving your ideas generation. Adrian Newey realises this. He is very good at making sure the in-season development is always to target, always striving for a little more. That's how Red Bull made such progress last season.

If you pull enough ahead of the opposition, that can buy you a little time to try something different. But that is rare and is a luxury that only a top team can afford.

It's now got to the point where it's the same in-season development rate whatever the regulations, although a rule change gives greater scope for improvement during the off-season. But again, the bigger/leading teams tend to benefit, so the best thing to do to get the field to close up is to leave the aero regulations the same for as long as possible. Until the cars get too fast, of course. One thing you can guarantee is that aerodynamic development, while regulated, continues relentlessly and always will. ■





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DRIVING CHANGE LUCAS DI GRASSI

FINDING THE COST CAP HOLY GRAIL

A cost cap in the region of \$150million could be part of Liberty's post-2020 vision for Formula 1, but such a move might prove difficult to police

When it comes to things like cost caps, for me, they never work. This is because it is impossible to police what each team is spending. Instead, it is vital to come up

with clever, creative solutions that allow technical development alongside marginal pace gains. And this only applies for all professional motorsport that needs OEMs to develop commercial technologies – so not Formula 2, Formula 3 or categories such as TCR – but Formula 1, LMP1, Formula E and WRC/WRX.

For a professional motorsport championship to work, three pillars must be balanced: overall cost, entertainment and technical development. If any of those pillars takes priority over the rest, the championship will fail in the long run.

You must keep a good balance between cost control, technical development and entertainment. Entertainment is the show – how you create an environment where the races are interesting, close and have

overtakes that are exciting for the public to watch. You need technical development to keep the manufacturers interested, and cost control so the marketing value for sponsors attached to a championship is enough to compensate for investment.

If you let technical development get too open then costs go high, and the differences between the teams increase, which means entertainment goes low and it's not sustainable. If technical development is tight, the entertainment goes up because cars are more equal, but in that case manufacturers lose interest because they cannot do what they want in terms of research and development. If you open up technical development and push entertainment high as well, then costs also go high and it doesn't work.

So, the big question is: how do you do it?

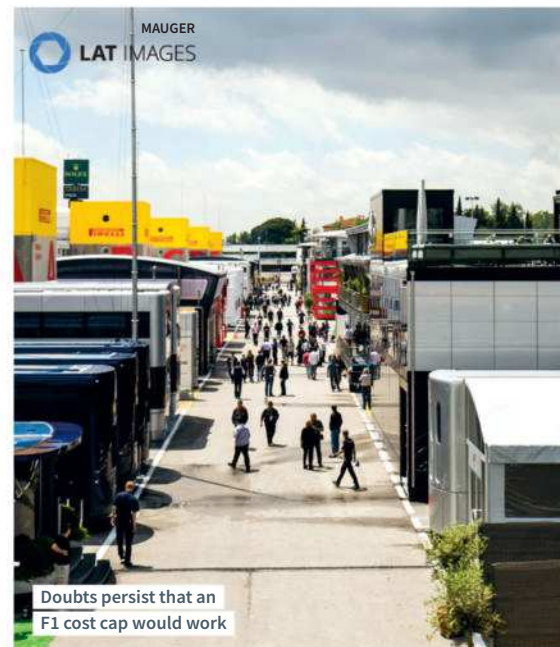
There are many ways of achieving it. One is to use sporting rules to overcome the technical gains. Second, is to tighten up development 'boxes' that give the right technical freedom but with only marginal performance gains.

For example, imagine in F1 if the first session of the weekend was qualifying, instead of FP1 – which would come later on. This would probably make the qualifying order more random than the current system, due to the fact that teams would have less time to optimise. With this scenario, you increase entertainment without touching technical rules and at the same time it makes the driver more relevant.

Another example would be in Formula E – if you said the battery technology is open and free, team budgets would explode into hundreds of millions and the difference between the cars would increase massively. Nobody wants that. But instead, if you say batteries are free but they must fit the same dimensions, have the same mass, energy and power output as current ones, the gains if somebody tried to develop their own would probably be marginal and the costs would stay in control.

The clear bad example is free aerodynamic development. We should never open aerodynamics rules in Formula E. It is totally commercially irrelevant and the more a team spends, normally the more they gain performance. But for what purpose? None really, apart for some engineering egos.

When it comes to the issue of control in motorsport, we need to find ways of opening up areas that are very relevant for the automotive industry, but at the same time these developments must have minimal impact on track performance. This is the holy grail of professional motorsport because you attend to the manufacturers' needs of having an R&D platform, but at the same time you keep the competitiveness between teams in such a way that a squad with a smaller budget also has the possibility of scoring a victory. ■



WHY FORMULA E IS SO HARD

The electric racing series has a justifiable claim to be the toughest out there for drivers and teams to master

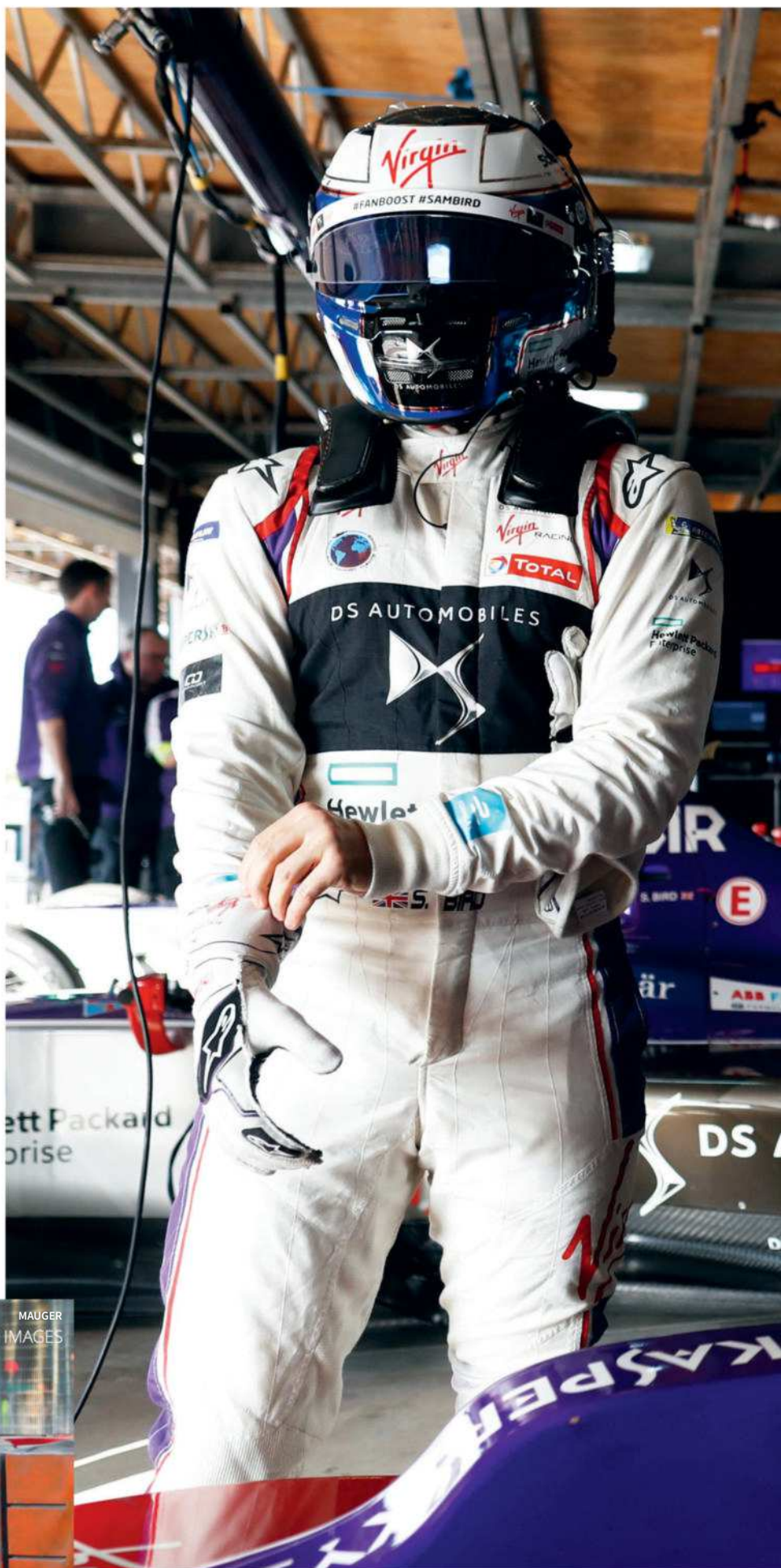
BY SCOTT MITCHELL

You would not say a GT3 car is slow as it blasted past you. You would not say a Formula Ford 1600 is easy to drive. You would not say Macau is a simple circuit. So why do some people feel compelled to consider Formula E anything other than one of the world's toughest categories?

