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F2 Russell hits
the top in battle
of the Brits



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MERCEDES FLAW HIGHLIGHTED AS MAX STRIKES BACK

Forget the hydraulics and fuel-pressure problems that put the two Mercedes out of last weekend's Austrian Grand Prix. The team will surely get on top of those issues very quickly. What's more concerning for Lewis Hamilton is that Mercedes made yet another strategy blunder that had cost him his chance of victory even before his W09 ground to a halt at the Red Bull Ring.

When Ferrari started applying consistent pressure last season, it was perhaps understandable that Mercedes didn't always get it right – it had spent the previous three years only having to worry about the intra-team fight between Hamilton and Nico Rosberg. But the fact that it is still making some quite obvious mistakes is surprising and could prove costly if Ferrari (or Red Bull) can stay consistently close enough to take advantage.

So far, it's already cost Hamilton victory in Australia, missed a chance in China, and given away the advantage in Austria. Hamilton will probably be rather pleased that a resurgent Max Verstappen put in one of the finest races of his career to beat Ferrari to victory, so Sebastian Vettel's championship lead is a mere one point.

More encouraging for Mercedes is that the revisions to the car appear to have given it the edge. Assuming there isn't a repeat of the tyre blistering that hampered Hamilton at the Red Bull Ring, that should put the team in good shape heading to Silverstone this weekend. Hamilton and Mercedes destroyed the opposition in the British GP last year. But this season is far less predictable, so nothing is guaranteed, and Hamilton may well need to rely on improvements on the Mercedes pitwall as much as he does on car developments.



Kevin Turner

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COVER IMAGES

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PIT+PADDOCK

- 4 Hamilton, Ricciardo key to F1 market
- 6 Porsche smashes Nordschleife record
- 8 Barrichello for Spa 24 Hours
- 11 New events for WRC calendar
- 13 F1 technical focus
- 15 British Grand Prix preview
- 17 In the paddock: Edd Straw
- 18 In the paddock: Adam Cooper
- 19 Feedback: your letters

RACE CENTRE

- 20 **COVER STORY**
Austrian GP report and analysis
- 36 World of Sport: Formula 2; GP3;
Porsche Supercup; Super GT; MotoGP;
IMSA; World Rallycross; NASCAR Cup

INSIGHT

- 44 RSF's legacy to British motorsport
- 50 Ekstrom bids farewell to the DTM

CLUB AUTOSPORT

- 64 Monger gets Formula 1 run
- 66 LMP3 and GT Cup will not merge
- 69 Pink Pig Le Mans winner to Goodwood
- 71 Best of club motorsport at British GP
- 72 National reports: Brands Hatch;
Pembrey; Snetterton; Oulton Park

FINISHING STRAIGHT

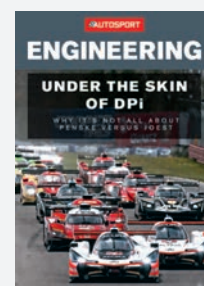
- 78 What's on this week
- 80 From the archive: 1925 Brooklands
- 82 Pit your wits against our quiz

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- 42 Subscribe for £1 for first six weeks

FREE INSIDE

ENGINEERING SUPPLEMENT



The new golden era of US sportscar racing and the story of the Handford Device are part of this month's Engineering.



HAMILTON, RICCIARDO

FORMULA 1

Formula 1 lacks the sort of silly season that has erupted in MotoGP in 2018, but whatever chance it has of enjoying a driver merry-go-round appears to rest with Mercedes and Lewis Hamilton.

A new contract between Mercedes and Hamilton should be a given. The two parties have won three drivers' and four constructors' titles in four seasons, they work well together, and have both effectively described it as a formality to continue beyond 2018.

Hopefully, Hamilton's inking of a new deal with Mercedes will have a domino effect. Red Bull team boss Christian Horner believes Red Bull will not be able to confirm it is keeping Daniel Ricciardo or make a call on Carlos Sainz Jr's future until Hamilton is announced at Mercedes, and those two drivers in turn have a big say in what happens throughout the grid.

Ricciardo is out of contract at the end of 2018 and has been waiting to see if there are options at Mercedes or Ferrari before committing to Red Bull, which will use Honda engines next year. But Mercedes is expected to retain Hamilton and Valtteri Bottas, while Ferrari will pair Sebastian Vettel with either current team-mate Kimi Raikkonen or rising star Charles Leclerc.

Ricciardo is keen to close the pay gap between himself and team-mate Max Verstappen, who signed a lucrative new deal last year, and at last weekend's Austrian Grand Prix both Ricciardo and Red Bull motorsport advisor Helmut Marko declared a new deal is "getting closer". Marko even used the same description Mercedes has given of Hamilton's long-running contract saga, saying it was "just details" that needed to be clarified.

Red Bull is in a strong position on the driver market because Sainz, currently on loan at Renault, remains under contract and can be called back should Ricciardo leave. The problem for Sainz is that Verstappen is on a long-term deal for the other Red Bull seat, so if Ricciardo stays his options appear limited to Renault or McLaren. The former is not a bad deal, given it is a works team that has been on the rise since it returned in 2016, but he will not be the only driver keen on a Renault seat.

With Bottas impressing Mercedes so far

**"RAIKKONEN MAY
BE FORCED INTO A
McLAREN REUNION
OR RETIREMENT"**



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KEY TO DRIVER MARKET

in 2018 and doing what he can to earn a new deal, Mercedes' junior driver Esteban Ocon is likely staring at a third year with Force India. The customer team, however, is enduring production problems with new parts that seem to be traced to a lack of budget. There are two possible consequences here. Mercedes could be tempted to get more involved to steady that ship and use it as a full-on vessel for its young drivers, by partnering Ocon with Formula 2 championship leader George Russell (see right). The other is that, either as a result of greater Mercedes involvement or a lack of faith in Force India's prospects, the well-backed Sergio Perez makes a move.

Perez would naturally be interested in Renault given it is a works team. Renault could also be interested in a driver who has compared very well to its current star Nico Hulkenberg, and also brings a financial incentive. While Marko expects Renault to stick with Hulkenberg and Sainz, it is not necessarily a given.

If Force India did not appeal and the Renault door is closed, Perez may look at Haas or Sauber. Both teams have close links to Ferrari and are producing performances that suggest their respective relationships are working well. Perez would be appealing to both given he has a strong reputation as a leading midfield driver, as well as

the aforementioned budget benefits.

Sauber looks like it will have at least one seat available given Leclerc appears Ferrari-bound. That seat is almost certainly not going to be free until 2019 — while that sounds obvious, it was a silly-season rumour that was dismissed in Austria. Sauber team boss Frederic Vasseur says there has been no discussion with Ferrari over Leclerc taking Kimi Raikkonen's seat during the current F1 season, after rumours emerged in the build-up to the Austrian GP suggesting Ferrari president Sergio Marchionne wants to fast-track Leclerc's promotion.

One big factor is Fernando Alonso's future. If he doesn't want to stay in F1, McLaren will be struggling for a replacement. A Stoffel Vandoorne-Lando Norris partnership does not seem to appeal, but tempting Ricciardo, Sainz, Bottas or Raikkonen — all of whom have been linked to the Woking squad — will be an extremely difficult task given its current struggles.

The only driver for whom that would not represent career stagnation is Raikkonen, who may well be faced with a choice between a one-year McLaren reunion and retirement. If the driver market reaches that conclusion, F1 will have done very well indeed.

SCOTT MITCHELL

Will Russell be on the grid in 2019?

FORMULA 1

British talent George Russell believes that he is "ready for Formula 1" after a run of strong performances that has led to the Mercedes junior driver taking the lead in the Formula 2 points standings heading into this weekend's British Grand Prix round.

Russell won his second feature race in a row from pole in Austria last weekend (below), following his Paul Ricard success the weekend before, and has usurped Lando Norris as the man to beat in the F1 support category, with four wins in total.

"If an opportunity arose with anybody at Silverstone this weekend, I'd feel ready, prepared," said the 20-year-old Brit, winner of the 2014 McLaren Autosport BRDC Award. "I've done extensive simulator work with Mercedes over the past two years. I feel confident that I can live up to the challenge. I won the GP3 championship last year and that showed I was capable. I think Mercedes believe in me."

"Now we're at the highest level of junior motorsport, it's the best young drivers in the world, it's definitely putting pressure on the guys who are managing my situation to hopefully find something for me next season."

Russell believes the recent influx of young drivers being given a chance in Formula 1, and performing to a high standard, is paving the way for drivers like himself. "I think what Charles [Leclerc] is doing now is a great example of how competitive some junior series are," he said. "He won GP3 and then F2, and I won GP3 last year and am currently leading F2. From my personal selling point of view let's say, there's a very good example in Charles to show what he's capable of and what we're doing this year."

Russell's upturn has been helped by a base set-up improvement at his ART Grand Prix team before Paul Ricard.

JACK BENYON



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Porsche sets its Nordschleife mega-lap

NÜRBURGRING

The long-standing fastest lap time around the 12.94 miles of the Nürburgring-Nordschleife has finally been beaten. The 6m11.13s pole position mark for the 1983 Nürburgring 1000Km set by Porsche driver Stefan Bellof 35 years ago has been obliterated. Fittingly, it was achieved by another Porsche driven by a big fan of the late German driver.

Timo Bernhard lowered the unofficial record for one of the greatest challenges left in motor racing to 5m19.546s aboard the Porsche 919 Hybrid Evo. That mark aboard the uprated LMP1 car, which incorporates more power, active aerodynamics and side skirts, is nearly 52s quicker than the late Bellof's time aboard his works Rothmans Porsche 956 Group C car.

The five-time winner of the Nürburgring 24 Hours needed just three flying laps aboard the 1100bhp 919 Evo to get down to the 5m19s early last Friday morning. An installation run was followed by what the German driver called a "familiarisation lap", which resulted in a 5m31.899s. He stopped the clocks at 5m24.375s on his first proper run, before going again and knocking nearly five seconds from that mark.

"I wanted another run to kind of clean up

my lap," said Bernhard. "I knew I could find a few seconds. I'm sure I could have found a bit more time if I'd had another 10 runs in the right conditions, but the temperatures were rising, so I think we did pretty much the maximum in the time we had. It was a clean lap; I was pretty happy with it."

Bernhard tested the Evo version of the 919 on the Nordschleife last month, but preparations for the record bid started at the beginning of the year.

"I've been in the simulator since January, and as well as the test I did a day at the track with a 911 GT2 RS road car with my race engineer," explains Bernhard. "That was important to work out a strategy."

"You can't just take a prototype and drive it the same way as a GT3 car. All the reference points changed because the speeds are so much higher — I was seeing the Nordschleife from a new angle. You can't use the kerbs — they are pretty old-style and it wouldn't be a good idea to go over them in a prototype."

Nor could the Evo go down into the banked section of the Karussell or the mini Kleines Karussell further around the lap.

"If we'd raised the rideheight, we'd have lost downforce," said Bernhard. "We would have gained time in those sections, but lost time around the rest of the lap. It

was all about finding the best balance for 90% of the lap."

Bernhard stressed that he doesn't want to be compared with Bellof, a driver whose career and life he celebrated with a lookalike helmet at the Spa World Endurance Championship race in 2015. "I think he was one of the best ever and what he did in a Group C car without all the technology we had was phenomenal," said Bernhard. "And he did his time with other cars on the track!"

He was touched, however, to get a telephone call from Bellof's 93-year-old father, Georg, on the evening of his record run. "I've been in touch with the family over the years and Georg phoned to say well done and that he was proud of me," said Bernhard. "That was very touching."

Bellof's lap record for a circuit layout that was only fleetingly used for international racing between the demolition of the old pits loop and the completion of the Nürburgring Grand Prix Circuit remains intact, however. Lap records are set in races, of course, so that means the 6m25.91s he posted the day after his qualifying run is the time that is in the record book.

GARY WATKINS

➔ P17 OPINION, EDD STRAW

Wolff takes over as Venturi team boss

FORMULA E

The Venturi Formula E squad will arrive at the season-four New York finale with a new team principal – ex-DTM racer and Williams Formula 1 test and development driver Susie Wolff.

The Monaco-based electric vehicle manufacturer has been executing a recent expansion plan, which included launching its Next Gen young electric driver academy, agreeing to supply the incoming HWA squad with a Gen2 powertrain and signing ex-F1 racer Felipe Massa for the 2018-19 season. Venturi CEO and founder Gildo Pastor explained that hiring Wolff marked the start of the next phase of the team's development and said it was a "key moment in the history of the group".

Wolff has been "working behind the scenes for quite some time" to assess Venturi's strengths and weakness and will head to New York with the

goal of "being fully operational" and forming a plan to improve the performance of the team – which is seventh in the 2017-18 championship on 56 points and is still yet to score an FE win – ahead of season five.

"It's a team with so much potential," said Wolff, who is FE's first female team principal. "Everyone is very committed to increase on-track performance. I've got a lot of respect for Gildo – the reason it came together was we had quite some discussions about me driving for his team. That's how the initial contact happened."

"I don't define myself because of my gender. It is a great challenge for me, and I've got my work cut out, but I'm fully committed for the team and its success. I founded my own initiative – Dare to be Different – to increase the talent pool of women entering the sport. If my new role can continue to inspire, then that is a win-win."



NEW RACE IN CHINA

One of the two 2018-19 races listed as TBA on the recently released calendar will take place in the Chinese city of Sanya on March 23 2019.

Sanya sits on the southern tip of Hainan Island and is in the Chinese mainland-controlled Hainan province. The calendar update is still

subject to the approval of the FIA. The track layout will be revealed at a later date, but it is expected to be placed against the backdrop of Haitang Bay.

In other FE news, Super Formula driver James Rossiter has joined the Techeetah squad as a development driver.

ALEX KALINAUCKAS

Fears over 'watered-down' 2021 F1 rules

FORMULA 1

Red Bull fears that Formula 1's overhaul for 2021 is already being "watered down" and may end up with "vanilla" regulations, says team principal Christian Horner (below).

F1 is planning a major shake-up that involves new technical and sporting

regulations, a governance restructure, a cap on the money teams can spend and revision of how funds are distributed to them.

Responding to a question about Liberty Media's performance since it assumed control of F1's commercial rights in late 2016, Horner praised its work in improving the experience for fans, but called the planned 2021 changes "by far" the biggest challenge it will face. "The risk I see is if the FIA and promoter aren't fully aligned we end up with compromises and vanilla-type regulations," he said. "There needs to be a real clarity going forward, as to what the sport is going to be, what the regulations are going to be."

"Liberty have paid \$8 billion for this sport they've got to turn into something more attractive [with] fantastic racing. There are cost issues, there are revenue issues that need dealing with. The FIA, as the governing body, have to be fully aligned with that. What concerns us are discussions over where things are going with engines, where

things are going with chassis regulations, is everything seems to be getting watered down somewhat from the initial concept."

The viability of a cost cap has been under scrutiny ever since Liberty officially tabled it to teams in April this year. A final version of the engine technical rules was expected this week, while the emphasis on the cars themselves has been to improve overtaking.

Mercedes motorsport boss Toto Wolff said: "Traditionally if you look at the objectives, Christian and mine are maybe a little different. We would like a bit more emphasis on the power unit, Christian on the chassis. That maybe changes [now Red Bull is partnering with Honda from 2019]."

"Transparency and a clear path are important. We need to know what's happening in 2021, what the regs look like on the power unit and chassis side, in order to get things moving and avoid a cost escalation at the last minute."

SCOTT MITCHELL





STAT

11

Formula 1 wins scored by
Barrichello from his
322 GP starts

SRO/HECQ

Barrichello to race Mercedes in Spa 24

SPA 24 HOURS

Rubens Barrichello is heading back to Europe for a second time in two years. Little more than 12 months after making his Le Mans 24 Hours debut, the Brazilian V8 Stock Car Championship regular will make his maiden assault on the Spa enduro.

The 46-year-old Brazilian, who still holds the record for the highest number of grand prix starts, will race a factory-supported Mercedes-AMG GT3 for the British Strakka squad in the Spa 24 Hours. He will team up with fellow V8 Stock Car driver Felipe Fraga

and Mercedes DTM reserve Christian Vietoris in the blue-riband round of the Blancpain GT Series on July 28-29.

Barrichello never managed to win the Belgian Grand Prix, but Spa still holds happy memories for him. "It was where I got my first pole position in Formula 1 [with Jordan in 1994]," he said. "It will be great to race with my good friend Felipe and I am looking forward to sharing the car with Chris."

Meanwhile, two-time Le Mans winner Timo Bernhard will make a return to the 24 Hours at Spa after an absence of five years.

Last year his Team 75 Bernhard operation

took part in the race, but Bernhard opted not to drive. Now, with Porsche's LMP1 programme in the World Endurance Championship over, Bernhard has decided that it's time to try to complete his set of victories in the major 24-hour enduros around the world, having also won at the Nurburgring and Daytona.

Bernhard, who will share his Porsche 911 GT3-R with Laurens Vanthoor and Earl Bamber, said: "I want to have a good race this year and see what happens, but winning Spa is definitely a goal."

GARY WATKINS

New F3 set to feature GP3 engine in 2019



FORMULA 3

The new International Formula 3 spec car for next season looks set to feature the engine and gearbox from the current GP3 Series racer.

F3 replaces GP3 on the Formula 1 support bill next season, but the latest news provides further credence to paddock feeling that the new F3 concept will be GP3 in all but name.

The existing Dallara

GP3/16 uses a 3.4-litre, naturally aspirated V6 engine producing 400bhp, and driven through a six-speed Hewland gearbox. The FIA has stated that the new F3 would feature 350bhp powerplants, and Autosport understands that the Mecachrome would be 'turned down' to meet this target.

Sources indicate that the monocoque will be new, with the latest side-

intrusion standards and a steel halo weighing approximately 15kg, compared to the titanium halo on the Formula 2 car.

Constructor Dallara is believed to be working on the aero and chassis upgrades required.

The future of the current F3 concept in Europe is still unclear, although moves are still being made to revive the F3 Euro Series in support of the DTM.



F2 standing starts parked

FORMULA 2

Formula 2's clutch problems led to the series adopting safety car starts for last weekend's Red Bull Ring round, and they will continue for this week's British Grand Prix support slot at Silverstone.

The series managed to arrange extra time on the end of its practice session in Austria for standing starts. After stalls for two drivers – Nicholas Latifi and Louis Deletraz – the decision was made to implement starts behind the safety car.

As part of its announcement, F2 stated: "FIA has decided that for safety reasons the Formula 2 formation laps of rounds six and seven at Spielberg and Silverstone will start behind the safety car and follow procedures set out in article 39.16 of the F2 sporting regulations."

But using 'safety reasons' is an odd one. Before last weekend, there had been 10 starts with F2 cars prone to stalling and drivers warning of the dangerous effects of what could happen – just like the recent Norisring Formula 3 crash, where Ameya Vaidyanathan smashed into the stalled machine of Dan Ticktum.

Consensus among drivers and teams was that the F3 crash had sharpened the teeth of the FIA in cracking down on the stalls, and that the series needed time between Silverstone and the subsequent Hungaroring round to fix the issues.

F2 race director Charlie Whiting (right) insisted that the F3 crash wasn't the reason for the call. "It's nothing to do with the accident in Norisring," he said. "It's all about what we saw in Paul Ricard [the

same weekend as the Norisring] where three cars stalled at the beginning of each race. I just didn't want to run out of luck, because I think we've been lucky. If there had been an accident, you could argue it would have been difficult to defend."

Reaction to the decision to start behind the safety car was mixed. Drivers who have mastered the start procedure complained, because they had lost an advantage. In the other corner, the drivers who had suffered from stalls were in favour.

One thing the starts did not detract from was the racing. George Russell passed Lando Norris at Turn 1 at the sprint-race start, and Antonio Fuoco (10 positions gained) and Roberto Merhi (eight spots made up) did plenty of overtaking.

JACK BENYON



IN THE HEADLINES

THIRD DRS FOR BRIT GP

A third DRS zone has been added to Silverstone for this weekend's British Grand Prix. It will be placed on the start-finish straight, and means the drivers can take the first two corners – Abbey and Farm – with the DRS open. Each of those corners is flat-out on low fuel. It is the first time such an option has been available since DRS was implemented in 2011.

OZ GP MOVES FORWARD

The Formula 1 season will kick off a week earlier in 2019, with the Australian Grand Prix announcing a March 17 date. The move means the race avoids clashing with other major Melbourne attractions that happen at the same time of the year.

F1 TEAMS WANT TEST CUT

F1 teams are pushing for less testing in the wake of the expansion of the race calendar, which now stands at 21 grands prix. There are currently two four-day pre-season tests, and two two-day in-season tests. The teams want a single five-day session pre-season, and a two-day rookie-driver test in-season. There has not yet been any formal discussion with the FIA on the matter.

BAUMANN IN ASTON

Former Blancpain GT and European GT3 champion Dominik Baumann will replace Alex Brundle in the R-Motorsport Aston Martin squad for the Spa 24 Hours and the remainder of the Blancpain Endurance Cup. Austrian Baumann will race the #62 Vantage, which has been campaigned this year by Maxime Martin and Marvin Kirchhofer. Brundle is now focusing on R-Motorsport's 2019 programme.

HONDA'S SPA 24 DRIVERS

Honda-contracted drivers Esteban Guerrieri and Bertrand Baguette will spearhead the Spa 24 Hours debut of the NSX GT3 later this month. Argentinian Guerrieri is a WTCR race winner for Honda, while Baguette represents the marque in Japan's Super GT series. The car, run by JAS Motorsport, will be in the Pro-Am class, so two 'bronze'-rated drivers will join Guerrieri and Baguette in the line-up.

FITTIPALDI ON TRACK

Pietro Fittipaldi reckons he is on target to return to the IndyCar Series for the Mid-Ohio round at the end of this month as he recovers from breaking both his legs in the Spa World Endurance Championship round in May. Fittipaldi got back behind the wheel last week when he kartered with his brother Enzo and uncle Max Papis. He is also planning tests in a US F4 car and his Dale Coyne Racing IndyCar to prepare.



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Chile and Japan set to join WRC in calendar overhaul



WRC

The World Rally Championship calendar looks set for an overhaul, with the potential for three new events in the next two seasons.

Chile's place on the 2019 schedule is all but certain, but Autosport's sources have revealed that Japan will also join, provided its November candidate rally runs without any major issues. Rally Japan's WRC return for the first time since 2010 (above) would mean that five of the anticipated 14 rounds next season will be long haul.

Chile is the 14th round for 2019, and Japan is tipped to replace an existing

European counter, with the most likely loser tipped to be Corsica. A further European round is likely to be jettisoned to make room for the Safari Rally, which is highly likely to be back for 2020.

With Rally Turkey returning this season, that would mean a total of four new events in just three seasons. The new rallies are at the heart of WRC Promoter's development for the series.

One source told Autosport: "What we need now is for everybody to be getting something from the championship. The teams have been by paid by the promoter for Turkey; it's part of the agreement

[with Turkey] that there's a fee for them to cover some of the logistics.

"The promoter has to make that happen – it's keen to make a new funding model work where rallies have to pay their way, just as they do in Formula 1. It will be the same agreement with Chile, Japan and Safari when they arrive on the roster. The promoter has to have the ability to make a business out of the championship."

The Tour de Corse organisers declined to comment on rumours that this year's event could have been the last WRC action on the French island.

DAVID EVANS

Piquet hitting form for Silverstone round

GP3

Nelson Piquet Sr believes his son Pedro has regained his confidence in the GP3 Series heading into this weekend's British Grand Prix support round, after a difficult time in Formula 3.

Piquet, 14th in the European F3 standings in 2017, had a tricky start to the season in GP3. But he battled for race wins in Austria last weekend, and was narrowly

defeated by Jake Hughes in the sprint race. He is sixth in the points, the second highest of the Trident drivers despite being the squad's only GP3 rookie.

"This year we left Pedro in Europe completely alone with no manager, no nothing breaking his balls," said Piquet Sr. "He is doing everything and he's turned from a kid into a man. For me, that's working."

"I'm pleased with how

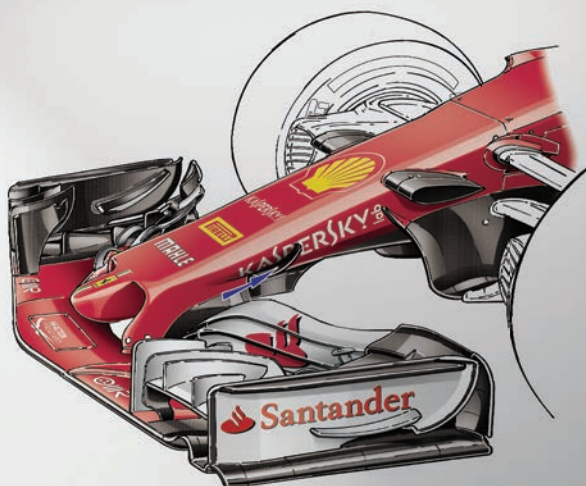
everything is going, how the team is working and how the four drivers are working together," said Piquet Jr, who says unlocking qualifying pace is key to the next step.

"The car is really good in the race and I'm always attacking someone. I think Silverstone will be the biggest challenge. It's a really long circuit and you don't have a lot of chances to put the perfect lap together."

JACK BENYON



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MERCEDES UPGRADE PACKAGE

Mercedes introduced a major upgrade package for the Austrian Grand Prix, including a new rear wing and endplate.

It's very similar in concept to what McLaren uses in that the transition between the lower narrower section to the upper wider section of the endplates has

now become a louvred panel, helping to expedite the airflow from below the undersurface of the rear wing.

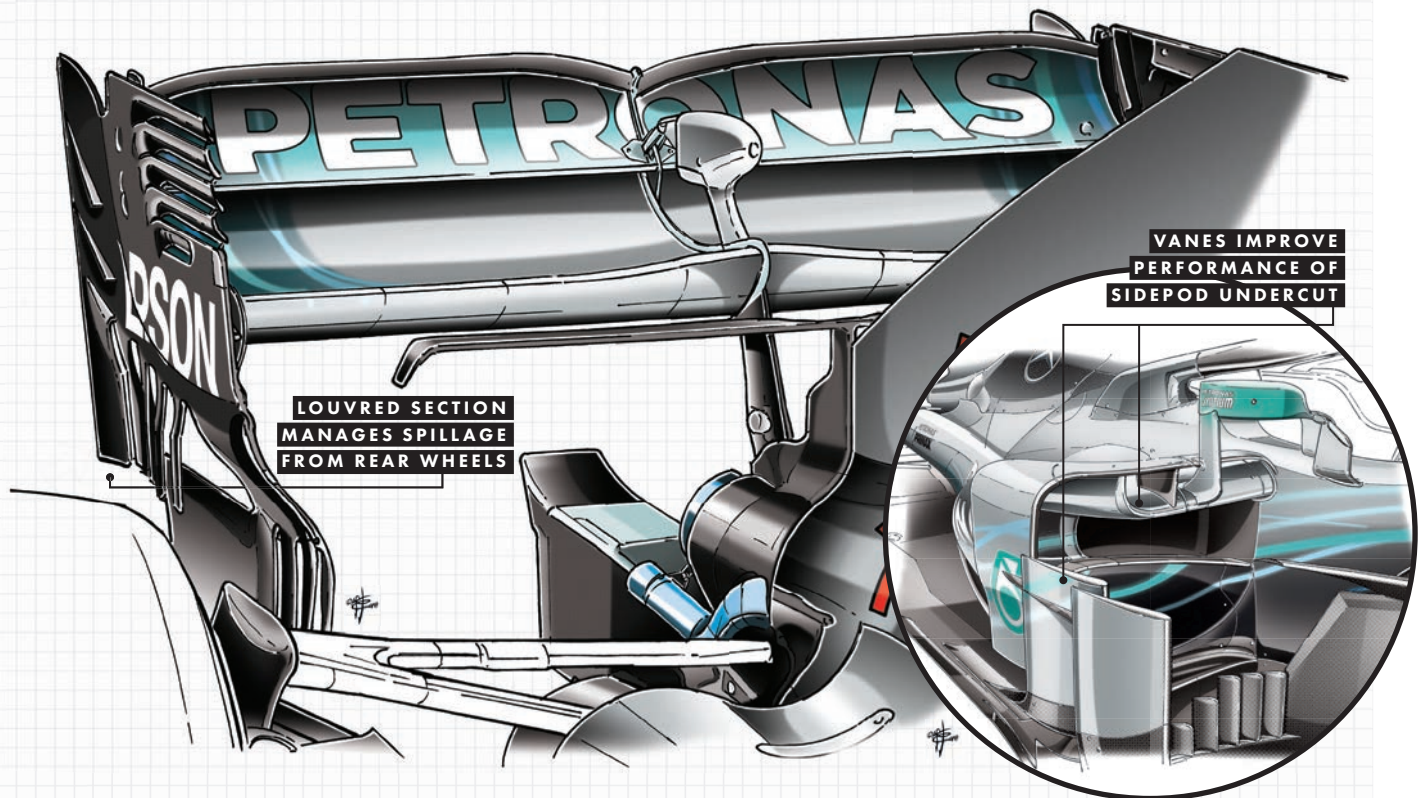
It also manages the airflow spilling around the rear tyres, reducing the negative effect this turbulent airflow has on the rear wing's undersurface. Both of

these changes will make the rear wing more efficient.

Mercedes also introduced a new vane package around the leading edge of the sidepod. This is much more complicated than the previous version, and visually comes from the same philosophy as the Ferrari sidepod-inlet system.

The objective of this package is to improve the performance of the sidepod undercut. Making this area work more efficiently improves just about every other area of the car. The front wing, the underfloor, the Coke bottle and in turn the diffuser will all benefit.

GARY ANDERSON



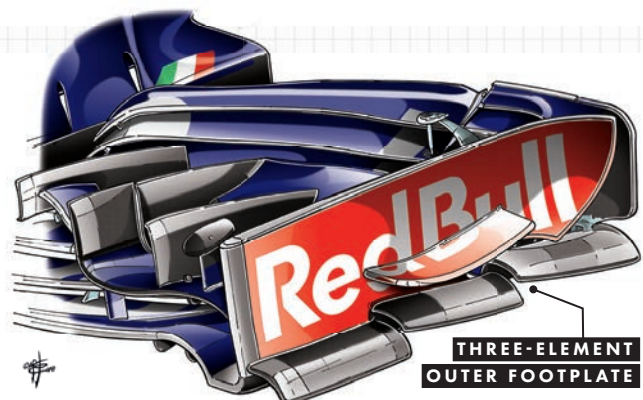
TORO ROSSO FRONT WING

Toro Rosso introduced a new front-wing endplate for the Red Bull Ring. The outer footplate is now three elements, with what could be called a slot gap between each one.

The original one-element version acts as a sealing device to reduce the amount of airflow that would normally spill under the wing endplate. It does this by working in conjunction with the airflow that is being displaced around the outside of the front tyre as the tyre rotates.

But when the car is under braking or, more importantly, in roll mid-corner, this part of the endplate gets very near to the ground. In Austria, it was this area of the wing assembly that hit the sausage kerbs. This means airflow through this tunnel gets disturbed and basically blocked off, so it makes the endplate sealing very inconsistent.

Red Bull runs its endplate tunnels at a reasonable angle (front up), which allows more consistent airflow. Toro Rosso's



will do the same since it will allow airflow to be pulled in through the slot gaps when the endplate is close to the ground. It's a small development and probably

impossible for the driver to feel, but it will improve the consistency of the airflow structure around the front tyres.

GARY ANDERSON



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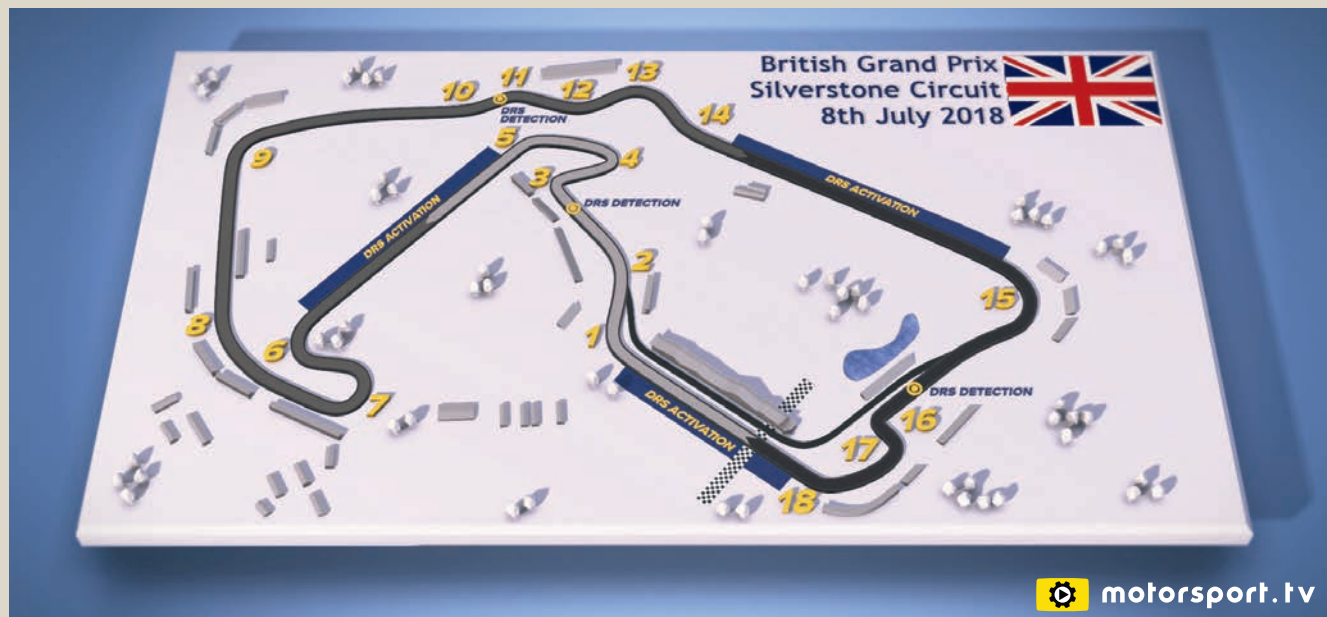
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F1 BRITISH GRAND PRIX PREVIEW



UK START TIMES

FRIDAY

FP1 1000 FP2 1400

SATURDAY

FP3 1100 QUALIFYING 1400

SUNDAY

RACE 1410

LIVE ON SKY SPORTS F1 & CHANNEL 4

BBC RADIO 5 LIVE 1400

DRIVERS' CHAMPIONSHIP AND CONSTRUCTORS' CHAMPIONSHIP SO FAR

1	Sebastian Vettel	146
2	Lewis Hamilton	145
3	Kimi Raikkonen	101
4	Daniel Ricciardo	96
5	Max Verstappen	93

1	Ferrari	247
2	Mercedes	237
3	Red Bull	189
4	Renault	62
5	Haas	49

TYRE ALLOCATION

SUPERHARD

HARD

MEDIUM

SOFT

SUPERSOFT

ULTRASOFT

HYPERSOFT

INTERMEDIATE

WET



TRACK STATS

LENGTH 3.660 miles

NUMBER OF LAPS 52

2017 POLE POSITION

Lewis Hamilton 1m26.600s

POLE LAP RECORD

Lewis Hamilton 1m26.600s (2017)

RACE LAP RECORD

Lewis Hamilton 1m30.621s (2017)

PREVIOUS WINNERS

2017	Lewis Hamilton	Mercedes
2016	Lewis Hamilton	Mercedes
2015	Lewis Hamilton	Mercedes
2014	Lewis Hamilton	Mercedes
2013	Nico Rosberg	Mercedes
2012	Mark Webber	Red Bull
2011	Fernando Alonso	Ferrari
2010	Mark Webber	Red Bull
2009	Sebastian Vettel	Red Bull
2008	Lewis Hamilton	McLaren

The best British GP ever? In 1969 Jochen Rindt (Lotus) battled Jackie Stewart (Matra) for over 60 laps before the Austrian (leading here) needed a tyre change.



THEMES TO WATCH

MERCEDES READY TO RECOVER

While the Austrian GP was a disaster, the major aerodynamic package Mercedes introduced was hugely successful. The configuration of Silverstone should suit the car, and if there aren't any more strategic curveballs a one-two is on the cards.

HAMILTON'S RECORD?

Lewis Hamilton currently has a share in the record for most British Grand Prix wins with five, along with Jim Clark and Alain Prost. A sixth win would make him the unquestioned King of Silverstone, a decade on from his famous first victory in heavy rain in 2008.

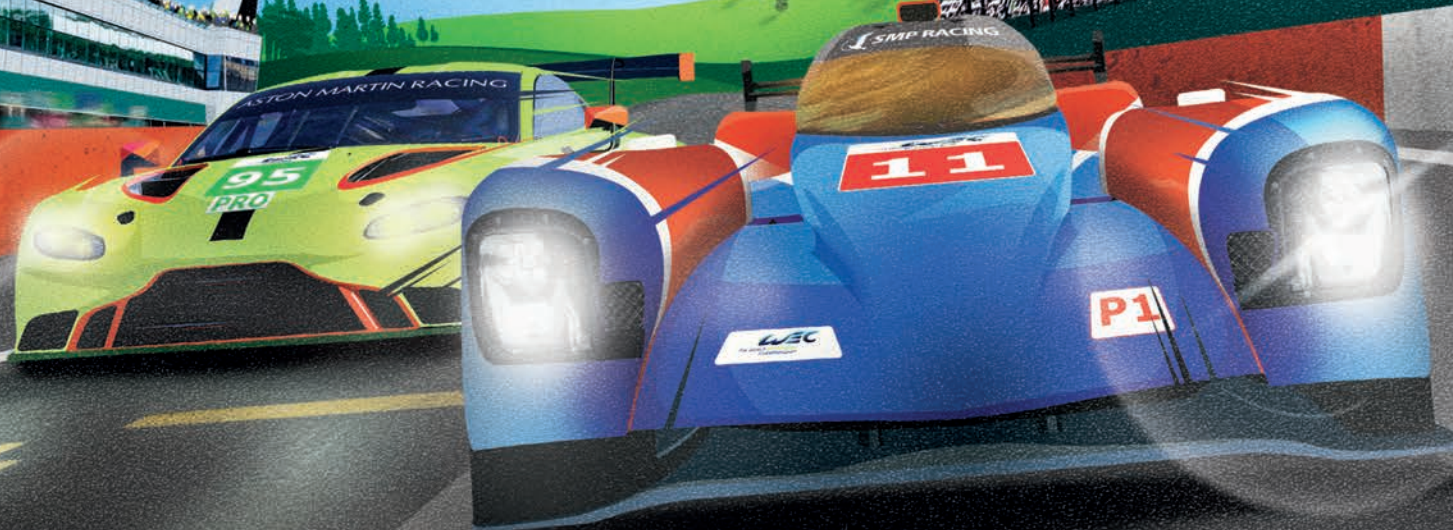
TEST FOR FERRARI

Silverstone has not been a happy hunting ground for Ferrari, which hasn't won the British GP since 2011. It's also not been series leader Sebastian Vettel's strongest track of late. He goes into the weekend with a one-point lead. If he can hold onto it, that will represent a successful weekend for him and Ferrari.

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RECORD BREAKERS

Porsche has scored a remarkable publicity coup by crushing the unofficial Nurburgring Nordschleife lap record — something F1 should be doing

EDD STRAW

Formula 1's mission statement is "to unleash the greatest racing spectacle on the planet". So to see Porsche and, by association, the World Endurance Championship that the marque has forsaken steal its thunder by unofficially breaking Stefan Bellof's legendary Nurburgring Nordschleife lap record will have stung.

The Porsche 919 Hybrid Evo is, to co-opt another of F1's marketing slogans, a brilliantly conceived piece of "engineered insanity". The feat of lapping almost a minute faster than the record at the 'Ring is exactly what F1 not only should be doing, but explicitly wants to accomplish.

It ticks all the boxes. It's a hit on social media, it showcases Porsche's technical brilliance, it is living proof of how fast a racing car can be, and it appeals to the gaming fans that motorsport is so keen to draw in thanks to the Nordschleife's reputation (even to those who pay no attention to racing) as the ultimate track.

Oh, and it was just a brilliant thing to do for its own sake. What's not to like about taking an already stunningly fast racing car, piling on more downforce, removing some of the power restrictions, and then taking it on a record-breaking tour? Hats off to Porsche for doing something brilliant. Now, the

"FOR ALL F1'S ATTEMPTS TO PRESENT ITSELF AS EXTREME, IT LACKS THE VISUALS TO MATCH"

question of how fast a grand prix car can go around the Nordschleife is one that needs to be answered.

In 2007, BMW Sauber did its own publicity-seeking demo run with Nick Heidfeld lapping the full track. It wasn't a record attempt, and as you can see from the onboard he's driving relatively conservatively but still pushing on when he can. The lap time released was 8m34s, but that was including the Grand Prix track, which counts for around 90s of that.

Porsche's lap was clocked at 5m19.5s so, given that Heidfeld probably lapped the Nordschleife itself in, by a conservative estimate, seven minutes, that should be within striking distance. The top speed claimed by BMW Sauber back in 2007 was 171mph (50mph down on the Porsche), and the onboard footage shows Heidfeld was attacking less than Timo Bernhard's brilliant lap in the Porsche, so the record could surely be broken — doubly so given that today's cars are quicker than 2007 F1 machines.

The Nordschleife is a track that transcends motorsport. It's a Mecca for car enthusiasts and, thanks to its presence on multiple racing games and the countless videos of it posted online, it's the gold standard for driving challenge. F1 keeps talking about wanting to draw in new fans; well, here's the perfect way to do it.

Mercedes team boss Toto Wolff was asked if he could imagine attempting the record with a grand prix car. He certainly could and, like most in the F1 paddock, loved the idea.

"It's obviously incredible, what they have achieved," said Wolff, who has plenty of experience of the Nordschleife. "It's like flying a spaceship around the track. It would be interesting to put a Formula 1 car on the Nordschleife and see what it does, but that's pretty more my spin than a realistic idea that somebody's going to finance."

And there's the rub — even though the cars exist, it would require resource to be put into such a project. But maybe a manufacturer could be tempted to throw in a few extra marketing dollars to make it a reality.

Ideally, the car should be as close to the current regulations as possible. The Porsche 919 Hybrid Evo is an unrestricted development of the LMP1 machine, unencumbered by limits on hybrid energy. F1 cars, too, are restricted on how much electrical energy can be drawn from the battery and deployed by the MGU-K per lap.

The 4MJ limit, however, is designed for F1 circuits that stretch from 2.074 miles (Monaco) to 4.352 miles (Spa). At 12.9 miles, the Nordschleife is not a normal circuit, so ideally more energy should be deployable per lap — provided, of course, it's possible to harvest enough, which could prove to be a challenge at a circuit that has a lot of gentler braking events.

The unusual track configuration also raises the question of safety. Modern F1 cars are supremely safe — just as LMP1 cars are. But the nature of the circuit means there is risk involved with lapping at that kind of speed, and it would be wise to avoid getting into an escalating war of trying to break unofficial records. But for a one-off attempt to show everyone that F1 cars are the fastest cars on the planet around a track like that, it is irresistible.

Regardless of the detail of the arguments and complaints about modern grand prix cars, for all of F1's attempts to present itself as extreme, it just lacks the visuals to match. These cars are stunningly fast, and difficult to drive with cutting-edge technology. What F1 lacks to the wider world are the raw, rough edges that best showcase that. The 'Ring is the roughest of rough edges in a sanitised world.

There's never going to be another grand prix on the Nordschleife. But a record run there would be the living embodiment of engineered insanity. ✎



FEARING THE BRITISH GP

Williams has a glorious history on home soil, but this year's British Grand Prix promises to be a painful experience for a team grappling with failure

ADAM COOPER

It's impossible not to associate the British Grand Prix with Williams, given the success the team has enjoyed at Silverstone over the decades. And it's not a question of the distant past, of the team's first pole position and win in 1979, or of the gloriously crowd-pleasing triumphs of Nigel Mansell and Damon Hill.

Just three years ago, Felipe Massa and Valtteri Bottas qualified third and fourth at Silverstone and, having jumped ahead of the works Mercedes duo, they initially ran at the front of the field. It was an extraordinary sight.

Since then the team's fortunes have veritably plummeted, and this year's FW41 has consistently been the slowest car on the grid. Thus far, the only points have come with Lance Stroll's eighth place in a high-attrition race in Baku, and the team is firmly last in the constructors' championship. New parts gave some hope last weekend in Austria, and further updates are due for Silverstone this weekend. Nevertheless, just getting off the back row will be an achievement for Stroll and team-mate Sergey Sirotkin.

"I love Silverstone and I love going there," says deputy team principal Claire Williams. "But I'm dreading it because we're going to let our fans down, and that's excruciatingly painful,

"JUST GETTING OFF THE BACK ROW WILL BE AN ACHIEVEMENT FOR STROLL AND SIROTKIN"

and Silverstone is going to show up our weaknesses and our failures even more because of the type of circuit it is.

"So I am dreading it; I'm dreading it for everybody. But we have to go through the pain to get out the other side."

So what's gone wrong? It's a hugely complex conundrum, and one that the team has been struggling to make sense of. The real challenge is to understand why the 2018 car was born so uncompetitive when all the numbers suggested it should work. If Williams can't identify where the design decisions went wrong, it can't expect its next car to be an improvement.

"The only way to get out of this is to go through it slowly and methodically, and to leave no stone unturned," says Claire Williams. "It's not just throwing things in there and hoping for the best. First off, when you've got an issue you've got to analyse exactly what it is, and then put a fix in place. During that process inevitably you'll find other fires that you've got to put out along the way.

"It's a really difficult piece of work, getting an F1 team into the shape that you need it to be in in order to be successful. People can underestimate that. I think when you do have problems people have an expectation that it's a relatively quick fix, and unfortunately for the problems that we have at the moment there's not a quick fix. I think it's going to take us a while to get ourselves out of this."

It's not easy for those who have been at Williams through the recent good times, and who now have to contribute to that process of finding out what's gone wrong. There's nowhere to hide.

"It's difficult, there's no doubt about it," says head of vehicle performance Rob Smedley. "It's certainly one of the most difficult situations that most of us have ever been in in F1, to see a team like Williams struggling like this.

"It's about now putting together objective data, and doing things as calmly and as rationally, but with as much speed as we possibly can, to sort the situation out. You've got to man-up, there's no point in shying away from it. We have to take responsibility for the project, that the project has not gone as we would have wanted it to. And then we move forward as a group."

Managing its human capital becomes a challenge when a team finds itself in crisis. Inevitably there are departures, enforced or otherwise, and when important engineering figures leave — Williams have recently lost chief designer Ed Wood and head of aero Dirk de Beer — it brings difficulties as well as opportunities.

"We're going to make sure that we've got all the right people in all the right places," says Smedley. "And they're working coherently, so there are no walls around, or silos of performance or information.

"In this sport there's never a silver bullet, there's never one person that changes everything. That's probably the outside perception of what F1 is about, but it's not. It's about groups of people. Any one single person can't make that difference, but a group of people can."

"I always equate an F1 team to an orchestra with a thousand parts," says Williams. "And you need to get every part right."

The future is where the focus must lie. Inevitably Silverstone this weekend will conjure up memories of glorious July days of past decades, of Clay Regazzoni, Mansell and Hill. The trick is to not allow that history to become a burden.

"You can't keep looking backwards," says Smedley. "Either to the immediate past, or to the legacy past. You've got to look forward. I'm a great believer that your past results are meaningless in F1, and they can be the past results of last week, it doesn't matter.

"Whatever we've done in the past, whatever we've achieved in the past, the legacy, whether that's recent legacy or less recent legacy, should be a motivation for us. But it shouldn't be our *raison d'être*. It's about looking forward." ❧

YOUR SAY

Formula 1 has totally failed to acknowledge or change the medieval practice of using an earthmover to retrieve cars

WILL GOODHAND

Lauda talks sense, but only on his terms

I agree with Niki Lauda when he said in your interview with him (Fifth Column, June 28), “for me this is the most important thing – the drivers should have total freedom to drive: no restrictions. If we live in a world of ‘stewards’ investigations’, in the minds of these guys you slow them down: ‘If it try to pass and I hit him I’ll get penalised...’”. All these stupid rules have to disappear – these guys are the best, so let them race, as they did in the past.”

I do not agree with him when he said, after the first-corner incident in France when drivers were on cold tyres and brakes and Sebastian Vettel made an error without any deliberate intent, “why Vettel only gets five seconds for this enormous mistake I don’t really understand. It is too little. There is more time they can give them. That is what I mean. Five seconds is nothing. He destroyed the whole race for himself and Bottas.”

It appears that Lauda believes his first comment only applies as long as no driver has the temerity to challenge a Mercedes.

ARitemann

By email

Only way is upwards for future of F1 safety

So the otherwise brilliant Nigel Roebuck drones on about the halo for the millionth time (June 28). And the ever-quotable Niki Lauda claims F1 is too safety-obsessed because of post-Jules Bianchi litigation fears. This would be a laughable assertion were it not so tragic – F1 has (perhaps for the reason Lauda states) totally failed to acknowledge or change the medieval practice of using an earthmover to retrieve cars.