The electric single-seater series has been defying critics and sceptics since its birth, and it is undeniably difficult. Anybody who has watched a race, or even half of one, will have noticed a top driver locking up, or spinning, or hitting the wall. Mistakes are commonplace, and it's not because the field is lacking talent.

"I haven't come across a championship as hard as this one," says championship challenger Sam Bird. "It's got everything. Try to name a championship with as high a level of driver – I can't. The engineering level is incredibly high. And OK, the cars aren't quick, but I don't think they need to be to give good-value-for-money racing on street circuits.

"I think we're giving some amazing racing. And it's such a high level, and super challenging. To extract the maximum out



Street racing ace Maro Engel gets it wrong in Santiago

MAUGER
LAT IMAGES

“I haven’t come across a championship as hard as this one”

Jerome d'Ambrosio
ponders how to make
up ground in Paris



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of this car all the time is extremely difficult. It's a tricky car to drive. To execute quick lap times compared to these other guys and only do it in a certain amount of power output, it's a tough skill."

The first-generation FE car is at the end of its lifespan, and will soon be ushered into retirement to make way for the 'Gen2' machine. That Batmobile-inspired racer will have huge shoes to fill when it comes along.

Even in FE's first season, when power levels were limited to 150kW in the race and 200kW in qualifying, the cars were dramatic. Certain circuits, particularly those with chicanes featuring high kerbs, proved punishing on the suspension of the SRT_01E, the inaugural spec car. This led to sudden failures, and drivers also complained about the feeling of the carbon brakes.

The suspension breaks were partly caused by higher-than-expected loads from the heavier-than-expected base chassis, which ended up at a whopping 888kg. The braking problem was because the speed of the car was too low for the quality of the brakes, which led to struggles to get them up to temperature. A heavy car with a lack of feel in the brakes was a recipe for mistakes.

Though the carbon brakes were refined thereafter, and the suspension was also beefed up, FE never got any easier.

The car's weight hasn't helped that. It's been trimmed slightly since its 888kg peak but only to 880kg, and it has a rearward weight distribution that, combined with the high torque from the all-electric powertrain, makes it tail-happy. FE has never relied heavily on aerodynamics, thanks to a combination of a low-powered car and tight street courses packed with slow corners. Though the aero does contribute something, it is far more aesthetic than in Formula 1 and other high-downforce categories. However, that benign aero has also helped facilitate close racing, and the car is far from on ▶

rails, particularly as FE races take place on bumpy, dirty, temporary circuits.

Ex-Honda F1 test driver-turned-Japanese racing ace James Rossiter has tested for the Techeetah and Venturi squads this season and came away with a renewed appreciation for the driving challenge. “The weight management on a bumpy circuit I found challenging and fun – the car moves around a bit, you’re in between walls, the kerbs can be taken at the apex,” he says. “With the bouncy track, the weight of the car and the lack of grip, if you go over the limit and the car starts sliding, it just carries on sliding.

“If you brake too late or carry too much speed, there’s nothing you can do as a driver to recover it. That’s what struck me most.

“It gives a huge respect for the drivers who are good at it. You have to be so strict with yourself, you have to be so controlled not to overdrive it, to be too greedy.”

A senior team figure once got his nose out of joint over the suggestion FE should trumpet more how difficult its cars are to drive. “We don’t want people to think electric cars are tough to drive,” was his logic. But the simple fact is that the electric element of FE offers a significant portion of the driving challenge.

“The car is not the quickest but it’s extremely difficult to drive,” says reigning FE champion Lucas di Grassi. “The level to get everything correct is very, very high. The car is changing all the time and you have to be really aware of the energy and regen.”

Di Grassi’s ‘regen’ comment refers to the energy harvesting that takes place between the powertrain and the battery. This is where energy can be recovered into the battery under deceleration by the driver manually activating a paddle or button, a software map that automatically engages the motor or a combination of the two.

Such a technique has two key impacts on driving an FE car quickly. First, it affects the braking performance. Bird tells a story from FE’s first season, when this process was at its most immature, of him spinning after braking in a straight line because the ratio was completely out. That is not very common, but regen can lead to braking problems, which is the second point.

Presently, when the battery hits 55C it starts to lose regen linearly until it reaches 60C. At this point, the system goes from

offering 100% energy harvesting to zero, usually over the course of three or four laps. While regen is active, it is the electric equivalent of engine braking. So, the brake bias is set more to the front to counter the stronger braking performance afforded by energy being recovered from the rear axle. Teams then have to factor in the changes that need to be made in brake bias to offset the subsequent reduction during a race stint.

“Your brake bias changes massively,” says Bird. “If the temperature has risen by one degree, you might be 5-10% out on your brake bias going into the next braking zone and you won’t even know – it’s that critical you’re on target every time in Formula E. When you lose regen, you have to turn the brake bias to the rear and do it quickly, otherwise the front locking will be severe.”

Word on the street is the new McLaren Applied Technologies battery for the second-generation car has ultra-impressive thermal degradation (for that read ‘very little indeed’). This could mean even more aggressive energy harvesting in the future





Rossiter was impressed after Techeetah test in Marrakech



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— especially if the series opts to allow energy recovery from the front axle, which is currently illegal. Conversely, a move to allow all-wheel drive — motors on each wheel — would facilitate torque vectoring. This would reduce the challenge, as adapting the power going to each wheel based on which phase of a corner the car is in would be an incredibly sophisticated driver aid.

The management involved in executing an FE race is complicated by the lack of data available. Energy consumption and harvesting numbers are not transmitted via telemetry during sessions, so drivers must relay this information to their engineers. This forms the crux of the strategy: how much can they push, do they need to save, when is regeneration likely to cease, are they marginal on temperature?

Season-two champion Sebastian Buemi calls it “one of the biggest challenges” and reckons the communication is “vital”. Patrick Coorey has engineered Bird, Adam Carroll and Nelson Piquet Jr across the DS Virgin and Jaguar teams. He says that the importance of feedback is amplified further by the lack of track time available thanks to FE’s (usual) single-day format of two practice sessions, qualifying and race.

“We have to draw conclusions and make the right decisions very, very quickly,” he says. “You’ve not got a lot of time to go away and spend hours analysing data.”

Bird’s current engineer at DS Virgin, Mike Lugg, offers a stark insight into how much conversation this can mean in FE: “Sometimes we might talk non-stop for an entire lap. There’s a lot to manage and he’s really good at that side of things, keeping

cool and calm, doing the driving on autopilot and being able to have conversations. We’re chatting about strategy, temperature management, things like that. There’s a lot of back and forth.”

Lugg reckons that one of Bird’s best attributes is that “when it comes to the crunch, you can rely on him” — and he knows the difference between relaying information and getting too involved.

“He’s happy that his job is the driving bit and he gives the feedback and leaves it to me to look into stuff,” says Lugg. “When he’s in the car, he’s quite decisive. When things do go wrong or things change, he’s good at immediately jumping on the new target he has to achieve.

“A lot of that comes from us spending a lot of time on the simulator and going through all possible scenarios, so he knows that if something happens, he does ‘this’.”

Bird says he has no trouble driving while on the radio because “the more information I can give and they can give me, I prefer it”.

“I don’t drive any slower if I’m on the radio, it doesn’t affect me,” he says. “In this championship you need to adapt, the steering wheel’s not straight very often. I want to know what the guy behind is like on energy, what his pace is like, if we think they’ll go a lap longer or shorter, if I need to look after temperatures — whatever I need to have a better race than I’m having.”