It’s time the phalanx of Bernie-era leftovers in race control used their imagination to solve this outrageous hazard. A virtual safety car is obviously no guarantee of a repeat horror; the use of virtual earthmovers would be. The drone that should be materialising is the sound of a coordinated group of airborne devices, each trailing a cable to be attached to the car by marshals to lift it to safety. Or if drones are too avant-garde for our technical showcase of a sport, then a helicopter would perhaps suffice. Come on airborne tech companies, F1 is an



amazing shop window – get involved! Until this issue is addressed, the notion of F1 as too safe is just a sick joke.

Will Goodhand

Camden, London

Fan’s British Grand Prix farewell

Great Roebuck/Lauda article last week. I agree with everything, every word and syllable. Not that the FIA will – do they ever? Do they ever listen to fans, drivers and experts like Lauda?

I first attended the British Grand Prix in 1983 (above). I loved the noise and speed of the cars, so much that I have not missed the British GP for 35 years. This weekend I am attending my last BGP. I hate the halo and the PC mentality F1 has become.

I dislike the boring qualifying and have not watched any Saturday ‘Q’ this year. I dislike the muted sound of the engines. I intensely dislike the FIA. As Lauda says, MotoGP is far more dangerous – but they do it and the fans love it.

F1 is a tragedy right now, except I’d agree Liberty really is on the right track (no pun intended). Hope they can overhaul the current situation. If they do, I might go back in 2021.


Clive Drake

Langham, Essex

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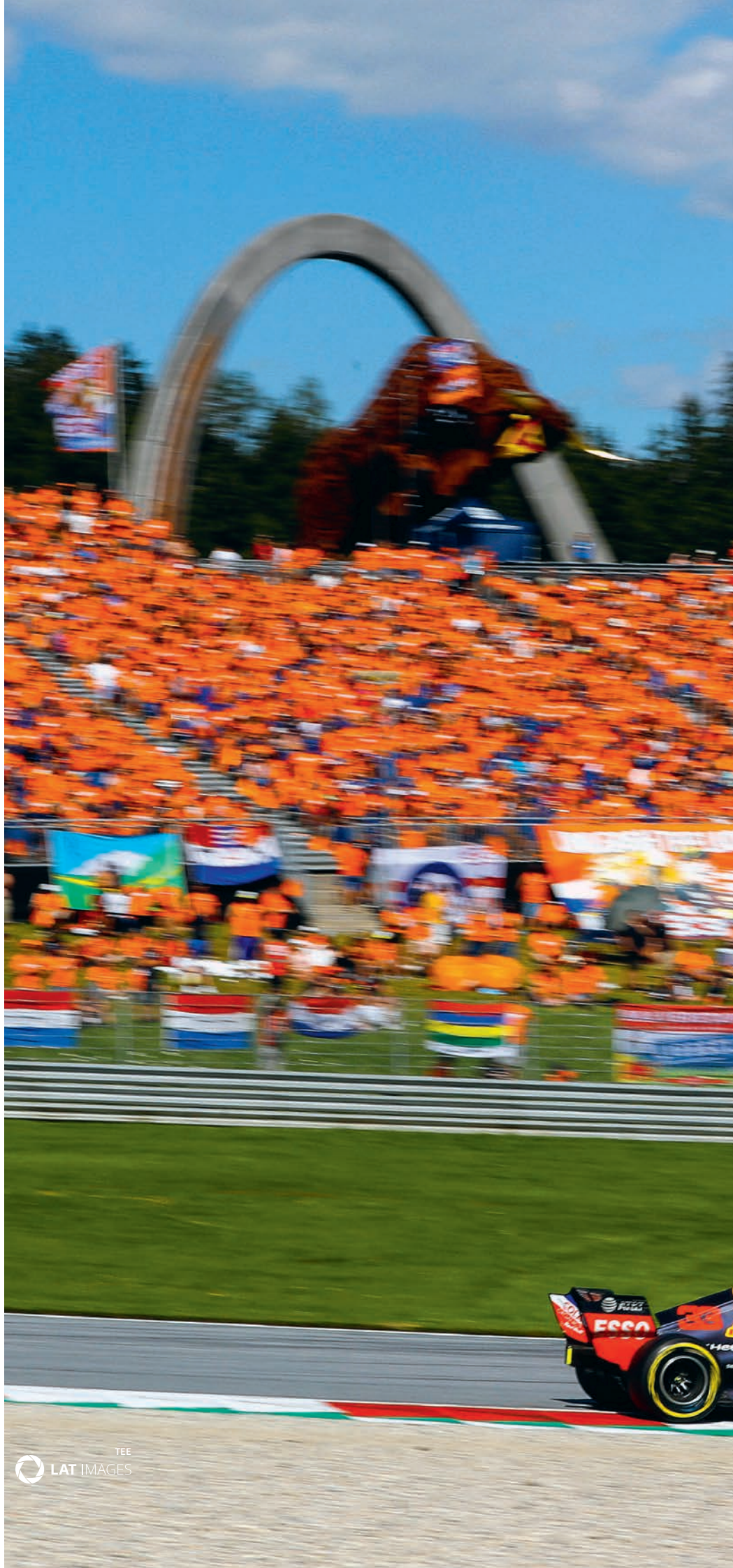

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HOW MERCEDES HANDED VICTORY TO VERSTAPPEN

A strategic blunder followed by mechanical failures for both Silver Arrows gave Red Bull's young star all the opportunity he needed

EDD STRAW





SUTTON/SUTTON IMAGES

AT TEN PAST THREE LAST SUNDAY AFTERNOON, MERCEDES LOOKED SET FOR A SCENIC stroll to a one-two, having annexed the front row with a car featuring a heavily revised aerodynamic package on top of the engine upgrade introduced at the previous weekend's French Grand Prix. Seventy minutes later Mercedes had thrown away the lead and parked both cars, while Max Verstappen took a wonderfully executed victory on Red Bull's home circuit.

Mercedes shot itself in the foot spectacularly through a combination of unreliability, tyre blistering and, most significantly, another strategic blunder. No wonder team boss Toto Wolff described it as Mercedes' "worst day".

The inexplicable decision not to call leader Lewis Hamilton into the pits under the virtual safety car, which was only deployed because team-mate Valtteri Bottas ground to a halt with a hydraulic problem that originated in the power steering, was the crux of the pain. No matter what followed — specifically Hamilton retiring with a failure in the fuel system — this was a painful blunder in a season blighted by strategic misadventures.

Things hadn't looked so bad at the start, even though poleman

Bottas bogged down and then picked up wheelspin. Kimi Raikkonen used the extra bite of the ultrasoft Pirellis that both Ferraris started on — compared to the supersofts on the Mercedes and Red Bulls — to thrust his car into the tight gap between Bottas and Hamilton, and briefly it seemed that he might take the lead.

Raikkonen had to back out of it because he was, legitimately, "scared we would hit" and went wide over the sausage kerb at the exit of Turn 1. Behind, Bottas was hung out to dry on the outside line and slipped to fourth place behind Verstappen.

Although Raikkonen's exit was compromised, he did get a run on Hamilton and had a look around the outside into the Turn 3 hairpin. This resulted in him locking up, the rear stepping out and pitching him



Raikkonen vies for the lead as Bottas bogs down at the start

over the runoff area. We didn't know it at the time, but what followed was effectively the battle for victory between Raikkonen and Verstappen.

Into Turn 3 Verstappen had wisely backed off from Raikkonen and Hamilton to maximise his exit from the corner, and he got a run on the Ferrari despite a little wheelspin off the turn. As Raikkonen moved right, briefly pushing Verstappen onto the grass, Bottas blasted past both of them on the outside line on the approach to the Turn 4 right-hander to reclaim second place.

Raikkonen held off Verstappen initially, but ran wide in the Turn 6 left-hander and allowed Verstappen to edge alongside him to Turn 7. They made light contact, Verstappen's front-right to Raikkonen's rear-left, with the Red Bull driver emerging in third place having just made what he could not have known was the race-winning overtake.

"I got a little bit sideways, or lost the line a little bit into 6," said Raikkonen. "Obviously we were pretty close to each other. I think the car in front of me, the Mercedes, disturbed me a bit [and cost] downforce and then obviously he got the run. I tried to hang on around the outside, but got a little bit sideways because we touched, and lost a place."

What Verstappen described as "hard but good" racing left him in a good position after a superb first lap during which he dovetailed the patience to know when not to stick his nose in, and when to seize

the opportunity Raikkonen presented him. With Hamilton and Bottas up front and Verstappen leading the charge ahead of Raikkonen and Daniel Ricciardo in the second Red Bull, the race looked firmly set.

Further back, Sebastian Vettel, still smarting from a three-place grid penalty for impeding Carlos Sainz's Renault at Turn 1 in the second segment of qualifying, was hauling himself back into contention.

Having started sixth, he slipped behind Ricciardo and the Haas of Kevin Magnussen at the start after locking up into Turn 1 and then also running wide at Turn 3. He picked off the two Haas drivers to run sixth on the third lap, then spent much of his first stint keeping a watching brief behind Ricciardo, who was trying to find a way past Raikkonen. Then the race was blown apart by the first Mercedes disaster.

Bottas, sitting a couple of seconds behind Hamilton and out of the worst of the turbulent air, slowed on lap 14. A hydraulic leak in the power steering led to the system shutting down and the loss of gearchange, and he did everything he could to park out of the way. He ended up rolling down an asphalt road lining the edge of the Turn 4 gravel trap, stopping when he had nowhere else to go and triggering the virtual safety car.

Astonishingly, Hamilton was not called into the pits. Tellingly, all of the cars in the rest of the top 10, save for Magnussen's Haas, which was left out because of concerns about a problem with its tyre blankets, >>



and Sergio Perez (Force India), who was too close to team-mate Esteban Ocon to avoid losing time in a double-stack pitstop, did come in.

“The VSC came out, we had half a lap to react, and we didn’t,” said Wolff. “This is where we lost the race. At that stage of the race with the VSC, pitting is probably 80% the thing you need to do. With one car out there against two others, the thinking process that happened was, ‘What would happen if the others pitted a car?’ We would come out behind Kimi because they would leave Kimi out. What would that mean for the race? That whole thinking loop I wouldn’t say distracted us, but we spent too much time on that. For me, it’s the most painful day in my years at Mercedes, worse than Barcelona [in 2016, when Hamilton and Nico Rosberg crashed out on lap one].”

It’s easy to be critical of strategic decisions in the heat of the moment. But the thinking time should have been ample. Bottas slowed emerging from Turn 3, meaning that from the moment the problem first manifested itself Hamilton completed the majority of a lap under

green-flag conditions before the VSC was deployed when he was on the run from Turn 3 to Turn 4 next time round.

Under controlled conditions, he probably took around 50 seconds to get from there to the pit entry so, even by the most conservative of estimates, Mercedes had maybe 90 seconds from the moment it should have become clear that a safety car – virtual or real – was a possibility to decide what to do.

There was nothing to gain for Hamilton, but Mercedes needed to minimise the chances of a loss. By not pitting it guaranteed that both Ferraris and both Red Bulls would pit and put themselves in with a shout of jumping Hamilton when he eventually did stop.

While stopping Hamilton might have allowed Ferrari and Red Bull to gain track position by splitting its strategies and leaving one car out while the other stopped, it would have been better than the alternative. And it should be noted that Red Bull team principal Christian Horner was adamant that both cars were coming in whatever happened. This smacked of indecision – although there was the expectation that the VSC would last long enough to see what other teams did first time around and allow Hamilton to pit and retain the lead, it was a risky shout.

As it happened, Mercedes couldn’t repair the damage thanks to the green flags flying when he was in Turn 5 of his 16th lap. At that point, he had a green-flag lead of 13 seconds and was informed by engineer Pete Bonnington that he needed to find eight seconds over Verstappen, a request to which Hamilton responded with incredulity.

“I’ve got no time in these tyres,” said Hamilton in response. Chief strategist James Vowles then, to his immense credit, came onto the radio to take responsibility for the error. “I understand, we’re still with you mate – it’s my mistake but give us what you can.” He later reiterated his message, saying: “I have thrown away the win.”

From lap 17 to 24, Hamilton attacked as much as his older supersofts allowed. But it got him nowhere, and he was called in at the end of lap 25 when Verstappen was, give or take a couple of tenths, still the same 13s behind. Hamilton was on average only the fourth-fastest driver on track





"IT'S THE MOST PAINFUL DAY IN MY YEARS AT MERCEDES, WORSE THAN BARCELONA 2016"

during this period, 0.132s off pacesetter Ricciardo and, more importantly, 0.129s slower than Vettel.

As the German was about to get close enough to jump the Mercedes when it stopped, it made sense for Hamilton to cut his losses and ensure he rejoined on softs in fourth behind Verstappen, Raikkonen and Ricciardo, but still ahead of Vettel, who hinted that he might have been able to do more about that had he been told more about the race situation.

"Am I fourth now?" asked the understandably incredulous Hamilton after stopping to take on softs. The plan from there was to try to recover, but with blistering of the rear tyres afflicting, in particular, those drivers who were pushing hard – namely Hamilton and Ricciardo – things were about to get harder. That was even after Ricciardo was forced to pit for new rubber, putting him back to fifth.

The blistering came as a surprise to some, but it shouldn't have. On Friday, when teams did their long-run work, Pirelli clocked the track temperature at 25–26C. On Sunday it was 42C. The runs were also longer and the tyre wear was minimal, meaning that on the softs in particular there was plenty of tread left, leading to more heat being retained and therefore a greater chance of blisters. Combine all this with the heavy braking areas and the many traction zones, and the constant corners from Turn 4 to the end of the lap, and the problems were inevitable.

Hamilton then came under attack from Vettel. The Ferrari driver got a run out of the first corner and, taking a bite of the grass exiting the Turn 2 kink, executed a brilliant move into the Turn 3 hairpin. Brilliant because, rather than overdoing it on the brakes, he held a middle line >>

QUALIFYING



VALTTERI BOTTAS'S FIRST POLE POSITION OF THE 2018 season was greeted with uncharacteristic exuberance by the Finn. Best described as a combination of laughter, 'woo-wooing' and shouts of 'yes!', this was a deserved reward for a strong but unlucky season. He had to beat Mercedes team-mate Lewis Hamilton in a straight fight to do it. But given that the average qualifying gap between the pair is just 29 thousandths of a second in 2018, we shouldn't have been surprised.

The Red Bull Ring is a happy hunting ground for Bottas. It's where he first led a grand prix and finished on the podium, and he won from pole last year. Bottas was almost half a second clear after the first runs in Q3, ahead of Ferrari's Kimi Raikkonen. This was thanks to mistakes from both Hamilton and Sebastian Vettel at Turn 4 that left them third and seventh respectively. On the second runs it wasn't going to be so easy.

"The first lap was really good, but I think there was a tiny bit of track improvement for the second run," said Bottas. "It's always difficult to say how much, but I think the second lap was very similar to the first one. The car really allowed me to push – we've found a very good balance with the car."

Hamilton had run too deep into the Turn 3 right-hand hairpin on that run, but this time there was no such error. Bottas was seven thousandths faster in the first sector, then lost two of those thousandths in the middle sector. But a strong run through the final sector, which includes the tricky double-right at Turns 9 and 10, gave him his fifth F1 pole by 0.019s.

Vettel was 0.334s down in third, which became sixth on the grid thanks to his penalty for impeding Carlos Sainz's Renault in Q2 (see page 31). In fact, Vettel was fractionally faster than Bottas out of Turn 4 on his lap, but lost time through the quicker corners in the second half of the run.

The real star of qualifying was Romain Grosjean – he split the two Red Bull drivers, who were too busy bickering about track position (see page 28), in sixth place. The Haas worked well in the medium-speed turns in the second half of the lap, and Grosjean nailed a great lap on his first Q3 run, almost matching Vettel in the final sector.

EDD STRAW

"WE'VE FOUND A VERY GOOD BALANCE WITH THE CAR"
BOTTAS



TRACKSIDE VIEW

'Ominous' is the word that springs to mind while watching free practice one from the first turn of the Red Bull Ring. At least it is when either Lewis Hamilton or Valtteri Bottas goes past in the heavily revised Mercedes W09.

From the first lap the car allows both to commit on the brakes, turn in earlier than most, carry the speed mid-corner and not compromise their exits. Usually, on a green track at the start of the weekend, cars appear less well-planted, but with a host of new aerodynamic parts the Mercedes absolutely looks the part.

By contrast Sebastian Vettel in the Ferrari is squaring off the corner, turning in later with a little less speed. This eliminates his wild rides over the yellow sausage kerb at the exit early in the session, one of which resulted in the edge of the forward-left part of the floor hitting it with such force that surely some damage was sustained.

Turn 1 is one of those deceptively tricky corners. Ostensibly a straightforward right-hander, the uphill approach makes picking a braking point difficult and invites drivers to brake too late. There aren't many lockups, but plenty get themselves into trouble at the exit by being a little too greedy in cars either



without the front-end grip or rear stability (or both) to make it work.

Both Renault drivers are limited by the front early on in the session, while the Toro Rosso drivers – Brendon Hartley in particular – are battling a rear end that steps out at the slightest provocation.

What makes this corner particularly tricky is that it's effectively made narrower by the combination of the painted yellow bump inside the apex kerb waiting to catch the imprecise driver out.

On his first flier Max Verstappen turns in a little early and clouts that kerb with the front-right wheel. That destabilises the car and compromises the exit. He doesn't hit it again.

Taken in fourth gear, it's a precipitous corner, made more complicated by the uphill approach that changes the car balance as you make your way through the corner as it levels out to the crest at the exit.

Not only can drivers not take too much of the inside kerb, but

while you can lean on the sausage kerb at the exit it's costly if you drift over the top of it and the left side of the car falls off the other side. This happens plenty, with the sound of grinding floors a common one.

Drivers take all manner of different approaches. But those who turn in early tend to suffer later in the corner, except for the two Mercedes drivers, who seem to have grip to spare at both ends of the car.

Ominous indeed.

EDD STRAW

Both Mercedes seem planted in a way that eludes all others





Verstappen has found how to balance attacking instinct with pragmatic pace management

and delayed Hamilton's turn-in as much as he could, ensuring he could get on the power earlier and retain third.

And that was it for Hamilton's race, with a second pitstop dropping him back to fifth behind Ricciardo. He had every chance of passing, but it proved unnecessary as the Red Bull slowed on the main straight with an exhaust problem. The Mercedes ignominy was crowned when Hamilton ground to a halt with a loss of fuel pressure.

While things unravelled for Mercedes, they came together beautifully for the Verstappen side of the Red Bull garage. Having taken the lead when Hamilton pitted, Verstappen had an advantage of 3.9s over Riccardo, with Raikkonen a further 1.5s back.

Ricciardo had earlier overtaken Raikkonen with the assistance of the DRS on the run into Turn 4, only for the reverse to happen on lap 38 as Ricciardo was battling seriously blistered rear tyres. At this point Verstappen was controlling things beautifully with an advantage of 7.4s over Raikkonen.

The gap was at 5.8s when Ricciardo slowed on lap 54, leading to Red Bull turning Verstappen's Renault engine down to minimise any chance of a similar problem. That allowed Raikkonen to close

to just 1.504s at the chequered flag after 71 laps — a gap that wasn't representative of how consummate a performance this was from Verstappen. It was also further distorted by Raikkonen setting fastest lap last time around.

"The margins in F1 are so fine," said Horner. "There was a touch with Kimi and a few races ago that could've been a puncture, and there's a very different story. Max has had a tough first third of the year and, all credit to him, he's kept his head and in the past three races he's been third, second and first with three very impressive drives."

While being up front and in control, rather than chasing, helped to mitigate the blistering, Verstappen's ability to manage tyres, minimising wheelspin and showing a willingness to be conservative to keep temperatures under control, is an underrecognised skill. In two of his early Red Bull races — his win in Spain 2016 and then his run to second in Austria — he showed his mastery of that, picked up after some intensive work done during his Toro Rosso days.

Verstappen had been given an opportunity by the collapse of the Mercedes challenge, but he had to make it happen for himself in a race that Raikkonen might just as easily have won.

His willingness to make it happen at the key moments, but play it safe when the race situation required it — a balance he has sometimes failed to strike this season — is what will ensure that Verstappen is a formidable force in grand prix racing for years to come.

He may keep saying that he hasn't changed his approach after the troubles earlier in the year, but it certainly looked like it in Austria. And to glorious effect. ✽

"MAX HAS HAD A TOUGH FIRST THIRD OF THE YEAR. ALL CREDIT TO HIM, HE'S KEPT HIS HEAD"

STAT
10

Run of consecutive points finishes for Renault, which came to an end in Austria



SUTTON IMAGES

Renault registers first blank of 2018

Renault failed to score points for the first time in 2018, with Nico Hulkenberg retiring from ninth place with a turbo failure after 11 laps and Carlos Sainz blighted by tyre problems on his way to 12th.

Hulkenberg qualified 10th, almost 0.3 seconds slower than his team-mate, and ran ninth ahead of the Spaniard after the start. He was holding the position when the turbo problem struck, causing him to pull to a fiery halt at Turn 1.

Sainz at this stage was 11th, having just been passed by Sergio Perez, but was suffering serious tyre-blistering problems that led to the car being undrivable.

"Our blisters arrived on lap five of each compound, except for the supersoft," said Sainz. "We were looking like one of the faster midfield cars there, but we put the soft on and in five laps lost performance."

Sainz made two stops and finished ahead of only the two Williams drivers.

Renault also introduced its upgraded MGU-K in Austria, running it on both its works cars and Stoffel Vandoorne's McLaren. The unit is understood to be around 2kg lighter, and the team is confident it's also more reliable.

It also continued to use its new, improved qualifying mode – first trialled at the previous weekend's French Grand Prix – although the drivers said they did not feel any big difference.



ANDRE/SUTTON IMAGES

Grosjean ends bad run with fourth



Romain Grosjean ended a 12-race points drought with an immaculate run to fourth place, which team principal Gunther Steiner hopes will end the Franco-Swiss driver's "negative spiral".

The result is the Haas team's best in its three seasons in F1 and was thanks to Grosjean's dominance of the 'Class B' fight. He qualified sixth, splitting the Red Bulls, with a stunning lap and, after wisely not putting up too firm a fight against Daniel Ricciardo on the first lap, stayed at the front of the midfield pack for the rest of the race.

Grosjean's previous points finish came in last year's Japanese Grand Prix, and errors and penalties – as well as Haas's problems – have cost him several top-10 finishes this year.

Team-mate Kevin Magnussen qualified two places behind Grosjean, 0.159 seconds down, then ran behind him in the early stages of the race. He was unable to pit under the virtual safety car because of a problem with his tyre blankets, but after making a green-flag stop he passed Carlos Sainz and Esteban Ocon, eventually closing to just 1.5s behind Grosjean.

Ricciardo's hackles up in qualifying-order confusion

The radio transmissions of Red Bull pairing Daniel Ricciardo and Max Verstappen drew attention during qualifying, with the Australian objecting to being the first driver on track on all three of their Q3 runs.

Ricciardo's radio comments suggested Verstappen had unfairly refused to give him a slipstream in qualifying. Verstappen insisted team protocol was that they alternated who ran first in qualifying from race to race, and that Austria was his turn, leading to him declaring "it's discipline" over the radio when he refused to pass the slow Ricciardo on their final runs.

With team principal Christian Horner stressing that normal team protocol had been followed, Ricciardo backed down after the session and admitted his hopes that the drivers would give each other a tow – potentially worth 0.2–0.3 seconds on the runs from Turns 1 to 3 and 3 to 4 – had not been as clearly expressed as he believed before the runs.

"During the heat of it all, I thought so. I've had a few discussions since, with Christian and with my engineer," said Ricciardo.

"I had my concerns, but I probably expected some of that to have been obvious and I didn't bring everything up before qualifying, thinking that it was just a bit more obvious than probably it was. I

probably should've talked about it more beforehand.

"I had concerns. I spoke a little bit with my engineer about it, but I guess as a team it wasn't discussed, so from their point of view once we got into Q3 and they saw us playing cat and mouse they were like, 'What's going on? No-one talked about this so what are they doing?'"

"But in my mind it's obvious what's happening, isn't it? Let's give me a run where I'm getting a tow instead of giving everyone my tow."

Ricciardo accepted Verstappen refusing to swap places in the circumstances. "I guess if we'd committed to it before, if we'd made it black and white before qualifying and said, 'All right, on the third run you've got to do this, Max,' then I could be a bit more upset," he said.

"We both knew what was going on but I guess the competitor in us is not wanting to give an inch. I'm not mad at him for that, that's just how it goes."

Ricciardo had a difficult time during qualifying, struggling to extract the pace from the supersofts he and Verstappen used during Q2. This forced him to do a second run in order to make Q3, and be able to start the race on the supersofts rather than the ultrasofts he was also struggling with.

Ricciardo ended up seventh fastest in qualifying, with the Haas of Romain Grosjean splitting the Red Bulls.



Alonso ascends from pits to eighth

Fernando Alonso started the Austrian Grand Prix from the pits after changing to an older specification of rear wing, coming through to take eighth place in the closing stages.

Alonso, who damaged his front wing by running wide on his final attempt in qualifying, spent the early stages of the race in 19th ahead of team-mate Stoffel Vandoorne, who made a first-lap stop with damage.

He pitted under the safety car and jumped Carlos Sainz, Sergey Sirotkin and Marcus Ericsson when they all stopped later, as well as picking up five places from retirements ahead and passing Lance Stroll. In the closing stages he overtook Pierre Gasly and Charles Leclerc using ageing, but well-managed, tyres to secure eighth behind the Force Indias of Esteban Ocon and Sergio Perez.

"We didn't expect to be in the points," said Alonso. "But the race unfolded in this way, especially with the blisters in the second part of the race, and we recovered a couple of positions."

Behind him, Leclerc claimed his fifth points finish in six races with ninth, despite a trip through the gravel trap on the opening lap.

He let Sauber team-mate Marcus Ericsson through late on for the Swede – on fresher rubber after a long first stint on softs – to have a go at Alonso, but they swapped back on the final lap.



Q & A GUNTHER STEINER Haas team principal

Haas team principal Gunther Steiner has publicly backed Romain Grosjean during the driver's difficult spell, and was repaid with a superb effort to fourth in

Austria. Steiner is confident it's a turning point for Grosjean.



you can imagine how happy they are.

How important a result is this for Romain?

Sure, he was close a few times and it always

slipped away, so I guess we need to keep focused, but we always said we gave him our confidence. He did good for us for a long time and we knew he would come back to be the Romain he was last year, so I hope this triggers an event with lots and lots of points for Haas F1.

Did you notice any dip in Romain's confidence before this weekend?

No, I wouldn't say so. Emotionally, after [crashes] that happened in Baku and

Barcelona for sure the emotions straight after the event are very high, but he came back to himself very quick. We spoke about it and said, 'Just keep on doing what you're doing and it will come to us.' Sure, if he had 50 points now his confidence would be higher, but now he knows he needs to work hard and he can get points.

Are you targeting fourth in the constructors' championship now given Renault's disaster?

Absolutely. You cannot just target fifth because we are fifth now – you need to always try to get more. Luck goes around – sometimes somebody gets lucky and somebody else gets unlucky. Renault is a strong team, they know what they are doing, and they will not make it easy for us.

What's the meaning of this result for team morale and confidence?

I think it's a redemption. We got back. Everybody was, 'Oh the team must be demoralised' and all that. They never were. Everybody knows the potential of the car, and if you know the potential then it will come if you work hard. And it came. This is fantastic, the 50th race, to finish fourth and fifth is for the guys –



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1965	Alfa Romeo 101 Spider Veloce	40,000 - 45,000	1972	Ford Escort Mkl	26,000 - 30,000
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1984	BMW E24 635 'Group A' Touring Car	165,000 - 185,000	1971	Ford Mustang Mach 1 Boss race car	30,000 - 35,000
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1964	Ford Cortina Lotus Mkl	55,000 - 65,000	1987	Morgan Plus 8 Class 'B' Race Car	28,000 - 38,000
1964	Ford Cortina Lotus Mkl	50,000 - 60,000	1980	Porsche 911 RSR Homage	75,000 - 85,000
1973	Ford Escort Mexico	28,000 - 35,000	1988	Rouse Ford Sierra RS500 Cosworth Group A	190,000 - 220,000
1972	Ford Escort Mkl RS1600 BDA FIA Rally Car	65,000 - 80,000		Williams F1 Replica. Show car.	10,000 - 12,000
1979	Ford Escort MkII Rally Car	38,000 - 45,000			
1980	Ford Escort MkII Rally Car	20,000 - 25,000			

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Vettel hit with impending penalty

Sebastian Vettel started the Austrian Grand Prix sixth, three places lower than he had qualified, after impeding Renault driver Carlos Sainz in Q2.

Vettel had completed a hot lap and was rolling through Turn 1 when Sainz, on a hot lap, closed on him and ended up running wide and clattering over the sausage kerb at the exit of the corner

after reacting to the Ferrari's presence.

"It is the belief of the stewards that notwithstanding the absence of a radio call, the driver of car #5 [Vettel], being aware of the issue of rear vision with his mirrors, should not have been so slow and on the racing line, during a slowdown lap in qualification," the stewards' verdict read.

"Having reviewed all alleged impeding

incidents since the beginning of 2016, the penalty of a drop of three grid positions is consistent with all other similar incidents."

Although this did not stop Sainz reaching Q3, he did suffer some wing damage as a result.

Vettel apologised for the mistake, although when asked during the pre-race driver's parade if he accepted the penalty, his reply was an emphatic "no".

Gasly goes rallycrossing

Toro Rosso driver Pierre Gasly's Austrian Grand Prix was more "rallycross than F1" thanks to damage sustained when he was hit by Stoffel Vandoorne at Turn 3 on the first lap and suffered bent suspension.

Gasly dropped out of the

points with just under six laps remaining having been passed by the Saubers of Charles Leclerc and Marcus Ericsson, as well as Fernando Alonso's McLaren, in the closing stages.

"It was one of the toughest races I've ever had because after the contact in Turn 3

with Stoffel the rear suspension was bent and it took half of the floor on the rear out," said Gasly.

Vandoorne stopped at the end of the first lap and spent the rest of the race at the back before pulling into the pits late on.



Late-stop Stroll loses one place

Lance Stroll was relegated from 13th place to 14th behind Williams team-mate Sergey Sirotkin and hit with three superlicence penalty points after receiving a 10-second penalty for ignoring blue flags.

Stroll made a pitstop for fresh tyres with just four laps left and came out ahead of Sergio Perez, who was attempting to lap him. The team told him to try to remain unlapped, leading him to ignore the blue-flag signals.

"Lance went quite a long time without moving over, but he was on new tyres as well," said race director Charlie Whiting. "One can understand that, but I think he should have moved over."





FREE PRACTICE 1

POS	DRIVER	TIME
1	Hamilton	1m04.839s
2	Bottas	1m04.966s
3	Verstappen	1m05.072s
4	Vettel	1m05.180s
5	Ricciardo	1m05.483s
6	Raikkonen	1m05.776s
7	Grosjean	1m06.028s
8	Ocon	1m06.055s
9	Leclerc	1m06.215s
10	Gasly	1m06.394s
11	Ericsson	1m06.400s
12	Magnussen	1m06.404s
13	Sainz	1m06.427s
14	Perez	1m06.455s
15	Hulkenberg	1m06.479s
16	Stroll	1m06.567s
17	Alonso	1m06.612s
18	Vandoorne	1m06.698s
19	Hartley	1m06.871s
20	Kubica	1m07.424s

WEATHER 19C overcast

FREE PRACTICE 2

POS	DRIVER	TIME
1	Hamilton	1m04.579s
2	Bottas	1m04.755s
3	Vettel	1m04.815s
4	Ricciardo	1m05.031s
5	Verstappen	1m05.125s
6	Raikkonen	1m05.265s
7	Grosjean	1m05.429s
8	Magnussen	1m05.559s
9	Gasly	1m05.758s
10	Vandoorne	1m05.930s
11	Sainz	1m05.999s
12	Leclerc	1m06.096s
13	Ocon	1m06.133s
14	Ericsson	1m06.199s
15	Hulkenberg	1m06.273s
16	Sirotkin	1m06.326s
17	Hartley	1m06.332s
18	Perez	1m06.354s
19	Alonso	1m06.429s
20	Stroll	1m06.626s

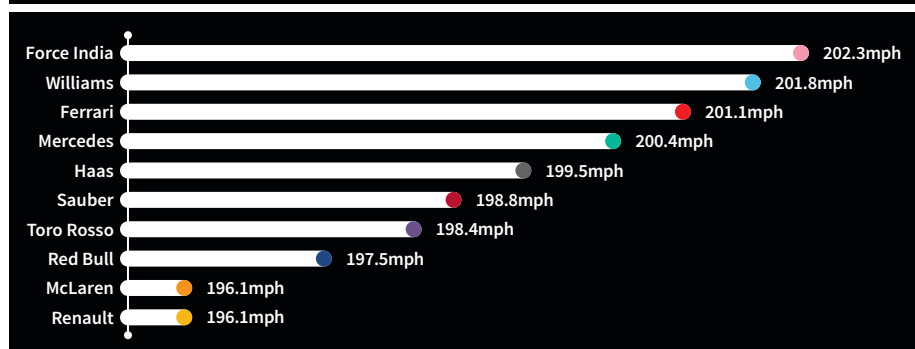
WEATHER 21C overcast

FREE PRACTICE 3

POS	DRIVER	TIME
1	Vettel	1m04.070s
2	Hamilton	1m04.099s
3	Bottas	1m04.204s
4	Raikkonen	1m04.470s
5	Verstappen	1m04.791s
6	Ricciardo	1m04.891s
7	Grosjean	1m04.916s
8	Magnussen	1m05.013s
9	Sainz	1m05.086s
10	Leclerc	1m05.219s
11	Hulkenberg	1m05.228s
12	Gasly	1m05.264s
13	Ocon	1m05.444s
14	Alonso	1m05.448s
15	Perez	1m05.502s
16	Ericsson	1m05.699s
17	Hartley	1m05.705s
18	Vandoorne	1m05.837s
19	Stroll	1m06.029s
20	Sirotkin	1m06.318s

WEATHER 24C sunny

SPEED TRAP



QUALIFYING 1

POS	DRIVER	TIME
1	Hamilton	1m04.080s
2	Bottas	1m04.175s
3	Raikkonen	1m04.234s
4	Grosjean	1m04.242s
5	Verstappen	1m04.273s
6	Vettel	1m04.347s
7	Magnussen	1m04.460s
8	Ricciardo	1m04.723s
9	Hulkenberg	1m04.864s
10	Sainz	1m04.948s
11	Alonso	1m04.965s
12	Leclerc	1m04.967s
13	Gasly	1m05.011s
14	Ocon	1m05.148s
15	Stroll	1m05.264s
16	Vandoorne	1m05.271s
17	Perez	1m05.279s
18	Sirotkin	1m05.322s
19	Hartley	1m05.366s
20	Ericsson	1m05.479s

QUALIFYING 2

POS	DRIVER	TIME
1	Vettel	1m03.544s
2	Hamilton	1m03.577s
3	Bottas	1m03.756s
4	Raikkonen	1m03.975s
5	Verstappen	1m04.001s
6	Grosjean	1m04.059s
7	Magnussen	1m04.291s
8	Ricciardo	1m04.403s
9	Sainz	1m04.561s
10	Hulkenberg	1m04.676s
11	Ocon	1m04.845s
12	Gasly	1m04.874s
13	Leclerc	1m04.979s
14	Alonso	1m05.058s
15	Stroll	1m05.286s

QUALIFYING 3

POS	DRIVER	TIME
1	Bottas	1m03.130s
2	Hamilton	1m03.149s
3	Vettel	1m03.464s
4	Raikkonen	1m03.660s
5	Verstappen	1m03.840s
6	Grosjean	1m03.892s
7	Ricciardo	1m03.996s
8	Magnussen	1m04.051s
9	Sainz	1m04.725s
10	Hulkenberg	1m05.019s

WEATHER 25C sunny

SEASON STATS

DRIVERS' CHAMPIONSHIP

1	Vettel	146
2	Hamilton	145
3	Raikkonen	101
4	Ricciardo	96
5	Verstappen	93
6	Bottas	92
7	Magnussen	37
8	Alonso	36
9	Hulkenberg	34
10	Sainz	28
11	Perez	23
12	Ocon	19
13	Gasly	18
14	Leclerc	13
15	Grosjean	12
16	Vandoorne	8
17	Stroll	4
18	Ericsson	3
19	Hartley	1
20	Sirotkin	0

CONSTRUCTORS' CHAMPIONSHIP

1	Ferrari	247
2	Mercedes	237
3	Red Bull	189
4	Renault	62
5	Haas	49
6	McLaren	44
7	Force India	42
8	Toro Rosso	19
9	Sauber	16
10	Williams	4

QUALIFYING BATTLE

Hamilton	5	4	Bottas
Vettel	8	1	Raikkonen
Ricciardo	2	6	Verstappen
Perez	2	7	Ocon
Stroll	4	5	Sirotkin
Hulkenberg	5	4	Sainz
Gasly	5	3	Hartley
Grosjean	3	5	Magnussen
Vandoorne	0	9	Alonso
Ericsson	2	7	Leclerc

WINS

Hamilton	3
Vettel	3
Ricciardo	2
Verstappen	1

FASTEST LAPS

Bottas	3
Ricciardo	3
Verstappen	2
Raikkonen	1

POLE POSITIONS

Vettel	4
Hamilton	3
Bottas	1
Ricciardo	1

STARTING GRID

10 Hulkenberg #27 1m05.019s	8 Magnussen #20 1m04.051s	6 Vettel #5 1m03.464s	4 Verstappen #33 1m03.840s	2 Hamilton #44 1m03.149s
9 Sainz #55 1m04.725s	7 Ricciardo #3 1m03.996s	5 Grosjean #8 1m03.892s	3 Raikkonen #7 1m03.660s	1 Bottas #77 1m03.130s

RACE RESULTS 71 LAPS - 190.43 MILES

POS	DRIVER	TEAM	FINISH TIME	LED	TYRES
1	Max Verstappen (NL)	Red Bull-Renault	1h21m56.024s	46	SSu, Sn
2	Kimi Raikkonen (FIN)	Ferrari	+1.504s		USu, Sn
3	Sebastian Vettel (D)	Ferrari	+3.181s		USu, Sn
4	Romain Grosjean (F)	Haas-Ferrari	-1 lap		USu, Sn
5	Kevin Magnussen (DK)	Haas-Ferrari	-1 lap		USu, Sn
6	Esteban Ocon (F)	Force India-Mercedes	-1 lap		SSn, Sn
7	Sergio Perez (MEX)	Force India-Mercedes	-1 lap		SSn, Sn
8	Fernando Alonso (E)	McLaren-Renault	-1 lap		SSn, Sn
9	Charles Leclerc (MC)	Sauber-Ferrari	-1 lap		SSn, Sn
10	Marcus Ericsson (S)	Sauber-Ferrari	-1 lap		Sn, SSn
11	Pierre Gasly (F)	Toro Rosso-Honda	-1 lap		SSn, Sn
12	Carlos Sainz (E)	Renault	-1 lap		USu, Sn, SSn
13	Sergey Sirotkin (RUS)	Williams-Mercedes	-2 laps		USn, Sn, SSn
14	Lance Stroll (CDN)	Williams-Mercedes	-2 laps		SSn, Sn, USn
15	Stoffel Vandoorne (B)	McLaren-Renault	65 laps-gearbox		SSn, Sn, Sn
R	Lewis Hamilton (GB)	Mercedes	62 laps-fuel pressure	25	SSu, Sn, SSn
R	Brendon Hartley (NZ)	Toro Rosso-Honda	54 laps-mechanical		SSn
R	Daniel Ricciardo (AUS)	Red Bull-Renault	53 laps-exhaust		SSu, Sn, SSu
R	Valtteri Bottas (FIN)	Mercedes	13 laps-hydraulics		SSu
R	Nico Hulkenberg (D)	Renault	11 laps-turbo failure		USu

FASTEST LAPS

POS	DRIVER	TIME	GAP	LAP
1	Raikkonen	1m06.957s	-	71
2	Vettel	1m07.082s	+0.125s	67
3	Hamilton	1m07.241s	+0.284s	58
4	Verstappen	1m07.442s	+0.485s	70
5	Ricciardo	1m07.591s	+0.634s	46
6	Ericsson	1m08.216s	+1.259s	67
7	Magnussen	1m08.476s	+1.519s	70
8	Perez	1m08.504s	+1.547s	66
9	Alonso	1m08.661s	+1.704s	69
10	Sainz	1m08.766s	+1.809s	37
11	Ocon	1m08.850s	+1.893s	64
12	Vandoorne	1m08.894s	+1.937s	63
13	Sirotkin	1m08.971s	+2.014s	64
14	Leclerc	1m09.006s	+2.049s	68
15	Bottas	1m09.044s	+2.087s	12
16	Grosjean	1m09.071s	+2.114s	17
17	Hartley	1m09.171s	+2.214s	42
18	Stroll	1m09.203s	+2.246s	68
19	Gasly	1m09.295s	+2.338s	38
20	Hulkenberg	1m10.380s	+3.423s	7

WEATHER 21C sunny

TYRES n - New set u - Used set Available | SH - Superhard H - Hard M - Medium S - Soft SS - Supersoft US - Ultrasoft HS - Hypersoft Int - Intermediate W - Wet

WINNER'S AVERAGE SPEED 139.45mph FASTEST LAP AVERAGE SPEED 144.26mph

RACE BRIEFING

FRIDAY DRIVER
ROBERT KUBICA
replaced Sirotkin
at Williams

FP1
McLAREN fined €10,000

for unsafe release of
Vandoorne from pits

FP2
HAAS fined €5000 for
releasing Magnussen's car
in an unsafe condition

GRID PENALTIES

LECLERC Five-place
penalty for replacement
gearbox
VETTEL Three-place
penalty and one licence
point for impeding

Carlos Sainz at Turn 1
HARTLEY required to
start from the back for
additional power unit
elements used
ALONSO required to start
from the pitlane because

car was modified under
parc ferme conditions

RACE PENALTIES
STROLL 10-second penalty
and three licence points for
ignoring blue flags

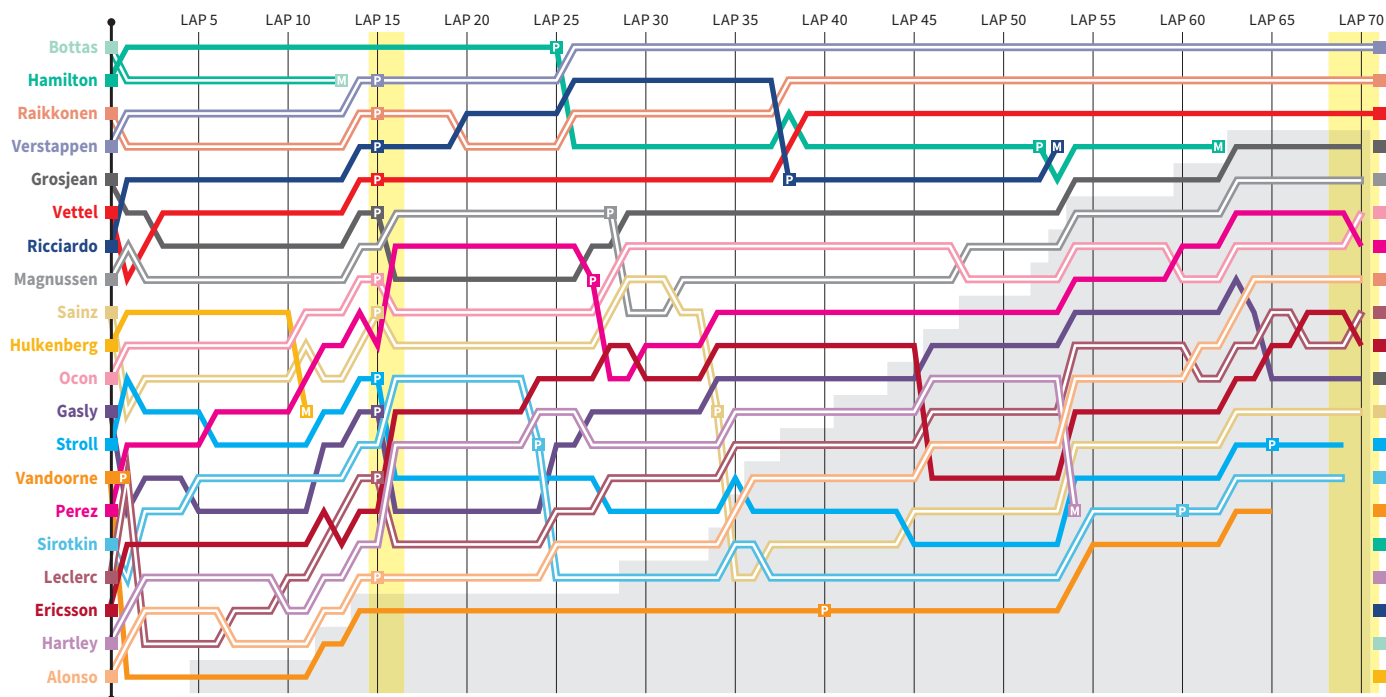
NEXT RACE

JULY 8
BRITISH GP

Silverstone



LAP CHART What happened, when



P Pitstop C Crash M Mechanical failure S Spin Pen Penalty L Car lapped SC Safety car

MAX FACTORS AFTER MERCEDES MAYHEM

Staying clear of trouble, and managing severe tyre blistering, proved crucial as the dominant Mercedes fell victim to a rare double retirement

EDD STRAW

MERCEDES



LEWIS HAMILTON

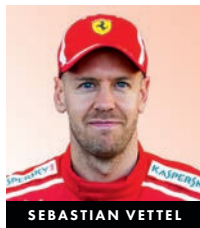
8 He was beaten by Bottas in qualifying, albeit narrowly. But before being derailed by a strategy blunder and then a loss of fuel pressure he had the race under control. Perhaps he could have done more to manage the rear tyres and keep Vettel behind him, but he wasn't at fault for the race unravelling.



VALTTERI BOTTAS

8 Continued his strong qualifying form by pipping Hamilton to pole, although he squandered that with a poor start. But partially made up for it by jumping from fourth to second in one move. Other than track position there was little between him and Hamilton while he lasted.

FERRARI



SEBASTIAN VETTEL

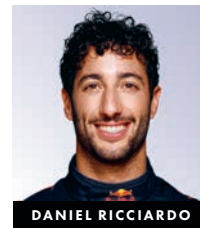
7 In many ways, this was a decent performance from Vettel, and his bold move to pass Hamilton for third by taking a bite of the grass the highlight. But there are a couple of negative points, namely putting himself in a position to be forced wide at the start, and getting himself a grid penalty.



KIMI RAIKKONEN

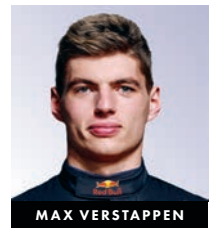
8 There was a lot of good in his weekend, which is why he ended up second. But there are a few asterisks, namely being nearly 0.2s slower than Vettel in qualifying, and making an error that allowed Verstappen to pass him. This made it more of a possible victory lost than a second place gained.

RED BULL



DANIEL RICCIARDO

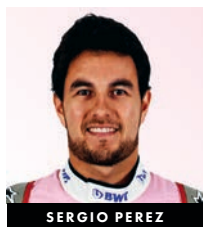
5 Ricciardo not only lacked the pace of his team-mate but also blotted his copybook during qualifying, despite the team's procedures being clear. In the race, he struggled with blistering and was probably destined to be passed by Hamilton and finish fifth had he not retired.



MAX VERSTAPPEN

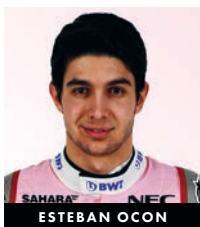
10 This was a performance that had everything, not least a clear margin over his team-mate. His first lap showed the right blend of patience (at Turns 1 and 3), and aggression, in passing Raikkonen at Turn 7. After that, he drove intelligently to look after the tyres.

FORCE INDIA



SERGIO PEREZ

8 Things didn't go well for Perez in qualifying. He made amends in the race as, even with the harder strategy thanks to his team's unwillingness to double-stack the drivers under the VSC, he came back through to seventh after initially being allowed past by Ocon to have a go at Magnussen.



ESTEBAN OCON

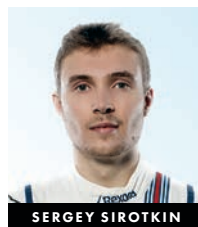
9 A good all-round performance from Ocon. Given the gap to the Renaults, you can't say he could have done better than 11th in qualifying, while he recovered from being barged off by Sainz on the run to Turn 3 to do much the same in the race. There wasn't a great deal left on the table.

WILLIAMS



LANCE STROLL

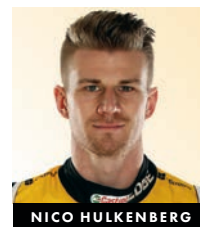
7 Did a good job to make Q2 for the first time since April's Azerbaijan Grand Prix, albeit assisted by getting ahead of the late yellow flags that stymied the runs of others. Made his traditional great start before falling back, then earning himself a penalty after a pitstop by ignoring blue flags.



SERGEY SIROTKIN

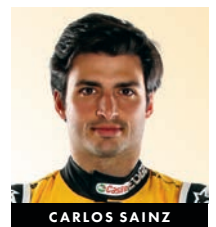
6 Sirotkin lost his final qualifying lap to yellow flags, and was only 0.018s down on Stroll after the first sector. Drove a solid race, taking a 'free' pitstop in the closing stages, but despite picking up a few places early on couldn't avoid falling back in a car that didn't work as hoped.