The single-day format poses two other challenges. First, as di Grassi notes, it tests the drivers much harder.

“If we stayed here for five days testing, drivers who take longer to find the limit would be closer,” he says. “But because we ►

have one hour of free practice and one lap in qualifying, either you find the limit without crashing or you're nowhere."

It also gives teams a tiny window of track time to engineer their cars. FE's early circuits were a bit samey, but variety has crept in since, with the now-absent Montreal and stellar Rome layouts offering cool gradient changes, Berlin Tempelhof providing completely different asphalt/concrete surface changes, and there is an

purser street tracks, this was something halfway between Tarmac and concrete. It's quite similar to Long Beach – big patches of this kind of concrete. The rear suspension is different across the powertrains so there could be some difference there and maybe also in the weight distribution."

Castillo also highlights how some venues, like Paris, can be "non-energy" circuits. This completely alters the teams' strategic preparations, the demands on the drivers

"Racing on a street circuit at high speed with walls everywhere is really tricky"

abundance of other challenges, such as the mega-bumpy and dusty Santiago track.

Last year's Berlin double-header is a fine example. Mahindra's ability to get the all-weather Michelin tyres – which are super-resistant and rarely show thermal degradation – to perform over the entire lap of the disused-airfield venue was key to Felix Rosenqvist's breakthrough 2016/17 win.

"The tyre deg [in Berlin] is high, the tyre heating is high, the tyre grip is high – higher than usual," Rosenqvist's engineer Andres Castillo notes. "Normally we're racing on

and the nature of the racing we see – as does the FIA's push to make the second half of a double-header, of which FE has had several, a lap or two longer.

"Paris is so twisty and has so many corners that the difference in pace between a flat-out and coasting lap is not huge," he says. "In Berlin it is big and then on day two, the race is two laps longer. It makes the coasting points and use of the regen functions different. We have to learn again in FP1 and FP2 about how to manage energy for the race."



"Racing on a street circuit at high speeds with walls everywhere, and trying to overtake at the same time, is really tricky," points out Buemi. "Unlike a normal circuit that has been purpose-built, there is not a lot of grip on everyday roads, so we must adapt. Plus, almost every track in Formula E is completely new."

As FE has matured, it's become envied. Earlier this year Bernie Ecclestone declared F1 needs to become fully-electric, citing the popularity of Formula E and the automotive industry's trend of switching to EVs. However, he missed the point. Switching to electric cars would not immediately transfer FE's best qualities to F1.

There's a lot more to FE than the fact it is electric, even if it is a core part of what makes it challenging. Since FE opened up powertrain development for the 2015/16 season, two and a half years ago, each of the current 10 teams has scored a podium. F1 isn't even close to that kind of statistic over the same timeframe. Daniel Abt's victory in Mexico took the tally of winning drivers on the grid to 10 (of 20) – F1's number over the same time is five race winners from three teams. That is a recipe F1 would dearly love, electric cars or not, and that's a testament to a few key variables that ensure it remains challenging and, by extension, produces good racing. The cars are low-grip, with less aerodynamic dependency. They are tricky to master and are raced on challenging circuits.

FE's new car has a lot to live up to (see right) when it is introduced next season, and everything about it seems impressive on paper. Under the skin, it has a 385kg battery capable of storing energy for twice the range of its predecessor to eliminate the need for mid-race car-swaps. It will have maximum power of 250kW, with 200kW available during races, a maximum speed of 280km/h (174mph), and a minimum weight of 900kg, up from the current 880kg limit.

FE has constantly pushed teams and drivers to learn more in the face of new challenges. If that continues into its next era then the series really can withstand the test of time. ■



THE BIG CHALLENGE FOR FE'S NEW CAR

FORMULA E'S SECOND-generation car design has substance as well as style. A move to anywhere near F1 levels of wing-derived aerodynamics would lead to cars being unable to follow within a couple of seconds of each other and be very negative for the spectacle. A desire not to do that, allied with FE being a spec chassis/aero formula, has given those that worked on this second-generation car more freedom, hence a design that is creative and doesn't have top-surface aero at its core.

Out has gone an extremely plain rear wing, replaced by something more akin to an aircraft's tailplane. The wings attach to either side of the spine of the car to form a dihedral angle, with simple wing elements sat on the outside and endplates that connect to more bodywork. This swoops down and connects to the sidepod, covering the rear wheels, and runs all the way up the car, doing the same to the front wheels

before connecting to an angled, single-plane front wing. This contains two simple wing elements, and the wing itself is connected to a wide, very smooth nosecone.

Closed wheels, smooth body surfaces and simple wings enforce a low-drag philosophy. It's a key principle for an electric car, because using less energy to push it through the air to a certain speed will mean more efficiency. It will also improve the lifting-and-coasting process because the faster the car slips through the air, the less it is slowed by air resistance.

Despite the reduction in downforce that comes with reducing drag, the new FE car will need to improve its levels of grip. To control its 25% power hike, the car packs a monster diffuser. That is more efficient than using front and rear wings because it's easier to control the airflow. This will increase downforce by accelerating the flow of air under the car and creating

an area of low pressure, pulling the air from the rear of the car so it hunkers down to the track. The floor begins before the sidepods, so it's pulling air under the car from as far forward as is realistically possible.

Working together with the rest of the floor, the diffuser will offset the loss of a traditional rear wing and then some. It also creates less drag. Having the front of the floor ahead of the centre of gravity may also help with the balance, because the downforce

isn't all at the rear.

What that means in racing terms is that if a car is following another, it will not be so badly disturbed by wake – the disturbed air from the car in front. That should help keep racing close, even though speeds are increasing.

The layout of the current car places the battery behind the driver in a position traditionally occupied by the engine and fuel cell on most single-seaters. This saves weight, because it doesn't require

a bespoke assembly, and utilises a structural element of the chassis, increasing rigidity. But the battery has always been on top of the chassis, whereas on the new FE car it will be integrated lower. This will help improve the car's centre of gravity.

Protecting the core values that make FE such an entertaining racing spectacle is as important to its success as the 'green' image it lets manufacturers flaunt. The early signs are that FE's new car will do just that.



Audi's Daniel Abt puts the new car through its paces



INSIDE AVL RACING MOTORSPORT'S HIDDEN CHAMPION

Austrian engineering giant AVL RACING has all the skills and clout to take on Formula 1 teams at their own game, so why does it prefer to remain in the shadows as a supplier?

BY JAMES NEWBOLD

A

n argument lifted from a Rev W Awdry book this author read as a boy came to mind during a recent tour of the Austrian engineering powerhouse AVL. It goes like this:

"I remember going to London. Do you know it? The station is called King's Cross."

"King's Cross? London's Euston, everyone knows that!"

"Rubbish, London's Paddington. I know, I worked there!"

Visitors to AVL's 3km campus in the heart of Graz will have some sympathy with that confusion. The company bills itself as the world's largest independent supplier of powertrain development, simulation and

testing services, but that only scratches the surface. Such is its vast scale, with more than 9500 employees worldwide applying those areas of expertise to multiple different applications, that many who have been working with AVL for a number of years don't realise the full extent of its scope. And as the business is constantly evolving to anticipate the needs of the market (see page 21) and avoid being pigeon-holed, there is no easy way to encapsulate what AVL does – even for the man in charge of its dedicated RACING division.

"It's difficult to put into one sentence!" agrees Michael Resl, Director Motorsports Marketing and Lead Development. "It's a company that has been run for years like a start-up that allows you to come up

with fresh ideas, prove them, make them into a business opportunity and do this on a global scale."

Founded by Dr Hans List in 1948, AVL (List Internal Combustion Engine Institute, to give it its full title) began as a modestly sized consultancy specialising in diesel engines and was, according to Resl, "basically a shed with a couple of desks" until List's son Helmut took over as chairman in 1979. Under his leadership, it grew from a company of around 220 people with virtually no presence outside Graz to a global entity boasting a wide-ranging portfolio, extending from hybrid powertrains to precision manufacturing of sensors, CFD modelling and calibration.