RENAULT



NICO HULKENBERG

6 Like his team-mate, Hulkenberg was never entirely happy with the car's balance. As long as it lasted, his race went well enough, although given the balance problems it's possible that he might have had the same troubles as Sainz. But an engine failure meant we never found out.

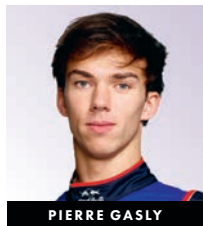


CARLOS SAINZ

6 Sainz was the better Renault performer in Q3, 0.3s faster than Hulkenberg. But pushing Ocon onto the grass on the run to Turn 3 was needless, and as the race went on he struggled with the tyres. Hulkenberg's retirement makes it difficult to judge if that was down to car or driver.



TORO ROSSO

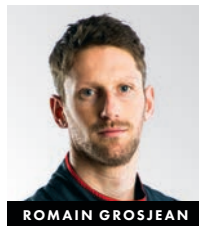


8 Looked accomplished throughout practice and quali. Considering the damage caused by being clouted by Vandoorne at Turn 3 on the opening lap, he did very well to get within six laps of a points finish before inevitably falling back in what felt like a rallycross car.



6 Hartley's habit of having untidy weekends that hide his pace again bit him in Austria and he was forced to run what he called a "hybrid" aero package, having damaged several front wings. After he took new engine components and started 19th, his reasonable run ended with a breakdown.

HAAS

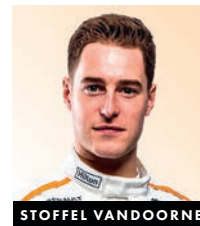


10 Despite some mishaps, Grosjean has been coming on strong, particularly since Haas's Canada upgrade. Split strategy boosted the advantage over Magnussen, but Grosjean had everything covered. This was a timely reminder that Grosjean can be as good as anyone.



8 Good, but not quite as good as his team-mate. He was just a tenth and a half down in qualifying, and in the race was about 0.3s per lap slower before the Haas strategies split. Did well to recover from the worse strategy and, after passing Ocon, closed up behind Grosjean.

McLAREN

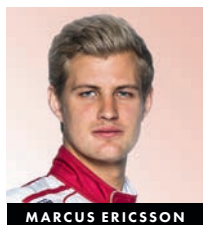


4 This was not an easy weekend for Vandoorne; mishaps in practice damaged components, and then he clashed with Gasly at Turn 3 on the opening lap, leaving him cast adrift in blue-flag hell. That, and the 0.3s deficit to Alonso in qualifying, adds up to a poor weekend.

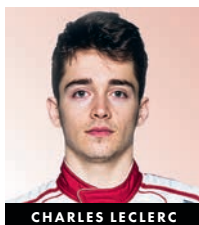


8 Qualifying was messy, with front wing damage on his final Q2 run. But after sounding a little uninterested early in the race, he came alive. His climb from a pitlane start to eighth only included three genuine on-track passes, but his pace was strong and his ability to draw out tyre life was important.

SAUBER



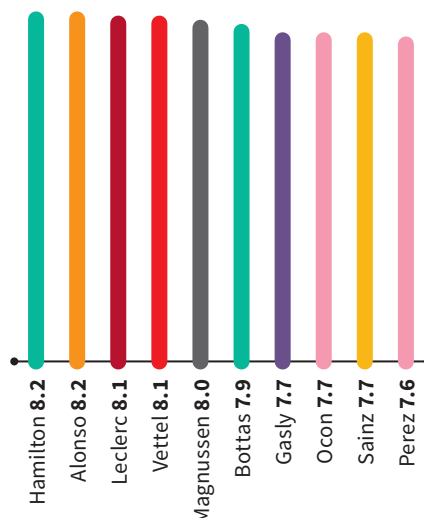
7 Ericsson seems lost on the softest tyres in qualifying trim, but he's at his best when executing a marathon stint on the harder compounds. His long first stint was remarkable given the blistering problems encountered by others even on the softs, and allowed him to pick up a point.



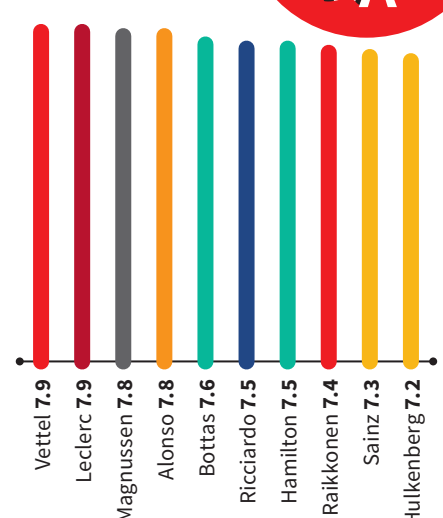
8 A crushing half a second faster than Ericsson in qualifying, Leclerc was set back by a five-place grid penalty for a gearbox change. His run to a fifth points finish in six races was a good one, although an off on the first lap was costly. He says following Alonso was instructive on tyre conservation.

TOP 10 AVERAGE RATINGS

AUTOSPORT'S RATING AFTER ROUND 9



READERS' RATING AFTER ROUND 9



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WORLD OF SPORT

MAUGER
LAT IMAGES

Russell hearty as he moves in front

FORMULA 2
RED BULL RING (A)
JUNE 30-JULY 1
ROUND 6/12

For the first time since the opening round of the season, the Formula 2 Championship has a new leader. That's a result befitting the most dominant performance of any driver over a single weekend so far this season: George Russell at the Red Bull Ring.

The reigning GP3 champion's pedigree was never in doubt but, despite two feature-race wins and a sprint success before arriving in Austria, mechanical, set-up or on-track issues had robbed him of a truly brilliant all-around weekend. Until now.

The 20-year-old ART Grand Prix star is

in potent form and showing above all else that, in a field packed with Formula 1 juniors, he is the standout. It may seem obvious, but that hasn't always been the case. Erstwhile series leader Lando Norris has plenty of momentum behind him, with plenty of F1 interest. But while he's also worthy, he's currently being outshone by Russell in the F1 feeder category.

"I feel like I'm driving better than ever," said Russell of his performance, starting with his victory in the feature race, of which he actually led very little.

An early safety car for Ralph Boschung's stranded car on lap six robbed Russell of the lead he'd built to avoid being in range of the potent DRS – available on three straights – from second-place starter Norris. It also

meant that the drivers who'd started on the soft tyres stayed out and headed Russell in hope of a late safety car. That meant Artem Markelov led most of the way, buoyed by a new chassis after he was launched airborne in both practice and qualifying by running wide at Turn 9. His Russian Time machine also needed a new engine, and qualified 18th.

When Markelov pitted late on, Russell, who had worked his way up to second on the road, took the advantage to beat the Carlin car of Norris.

Third featured an incredible scrap. Roberto Merhi – who had briefly passed Norris for a net second before being retaken – had started his MP Motorsport car 12th and driven through the field. But in doing so he had spent his tyres, and was jumped by Antonio Fuoco on the last lap. The Charouz-run Ferrari junior had started 13th, and finished 9.6 seconds behind winner Russell, despite making an extra pitstop for a new nose. Fuoco was furious, and insisted that a win had been on the table.

Usual frontrunner Alexander Albon was struggling for braking in his DAMS-run car and took fifth ahead of Norris's team-mate Sergio Sette Camara. But in the late running the attention was all on Markelov – he overtook four cars on the last lap on his fresh supersofts, incredibly leaping up to eighth and pole for the reversed-grid race the following morning, having pitted with four laps to go.

In the midst of clutch issues for its F2 2018 car, the series had announced before

Markelov earned last-ditch sprint pole and converted it to win



With nine wins, Markelov is just two adrift of Vandoorne's all-time GP2/F2 record

MAUGER
LAT IMAGES



Russell scored fourth win of 2018 and took the F2 points lead



Merhi leads Fuoco, but the Italian would grab third

the first race that a single-file rolling start would be implemented. Not good if you wanted to overtake from the start, or so you'd think. But if ever there was a pivotal moment this season, this could be it...

From the sprint race's rolling start, Russell passed Norris at Turn 1 in an audacious move, which was for sixth, as Merhi had started from the pits with a clutch issue. He followed that up by passing the next three cars over as many laps at the same corner. Surely his tyres – the Pirellis were degrading quicker than everybody anticipated in Austria – wouldn't last?

They did for Russell. After passing Norris, Albon, Fuoco and Sette Camara, he reeled in and passed Russian Time's Honda protege Tadasuke Makino for second on lap seven of 28. Although he couldn't make an impression on Markelov, he had proved enough with opportunistic overtaking combined with excellent tyre management. Every bit the drive of a champion.

Norris had a nightmare, cooking his tyres and falling like a brick to 11th. "All of a sudden it [the performance] just dropped," said Norris. "I just didn't do a good enough job." He's his own worst critic and it's easily forgotten that he's new to this Pirelli rubber. Don't write him off yet, although a win hasn't looked likely since the first round in Bahrain and a step up is needed.

Behind Russell, Sette Camara proved a Carlin car could save its tyres by taking third, ahead of Fuoco, Albon and Makino.

JACK BENYON

RESULTS RED BULL RING (A), JUNE 30-JULY 1, RACE 1 (40 LAPS – 107.245 MILES)

POS	DRIVER	TEAM	TIME
1	George Russell (GB)	ART Grand Prix	56m16.865s
2	Lando Norris (GB)	Carlin	+5.130s
3	Antonio Fuoco (I)	Charouz Racing System	+9.633s
4	Roberto Merhi (E)	MP Motorsport	+11.795s
5	Alexander Albon (T)	DAMS	+14.642s
6	Sergio Sette Camara (BR)	Carlin	+16.900s
7	Tadasuke Makino (J)	Russian Time	+18.833s
8	Artem Markelov (RUS)	Russian Time	+24.689s
9	Nirei Fukuzumi (J)	Arden International	+25.527s
10	Santino Ferrucci (USA)	Trident	+26.585s
11	Nicholas Latifi (CDN)	DAMS	+27.406s
12	Luca Ghiotto (I)	Campos Racing	+29.484s
13	Sean Gelael (R)	Prema Racing	+37.135s
14	Arjun Maini (IND)	Trident	+39.354s
15	Maximilian Gunther (D)	Arden International	+49.152s
R	Louis Deletraz (CH)	Charouz Racing System	32 laps-engine
R	Jack Aitken (GB)	ART Grand Prix	19 laps-fire extinguisher
R	Nyck de Vries (NL)	Prema Racing	7 laps-puncture
R	Ralph Boschung (CH)	MP Motorsport	4 laps-engine
R	Roy Nissany (IL)	Campos Racing	3 laps-oil leak/fire

Winner's average speed 114.331mph. **Fastest lap** Markelov 1m17.062s, 125.341mph.

QUALIFYING 1 Russell 1m13.541s; 2 Norris 1m13.779s; 3 Sette Camara 1m13.823s; 4 Aitken 1m13.961s; 5 Maini 1m13.999s; 6 Gunther 1m14.014s; 7 Deletraz 1m14.104s; 8 Albon 1m14.115s; 9 de Vries 1m14.171s; 10 Makino 1m14.201s; 11 Ghiotto 1m14.309s; 12 Merhi 1m14.323s; 13 Fuoco 1m14.330s; 14 Ferrucci 1m14.334s; 15 Gelael 1m14.363s; 16 Boschung 1m14.389s; 17 Fukuzumi 1m14.400s; 18 Markelov 1m14.589s; 19 Latifi 1m14.700s; 20 Nissany 1m15.436s.

RACE 2 (28 LAPS – 75.048 MILES)

1 Markelov 36m41.950s; **2** Russell +5.601s; **3** Sette Camara +8.543s; **4** Fuoco +17.189s; **5** Albon +17.925s; **6** Makino +22.580s; **7** Ferrucci +24.588s; **8** Latifi +27.286s; **9** Fukuzumi +28.046s; **10** Maini +28.665s; **11** Norris +30.190s; **12** Gunther +30.800s; **13** Ghiotto +32.189s; **14** de Vries +32.953s; **15** Boschung +36.952s; **16** Merhi +38.895s; **17** Nissany +44.100s; **18** Aitken +44.249s; **R** Deletraz 23 laps-accident damage; **R** Gelael 22 laps-accident damage.

Winner's average speed 122.697mph. **Fastest lap** Markelov 1m17.365s, 124.850mph.

GRID FOR RACE 2 Decided by result of Race 1, with top eight finishers reversed.

CHAMPIONSHIP 1 Russell 132; **2** Norris 122; **3** Markelov 94; **4** Albon 89; **5** Sette Camara 86; **6** Fuoco 82; **7** de Vries 75; **8** Aitken 49; **9** Ghiotto 47; **10** Deletraz 44.



Russell (right) has now got the upper hand over Norris

Ilott's pole and win
have moved him into
the series leadership

STANDINGS

1	Callum Ilott (ART)	69
2	Anthoine Hubert (ART)	63
3	Leonardo Pulcini (Campos)	61

For more info: autosport.com/gp3



MAUGER
LAT IMAGES

Ilott stakes his claim in Austria

GP3 SERIES
RED BULL RING (A)
JUNE 30-JULY 1
ROUND 3/9

Entering the Red Bull Ring, two British drivers who had been expected to fight for honours had almost been forgotten about in the title chase. Leaving Austria, Callum Ilott had the points lead and Jake Hughes had his mojo back after a tricky start to the season.

ART Grand Prix remains the class of the field, and its drivers are always going to be in the conversation for poles and wins. But Ferrari Academy prospect Ilott's session topper on Friday was the first 'real' GP3 pole of 2018 for the squad, and with it heaped pressure on his team-mates – especially Anthoine Hubert, the pre-weekend points leader and the man tasked with fighting through the field thanks to an off-track moment at the exit of Turn 10 in qualifying.



Hughes broke his
GP3 duck on Sunday

He collected grass in his radiator, which sent his engine temperature, and his mood, soaring through the roof. He'd start 19th.

The key moment of the weekend came on lap 15 of 24 in the feature race. Hubert had driven brilliantly through the field, and was attacking Jenzer man David Beckmann for seventh when ART team-mate Nikita Mazepin moved in for a piece of the action. Mazepin was in the blind spot of Hubert, who cut across the Russian, the contact spinning him down to an eventual 17th.

Mazepin also fell back, and finished the race outside the points, having started the weekend second to Hubert in the standings. Of course, Ilott was oblivious to this. His focus was on building an early lead. With three DRS zones at this track, breaking the tow and edging a one-second gap over the field would be key – he pointed out before the race that the total gain of the aero aid was worth almost a second in lap time.

It started well, Ilott built a margin, but a safety car on lap one for Joey Mawson's car – which had clutch issues and didn't make Turn 1 – undid his work.

He'd have to go again. As a GP3 rookie, Ilott has shown remarkable maturity in dealing with a scrappy start to the season, and the restart was no different. It was timed perfectly and a 1.7s gap was built quickly, with no sign of the errors that often crept in during his Formula 3 days.

He was also helped by those behind him

squabbling. Hughes had started second – inside the top 10 for the first time this season – and now he had a genuine chance at the front, only it didn't go to plan.

Like so many drivers over the weekend, he visited the Turn 9 runoff and the small banana kerbs, which sent him airborne and broke his chassis while he was trying to escape Alessio Lorandi. Campos Racing's Leonardo Pulcini had already passed, and Trident pair Lorandi and Pedro Piquet followed suit. Hughes was lucky to hold fifth.

There was further luck for Hughes in the sprint race. Ryan Tveter was leading at the entry to Turn 1 from second on the grid, but squeezed polesitter Beckmann into Giuliano Alesi and took all three out of the race.

Piquet attacked early race leader Hughes successfully at the halfway point, but three laps later Hughes returned the favour, and Piquet had run out of his six DRS opportunities. So too had Pulcini, who was dropped by the leading pair, but Piquet's and Hughes's squabble brought the majority of the top 10 into a close train behind.

Pulcini was a comfortable third, while Lorandi mugged Dorian Boccolacci – who had in turn just passed Ilott for fifth – to take fourth. A great weekend for Lorandi, who is racing against doctor's orders due to a broken collarbone from a karting crash one month ago. "If the car had a halo, I don't think I'd be able to get out!" said the Italian.

JACK BENYON

Preining shining on home ground

**PORSCHE SUPERCUP
RED BULL RING (A)
JULY 1
ROUND 3 / 9**

Shortly before cheering demonstration runs by Austrian racing legends Niki Lauda and Gerhard Berger at the Red Bull Ring, the home crowd celebrated a home victory from a rising star of its next generation of racers. And Lechner Racing driver Thomas Preining's battling victory was well worth the ovation he received from the grandstands.

The 19-year-old took his first pole position by 0.210s ahead of fellow Porsche junior Julien Andlauer. But Andlauer got the jump at the start and got up the inside into the first corner. Preining ran wide, and came under attack from Florian Latorre. By the time the safety car was deployed to clear up Roar Lindland's car, which was pitched into a low-altitude spin at the first corner after contact with Khalid Al Wahaibi, Preining was down to third.



After the restart, Latorre initially looked to threaten Andlauer's lead, but on the seventh lap Preining was able to attack on the outside into Turn 4. They emerged side by side, but Preining made sure of the position into the following left-hander.

With Andlauer struggling for pace, Preining started to threaten, and three laps from home he took the lead up the inside into Turn 1. But Preining ran wide onto the runoff at the exit, as did Andlauer, and opted to ease off on the long flat-out run to Turn 3 to drop back to second and make sure of no penalty. A wise move given how

many drivers had been penalised for exceeding track limits during practice, one that showed great maturity given that there would not be many more opportunities.

The following lap, Preining made no mistake and pulled off the move without exceeding track limits to secure victory.

While the pair battled, the top three had been joined by Dylan Pereira and Nick Yelloly. The Brummie climbed from eighth on the grid to fifth to close the gap to leader Michael Ammermuller, who finished seventh, in the championship.

EDD STRAW

Kovalainen stars for SARD

**SUPER GT
BURIRAM (T)
JULY 1
ROUND 4 / 8**

Heikki Kovalainen overtook fellow former McLaren Formula 1 race winner Jenson Button at the top of the table by winning on the series' annual away trip to Thailand with Kamui Kobayashi.

Kovalainen made a great push from the very beginning of the race in extremely hot conditions, after starting the SARD Lexus from third on the grid. He immediately passed the front-row Honda of Takashi Kogure for second, and on lap 19 he got ahead of the Team Mugen Honda of Hideki Mutoh, who had qualified on pole, to take the lead.

The Hondas looked in good shape in practice and qualifying, but in the race they could not match that performance. Jenson Button, carrying the heaviest success ballast (64kg) in the Team Kunimitsu NSX he shares with Naoki Yamamoto, and with the smallest-diameter air restrictor, had done a brilliant job to qualify fifth. But he wasn't able to keep pace in the first stint. "I

struggled in the pack – it was tough," said Button. "We need to improve the package of the NSX and the Bridgestone tyres." Button dropped to 10th by the end of his stint, and Yamamoto finished the race 11th, out of the points.

As the Hondas faded, the Lexus cars came to the fore. Felix Rosenqvist had brought the Team LeMans LC 500 up to second before his stop by passing Mutoh, then handed over to Kazuya Oshima.

Oshima attacked leader Kobayashi – who missed the Fuji round in May while on Toyota WEC duty, so can't win the title with Kovalainen – but ran wide. That allowed the TOM'S Lexus of Yuhi Sekiguchi, which Kazuki Nakajima had charged from 10th on the grid in the opening stint, up to second. Sekiguchi moved up to battle with Kobayashi, only to run out of fuel on the final lap and coast to a stop – he was classified 10th.

Oshima moved up to second from the Bandoh Lexus of Yuji Kunimoto and Kenta Yamashita, and the Cerumo Lexus of Yuji Tachikawa and Hiroaki Ishiura. A problem closing the door of the Mugen Honda at the pitstop consigned it to fifth.

JIRO TAKAHASHI

WEEKEND WINNERS

GP3

RED BULL RING

Race 1 Callum Ilott

ART Grand Prix

Race 2 Jake Hughes

ART Grand Prix

PORSCHE SUPERCUP

RED BULL RING

Thomas Preining

Lechner Racing

SUPER GT

BURIRAM

Heikki Kovalainen/Kamui Kobayashi

Team SARD Lexus LC 500 (below)

FORMULA RENAULT NEC

MONZA

Race 1 Logan Sargeant

Race GP

Race 2 Victor Martins

Race GP





Marquez emerges from Dutch thriller

MOTOGP
ASSEN (NL)
JULY 1
ROUND 8 / 19

A glance at the results of this year's Dutch TT could fool you into thinking it was just another ordinary MotoGP race. After all, clear pre-race favourite Marc Márquez converted pole into win number four of 2018, doing so by a little over two seconds.

The reality could not be more different. While Márquez had the pace to break away on his Honda in the closing stages, the Assen race was an instant classic, with no fewer than five different leaders and

more than 100 overtakes packed into 26 thrilling, spellbinding laps.

Although the identity of the winner was expected, this race had it all, evoking memories of an equally chaotic encounter at Phillip Island in 2015. Márquez was victorious then too, and this again was a sublime display of attacking gusto combined with patience and guile.

Jorge Lorenzo – winner at Mugello and Barcelona for Ducati – set the tone for what was to come by grabbing the lead on the opening lap, despite starting from 10th on the grid, but he was never able to edge more than a few tenths away from the chasing pack. The Spaniard was also

extremely fortunate that a hefty whack on the rear from Valentino Rossi's Yamaha as he fought to hold onto the lead didn't result in a trip to the gravel.

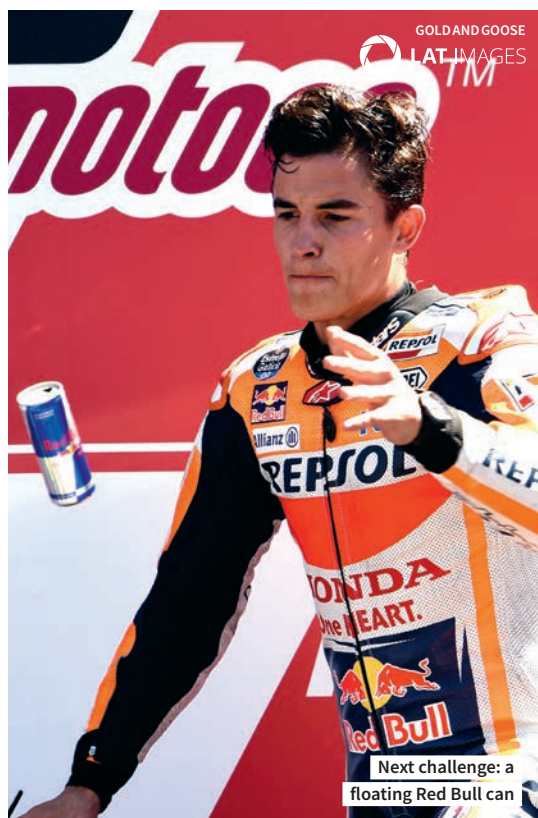
That was just one instance of contact in a race that featured plenty of on-the-limit moves, although incredibly – with the sole exception of Pramac Ducati's Danilo Petrucci some way further down the field – there were no crashes.

Suzuki's Alex Rins ensured there were four manufacturers represented in the lead group, attracting the attention of the stewards when he muscled past Márquez for second behind Lorenzo at the slow Strubben left-hander on the 12th lap. No action was taken.

Honda man Márquez returned the favour in a near-identical move a couple of tours later and, with six laps to go he had managed to find a way by the Ducatis of Lorenzo and Andrea Dovizioso to retake the lead, after Maverick Vinales had also enjoyed a brief spell out front.

Vinales went all out in his bid to claim a first MotoGP win for Yamaha since Rossi's triumph at Assen last year, but his attempt to repass Márquez ended with both riders running out wide at the Turn 9 left-hander, allowing Dovizioso and Rossi into the top two places. Rossi became the race's fifth different leader when he made it past Dovizioso at the final chicane, but was shuffled back on a mesmerising 22nd lap of 26 that resulted in Márquez emerging from a stunning piece of three-wide





Next challenge: a floating Red Bull can

action with a lead he wouldn't lose.

Attention then turned back to the fight for second, as Rossi ran wide at Turn 1 after trying to brave it out on the outside against Dovizioso. Rossi later criticised his compatriot for being "not clever", but Dovizioso was equally adamant he didn't do anything "over the limit". Whoever was to blame, the episode allowed both Rins and Vinales through, and it was Rins who managed to overcome Vinales by 0.039s to score his best-ever MotoGP result.

Dovizioso had to be content with fourth, followed by Rossi and Cal Crutchlow, who was always lurking at the rear of the lead train on his LCR Honda but never able to get stuck in. Lorenzo fell away to a seventh ahead of the Tech3 Yamaha of Johann Zarco.