Ex-Cosworth man Resl admits that he



too was initially surprised by the full breadth of the company and how it could be applied to motorsport. In 2012 he oversaw the creation of a formalised RACING department to consolidate AVL's sub-structures – including linking up a driver simulator with a vehicle dynamics testbed to replicate the stresses on a power unit in a competitive environment – and streamline communication, as representatives from different departments that “stumbled into each other at the customer's door was the rule rather than the opposite”.

“I didn't know that AVL was so deeply involved in racing when I joined,” he says. “There were basically no cross-division activities and opportunities. Imagine a Formula 1 pitstop and everyone does what his best intention is, but they are not aligned – evidently two seconds will be difficult to achieve to change the tyres.

“I was fascinated by the different segments and I joined vehicle dynamics, then moved into testbeds, then manufacturing and looking after marketing. What I did not know before turned out to be the biggest strength of AVL.”

With all its competencies working harmoniously under one roof – Autosport was thankful for the warren of underground tunnels connecting the complex that

provided cover from the biting cold – AVL RACING is well-placed to service the top flight of motorsport from Formula 1 to NASCAR and Formula E. In fact, its biggest competitors are the race teams themselves, each looking towards the future and the most cost-effective areas to invest in.

“We're on the one side engineering providers and then on the other side tool providers, so we've got our own biggest customer in-house,” says Matthias Dank, Global Business Segment Manager Racing, Instrumentation and Test Systems. “If I as a test systems provider need an outlook on the future, I have people who work in these fields that can give me an insight into the components I want to design test systems or tools for. No matter if it's simulation, process tools or crash-test system instruments, everybody has his expertise.

“If you have a problem where you're really stuck, it's not necessarily that we have the answer, but we are more than interested to discuss it and find out what we can do better in future. With this input, customers telling us ‘in the next three years I will get this problem and I don't have a solution' might trigger with our R&D activity to find a simulation, a tool or a method. We are constantly broadening our portfolio on what we do.”

This can also extend to cover

manufacturing, if customers decide it is more cost-effective to work with a strategic partner such as AVL RACING than to invest in its own in-house assets.

Although F1 teams must design and build their own cars to be classed as a constructor, Appendix 6 of the Sporting Regulations permits outsourcing the manufacture of Listed Parts – including the survival cell, front impact structure, roll structures and bodywork – to third parties, provided the constructors have sole rights to use them and the third party concerned is not a fellow competitor.

Non-listed Parts, ranging from power units and suspension to bearings and pedals, can also be outsourced, so AVL RACING has to be responsive to all manner of demands.

“It depends on what they define as their core business,” explains Dank. “A good example of this is vehicle dynamic simulation. A top Formula 1 team defines vehicle dynamic simulation as their core competence, so they will never outsource that to a third party, whereas NASCAR teams don't do that.

“At the same time, there are race classes where the engine is just a commodity and there are classes like F1 where the power unit is a brand differentiator, so there you will always want to do your own engine.” ▶



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HOW AVL STAYS AHEAD OF THE CURVE

A researcher first and businessman second, AVL chairman Helmut List has retained his father's strong emphasis on innovation, and to this day reinvests 10% of the company's annual turnover into R&D.

With this in mind, it's no coincidence that AVL RACING has a knack for pre-empting the needs of its customers. When Formula 1's new era of V6 hybrid power units was first announced in 2011, AVL RACING predicted systems integration could become problematic, so developed braking competencies that attracted F1 customers to use their testbeds. When the brake-by-wire systems proved unreliable in '14, AVL RACING's approach was validated and it is now working on a new generation of dyno-testing system in advance of the new-for-'21 engine regulations.

Nobody is under any illusions that AVL RACING's research-led approach – often in tandem with the Technical University in Graz – will always yield a profitable outcome, but by starting development for what will be needed rather than waiting on customer requests, it has hit on the right course.

"We try to think ahead for the requirements of the future, what the future technologies might be like," says Matthias Dank, Global Business Segment Manager Racing, Instrumentation and Test Systems.

"Batteries are a good example. It is not enough to know what today's battery technology is, or what in the next one to three years battery technology will be, you also need to have an idea of what is physically possible. Maybe if we don't have a solution for you today, we might have tomorrow."

With its fingerprints present across the spectrum of motorsport, you could forgive AVL RACING for shouting about its achievements, but the requirements of non-disclosure agreements ensure it remains firmly in the background. No matter how hard you look, you will never see an AVL logo on an F1 car, and its employees are accustomed to shying away from the spotlight.

"If you join AVL, you know that you are not on television, you're not on the radio, you're a hidden champion," says Resl. "It's rewarding that sometimes the customer taps on your shoulder and says, 'Well done mate', but that's as far as it goes."

Although they can't join in with the celebrations, there are advantages to the sworn code of secrecy. AVL RACING has the satisfaction of working with "the majority" of teams on the F1 grid, which keeps Resl's days varied and has a healthy implication for the company's coffers too.

"We call it 'the three Ms' – media, money and manufacturers – and wherever these three Ms come together is where we are," laughs Resl. "We are very careful in our messages to the outside world and when you see an outside image there will never be only one car or two cars, otherwise we would be in breach of our NDA's."

"It allows you to work on a confidential

basis with the majority of the customers, be it racing or non-racing, because they trust what AVL does, what it protects and what it stands for. I would rather work with the majority of people than have a very exciting project just for one customer."

Would an AVL RACING team ever be on the cards? AVL has all the constituent parts it would need to become a constructor in its own right, but Dank points out that competing against its customers would not make business sense.

"We would cut one of our good legs off!" he laughs. "Even if we could do our own race engine, we would never do so because we would never compete with our customers."

As a company that prefers to remain a silent partner in success over claiming glory for itself, what does Resl want people to know about AVL RACING?

"It depends who this is," he admits. "If it was an F1 team boss, I want them to know that AVL wins races and wins championships. If it's a student, I want them to know that AVL RACING is a fantastic workplace with loads of personal growth opportunities, and if it's a journalist, I don't want them to know anything!"

It was ever thus, but for motorsport's hidden champion, this tried and tested approach shows no signs of changing. ■



AVL works with the majority of the F1 grid

PETRONAS FUELLING F1'S MOST SUCCESSFUL PARTNERSHIP



Hamilton and Bottas paid a visit to PETRONAS's new R&T centre

Mercedes success has been a constant feature of Formula 1's hybrid era, and this is underpinned by the contribution of PETRONAS fuel and lubricants

BY JAMES NEWBOLD

In the end, talk of doom and gloom at Mercedes AMG PETRONAS Formula One Team proved premature. After a winless start to his title defence in the opening three grands prix, Lewis Hamilton righted that statistic in Azerbaijan when a puncture denied team-mate Valtteri Bottas victory, and seized the championship lead in doing so. And, just like his 40 previous victories since the advent of F1's V6 hybrid era – enough to tie him with childhood idol Ayrton Senna on post-2013 wins alone – Hamilton had PETRONAS fuel and oils in

his corner, lubricating his path to success.

As if anybody needed reminding, with four world championships in as many years shared between Hamilton (three) and Nico Rosberg (one), tallied with four constructors' titles, the collaboration between Mercedes' chassis arm at Brackley, Mercedes AMG High Performance Powertrains in Brixworth and PETRONAS has been F1's gold standard. Hamilton's Baku breakthrough took Mercedes' win tally to a remarkable 77.1% since 2014, a period in which it has broken the record number of victories in a season, matched it, then broken it again with 19 wins from 21 races (90.5%) in '16 – a conversion rate

second only to McLaren in 1988.

Against this backdrop of success, PETRONAS could be forgiven for sitting back and taking the plaudits, but that would do it a disservice. A company with more than two decades of motorsport heritage dating back to 1995, PETRONAS began its partnership with the reborn Mercedes team in 2010 and built a close working relationship that meant both parties were well-positioned to capitalise when F1's new power unit regulations were introduced for '14, placing a premium on efficiency.

And it's not only Mercedes that reaps the benefits from the collaboration. PETRONAS recently opened a \$60million Global



Hamilton opened his 2018 account in Baku



PETRONAS fluids are the lifeblood of Hamilton's W09



Wolff has forged close working relationship

Research & Technology centre in Turin, Italy, where technology developed in the fast-paced and high-pressured F1 arena will inform the development of oils that you can use in your everyday road car.

All told, it amounts to far more than simply having its name adorn the side of the racing car.

"PETRONAS is not only a brand on the car, PETRONAS is the lifeblood of this car," says PETRONAS Lubricants International Group Chief Commercial Officer Giuseppe Pedretti. "PETRONAS is inside the engine, inside the brake fluid, inside the transmission and inside the coolant. The success of the team is our success."

"I'm not sure title sponsor is the right word – we call it like this, but we didn't come up with a better word for it. PETRONAS is much more than a sponsor," agrees Mercedes team principal Toto Wolff. "They've been with us for a long time and almost like we speak of Brixworth as the

engine facility, Brackley as the chassis facility and Stuttgart as the mothership, we could speak about PETRONAS and its facilities as an additional part of the jigsaw that has made us successful.

"Now that we've been so many years with each other, on all levels the collaboration is great. The mindset is very similar; we are all a group of perfectionists that strive together to achieve the unachievable, it is a constant battle to have the best product."

It sounds obvious, but the quality of fuel and lubricants has a clear and direct impact on performance. Both are tightly governed by the FIA. Fuel is limited to 105kg, up from 100kg to compensate for the increased lap times and drag resulting from the 2017 aero regulations, while oil is restricted to 0.6 litres per 100km, down from 1.2l last season, all of which means the more efficiently each is used, the more power the drivers can access.

But no matter how efficiently Hamilton

and Bottas manage their allowance of PETRONAS Primax fuel, if they don't have the correct oil, there's only so much they can look after the highly complex engine before it will cry enough. Without the diligence of PETRONAS technicians working to hone the formulations down to the last molecule, the constituent parts of the W09's hybrid would grind themselves to pieces during the combustion process.

Just as the power unit has to emulate Usain Bolt over a single lap in its qualifying 'party mode' before adopting the stealth of Mo Farah for the race, PETRONAS too faces a continual balancing act. While a lower viscosity oil – that flows well and produces less friction – will improve thermal efficiency, and thus give more energy to the wheels, it will also expose engine parts to higher wear because the layer of protection on the surface is thinner.

The job is complicated by the highly intricate nature of the hybrid powerplants, ▶



which means PETRONAS has multiple formulations to perfect. In addition to the fuel and oil for the 1.6-litre internal combustion engine and turbocharger, the power unit also has an energy recovery system comprising two motor generators – the MGU-K and MGU-H – that require oil and coolants, plus an energy store and control electronics, all of which must be integrated and working harmoniously to ensure peak performance over its lifespan.

A far cry from the days of qualifying engines that would last no more than 50km before expiring, a



modern hybrid engine must now endure seven full grands prix weekends – practice, qualifying and race – to avoid incurring a grid penalty, following the reduction to three power units per season. As Wolff puts it, “we could easily have the best engine for one single grand prix and blow everybody away, but it wouldn’t last”.

This means there can be no secrets between the partners. PETRONAS engineers hold quarterly meetings with Mercedes personnel, including Wolff and Mercedes AMG HPP Managing Director Andy Cowell, to discuss areas for improvement and work closely to find the optimal blend of performance and reliability.

“We are very much integrated, we are

part of the same team and that’s the only way it can work,” says Dr Andrea Dolfi, Global Technology Manager – Engine, Fluids and Motorsport for PETRONAS Lubricants International.

“We work in a set-up that we call ‘continuous improvement’, it’s like really refining and moving forward to the finest details. We are looking for any gains that can make the car faster and the fluid is super-customised for that hardware configuration. The competition is so tough and the performance you need to reach is so high that you need to co-engineer and tailor-make the fluids to bring out the best performance.”

This joint effort even applies to the packaging of the power unit and exhausts, as Cowell explains.

“The work that we do together at PETRONAS on both fuels and the fluids within the engine enables us to make everything more compact,” he says. “To get

extra life it would be easy to make bearings bigger, but the aerodynamicists would frown at that, so it’s two prongs of attack. One is to make sure that we keep performance at high life and the other one is to increase performance in the ‘party mode’ and the race mode, by making sure that the space that we occupy inside the car is narrower.”

As Cowell indicates, PETRONAS technicians also hold an important remedial function, analysing fluids to identify problems with the engine before they result in a costly failure. PETRONAS Motorsport Technical Support Engineer Salvatore Schembri is embedded within Mercedes and travels to every grand prix with a mobile lab, complete with state-of-the-art spectrometer, to test for disproportionate levels of aluminium elements in the oil. Using this data, Mercedes engineers can make assessments and, if necessary, make precautionary changes to high-wear components.



Tiny molecular formulations
invisible to the naked eye
make all the difference

There are little tricks the drivers can employ to reduce stress on the power unit – Hamilton is excellent at giving accurate feedback during practice without using up all the engine mileage available to him – but it’s a point of pride for PETRONAS to ensure that it plays its part too.

As Mercedes buckles down for what promises to be the closest title battle of the V6 hybrid era so far against a resurgent Ferrari and Red Bull, the unseen arms race of fuels and lubricants suppliers will be intensified once again, searching for marginal performance and reliability gains through molecular changes that are impossible to detect with the naked eye.

“The challenge is getting higher and higher because the other teams are getting closer,” agrees Dolfi. “But believe me, still like the first days, there is a lot of excitement and a lot of hard work going through.”

That’s a source of great comfort to Hamilton in his pursuit of a fifth world

title, which would put him equal with Juan Manuel Fangio – who helped the Silver Arrows to glory in 1954 and ’55.

“In today’s world, no-one wants to stand still and if you’re with a company that wants to stand still then you’re probably in the wrong place,” he says. “PETRONAS and Mercedes, they’re all about moving forwards, pioneering and trying to be a couple of steps ahead of everyone else.”

“When you come and see what’s happening [at PETRONAS], when you see what’s happening in Brackley and Brixworth, it’s no coincidence that we’re world champions, but the great thing is we’re always willing to move forwards. I have absolute confidence in these guys, because we all want to win the world championship again.”

But even if Hamilton succeeds in his goal, the job of PETRONAS is never done, as every molecular compound that is developed in the F1 arena will have

road-relevant implications. While the formulations used on the road and in F1 are refined for different applications, Dolfi explains that “the building blocks are roughly the same”.

“What varies is the way you mix them,” he says. “It’s like when you go to a grocery shop and you buy your stuff for cooking, you can cook a fast food type of meal or a Michelin star type of meal depending upon how you put the things together, and that’s what it’s all about with the fuel as well.”

With its new R&T Centre in Turin posing a “tangible sign” of its commitment to motorsport, PETRONAS has no intention of departing the scene anytime soon.

“We have already more than 20 years’ history in supporting motorsport applications within PETRONAS as a company, I wouldn’t see why we should quit now when we are having fun,” Dolfi says with a grin. “For sure, we don’t want to spoil the fun.” ■

HOME AWAY FROM HOME

Part home, part office, entirely high-tech, this mobile living space brings a touch of the high life to the road

Every motorhome makes a statement about its owner's brand values and personality: a functional place to do business, a welcoming environment in which to host guests, a snug trackside home away from home, cossetting and insulating the occupants from weather and noise... A motorhome is all of this and more.

Created by Huslig Collective, an international design firm specialising in VIP aircraft interiors and motorhomes, and engineered and built by Schuler Fahrzeugbau GmbH, this multi-functional mobile living space can serve as a team office, hospitality suite, driver accommodation, or even a high-end residential mobile home. The welcome begins outside with a comfortable patio space, leading via an electric door (which can be securely operated with fobs or camera-controlled access) into a spacious hall currently configured with two divans and a dining table for 10. It can easily be reconfigured as a team-dining space seating 30. Serving buffet cabinets cater for guests' appetites, an entertainment centre with video game systems and a 65-inch television offer sedentary satisfaction, while behind a bar unit and moveable wall divider there is a gym space with stationary bike, treadmill, free weights, ping pong table, and another 65-inch television. LED downwash lighting and window shades provide privacy as well as flexible control of the interior ambience.