While Yamaha was the most competitive it had been for some time at Assen, the Iwata manufacturer is about to enter its longest winless spell in the MotoGP era, with a barren run of 18 races matching a dry spell that spanned the back end of 2002 and the whole of '03 prior to Rossi's arrival in '04.

Rossi and Vinales may be second and third in the standings, but that's down more to consistency than anything else. Meanwhile, Marquez's advantage now stands at 41 points with more Honda-friendly tracks such as the Sachsenring and Brno coming up next on the schedule.

Marquez had expected to lose ground at Assen, and yet he came out on top. After two defeats at the hands of Lorenzo in the past two races, his march towards title number five looks to have resumed in earnest.

JAMIE KLEIN

RESULTS ROUND 8/19, ASSEN (NL), JULY 1 (26 LAPS – 73.379 MILES)

POS	RIDER	TEAM	TIME
1	Marc Marquez (E)	Honda	41m13.863s
2	Alex Rins (E)	Suzuki	+2.269s
3	Maverick Vinales (E)	Yamaha	+2.308s
4	Andrea Dovizioso (I)	Ducati	+2.422s
5	Valentino Rossi (I)	Yamaha	+2.963s
6	Cal Crutchlow (GB)	LCR Honda	+3.876s
7	Jorge Lorenzo (E)	Ducati	+4.462s
8	Johann Zarco (F)	Tech3 Yamaha	+7.001s
9	Alvaro Bautista (E)	Aspar Ducati	+7.541s
10	Jack Miller (AUS)	Pramac Ducati	+13.056s
11	Andrea Iannone (I)	Suzuki	+14.255s
12	Pol Espargaro (E)	KTM	+15.876s
13	Alex Espargaro (E)	Aprilia	+15.986s
14	Scott Redding (GB)	Aprilia	+16.019s
15	Dani Pedrosa (E)	Honda	+16.043s
16	Tito Rabat (E)	Avintia Ducati	+16.416s
17	Bradley Smith (GB)	KTM	+29.073s
18	Hafizh Syahrin (MAL)	Tech3 Yamaha	+33.824s
19	Takaaki Nakagami (J)	LCR Honda	+34.037s
20	Thomas Luthi (CH)	MarcVDS Honda	+47.853s
R	Daniilo Petrucci (I)	Pramac Ducati	17 laps-accident
R	Xavier Simeon (B)	Avintia Ducati	17 laps-rear tyre
R	Karel Abraham (CZ)	Aspar Ducati	11 laps-electronics
NS	Franco Morbidelli (I)	MarcVDS Honda	physical

WEEKEND WINNERS

MOTO2 ASSEN

- 1 Francesco Bagnaia Kalex
- 2 Fabio Quartararo Speed Up
- 3 Alex Marquez Kalex

MOTO3 ASSEN

- 1 Jorge Martin Honda
- 2 Aron Canet Honda
- 3 Enea Bastianini Honda

Bagnaia took Moto2 victory



Winner's average speed 106.782mph. Fastest lap Vinales 1m34.113s, 107.957mph.

QUALIFYING 2 1 Marquez 1m32.791s; 2 Crutchlow 1m32.832s; 3 Rossi 1m32.850s; 4 Dovizioso 1m32.870s; 5 Rins 1m32.933s; 6 Vinales 1m32.984s; 7 A Espargaro 1m33.029s; 8 Zarco 1m33.072s; 9 Iannone 1m33.120s; 10 Lorenzo 1m33.167s; 11 Petrucci 1m33.292s; 12 Bautista 1m34.015s.

QUALIFYING 1 1 Zarco 1m33.578s; 2 Rins 1m33.600s; 3 Nakagami 1m33.625s; 4 Rabat 1m33.666s; 5 Syahrin 1m33.666s; 6 Miller 1m33.672s; 7 Redding 1m33.995s; 8 Pedrosa 1m34.125s; 9 Abraham 1m34.145s; 10 Smith 1m34.149s; 11 P Espargaro 1m34.268s; 12 Luthi 1m35.192s; 13 Simeon 1m35.646s.

RIDERS' CHAMPIONSHIP 1 Marquez 140; 2 Rossi 99; 3 Vinales 93; 4 Zarco 81; 5 Dovizioso 79; 6 Crutchlow 79; 7 Lorenzo 75; 8 Petrucci 71; 9 Iannone 71; 10 Miller 55; 11 Rins 53; 12 Pedrosa 41; 13 Bautista 33; 14 P Espargaro 32; 15 Rabat 27; 16 Morbidelli 19; 17 Syahrin 17; 18 A Espargaro 16; 19 Redding 11; 20 Nakagami 10; 21 Smith 7; 22 Mika Kallio 6; 23 Abraham 4; 24 Luthi 0; 25 Simeon 0.

MANUFACTURERS' CHAMPIONSHIP 1 Honda 175; 2 Ducati 145; 3 Yamaha 140; 4 Suzuki 100; 5 KTM 33; 6 Aprilia 25.



Rins took second, his best MotoGP result

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Simpson homes in on success at Glen

IMSA SPORTSCAR
WATKINS GLEN (USA)
JULY 1
ROUND 6/12

English-born, South African-raised Stephen Simpson celebrated his first American Independence Day holiday weekend since becoming a US citizen by overtaking reigning series champion Jordan Taylor (Wayne Taylor Racing Cadillac) and Juan Pablo Montoya (Acura Team Penske) in one brilliant opportunistic

manoeuvre at the final restart with 40 minutes remaining. He then maintained his advantage to win a thrilling Six Hours of the Glen for the tiny JDC-Miller Motorsports team.

Simpson shared the spoils with Canadian-domiciled Russian Misha Goikhberg and American Chris Miller, who had kept their ORECA-Gibson in contention throughout a blisteringly hot day.

Colin Braun, sharing CORE Autosport's similar ORECA with Romain Dumas and Jon



Bennett, snatched second from Montoya and Dane Cameron at the final corner after the Acura DPi had seemed in control for much of the contest. Paul di Resta, Bruno Senna and Phil Hanson were fourth after an excellent performance in the United Autosports Ligier.

Dirk Muller and Joey Hand scored a narrow and hard-fought GTLM victory for Ford Chip Ganassi Racing over Antonio Garcia/Jan Magnussen (Corvette) and the Porsche of Patrick Pilet and Nick Tandy.

JEREMY SHAW

WEEKEND WINNERS

IMSA SPORTSCAR
WATKINS GLEN

Prototype Stephen Simpson/Misha

Goikhberg/Chris Miller

JDC-Miller Motorsports

ORECA-Gibson 07

GTLM Dirk Muller/Joey Hand

Ford Chip Ganassi Racing Ford GT

GTD Markus Palittala/Dillon

Machavern/Don Yount

Turner Motorsport BMW M6 GT3

WORLD RALLYCROSS
HOLJES

Johan Kristoffersson

PSRX Volkswagen Sweden Volkswagen Polo R

NASCAR CUP
CHICAGOLAND

Kyle Busch

Joe Gibbs Racing Toyota Camry

NASCAR XFINITY SERIES
CHICAGOLAND

Kyle Larson

Chip Ganassi Racing Chevrolet Camaro

NASCAR TRUCKS
CHICAGOLAND

Brett Moffitt

Hattori Racing Enterprises Toyota Tundra



Kristoffersson wins at home

WORLD RALLYCROSS
HOLJES (S)
JUNE 30-JULY 1
ROUND 6/12

Johan Kristoffersson's weekend on home ground in Sweden wasn't quite as successful as the previous round in neighbouring Norway had been. This time he didn't top every session — PSRX Volkswagen Sweden team-mate Petter Solberg set the fastest time in qualifying three — but aside from that the reigning champion's fifth win from six starts was another textbook performance that puts him 40 points clear in the standings.

While Kristoffersson won, the drama was

over second. Peugeot's Timmy Hansen had taken an early joker lap, and moved into second on the final tour when Andreas Bakkerud took his extra route. Bakkerud slotted onto the main circuit just ahead of his EKS Audi team boss Mattias Ekstrom, but Ekstrom nudged the sister Audi in the rear, and Bakkerud in turn pushed Hansen wide into the Velodrome corner.

Bakkerud moved up to second, while Ekstrom pushed Hansen off at the penultimate corner for third, but was later demoted to sixth for the incident. That promoted Jerome Grosset-Janin to the GC

Kompetition Renault team's first podium.

HAL RIDGE

Busch tops late slugfest

NASCAR CUP
CHICAGOLAND (USA)
JULY 1
ROUND 17/36

"If you don't like that kind of racing, don't even watch." That was Kyle Busch's opinion of his final-lap showdown against Kyle Larson at Chicagoland.

Busch never troubled the top of the timing screen in stage one, claimed by the Stewart-Haas Ford of Aric Almirola for the first stage win of his career. Larson's progress was swift in the first 80 laps, his Chip Ganassi Racing Chevrolet rising to second.

In stage two it was Busch's turn to

make a move. Quick work in the pits got his Joe Gibbs Racing Toyota back on track in 10th place ahead of the 107 laps that made up the final stage of the race.

It boiled down to second-stage winner Kevin Harvick (Stewart-Haas), Busch, Martin Truex Jr (Furniture Row Toyota) and Larson in the top four, and Larson scythed past Harvick and Truex to set up the last lap. Larson pounced and grabbed the lead, but slid into Busch as he did so, pitching the two into the outside barrier. Both continued, but further contact led to Larson slewing onto the infield, leaving Busch clear to take his 48th Cup win. Larson caught his slide to salvage second ahead of Harvick.

INSIGHT

RACING STEPS FOUNDATION • MATTIAS EKSTROM'S POST-DTM LIFE



STAIRWAY TO HEAVEN

The Racing Steps Foundation provided unheard-of opportunities to young British drivers from 2008-17 before bowing out. Now it's time for founder Graham Sharp and manager Derek Walters to look back

MARCUS SIMMONS



He's probably the least recognisable of the most significant figures in British motorsport of the past decade. The philanthropy of Graham Sharp, a wiry, bespectacled 58-year-old Lancastrian, has taken seven talented-but-underfunded young Britons to professional racing careers (six on four wheels, one on two), and has aided countless more. He's always stayed in the background, rarely attending races – except to watch his stepson, reigning Blancpain GT Sprint champion Stuart Leonard – yet without him the UK racing landscape would look vastly different.

Sharp was the money man behind the Racing Steps Foundation, which was managed from its inception in late 2007 to its close at the end of '17 by Derek Walters, a genial chap in his mid-seventies from a marketing and promotion background in the sport. Walters was always the public face of the RSF, the 'Uncle Derek' to a host of young charges.

From a lower-middle-class background (dad worked for General Electric, mum was a primary school teacher), Sharp won a scholarship to his local grammar school in Bury, then earned first-class honours in engineering, economics and management at Oxford University. He made his fortune as a founder of the Trafigra oil company where, along with colleagues Mike Wainwright and Roald Goethe (both more recently found in endurance racing), Sharp used to compete in arrive-and-drive karting. Simultaneously, he started the Helsington Foundation, a scheme to get kids from state schools onto summer-school programmes at Oxford, breaking down the class barriers and encouraging them to aim for a top education – that became a model for the RSF.

Trafigra was a client of a London PR company called Bell Pottinger, whose chief David Telling was at dinner with Sharp one evening in 2007. Sharp outlined his plan, and by a stroke of luck Walters's long-time friend Simon Pearson had a desk at Bell Pottinger – although he had recently stopped working for the company – and Telling mentioned the discussion with Sharp to him. Pearson immediately got on the phone to Walters, and a series of meetings in London followed...

"It seemed like there was an idea that we could put together a foundation to support young drivers, and initially the idea was at the very junior level – karting through to F3 and no further," recalls Sharp. "So we said, 'OK, we need to find some boys to sponsor'"

The first 'boys' to sport the RSF livery in 2008 would be Oliver Turvey in British Formula 3, James Calado in Formula Renault UK, and Jake Dennis and Jacob Stille in karting. Walters had already earmarked Carlin Motorsport (as it was then known) to run the F3 programme, Fortec Motorsport for FRenault 2.0, and Zip Kart for karting. Turvey came recommended by former Jaguar F1 boss Tony Purnell, who latterly has driven Sharp's Elite Engineering Programme (a spinoff from Helsington), as well as John Surtees, who enthusiastically took an ambassadorial role with the RSF (which he'd initially hoped would support son Henry's

"CALADO GOT THE CLOSEST. I THINK IF HE'D WON GP2 THAT YEAR HE'D BE IN F1 TODAY"





Calado rose from karting graduate to leading star of GP2

JEP
LAT IMAGES



STALEY
LAT IMAGES



Rowland looked strong in Formula Renault 2.0 but his road was bumpy

EBREY



JEP
LAT IMAGES

career!), Carlin chief Trevor Carlin, and Zip Kart impresario Martin Hines. “The only other boy we looked at seriously was Sam Bird,” reveals Sharp.

Turvey progressed through Formula Renault 3.5 in 2009 and GP2 in '10 before becoming the first RSF protege to 'graduate'. He had a McLaren F1 testing deal in his pocket, helped by former Mika Hakkinen manager Didier Coton, who had been managing Turvey for some time. Also, GP2 was so damn expensive, and proving a stretch for RSF. “The thing is, you have to cut it off at a certain point,” says Sharp. “The experience with Oliver actually made us change the way we did that move to GP2, which was that with Oliver we funded it 100%. After that we really had a view that we're not going to spend tons of money in GP2 unless we see a real route to F1, because it's not worth it. And the boys are better off getting out one level down and going to somewhere you can eventually get paid.”

This philosophy would carry over with Calado for his second year of GP2 in 2013, when he became managed by Nicolas Todt, who contributed a portion of the budget, and for Oliver Rowland in '16, when Renault and MP Motorsport took care of the majority.

Calado had been the winner of the first RSF shootout, held at Rockingham in November 2008, and with the Foundation he rose from Formula Renault UK, via British F3, GP3 and GP2 to Force India F1 Friday practice driver. Unfortunately for Calado, that crucial second year of GP2 coincided with a downturn in form for ART Grand Prix, the French powerhouse team with which he'd first competed in GP3, where he was pipped to the '11 title by Valtteri Bottas. “James was very satisfying; he was just unlucky,” says Sharp. “He just happened to be with ART when they were off the boil. They lost a couple of [technical] people and it was bad luck. He probably got the closest to F1 [of the RSF drivers], and I honestly think if he'd won GP2 that year he'd be in F1 today.”

While Calado was always the nearly man in terms of winning titles, Dennis — just 12 years old when he got taken onto the RSF — hoovered them up, taking crowns in national and world karting, InterSteps (the series for old Formula BMW cars instigated by the RSF and former Young Guns series boss Martin Phaff in 2011) and then Formula Renault NEC. The thing is, Dennis was growing ever taller and it meant that by his F3 days in 2014-15 he was getting too big for single-seaters. “You have to be realistic with Jake: he's too tall,” says Sharp. “I don't know how Red Bull fitted him in [for his F1 test at Barcelona in May] — they must have made a long wheelbase for him! In his last year in F3 he was overweight, but I've never seen anyone so skinny. It was awful — it's part of the stupidity of motor racing. For the sake of five or 10 kilos, taller or bigger-boned drivers really struggle.” Walters adds: “He was taking his Tupperware box everywhere with his piece of boiled chicken in it.”

Ironically, Dennis, after partnering Sharp's stepson Leonard at the WRT Audi Blancpain GT team in 2017, is now with the Aston Martin squad of R-Motorsport, funded by two orthopaedic surgeons — exactly the people who could have sorted Dennis's anatomical woes...

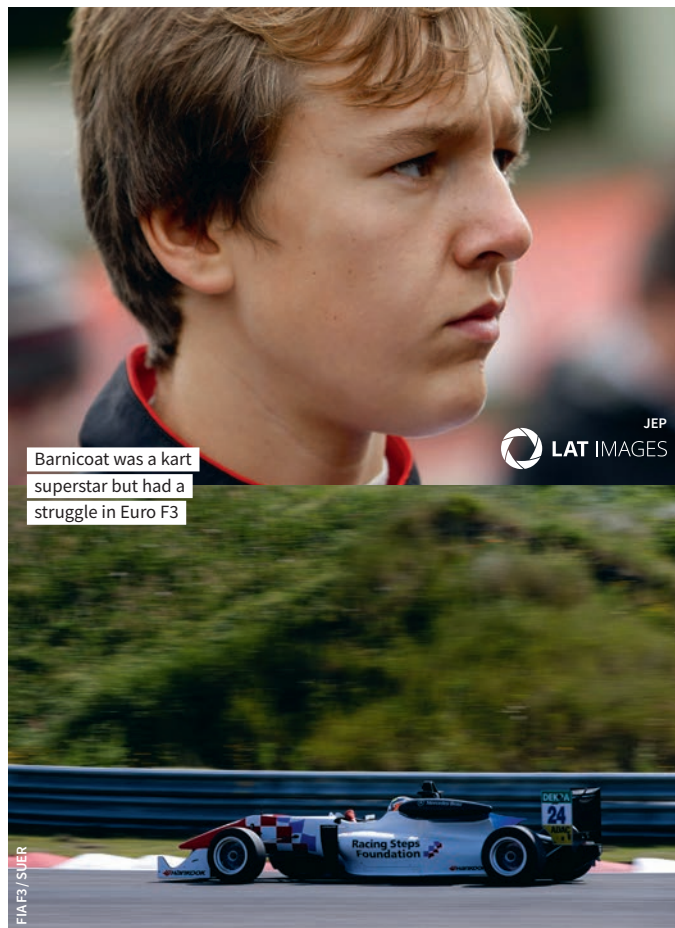
Dennis's FR2.0 career overlapped with that of Rowland, who became very much the *enfant terrible* of the RSF. A protege of Hines, Rowland was in the process of being dropped as a McLaren junior when he was picked up by the RSF for 2011. “Martin Whitmarsh and Dr Aki [Hints, the late McLaren doctor] said he was very talented, but he's never going to make it,” remembers Walters. “And we said, ‘He might not make it with you, but he will with us.’ It was a bit of a challenge. They turned out to be right.”

Rowland was dropped by the RSF at the end of 2012, then given a lifeline for '13, when he was put under the wing of BRDC president Derek Warwick. An influential figure in the RSF, Warwick was the ‘informal’ element of the RSF in mentoring drivers, while others including mind guru Don Macpherson, Porsche Human Performance Centre's Eliot Challifour and media coach Louise Goodman honed the off-track skills.

Warwick put Rowland back on the right track, and he rewarded the RSF with the FR3.5 title with Fortec in 2015, Sharp saying “you really felt that he'd turned the corner. And then the next year...” This was where Rowland went GP2, with the support of Renault. “It was when the Renault management were trying to buy Lotus [F1],” says Sharp, “so they were a bit preoccupied because it took about six months longer than it should have done. There was no question at one point they were very positive about Oliver, and then because everything else was so messed up, and they changed the management and the new guys didn't have the same enthusiasm for Oliver, what we eventually got from them was a lot less >>



Harvey was picked up at 15 and came close to Indy Lights title



Barnicoat was a kart superstar but had a struggle in Euro F3

NANNYING McPHEE

THE MOTORCYCLE EXPERIMENT

Along with its six graduates on four wheels, the Racing Steps Foundation had a further 12 beneficiaries in car and kart racing, and provided sizeable multi-year funding of the MSA Academy to help youngsters in all disciplines of cars, from karts to rallying.

As well as that, the RSF entered motorcycle racing in 2010. Fraser Rogers and Wayne Ryan were the first of six riders to carry the red, white and blue livery, initially in the British Superbike-supporting 125GP category and then the Spanish CEV 125/Moto3 ranks. But it was John McPhee who became the RSF's sole graduate on bikes, winning the 2016 Czech Grand Prix in Moto3.

The RSF's creed here was to drag youngsters out of the production bike-centred comfort zone of UK racing and into the MotoGP arena – a tough task.

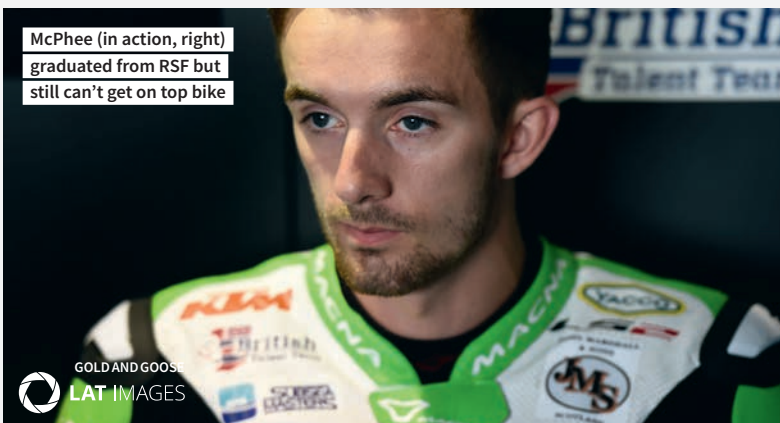
“Unlike the karting world, where the UK was at the centre of everything,

the reality was that the centre of motorbike racing is in Spain, where there were no British teams and no British riders,” says Graham Sharp. “We identified a good British team [Mark Keen's KRP operation] that were willing

to go and run in Spain. Out of the boys we brought, the best was John [McPhee]. But the problem was again that you just couldn't get into the top teams. It wasn't just a question of money; it was you weren't Spanish or you weren't Italian.”

MotoGP promoter Dorna was keen to encourage talent from what Sharp describes as “the Anglo-Saxon world”, and the RSF had discussions with MotoGP UK TV rights holder BT Sport about emulating the deal Sky had with Valentino Rossi's team for Italian youngsters. “You could see that it made sense for BT Sport,” says Sharp. “But it never happened.”

While KRP could take the riders so far, the leap to Moto3 proved difficult. “Fair play to Dorna – that year that John won the Czech GP, they were paying for him,” states Sharp. “We could always get the boys in the top teams in cars, but we could never get John on a frontrunning bike.”



McPhee (in action, right) graduated from RSF but still can't get on top bike

than they'd originally said they were going to do. Which was fair enough – it was never in a contract.” While all this was going on, Rowland missed out on chances with ART, DAMS and Prema Racing, hence the seat with MP. Rowland put on weight, and the season was a disappointment.

Meanwhile, Jack Harvey was making waves in the US. The RSF had a contract with Fortec for Wayne Boyd in FRenault UK for 2009, but came to an impasse with the Northern Irishman's manager Chas Cole, father of BTCC racer James. At the same time, Harvey was testing for Fortec in FBMW and team boss Richard Dutton put in a call. “Next thing, Richard's saying, ‘Have I got an F1 driver for you!’” laughs Walters. The Boyd/Renault deal was transferred to FBMW Europe for Harvey, who at 15 years old was too young for Renault. He won the British F3 title in '12, but after a year in GP3 with ART the move was made across the Atlantic to Indy Lights.

“It was €1.4-1.5million in GP2 and €600-800,000 in GP3,” explains Walters, “and even if Jack won both series there was no natural leap into F1, whereas in Indy Lights he would have ended with a prize fund in excess of \$1million and an entry into four or five races in IndyCar. By the time he was in his mid-twenties he could have been earning millions.”

Harvey didn't – he was pipped two years running – but could the RSF have contributed more budget for a fuller programme in IndyCar? “I think something probably could have been done,” says Sharp. “We would have tried, that's for sure. I've got a huge amount of time for Jack, how he's stuck at it out there and got himself on the verge of something.” That has culminated in a part-programme in IndyCar, and he looked in with a shot of victory in this year's Indy 500 until a late splash-and-dash was

**“EVEN IF JACK WON BOTH SERIES
IN GP2 AND GP3, THERE WAS
NO NATURAL LEAP INTO F1”**

needed. “If it was called the Indy 490, he'd have had it!” jokes Sharp.

The other RSF graduate in cars is Ben Barnicoat, who like Dennis races in Blancpain GT, in his case as a McLaren factory driver. He was part of the second wave of karters, joining the scheme in 2011, when Zip Kart collaborated with ART as the single-seater giant spread its tentacles downwards. From rivalling Charles Leclerc and Max Verstappen in karts, he won the FRenault NEC title, but had a disappointing '16 season in F3. “He was always so grateful for everything done for him,” says Walters. “If he made a mistake he was absolutely mortified because he thought he'd let us all down. I remember him phoning once; we were chatting and I said, ‘Why are phoning me Ben?’ He said, ‘I've had a bit of an off.’ I said, ‘Good, that means you must be trying.’ I damaged the front wing.” Oh great, Ben. “Is that all right then?” Yes, you keep trying and find the limit.”

“Maybe Ben suffered a bit from lack of self-confidence compared to the other boys,” interjects Sharp. “That's changed now – I see him at the GT races and he's really grown up the last couple of years.”