To the right, accessed through convenient double doors, the service trailer accommodates a restaurant-style kitchen with induction cooktop,

oven, exhaust fan, express dishwasher and sink. At the rear a large storage area enables catering for a crowd with multiple refrigerators and freezers, storage shelves, and a full-size washer and dryer. The service unit features its own apartment space with a divan, bed, desk and 32-inch television as well as a shower. To completely facilitate independence there are clean and waste water tanks, along with additional generator systems and a satellite uplink system. The trailer also includes a spindle lift floor in the rear storage area for loading containers (or even two cars).

Along the left out of the hospitality area you enter the inner sanctum, the two-storey 'Skyrise'





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unit featuring a separate groundfloor meeting and dining area, luxuriously appointed in the finest materials and serviced by a separate kitchen to the rear. Featuring Gaggenau appliances including a French-door fridge with freezer, a convection oven with high-heat pizza and rotisserie functions, a microwave, a five-burner induction cooktop with down-draft ventilation fan, plus a dishwasher, the kitchen is trimmed in a combination of high-gloss Rosso Corsa and carbonfibre, with polished stainless steel counter tops. Removable elements enable the meeting space to be rapidly reconfigured into a 160cm by 200cm sleeping area, with a 55-inch television concealed in a retractable cabinet.

Upstairs the 'Skyrise' unit extends sideways to double the width of the ground floor, encompassing a large lounge with a three-person divan, two leather Ekornes recliners with ottomans, and two single chairs. A 65-inch television set in a leather-panelled wall, luxurious throw rug over laminate flooring, combined with tall, wraparound windows screened by motorised shades offers the soothing ambience of home. Elsewhere on the top floor you'll find a flex room that can be used for physio work or as an office space, a luxury bathroom with walk-in shower, and two spacious bedrooms with wall-mounted televisions and ample hanging space for clothes.

Behind the scenes, this hydraulically self-levelling trailer unit features clean and waste water tanks and a large generator, enabling it to be fully self-supporting and self-contained with no need for ground-based hook-ups. It has a Crestron system to allow control of lighting, climate, window shades and entertainment from multiple control locations – including from iPads. The entertainment system has internet access, multiple satellite decoders, Blu-ray players, Apple TV units and a streaming video server.

Currently offered for sale with three Mercedes Actros tractor units, this amazing construction is the perfect go-anywhere, do-anything team home-from-home.

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THE DESIGNER OF JAPAN'S ONLY LE MANS WINNER

Toyota could finally break its Le Mans hoodoo this year, but it will come 27 years too late to be the first Japanese winner.

Meet Nigel Stroud, the man who penned the iconic Mazda 787B

BY JAMES NEWBOLD

The screaming rotary-engined Mazda 787B, which remains the only Japanese car to win the Le Mans 24 Hours, is rightly regarded as one of the most iconic

sportscars of all time, and unsurprisingly stands as designer Nigel Stroud's favourite creation. He has a 1:43-scale model of it by way of a memento in his house. But that affinity is not simply because it beat the fancied Jaguars and Mercedes to score a shock victory in 1991. Rather, it's because it successfully applied the lessons learned in three previous iterations of Mazdaspeed's Le Mans programme dating back to '86.

"It's the one I spent the most time on, put it that way," he says. "I never stick with anything for very long!"

An alumnus of March, Hesketh and Lotus who worked with Harvey Postlethwaite, Colin Chapman and Adrian Reynard during a colourful 30-year career, Stroud flitted around the edges of Formula 1 before later finding success as a race engineer in Indycars and a freelance pen-for-hire in sportscars, where he carved out a niche making improvements to substandard chassis.

Starting out as a mechanic at Cirencester agricultural college, he was given a job at March as a fitter by Bill Stone – who teamed up with Reynard to found Sabre in 1973 – and engineered a young Niki Lauda in the '71 Formula 2 championship. The year wasn't



a success, as the Austrian was plagued by numerous mechanical failures while works driver Ronnie Peterson romped to the title, but Lauda certainly made an impression.

"I remember he said, 'Nigel, one day I will be world champion. So you see, you must try harder.' You couldn't argue with that, could you?" chuckles Stroud. "He was good value."

Away from the circuit, Stroud worked under Postlethwaite in March's production shop developing F2 and F3 cars. Money was always tight and, when Postlethwaite moved to head up the technical department at new entrant Hesketh for 1973, he took Stroud with him to work on the team's customer March 731 chassis, which James Hunt took

to podiums at Zandvoort and Watkins Glen. At the same time, Stroud took a step back from trackside operations to set up a business designing furniture.

"I didn't want to go racing anymore," he says, "so I only did that first year and then got involved helping build the new cars. I did the odd race, but I was part-time then."

Hesketh continued to punch above its weight into 1975, but Hunt's popular victory at Zandvoort was not enough for the eccentric Lord Hesketh to keep the team afloat. After it invested in a new 308C for the final two rounds of the season, the squad's assets were sold to Walter Wolf and Postlethwaite followed with them, but Stroud stayed behind for '76 and toiled away for little reward with an upgraded 308.

Stroud collaborated with up-and-coming engineer Frank Dernie – who introduced CAD to F1 with Williams 10 years later – on a new Hesketh 308E for 1977, but with a succession of paying drivers and zero development budget, the team was a shadow of its former self and folded in '78.

"They had sold the 308C to Wolf, so we were stuck with the 308 and then we designed the 308E, which wasn't a great success," says Stroud. "We were strapped for cash by then. It was pretty hopeless."

Having now abandoned his furniture venture, Stroud was introduced to Gunter Schmid's ATS team by former Hesketh chief mechanic Dave 'Beaky' Sims. He designed the D3 that Hans Stuck took to fifth at ►



Stroud's first F1 design was Hesketh 308E, driven here by Ian Ashley at Watkins Glen

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“It’s the one I spent
the most time on,
put it that way”



Stroud engineered Mansell at Lotus, but came away feeling unimpressed

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the 1979 US Grand Prix, but optimism invariably wasn't to last as he came to loggerheads with the headstrong Schmid, who had used seven drivers in '78.

"He was just crazy really, you could wind him up beautifully," Stroud recalls. "We went to Belgium and he was on to me about spring rates, so I said, 'We need to go stiffer, not softer.' We were in the middle of this when [then-Ligier designer] Gerard Ducarouge came over and asked me, in front of Schmid, 'Have you got any 1500lb springs?' His face was an absolute picture. They were running double what we were!"

Stroud's next stop was Team Lotus as chief race engineer for F1 rookie Nigel Mansell in 1980, but he had joined a team in decline. While impressed by the famously meticulous Chapman — "You could see why he had achieved what he did" — the various business interests that increasingly occupied his time meant Lotus had fallen a long way

"I found the whole Lotus team to be quite a disappointment really"

from its dominant '78 campaign, with that year's champion Mario Andretti only managing a single point all season.

"I found the whole Lotus team to be quite a disappointment really," he says. "When I went there, I tried to find proper records of previous races and it was so badly documented, you couldn't just open a file and look up what they ran last year."

When Peter Warr rejoined the team following Chapman's death, Stroud went on his way again and headed Stateside to perform race-engineer duties for Galles Racing, which had rising star Al Unser Jr on its books in a Cosworth-powered March.

"The first time I went over there, I was walking through the restaurant at the hotel when Mario jumped up and said, 'Nigel, welcome!' He thought that [March boss] Robin Herd had arranged for me to be the race engineer for his son Michael, so I said, 'Actually, I've come to see Rick Galles.'

"All hell broke loose after that — they flew Robin out next day on Concorde!"

It was around this time that Stroud began his foray into sportscars, lured by the prospect of greater design freedom. Having assisted Jo Marquart on the Argo JM16, he designed a new honeycomb monocoque for Richard Lloyd's Porsche 956 before joining Mazdaspeed to design its new 757.

Flying back and forth from Japan to the US, something had to give and

Mazda duly won out.

"One of the reasons for giving up F1 was to have more time at home, as I'd just had a family, but in fact I spent more time on a jumbo than I would have done if I had stuck to F1!" he says. "Mazda was a design job and I had to be around to make sure it worked; that was far more important than doing race-engineering work."