GT is where it's at for professionals these days. Even so, there's no way Sharp will ever be fully repaid – RSF contracts stipulate that 10% of any annual earnings over £100,000 are returned. So why stop? Well, it was easier when RSF started. “We wanted to run boys in the top teams, and hopefully we'd have boys the top teams wanted to run,” says Sharp. “And if top teams didn't want to run our boys, we probably had the wrong boys!”

Now it's more complex. “Back when we started, the only F1 team that did anything was Red Bull,” reflects Sharp. “Now you've got Red Bull juniors, Ferrari, Mercedes, Renault, McLaren... Obviously the teams are going to take their boys first. I honestly think if we picked somebody up today we'd almost be hurting their chances.

“We had a good 10 years. And you know? Three of our boys [Turvey, Rowland and Dennis] drove recently in the Barcelona F1 test, and paid nothing to do it. Jack Harvey ran the Indianapolis 500. Jake and Ben were pole and second on the grid for the Blancpain Paul Ricard race. James is defending his World GTE title. They're never going to repay the money that was put in, but I think we can be quite proud of that.” ❧



AN EKSTR-EMELY GOOD CAREER CHANGES TACK

*Mattias Ekstrom was a talisman of the DTM with Audi.
Then he suddenly gave it up to focus on his World Rallycross team*

TOM ERRINGTON



While the opening salvos of the 2018 DTM season were fired at Hockenheim back in May, it was unusual to have Mattias Ekstrom down in 17th and 16th in the two races — and for it not to matter. No, he wasn't "saving the environment" like he claimed he was when he turned his engine off at the Red Bull Ring in 2011 after becoming frustrated at running 16th. Instead, this was a touring car career farewell for the Audi hero.

"You spend so many years somewhere," he says of his exit to concentrate on his World Rallycross Championship exploits as a team boss and driver. "On the one side it's hard, on the other side it's also the end of a chapter and it always starts a new one. In some ways, I don't miss the DTM. It's strange but that's how it is — I feel like I achieved a lot, we won some races, two championships. Something I'm proud of is the amount of podiums, and also I feel I have entertained the people well over the years."

But don't mistake that for a lack of interest in the DTM. In the space of nearly an hour discussing his career, the Hockenheim farewell and his WRX hopes, Ekstrom makes a point of talking about the DTM's future, especially the post-2018 era once Mercedes has gone. "I think it is difficult to see in my world how DTM can go so far without Mercedes," he says. "In my opinion, DTM, in the beginning, was Mercedes. I struggle to see a DTM without Mercedes getting to the same standing."

Ekstrom is also unusual in that he pits himself against the prevailing opinion on one of the DTM's biggest talking points. Ahead of the 2018 season, the series ended its costly aerodynamic war and mandated a common aero package across Audi, BMW and Mercedes. Audi, which had spent vast sums in finding an aerodynamic advantage — winning it the manufacturers' and drivers' (with Rene Rast) titles in '17 — has now dropped to third in the pecking order. It is the development war-averse Mercedes that has gained the most.

While many praise the wholesale change for putting more into the hands of the drivers, Ekstrom does not agree. "For me, it's peanuts difference to last year," he says. Ever the master of the short-but-blunt statements, when asked to expand on this, he says: "I think it's never easy to win. But, frankly and honestly, the cars are underpowered, overdownforced, overtired."

"You understand what I'm saying so you can write it in a sensible way? So, too-good tyres, too much aero, too little engine. I did NASCAR [in 2010 at Sonoma and Richmond] and it's overengineered, undertyred and an underdownforced car. An RX car is undertyred, underaeroed, overmechanical, or neutral mechanical, and overpowered. So the DTM formula, I think it's not healthy."

That's Ekstrom's first mention of WRX during our encounter. He describes the decision to set up the EKS WRX team in his native Sweden back in 2014 as "full-circle", having grown up around rallycross as a child. His father Bengt competed in the European Rallycross Championship, and Ekstrom Jr had a foray in a Marklund Motorsport Volkswagen Polo in '13. In a rapid-fire growth phase, which left some sceptical that it could succeed, the >>

WRX formula is
more to Ekstrom's
taste than DTM





Ekström made his DTM debut with Abt Audi in 2001

EKS team planned to enter the WRX season in '14. In June, the first Audi build was completed and by July Ekström was on the top step of the podium at his home event. That was just six months after the team had moved into an empty garage in Fagersta, Sweden. A year later, Ekström won at Holjes again.

More success followed in 2016, when Ekström became the WRX champion and his team won the championship in its best year to date. The driver-owner role is something he's now relishing as he moves into the next phase of his career. "I think that the knowledge as a driver is such a small part of the operations of a racing programme," he explains. "When you see what everyone else does, that has a bigger influence on a daily basis, but from the sporting side the driver has a big part. Running the team and driving it, you are part of every single process, which is awesome."

Yet consider his DTM form alongside his WRX commitments. In 2015, at the two-thirds mark of the season, Ekström led eventual champion Pascal Wehrlein by six points in the standings before he fell away from the crown, enduring a run of four races with just one point. A year later, he skipped the final round of the DTM season at Hockenheim, while fifth in the points, to secure his WRX crown. But he bristles at suggestions that his WRX commitments have impacted his DTM title bids – he was a close second last year.

"I would say that has really zero influence when it comes to this," he says. "I managed to squeeze out the performance, which I am happy for and it wouldn't change much. Sorry to say, but it was not the reason I was not performing – it would have been the same."

While this may come across as covering over the cracks, the fact that his Audi team-mate and former rival Jamie Green was surprised by Ekström's exit speaks volumes. "Yeah, it's a bit strange," says Green. "At first when I heard that he was stopping over the winter time I was surprised, because I would have thought he would have said something last year."

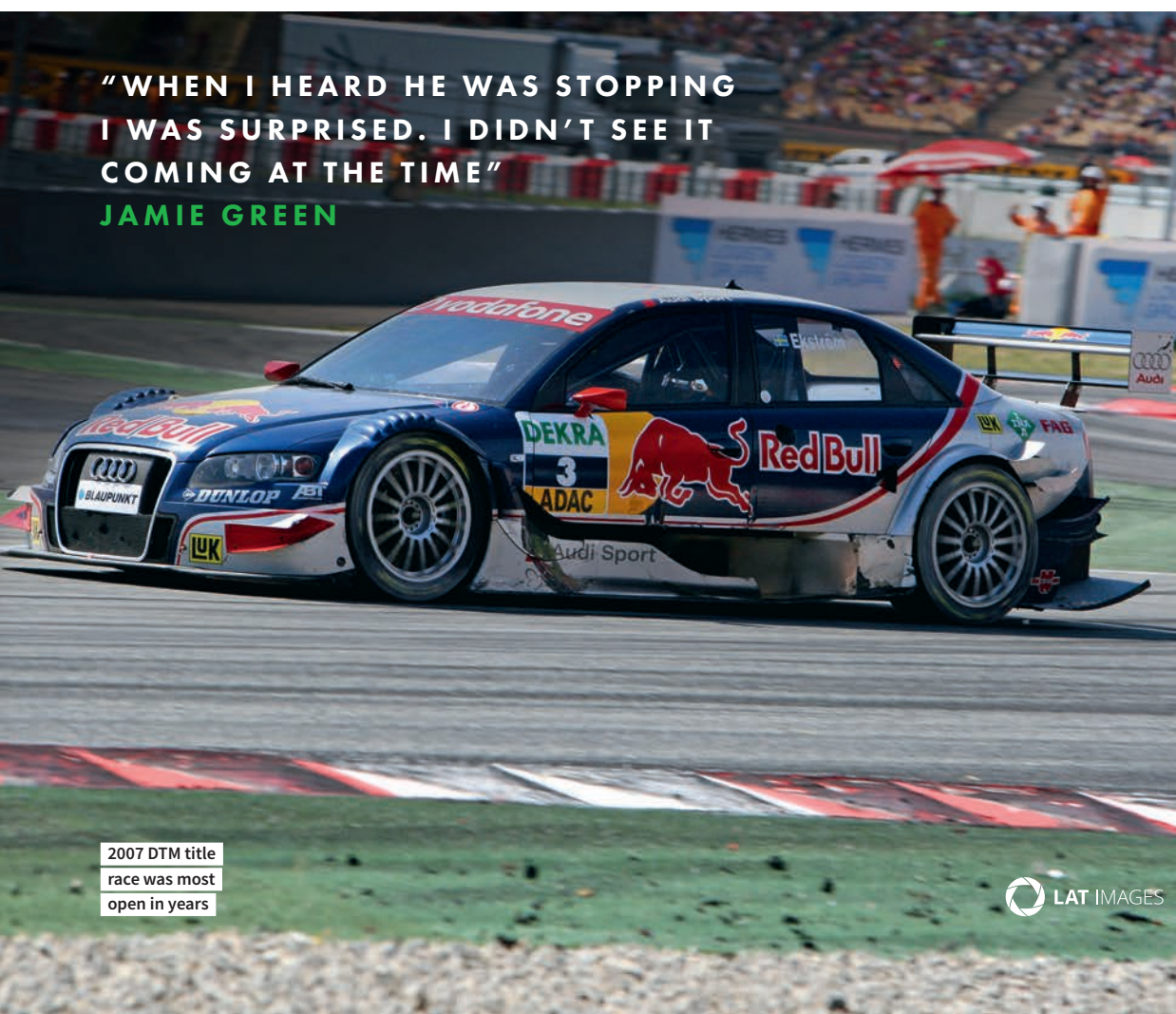
"So for him, I think he was so focused on last season and when he calmed down and it was over – obviously he was gunning for the championship and he didn't get it – he decided it was the right time to stop. It was a surprise – I didn't see it coming at the time."

But that exit may not have happened had Ekström and EKS not secured its WRX future going into 2018. The Audi-backed project needed more support from the manufacturer for it to continue into this season. Ekström pursued some peculiar strategies to attract the attention of the 'mothership' – for instance, making an announcement during the Loheac WRX round in 2017 that four of the team's five Audi S1 Supercar chassis were for sale.

There were further fears over the programme's future when WRX event winner Reinis Nitiss parted company with the team on the eve of Ekström's 2018 press conference. Once again, he stressed how essential Audi backing was.

"WHEN I HEARD HE WAS STOPPING I WAS SURPRISED. I DIDN'T SEE IT COMING AT THE TIME"

JAMIE GREEN



2007 DTM title
race was most
open in years

EKSTROM
DTM
STATS

23
WINS

2
TITLES
2004, '07

4x
RUNNER-UP
2005, '11, '14, '17

3x
THIRD
2002, '08, '15



Finally, Audi came through with a revised S1, featuring significant aerodynamic development, plus Andreas Bakkerud was added to the driver roster. Audi's goodwill had already extended to it granting permission for Ekström to exit the DTM for the WRC, rather than forcing him to respect his DTM contract.

He plays down the perilousness of the situation, but admits Audi's support was key. "I appreciate the chance [from Audi to leave DTM and focus on WRC] and I am happy to be here," he says. "It's massive [the support from Audi in order] to stay competitive. Now, for the time being, we are in the game and I can't see that we have a big advantage, but at least we are in the mix. So a lot of thanks to Audi. The cooperation with them was key."

The toll of combining two championships was also a price he was no longer willing to pay. When asked why he wanted to focus on

WRC, he says: "Many things. But it takes a lot of energy and I also felt being on the road all the time. Even if I am only home a couple more weekends they mean a lot to me. I can have some more time with family and maybe a couple of more weekends in the sun. Just a little bit less to do is nice."

As the man himself says, the DTM chapter has now closed. But try telling that to DTM boss Gerhard Berger. "He's [Ekström] a good guy, great driver, good personality," says Berger. "He will be back."

A shame, then, that Audi Sport boss Dieter Gass pours cold water instantly on such a theory: "I think it was a well-deserved farewell from DTM. Thanks to Mattias for everything he did for Audi over the past 17 years. He has taken his choice and he is doing the WRC, which he enjoys a lot as well. So, I think we take it as it is that his involvement has ended and things won't change." ❧

SEVENTEEN YEARS, TWO TITLES

It's fair to say that Mattias Ekström should have won more than two titles during his DTM career. While his recent 2015 miss was particularly disappointing, and the following year he switched his focus to gaining the World Rallycross Championship title by missing the final round, there were several other notable misses.

Ekström does not agree that he peaked in his title-winning years of 2004 and '07, and points to '11 as his best campaign. That was the year when his Audi stablemate Martin Tomczyk made the most of a weight advantage in the older-spec A4, combined with a run of four races without a podium for Ekström early on.

The following year he struggled to the point that Autosport described him as

a man who "looked finished at times". Ekström could then have left for either BMW or Mercedes, but he saw the bigger picture and remained with Audi.

By the time he bowed out at the end of 2017, at the

age of 39, he'd been a mainstay of the DTM for 17 seasons. He burst onto the scene with the privateer Abt Audi team in 2001 and successfully played rear-gunner for champion Laurent Aiello in '02. And

by '04 – the return of Audi as a factory team – the tide was turning in favour of the next generation.

Ekström's first title year came after a fight with fellow young gun Gary Paffett, one that

significantly swung Ekström's way when the British Mercedes star was excluded because of insufficient fuel for a sample after a stunning race at the Lausitzring.

"I think that was the hype year when I felt DTM was really cool," he says. "That was when the cars had less downforce and the tyres were way different. It was unique as a formula. I think it was a real honour to be a part of the championship. 2001, '02 and '03, it took a while [to get up to speed]."

In 2005 Paffett took his revenge with the title and Ekström struggled with the updated Audi. Two years later Ekström won the most open title race in modern times. "With the amount of races we have," he says, "you can't afford to have a bad weekend."



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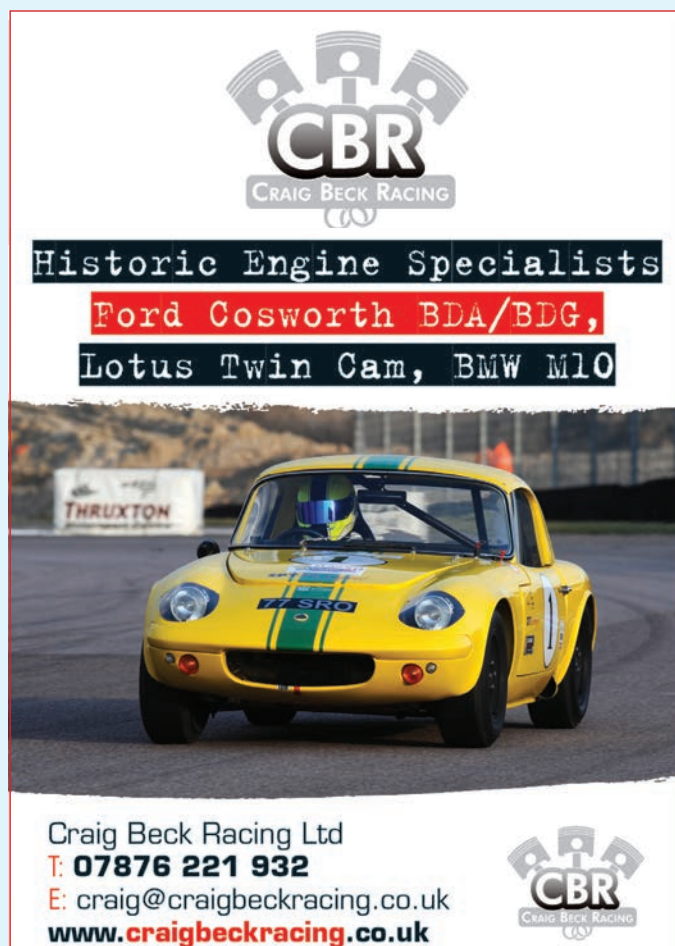
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F3 winner Cane quits racing

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BRDC British Formula 3 race winner Jordan Cane has quit motorsport with immediate effect.

Cane cites the ever-increasing budgets and the risks associated with racing as the reasons behind his decision.

Writing on social media, he said: "After a lot of thought, I have come to the difficult decision to not continue my racing career. The reason for my decision is that I'm just being realistic – motorsport more and more is about money and not talent, and the only chance of a good career is to buy it, not earn it."

"My problem is not just about the money, it's about the risk versus the reward. I'm not scared of racing but I do feel it's not worth risking serious injury or worse when the

odds of getting a career are so low. In my short time in cars several people I know have been seriously hurt and two have died – in all cases except one it has been another driver's fault.

"For me, though, I feel I have better opportunities elsewhere and don't want to waste three more years chasing a dream that as each year passes it becomes harder and harder to get up the ladder."

The 17-year-old has competed in British F3 for the past year, and took three wins in 2016. He was planning to race in the Formula Renault Eurocup this term but pulled out just before the season.

He had previously raced in the US and became the youngest Briton to win a single-seater race when he triumphed in US F1600 a month after turning 14.

STEPHEN LICKORISH

MONGER GETS SURPRISE CHANCE TO TEST AN F1 CAR

FORMULA 1

BRDC British Formula 3 racer Billy Monger enjoyed a “bit of a shock to the system” after realising a childhood dream when he was given a surprise chance to drive a Formula 1 car.

The 19-year-old visited Rockingham last week believing he was going to do more training with stuntman Terry Grant, who worked with Monger ahead of his appearance at this year’s Autosport International.

But on arrival Monger, who suffered a double leg amputation following a British Formula 4 crash at Donington

Park last year, was presented with a 2011 Sauber F1 car to drive.

“It’s definitely not something I was expecting to do, but I had a feeling something was going on as my family were acting a little strange,” said Monger, who returned to racing this season and took a podium in his first race back at Oulton Park.

“I was probably a little worried at first [about crashing the car] when I turned up and there’s an F1 car there.

“It was a Sauber from 2011 but it had a slightly different powertrain and the aero was a bit different I think. We were out for about 12 laps.”

“I FELT SOMETHING WAS GOING ON AS MY FAMILY WERE ACTING A LITTLE STRANGE”

The car, which is operated by Heritage F1, a company that refurbishes and sells historic F1 cars, was adapted with hand controls similar to those Monger uses in BRDC British F3 with Carlin this year.

The session took place during the trackday lunch break at Rockingham and was organised as part of a programme that featured on Sky Sports F1 last weekend as part of the build-up to the Austrian Grand Prix.

“It’s a big step up from the British F3 car and it’s just completely different in every aspect,” added Monger, who sits eighth in the British F3 standings and is 13 points away from the top six.

“Everything is evolved and it was a bit of a shock to the system, the braking zones are shorter and the corner speeds are higher. For any young driver, getting into an F1 car is a massive opportunity.”

Monger’s next race outing is the British F3 series’ away visit to Spa, on July 21-22.

STEFAN MACKLEY



Monger sampled a 2011 Sauber F1 car at Rockingham last week



JEP LAT IMAGES

Cane tasted success in US and UK



Cane raced with Douglas team in British F3 this year

JEP LAT IMAGES

Simmons to make F3 debut

BRDC BRITISH F3

British Formula 4 title contender Ayrton Simmons will dovetail a programme in the BRDC British F3 Championship for the rest of the season.

The 17-year-old is currently second in the F4 standings driving for the JHR Developments squad and has taken three wins so far this term. There are four remaining British F3 weekends, and Simmons will make his debut in the Spa event later this month.

He will compete with the Chris Dittmann Racing squad, which was without a driver for the recent Silverstone round. Harry Webb and Chia Wing Hoong both raced for the team earlier this season.

Simmons plans to use the F3 races

as preparation ahead of a possible full campaign in 2019.

“This is the next step up in my career and, while it’s come earlier than we expected, it’s too good an opportunity to miss,” he said.

“It’s a move I expected to make anyway, and now I have a chance to learn the car and series ahead of hopefully a full season in 2019.”

Team boss Chris Dittmann added: “Ayrton has shown what he is capable of in the past couple of years and we are really looking forward to working with a driver of his potential, especially after we had our best round of the year so far at Snetterton [in May with Webb].

“We’re excited to see what he can do with us and can’t wait to get going at Spa.”

STEPHEN LICKORISH

LMP3 Cup and GT Cup will not combine grids

MSVR

LMP3 Cup and GT Cup series organisers have ruled out the possibility of the two series combining grids to become a World Endurance Championship-style multi-class event.

A recent survey released by GT Cup aimed at drivers and teams included a question on whether it should be combined

with the sister LMP3 Cup series.

United Autosports boss Richard Dean earlier this year suggested combining the grids, but Chris Haynes, the managing director of series organiser Bute Motorsport, has ruled it out.

"We wanted to know [in the survey] what they thought, but they're confirming what we think, which is that those things should be kept separate," said Haynes.

"They're happy to do the odd race where it's appropriate, where the circuit can cope with it – Spa for instance, and possibly Silverstone. But as a rule they would prefer the two to be apart."

"GT racing and prototype racing, they're two different species. We want to have more than one championship that complement each other."

Steve Ruston, who drives a GT4 Ginetta, which is among the slower GT Cup cars, is concerned about the speed disparity of a combined grid. "There's just massive accidents that could happen there, and that would put me off," he said. "I don't want to be repairing a car every weekend because an LMP3 who's got pots of money wants to come and smash it up."

Some GT3 runners were more open to combined grids. "We've raced two years with them at Spa and it's been good fun," said GT Cup frontrunner Nigel Hudson. "We have to cope with them [GT4 cars] in GT3, so there's no reason why they [LMP3 cars] can't. It would make for a better spectacle and better racing."

LMP3 racer Bradley Smith also liked the idea: "Mixed classes is what endurance has always been about. With a P3 and a slow guy in a GT4 the closing speeds are quite quick. That's an element of endurance racing – they just need to get the right balance."

GRAHAM KEILLOH



Gunn to make competitive race return

SPA 24 HOURS

British GT4 champion Ross Gunn will contest his first competitive race for nearly nine months after joining TF Sport's driver line-up for the Spa 24 Hours later this month.

The 2015 title winner, who is now a factory Aston Martin driver, last raced in the American round of the Creventic 24H Series last year. He took part in the Aston Martin Festival race

that supported Le Mans in the manufacturer's new GT3 car last month and finished first on the road, but his car was significantly faster than the others and was not included in the results.

Gunn will now join reigning Porsche Carrera Cup GB champion Charlie Eastwood, Euan McKay and Ahmad Al Harthy in a Vantage GT3 for the Blancpain GT Series round on July 28-29.

"It's a huge opportunity

for me," said Gunn, who currently has no other outings confirmed. "This year I have been a full-time driver for AMR, doing a lot of work behind the scenes and development work."

"I'm looking forward to getting a proper race under my belt. It's been a bit of a tricky period, but I'm really hungry to make this work out and Spa can be a springboard."

STEPHEN LICKORISH



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Britcar targets Algarve trip

BRITCAR ENDURANCE

The Britcar Endurance Championship could host its first overseas meeting since 2016, with a non-points-scoring round at the Algarve International Circuit being considered for next season.

Although the date is yet to be confirmed, a slot in August or September 2019 on the support bill of the European Le Mans Series has been offered.

Depending on the size of the entry list, the race could run for either two or four hours and, so long as cars run to 2019 regulations, international entries will also be eligible to compete.

Britcar managing director Claire

Hedley said: "We were offered the track time for a very reasonable price. The feedback so far has been, 'I'll bring two cars', 'I'll bring four cars', etc, etc."

"I'm going over there in October to have a meeting with the circuit manager. Hopefully there's potential to take it further. It's looking very, very good already."

"We're trying to invite all the teams back into Britcar and my gut feeling is to keep it as a seven-round championship with this as a one-off special."

If the race does go ahead, it will only be the second time Britcar has held an international meeting since relaunching under new management in 2015.

MATT KEW

Porsches trial pitstops

PORSCHE

The British Racing & Sports Car Club's Porsche Championship featured a pitstop race for the first time at Rockingham at the end of last month.

Competitors were required to pit and have Velcro strips removed from their windscreens during a seven-minute window in the weekend's third race.

Series coordinator John Broadley said the idea arose from driver feedback. "We had an end-of-season meeting and thought we'd put in an option to do a pitstop, so it's in the regulations for this year," he said.

"The previous round at Cadwell Park

had a few incidents on track with the reversed-grid race because it was narrow. As a result there was a bit of reluctance to carry on doing reversed-grid races.

"That's calmed down a bit, but we thought as we're coming to Rockingham, where there's an enormous pitlane, we'd try the pitstops here."

Originally intended as an alternative to a reversed grid, the pitstop format was well received, with triple race winner Adam Southgate saying: "With a reversed grid, you can get stuck behind people that are slower, so it's a different way of getting past."

MARK PAULSON

IN THE HEADLINES

SHERARDIZE'S DOUBLE

Peter Belshaw and Marcus Clutton made it a winning double as the Fun Cup ventured to Zandvoort last weekend. The Sherardize pair dominated the second half of the first race, with the first 30 minutes run mostly behind the safety car after Michael du Bois had a huge roll, but was uninjured. Stuart Hall set the pace in race two for MAK Racing, but the engine let go, so for the last 33 laps it was Sherardize in charge again.