The 757 had to accommodate Mazda's high-revving Wankel engine, originally a three-rotor unit that soon expanded to four. As a result, the monocoque had to be designed with a view to accepting more power, but this meant the whole concept wasn't significantly changed through the evolutions of the 767, 787 and 787B, meaning the Mazdas were usually reliable, if not always the fastest.

"One of the reasons why the Porsche was so successful was the fact that it was racing for five or six years, so they knew the thing inside-out; it was always going to be reliable and effectively that's what happened with the Mazda," Stroud says. "It was essentially the same car and just the detail got better over the years."

Stroud maintains that the normally aspirated 26B rotary — which produced up to 700bhp at 9000rpm — did not give enough torque, which is supported by the 787B's meagre results in 1991, the first



Time at ATS was overshadowed by volatile owner

LAT IMAGES

year for the new 3.5-litre engine rules.

Aside from Le Mans, it only managed a best result of sixth in the World Sportscar Championship and a single podium in its domestic All Japan Sports Prototype Championship, in spite of “tidied-up” aero and braking upgrades.

“The engine was always going to be a problem to package because you couldn’t put any stress through it and it was too long – it was only four rotors, but it was as long as a straight-six almost,” he says.

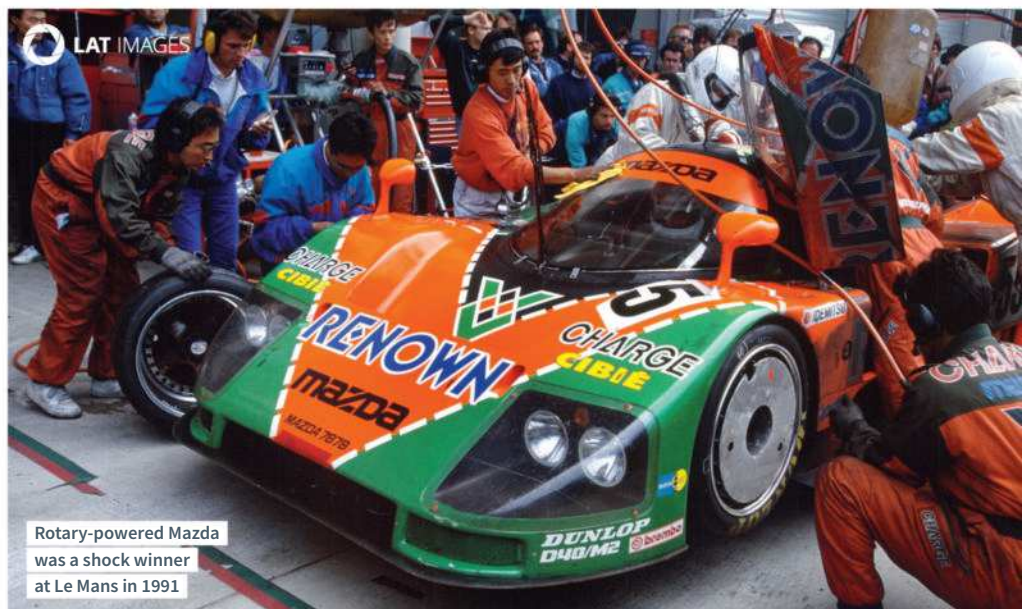
But for the one race that really mattered, it was an altogether different proposition. Nissan had become the first Japanese marque to take pole in 1990, but was hampered by unreliability in the race and subsequently withdrew for ’91, leaving the accolade of first Japanese winner within reach of Mazda.

“I couldn’t understand why they couldn’t make the engine shorter, but for Le Mans it was a good package,” says Stroud. “That was the only race that we really stood any chance of winning. Give Mazda their credit – at long last they agreed that at least one car should go flat-out the whole way and [team consultant] Jacky Ickx was a great help in helping me persuade them. Anything he said was gospel and he agreed with me and the drivers that we should go for it.”

Ickx’s charms also worked on the ACO, which handed Mazda a substantial weight break. Having been co-opted into the class for non-3.5-litre entrants with Mercedes and Jaguar – which both used turbocharged V12s – Ickx successfully lobbied for rotary-engined cars to run at 830kg, instead of the mandated 880kg, while the V12 cars weighed in at 1000kg.

Although the Mazdas couldn’t match the turbo cars over a single lap, their greatly reduced brake and tyre wear meant they would be in contention over a race stint.

In the lead Mazda, single-seater hotshoes Johnny Herbert, Bertrand Gachot and Volker Weidler screeched through the night without a hitch and were lying second when the water pump on the race-leading C11 of Jean-Louis Schlesser, Jochen Mass and Alain Ferte gave up with three hours to go. Despite suffering from severe dehydration, Herbert



Rotary-powered Mazda was a shock winner at Le Mans in 1991

“That was the only race that we really stood any chance of winning”

brought the car home to secure a victory that marked the pinnacle of Stroud’s career.

“It was a bit unreal really,” he says. “Obviously it was a big deal, but it didn’t really hit home until a few days later. The car went pretty much like clockwork.”

But hopes that it would mark the start of a significant chapter in Mazda’s Le Mans history proved misplaced. With rotaries banned for 1992, Mazda was forced to source an underpowered Judd V10 unit and a rebadged Jaguar XJR-14, branded the MXR-01, to accept the engine. Without the same funds for development available to Peugeot and Toyota, fourth at Le Mans and second at Silverstone were the only results of note before Mazda pulled the plug.

“It was a bit annoying after Mazda finished – I said, ‘Why don’t we go for the land-speed record with a rotary-engine car?’ but they didn’t want to know,” says Stroud. “It would have been so easy, just hack the

wings off, boost it up a bit. I don’t think they capitalised on that win at all.”

After Stroud joined Reynard’s special-vehicles division as a consultant, a litany of projects came his way, with varying success.

After working on the quirky front-engined Panoz Esperante GTR-1 – “Another fighting match with the principal: Don [Panoz] was adamant it was going to be in the front” – Stroud made substantial structural revisions to the flawed Reynard 2KQ prototype, before performing a similar function on Cadillac’s Northstar LMP, which was originally built by Reynard subsidiary Riley & Scott.

Tasked with designing a brand-new car for the 2002 American Le Mans Series, Stroud’s Northstar LMP02 ended the year with four straight podiums, but frustratingly he was unable to see the fruits of the programme because General Motors canned the project after finishing third at Petit Le Mans.

“The Cadillac thing was knocked on the head after two years when it should have been a three-year deal; it was just a waste of everybody’s time,” he says. “It was quite sad really, it was a good bunch of guys and the car was beginning to come good.”

Now aged 70 and retired as a designer, Stroud has returned to his agricultural roots and settled down in Oxford, but has lost none of his passion for motorsport.

“I’ve just got my racing licence!” he says. “I’ve done a few sprints in the past couple of years, but I might have a go at some races. I’ve got a couple of old MGs which keep me out of trouble, or in trouble actually!”

Will he be watching Le Mans this year to see if Toyota can finally join Mazda in the winner’s circle? You bet. ■



Ickx (centre) was an important Stroud ally in convincing the top brass to go flat-out



FF CORSE

BEHIND THE SCENES OF AN ENDURANCE RACE

Autosport was the fly on the wall at the Silverstone 12 Hours to see how strategy unfolds in endurance racing

BY JAMES NEWBOLD

There's a frustratingly lazy misconception that, with more time to make up for any ground lost, the job of an endurance racing strategist is less pressured than their counterparts in

sprint formats. But, as anybody who's spent hours upon sleepless hours calling the shots from the pitwall will tell you, it's no picnic.

There are any number of variables that can decide the final outcome, from the obvious such as fuel calculations and tyre wear to those unique to sportscars – namely, driver stint-length – and the ever-present threat of Code 60 slow zones. All this combined ensures teams are kept on their toes – and that's even before inclement weather is factored into the mix.

At the recent Silverstone 12 Hours, teams

had to contend with rain of near-biblical proportions, but as FF Corse team boss Anthony Cheshire puts it, “when you run an endurance race at Silverstone in March, what do you expect?”

FF Corse is used to dealing with misconceptions of its own. Although it started as a trackday car management organisation, Cheshire's outfit is well-versed in race operations too, racking up honours across British GT, International GT Open and Ferrari Challenge competition with a fleet of the Italian machines maintained at its Silverstone base.

On a race weekend it's a finely tuned orchestra, with performance engineer Tom Sander conducting proceedings from behind a bank of screens on the pitwall. A Masters in Advanced Motorsport Engineering postgraduate at the

Sander (right) and Slater follow the Ferrari's progress at Silverstone

University of Cranfield, Sander's 9-5 job at data-logging specialists Influx Technology made him the best-qualified to step into the breach as race engineer for the 12 Hours when a family emergency forced ex-Lola and Penske man John Travis to withdraw.

Sander's fellow Cranfield MSc alumnus Ben Slater, a design engineer working under Travis at Wirth Research, sits alongside jotting down lap times in a notebook, the pair in constant radio contact with team manager Jamie Collins, a 10-year veteran of Carlin's World Series and GP3 teams, and #1 mechanic Pete Dillon in the garage.

Although decisions on strategy are reached collectively between this core group before being relayed to the driver, it's the driver who has the final word when changing conditions raise the prospect of an off-sequence tyre change. Sander's role extends to keeping the driver calm over the radio and dissuading them from making knee-jerk decisions, particularly important when they aren't experienced professionals.

FF Corse's Ferrari 488 GT3 was entered in the A6-Am class at Silverstone, with sportscar veteran Johnny Mowlem joined on the driving roster by gentleman duo Ivor Dunbar and Bonamy Grimes. It was the first time on the 24H Series' control Hankook tyres for drivers and team alike,



Sander watches on as the team sets to work



KEEPING TRACK WITH NEW APP

As an adjunct to its racing schedule, FF Corse has developed a new mobile app called Track Book to help teams keep tabs on expenses incurred.

Used for the first time at the final Britcar event of 2017, the app can be accessed by everybody in the team to log fuel and tyre usage, or replacement parts in the event of accident damage.

Team boss Anthony Cheshire expects it to be especially useful for teams with cars entered in multiple championships.

"The old model of a team running two cars in one championship for a season is outdated," he says.

"Teams have to be multifaceted and offer their customers different programmes to survive, so Track Book will help teams keep track of their accounts and improve the flow of information."

Track Book is still in development, but Cheshire plans for it to be made commercially available in the next 12 months after further testing with partner teams.



and Grimes' first-ever race in the GT3, so qualifying was an exploratory exercise after rain disrupted the team's running in the pre-event test.

Grateful for the increased stability brought by anti-rollbar tweaks, Grimes held position on the fringes of the top 10 at the start, heeding instruction from Sander to look after his left-rear tyre following a spate of punctures. Towards the end of his second stint on wilting tyres, the long-threatened rain began to materialise and following a few "sketchy" moments, Grimes made the call to box for wets, where Collins set about organising the troops.

Although initially sceptical that conditions were too dry to keep the wets alive, Mowlem was soon lapping 15 seconds quicker than the cars that had stayed out and ran as high as third overall before pitting to revert to slicks, swapping back to wets 17 laps later when the rain returned.

As visibility and track temperature steadily deteriorated, Dunbar struggled to maintain tyre temperature – "every time I leaned on it I spun!" – and was called in during an opportunely-timed Code 60 for Grimes to take the car to the overnight halt.

Just 25 minutes were left on the clock in failing light when Grimes became the third casualty of the treacherous right-

hander at Becketts and had to be retrieved from the gravel but, despite the delay, FF Corse held third in class and had avoided any major damage.

"Bon must hate me because I kept putting him out in the worst conditions!" jokes Sander. "There's a massive feeling of relief with the conditions as they were just to get the car back in one piece and Bon being safe as well, I don't think he was enjoying it. Strategy went pretty well and we switched tyres at pretty much the right point, so I don't think we could have done much else."

Having been unable to touch the car overnight in parc ferme conditions, Sander took the chance to perform a data download on the grid the following morning, but the atmosphere in the team was sullen. A five-lap penalty, later negotiated down to two by Cheshire, was handed down for illegal spikes in turbo pressure – an unfortunate consequence of short-shifting in the wet – and made the remaining seven hours a case of survival, while trying to stay a step ahead of the changeable weather.

"Making sure you're on the right tyres at the right time and not being caught out by Code 60 or in the fuel area, you need to always be second-guessing basically," says Slater.

Sander was disappointed with a spate

of ill-timed Code 60s that neutralised Mowlem's stint, but a top 10 finish and fifth in class was nothing to sniff at after an event that had thrown everything at the drivers and engineers.

"Without any shadow of a doubt, that completely trumps anything I've done yet," he says. "That was definitely a challenge, but it was great fun looking back on it. I'd take the opportunity to do it again, but I need sleep first, we'll do it after then!"

"That's sport for you isn't it?" adds Cheshire. "You either have a really good day or a really difficult day and that's what I think makes motorsport so exciting. It's certainly never boring." ■

HOW TO BE AN ACE ENGINEER

Ground-effect pioneer Peter Wright shares his experiences

BY ALEX KALINAUCKAS

"I started not knowing much and ended up knowing a bit," says Peter Wright of his time working in motorsport engineering. Given the length and variety of his

career, plus the innovations he contributed to automotive and Formula 1 projects, this is somewhat of an understatement.

Straight after graduating from Cambridge University in 1967, Wright joined BRM where he "built the engine, the gearbox, the chassis – the lot". It was a period of "learning, learning, learning, bearing in mind that when you come out of university, you don't know anything".

When John Surtees arrived two years later, Wright left BRM to work for Specialised Mouldings where he designed a quarter-scale windtunnel. After learning "a lot about composites and carbonfibre there", Wright was invited by his former BRM mentor Tony Rudd to join him at Lotus in 1974 to run the composites research company, "developing processes for production cars and production boats, which Colin Chapman was into at the time", working on aerodynamics in his spare time.

He spent the next 20 years at Lotus, developing the first ground-effect grand prix car – the Lotus 78 – and pioneering active suspension, before becoming managing director of Lotus Engineering and going on to take over the F1 team in the final years of its original iteration with Peter Collins. Tired of "front-line stuff" after the team ran out of money, he was made

technical advisor to the FIA, and today is president of the FIA Safety Commission and a senior research advisor to the Global Institute for Motorsport Safety.

"I've had 50 years and when I started at BRM there was no aerodynamics, no computers – we developed a very early data system – all the technology was in its infancy," says Wright. "I've seen all that coming through to now. It's fantastic, the most exciting period in motor racing, technically, if not necessarily the most exciting racing period."

"In those 50 years we've gone from narrow tyres, no aerodynamics, no computers – just classic engineering, or industrial engineering, seat of the pants stuff – right up to this high technology state, so it's been a very good period."

Of all the engineering innovations Wright worked on during his career, he highlights the ground-effect development as the greatest. He worked closely with Chapman, who saw the potential in the project he had first started at BRM – "there were people at

the time who went, 'We're not going to waste our time doing that', but he went, 'Nope, we're going to persevere' – and developed a basic data system with Cranfield University.

"That was the most exciting time," Wright recalls. "The real excitement is when you get into work, the driver comes in and his eyes are up on stalks and he says, 'Bloody hell, what have you done? It goes a second and a bit quicker!' That was a really exciting period, getting the 78 to work."

But despite the pioneering nature of the 78, Wright reckons the success of its engineering had a harmful overall influence on motorsport.

"Ground-effect destroyed motorsport as far as I can see," he says. "I cannot believe that people haven't got rid of it or got rid of downforce because it has destroyed racing. People go, 'You can't say that', but it has."

"From a racing point of view, it's irrelevant whether they pull 5G or 2G. I don't get why it's so necessary to have all that downforce, high G, high speeds. I don't think it makes the racing better." ■



TOP TIPS FOR ENGINEERS

- Put yourself out there and get into motor racing however you can.
- Get into a team, get your hands on a car, find out what it's all about – then stand back and think, 'What do I want to do?'
- You've got to be committed. It's not something to play with; you've got to really want to do it.



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