RAVEN IN CONTENTION

James Raven remains in title contention after another strong weekend in the F4 United States series at Mid-Ohio. The 2014 Formula Ford Festival winner coupled a best result of second with two fourth-place finishes, but falls from third to fourth in the standings. Another Brit, karting graduate Teddy Wilson, was third in all three races.

GTO MAY BREAK RECORD

An ex-Phil Hill Ferrari 250 GTO could set a new world record for the most expensive car sold, as it heads for auction with a \$45million estimate. It was used as a test car by Ferrari, and driven by 1961 F1 world champion Hill during the '62 Targa Florio.

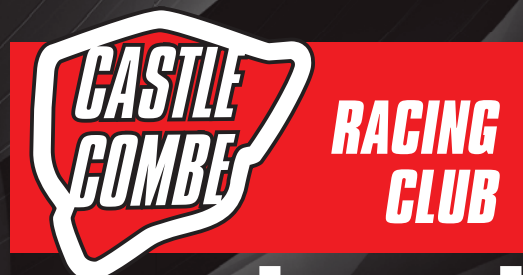
PORSCHE GUEST RACERS

Top Gear presenter Chris Harris and three Carrera Cup GB race winners will be guest entries in the Porsche Supercup at Silverstone this weekend. Harris will be joined by Dino Zamparelli, Lewis Plato and Tom Wrigley. Supercup debutant Wrigley said: "In my Kumho BMW days I never imagined this! I'll be racing against the best Porsche drivers in the world – it should be epic."

PITTARD TO VLN IN BMW

GT regular David Pittard will switch to the German VLN series for the rest of this season. Pittard, who finished third in the British GT4 points last year in a Lanan Ginetta G55, will share a Walkenhorst Motorsport BMW M6 GT3 (below) with Alex Lambertz and Immanuel Vinke in the Nordschleife-based series. "This is my big opportunity in my career," said Pittard. "I'm ready to sink or swim."





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GOODWOOD FESTIVAL OF SPEED Fresh from winning the GTE Pro class at the Le Mans 24 Hours last month, the 'Pink Pig' 911 RSR GTE will be among Porsche's selection of cars appearing at the Goodwood Festival of Speed next week. The car raced in the special retro livery to commemorate the German manufacturer's 70th anniversary. Two of the winning car's drivers, Laurens Vanthoor and Kevin Estre, will be at Goodwood and may drive it up the famous hill. The sister Rothmans-liveried car will also be on static display. **Photograph by LAT Images**

FFord racer on the mend

HERITAGE FORMULA FORD

Jack Clayton is continuing to recover from injuries sustained in a crash in a Heritage Formula Ford race at Silverstone last month.

The Souley Motorsport Van Diemen RF89 driver collided with the Crossle 25F of Scott Guthrie, who had spun and come to a stop through Copse. The side of Clayton's car struck Guthrie's rear wheel, fracturing his pelvis in three places as well breaking seven ribs, three of which had to be pinned. Clayton was expected to return home from hospital this week.

Team boss Brian Soule said: "He was

struggling to breathe as the ribs kept collapsing on his lungs, so he had three of them pinned. He's going to be out for about three months and as soon as he's fit and ready he wants to get back in the car.

"Scott sent me a message saying there was no way he [Clayton] was going to avoid him, and I think he had a broken rib as well."

- Heritage FFord series organiser James Beckett is seeking championship status for the category next year. The new-for-2018 series, which caters for Pre-1993 Kent-engined machinery, has been popular this season, attracting 24 cars for its first race.

STEFAN MACKLEY

IN THE HEADLINES

ECLECTIC HGPCA GRID

The Historic Grand Prix Car Association's eclectic Pre-1966 grid at Brands Hatch last weekend included Jo Bonnier's '59 Dutch GP-winning BRM P25 in the hands of American Charles McCabe, the ex-Jean-Pierre Wimille Bugatti T59/50A of Tom Dark and Australian John Gillett's ex-Bira White Mouse Stable MG K3.

HISTORIC FF1600 DEBUTS

Five-time Le Mans 24 Hours participant Pierre-Alain Lombardi (Brabham BT18) and fellow Swiss Jean-Michel Clerc (Merlyn Mk20A) were welcome Historic Formula Ford Championship debutants at Brands Hatch. But it was a baptism of fire for the duo, Lombardi taking the best result with 19th in race two.

WAREING'S ENDURO

Lancastrian Historic F1 stalwart Andrew Wareing had fun baiting Sports 2000s in the Pre-1980 Endurance races at Brands Hatch, at the wheel of the startlingly-liveried Nickey Chevrolet McLaren Elva M1A that American Charlie Hayes raced at home and in the '65 Nassau Speed Week. He took a best result of 11th in the opener.

CTCRC AT LYDDEN

Action from the Classic Touring Car Racing Club will be central to this weekend's Classic Festival at Lydden Hill. Saturday's line-up will feature a celebration of Group B and rallycross, with a full programme of classic touring car races on Sunday in the club's fifth event of eight this season.

Sprint ace's debut win

HISTORIC 750 FORMULA

Former British Sprint Championship frontrunner Simon Boulter stunned Historic 750 Formula regulars by taking two victories on his racing debut at Pembrey last weekend.

He had acquired the ex-Mike Dorsett Time 3B that former British Touring Car ace Anthony Reid took to victory at Anglesey last summer to make the switch onto circuits, carrying out extensive work on the car and lightening it significantly.

"It's basically a completely new car," he said after taking his first win by a narrow margin over the experienced Christian Pedersen. "The fact that Historic 750 Formula is a control formula, with control tyres and a control cam, appealed to me."

The second win came in Boulter's favoured wet conditions. He knew Pembrey from his sprinting days, but the next round is at Cadwell Park, which is unfamiliar to him. "I'm looking forward to learning it already," he added.

IAN SOWMAN



Boulter shocked the Historic 750 Formula regulars

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- A** Jim Clark
- B** Ayrton Senna
- C** Michael Schumacher

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FROM GRASS ROOTS TO THE BRITISH GRAND PRIX

This weekend isn't just about F1 at Silverstone, and here we pick some of the other highlights that are related to the world of national racing



RIISING BRITISH STARS
JACK BENYON

Since Lewis Hamilton entered Formula 1 in 2007, there hasn't been much British new blood coming in to cheer about. But at Silverstone this weekend you'll be able to see two national racing graduates take centre stage and battle each other for home honours.

George Russell won at his first attempt in a national series, BRDC F4 in 2014, in parallel with a Formula Renault ALPS campaign, which catapulted him into European competition.

After four wins in Formula 2, Russell leads the points and is full of confidence. He's barged his way to the front of the queue in F1's premier feeder category and making a grab for teams' attention.

"Silverstone is my favourite track on the calendar this year, it's been a great one for me and I've won in every category I've raced in there," Russell says. "It's a circuit I like. Maggotts and Becketts are just an incredible sequence of corners. It's high-speed and it suits my driving style."

While Russell only had one year on the national scene, his main rival Lando Norris had three. He was third in Ginetta Junior in 2014 and MSA Formula champion in '15, before splitting BRDC British F3 with European series the following year.

As with Russell, the McLaren Autosport BRDC Award helped boost his career, and a test with the McLaren

F1 car as part of the award led to a junior role with the team.

That's turned into three other teams enquiring about Norris's availability this year. He's certainly made the most of his career. It feels like Norris has been here forever but he's still only 18 years old.

"It'll be nicer to win, potentially, in front of your home fans," he says. "I don't think it puts any extra pressure on me — it just makes me want to do better, it's more rewarding."

While there's plenty of British interest in F2 and feeder category GP3, Norris and Russell are simultaneously the best prospects and the two who have mixed it at national level.

It's clear that to make it to their level, an enormous amount of investment is needed and a huge amount of dedication from the drivers. But the fact that they came from the UK scene should give a glimmer of hope to any club racer out there willing to dedicate as much as these two young racers have to their craft.

"NATIONAL RACING GRADUATES WILL TAKE CENTRE STAGE AT SILVERSTONE"



MASTERS HISTORIC F1
MATT KEW

Some say he could have been motorsport's George Best, others describe him as 'the greatest driver you never saw'. His seemingly innate ability to wring the neck of a single-seater meant he was a driver feared by junior formula contemporary Ayrton Senna. Tommy Byrne could and should have been a world beater.

The 1982 British Formula 3 champion has just two grand prix starts to his name, with perennial non-qualifier Theodore Racing. Despite his abortive career in the top flight, those who watched his time in the junior ranks rated Byrne as one who could have risen up the pecking order to fight for F1 wins and titles. But, ultimately, his temperament and exuberant lifestyle put paid to a potentially glittering career.

More than three decades on, Byrne has bounced back into motorsport consciousness following the release of his biography and the subsequent film *Crash & Burn*. So to have him back in an

F1 car at the British Grand Prix is nothing if not cool.

"TO HAVE BYRNE BACK IN AN F1 CAR AT THE BRITISH GP IS NOTHING IF NOT COOL"

Sandwiched between the Masters Historic Festival at Brands Hatch and the Silverstone Classic later this month, Byrne will enter the two FIA Masters Historic Formula 1 races across the F1 weekend. He'll be piloting a Hesketh 308/1 and, as a result, is unlikely to mix it at the sharp end with the likes

of series champion Nick Padmore in his later and more sophisticated Williams FW07C. But Byrne coming back is a fantastic story in itself, regardless of how he fares.

It'll be the first time the 60-year-old has raced at Silverstone since 1984, and the fact that he'll be sharing the grid with F1 aero design ace Adrian Newey in his Lotus 49C adds some genuine intrigue to the Historic F1 grids. Former McLaren mechanic Warren Briggs will feature too in his ex-John Watson M29C.

The racing in the championship can be hit and miss, exaggerated by the spread in driver ability throughout the field and the gulf in pace between the cars that pioneered ground effect and those that rely on conventional front and rear wings.

But to see this ensemble and, in particular, Byrne in a grand prix car over the F1 weekend is easily worthy of being on the support bill for British motorsport's premier event. *W*



Bradshaw skilfully avoids Argo nought

**BRANDS HATCH
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Tom Bradshaw's stirring Classic Formula 3 victory, from the back of Sunday's 27-strong amalgam of British and French competitors, was deservedly the talk of the Historic Sports Car Club's swelteringly hot Legends of Brands Hatch Superprix.

An electrical short circuit had silenced the ex-Thierry Tassin Argo JM6's Toyota engine on Saturday, but the blinding consistency and breathtaking corner-speed carried by Bradshaw – the 2008 Formula Palmer Audi runner-up – elevated it to 13th on lap one and the lead within eight laps. "I had to be patient working my way

through, but the car was stunning. It never missed a beat," he said.

David Shaw (ex-Nelson Piquet Ralt RT1) won the bizarre opener. "I've never known a race like it," he said. "I started sixth, the chap in front of me bogged down, Fred [Rouvier, Martini MK31] spun at Paddock, and by the second corner I was leading."

Ian Jacobs (Ralt RT3) and Simon Jackson (Chevron B43), plus Keith White (RT1), Pat Gormley (Safir) and Paul Smith (Ralt-VW RT3) chased Shaw. Rouvier recovered superbly from 25th to eighth.

Bradshaw rocketed up Sunday's lap chart, diligently hunting down leaders Jackson and Jacobs before slicing ahead into Surtees. Thereafter he was gone, and his best lap of 1m31.908s (95.30mph) proved peerless. Jacobs and Jackson joined Bradshaw on the overall podium, with Rouvier next home.

Great Britain's B team, led by Andrew Hibberd and Michael Scott who finished one-two in Sunday's decider, claimed the Historic F3 Nations Cup, which Hibberd's Brabham BT18 won with Chris Irwin up in 1966. Jon Milicevic, who beat Steve Smith on Saturday after fuel vaporisation slowed Hibberd, retired from their Sunday duel when a broken rocker ended his 2018 win streak at seven races. Christoph Widmer buckled a corner of his Brabham, having arrived

brakeless at Clark Curve on Saturday, but the 1000cc fraternity eagerly helped him repair it and shared his joy at third on Sunday.

Geraint Owen took a mighty HGPCA Pre-'61 double in his Kurtis-Offenhauser 'Merz Engineering Special'. Owen shook off Rod Jolley (Lister-Jaguar 'Monzanapolis') on Saturday, but Will Nuthall's extraordinary Sunday drive in the ex-Peter Whitehead/Martin Grant Peterkin Alta F2 forced Owen to "use more revs".

Once Peter Horsman had spun his Lotus 18/22 at Druids on Saturday – presaging a tigerish recovery to second – and stopped when a stone jammed its throttle open the following day, Jon Fairley (Brabham BT11/19) was uncatchable in the Pre-'66 set. Mark Daniell (ex-Alec Mildren Cooper T45) kept him honest in race two, finishing ahead of Chris Drake (Gerard Racing Cooper T73).

Michael Lyons blasted to another stylish Derek Bell Trophy double in his F5000 Lola T400, but Mark Charteris's endeavours to rob Neil Glover (Chevron B37) and Greg Thornton (Surtees TS11) to prevent a V8 clean sweep in his F2 March-BDG 742 thrilled onlookers. Charteris made it onto the podium, behind Thornton, on Sunday. Matt Wrigley (March 79B) aced the promising FAtlantic revival's debut.

In Saturday's Pre-'80 Endurance race,



BRANDS HATCH WEEKEND WINNERS

CLASSIC CLUBMANS

Mark Charteris (Mallock Mk20/21)

CLASSIC FORMULA 3

Race 1 David Shaw (Ralt-Toyota RT1)

Race 2 Tom Bradshaw (Argo-Toyota JM6)

DEREK BELL TROPHY

Race 1 Michael Lyons (Lola-Chevrolet T400)

Race 2 Michael Lyons (Lola-Chevrolet T400)

HGPCA PRE-'61 GP CARS

Race 1 Geraint Owen (Kurtis-Offenhauser 500C)

Race 2 Geraint Owen (Kurtis-Offenhauser 500C)

HGPCA PRE-'66 GP CARS

Race 1 Jon Fairley Brabham-Climax BT11/19)

Race 2 Jon Fairley Brabham-Climax BT11/19)

HISTORIC FORMULA 3 NATIONS CUP

Race 1 Jon Milicevic (Brabham BT21B)

Race 2 Andrew Hibberd (Brabham BT18)

HISTORIC FORMULA FORD

Saturday Final Richard Tarling (Jamun T2)

Qualifying Heat Kevin Stanzl (Crossle 20F)

Sunday Final Ben Mitchell (Merlyn Mk20)

HISTORIC FORMULA JUNIOR

Chris Goodwin (Lotus 20/22)

HISTORIC TOURING CARS

Phil House (Ford Cortina Lotus)

PRE-'80 ENDURANCE

Race 1 John Burton (Chevron-BDG B26)

Race 2 John Burton (Chevron-BDG B26)

For full results visit:

www.mstworld.com/results/hssc

John Burton, 76, (European 2-litre sportscar championship runner-up in 1972 and '73 in Chevrons) screamed his BDG-powered B26 to victory over the massive March-Chevrolet 717 of Nick Adams. John Spiers (Osella-BMW PA3) wrested second from Kevin Cooke (March-BDG 75S) in Sunday's best tussle, but couldn't catch Burton, who improved his best lap to 1m30.061s.

Led briefly by John Harrison, Charteris shattered the 1m30s barrier in a four-lap Classic Clubmans sprint, following a nasty incident on Brabham Straight in which Mike Lane's Mallock came to rest atop Dave Wale's. Local man Adam Paterson passed B-sport points leader Barry Webb, while Jonathan Loader (Tiga) claimed Sports 2000 gold, as he had in Pre-'80.

Phil House boldly usurped Spiers for Historic Touring Car victory after a clean battle. Behind the FIA Appendix K versions, Rick Belcher made it a Lotus Cortina clean sweep, ahead of Mark Watts's Mustang.

With lightning starter Pete Morton still a threat, 1989 FF1600 Champion of Brands Chris Goodwin negotiated nine lapped cars on the final lap to net his first FJunior victory.

MARCUS PYE

MITCHELL MAKES IT FIVE WINS



The epic struggle between Ben Mitchell, Cameron Jackson and reigning champion Richard Tarling for the Historic Formula Ford title passed half way with another combative weekend at Brands Hatch embroiling capacity 38-car grids.

A clash between leaders Mitchell and Jackson at Sheene Curve on Saturday gifted Tarling his second maximum of the season, but Jackson and Mitchell escaped the gravel to salvage second and third respectively after what they deemed a racing incident. "I was extremely surprised that they got out," said Tarling.

Twelve points ahead of Jackson entering the fifth of nine double-headers, top qualifier Mitchell bounced back to eke another point's advantage with a hard-earned fifth win from 10 races in a Merlyn Mk20.

Jackson rounded poleman Mitchell to lead at Paddock, but 2013 champ Sam Mitchell and Tarling went with them and double champion Callum Grant and Ben Tusting (who fell with radiator cap failure), Ed Thurston and Max Bartell were in the mix. When Sam Mitchell threw his Merlyn sideways and spun to avoid his brother, whose similar car jumped out of second gear accelerating out of Graham Hill Bend – "a brilliant save", remarked Ben – he fell to 23rd as the elder Mitchell fought back to lead again.



"When I got a bit sideways at Westfield, Cameron got a run on me so we arrived side by side at Sheene," said Mitchell.

"It was tight, but I was launched by the kerb on the apex," said Jackson. As he countered his Lola T200's landing with opposite lock, front-wheel contact sent them both into the shingle.

"I wasn't really quick enough to race them, but I thought something might happen and it did," said beneficiary Tarling, with a rear-suspension pick-up point failing on his Jamun T2. Jackson and Mitchell, their steeds pebble-dashed, joined him on the podium, fortunate to have kept going.

Grant, overheating, finished a distant fourth, while Sam Mitchell recovered strongly to seventh behind Thurston and Bartell. Tiff Needell – one of two Le Mans veterans competing – won a tough Over 50s class tussle in his Autosport Lotus 69.

Sunday's grid was again full, so Lotus 61 stalwart Dick Dixon sportingly stood down to give the sole reserve, Michael Rasper (whose Merlyn Mk11A was repaired by a paddock posse after a Saturday incident) another run.

Jackson led initially, but fell to seventh when he took too much kerb at Stirlings on lap two. Flicked sideways into the gravel, he narrowly missed the barrier on the exit of the left-hander. Watched by the Merlyn's first owner Rob Cooper, Ben Mitchell then eased clear to win on the first anniversary of his debut in it.

Tarling, a fired-up Grant and Sam Mitchell disputed second before Jackson caught them and seized it for himself. Tarling finished third, despite a front wishbone ripping out, ahead of Grant and the younger Mitchell, angry to have had his helmet dinged by "a line of flint" that he and Grant found on track at Stirlings on the last lap. Needell again reigned supreme among the 'seniors'.

MARCUS PYE



Fiesta driver Ward doubled up
on 750MC Pembrey visit

Ward stakes claim for Classic Stock Hatch glory

**PEMBREY
750MC
JUNE 30-JULY 1**

Ford Fiesta XR2i driver Marcus Ward scored two Classic Stock Hatch wins at Pembrey to make it four in a row, putting him in title contention as the season reached the halfway point.

Pete Morgan claimed pole for both races in his XR2i, but Ward grabbed the initiative at the start of the first. Morgan remained a thorn in his side until his engine failed on the penultimate lap, promoting the Vauxhall Nova of Ted Cooper and points leader Lee Scott (XR2i) onto the podium.

After replacing a valve overnight, Morgan was back on song on Sunday but, pushed hard by Ward – who found another half-second despite carrying an extra 25kg of success ballast – he repeatedly exceeded track limits and had

15s added to his time. Ward was bewildered to receive a garland, but pleased that his brother Scott (XR2i) was on the podium for the first time after he had made up two places when he went three-wide with Cooper and Lee Scott through Dibení on the penultimate lap. Cooper was classified third, Andy Philpotts's XR2i fourth and Scott fifth, his lead over Marcus Ward cut to seven points but with Ward 18 ahead on dropped scores.

Patrick Fletcher's hopes of claiming the Clio 182 title for a third successive year suffered a setback when he was excluded from victory in the final race after clumsily challenging title rival Jack Kingsbury for the lead at Brooklands on lap one of 11. With Fletcher having to count the zero when scores are dropped, just a handful of points now separate Fletcher, Kingsbury – who retired from race three, having had two podiums earlier in the weekend – Mark Balmer and Ryan Polley.

Balmer had won a tepid opener from Andrew Tibbs, but the second race was livelier, with Tibbs benefiting when Fletcher and Kingsbury touched at Hatchets on the third lap of 12, taking his first win since 2015. Having been delayed by the loss of his front bumper, Balmer retrieved fifth from Polley at Brooklands on the final lap.

Although Fletcher cruised to the on-the-road win in the final bout, Tibbs was promoted to victory. Don de Graaff got his mojo back after a trying start to the year with second and fastest lap on a track that was surprisingly grippy in spite of rain.

Mark Burton won only one Locost race – compared to three at Croft – but he still extended his championship lead by three points. After a second restart, Louis Wall took the opener by passing Burton into the final corner of the race, but Burton retaliated on Sunday morning with an exhibition of defensive driving on a circuit that provides slipstreaming aplenty. Martin West and Ben Powney – who almost dead-heated with Wall – completed the podium.

The finale was stopped early, much to the chagrin of Wall who had just passed Powney for the lead at Hatchets. Thus Powney, who admitted that he “drove like a plonker” on Saturday, claimed the victory from Wall and West, who remains winless.

Paul Maguire scored two MX-5 wins from three, but Ben Hancy's delight at his first category win in the second encounter was a highlight. That was set up when Maguire ran onto the grass at Honda on lap three and Hancy seized his chance, just as Maguire's win in the curtain closer was sealed when he aced the start to lead – from fifth – by Hatchets.



Pither dominated in the
750 Formula championship

PEMBREY WEEKEND WINNERS

750 FORMULA

Race 1 Ed Pither (PRS 1b)

Race 2 Ed Pither (PRS 1b)

CLASSIC STOCK HATCH

Race 1 Marcus Ward (Ford Fiesta XR2i)

Race 2 Marcus Ward (Ford Fiesta XR2i)

CLIO 182

Race 1 Mark Balmer

Race 2 Andrew Tibbs

Race 3 Andrew Tibbs

HISTORIC 750 FORMULA

Race 1 Simon Boulter (Time 3B)

Race 2 Simon Boulter (Time 3B)

HOT HATCH

Race 1 Steve Sawley (Honda Civic)

Race 2 Ben Rushworth (Honda Integra DC2)

LOCOST

Race 1 Louis Wall

Race 2 Mark Burton

Race 3 Ben Powney

MX-5 CUP

Race 1 Paul Maguire

Race 2 Ben Hancy

Race 3 Paul Maguire

RGB SPORTS 1000

Race 1 Paul Smith (Mittell MC-53)

Race 2 Paul Smith (Mittell MC-53)

SPORT SPECIALS

Race 1 Rob Johnston (Cyana Mk2)

Race 2 Matthew Booth (MK Indy RR)

For full results visit:

750mc.co.uk

Paul Smith dominated the RGB Sports 1000 encounters, giving the Mittell MC-53 a double victory over championship leader Billy Albone, who endured a trying weekend. Just prior to Saturday's race Albone's car wouldn't start, leaving him to race Jonathan McGill's Spire GT3 from the back of the grid to second.

Electrical issue fixed, he was back in his own Spire on Sunday, but an unwell Albone could not keep pace with Smith, who demolished his own lap record – set a day earlier – by 2s. After 15 years of racing in RGB, Colin Chapman took his first podium, before Danny Andrew took third on Sunday – his first finish in a year, having had his brakes stick on while leading in the early stages of race one.

Rob Johnston took the lead of the first Sport Specials race at Hatchets to win in his Cyana, but in race two the corner proved his downfall as a half-spin there as he challenged leader Matthew Booth's MK Indy left him playing catch-up. Lee Emm had a strong weekend, a Class B win and second in his Mazda-engined Locost increasing the gap to Johnston, although the fast-starting Rogue Xenon of Leighton Norris defeated him on Sunday.

IAN SOWMAN

FROM MALTA TO PEMBREY: RACING ABROAD



Lack of Maltese circuits means
UK is Vella's racing home

For motorsport enthusiasts in one of the world's smallest and most densely populated countries, the opportunities to compete are limited – which is why the joint leader of the 750 Motor Club Hot Hatch Championship, Rodren Vella, travels from Malta to the UK to race.

"Motorsport is very popular in Malta, especially drag racing and hillclimbs. It's just the race tracks that are missing," says Vella, a web designer by day. "My father used to race go-karts. Back in those days there were temporary tracks for karting, but they went away so I couldn't do that. I started to go to Sicily, competing in Time Attacks there."

Vella's desire to put his motorsport activities on a more professional footing led to him making his first foray into racing in the then-750 Motor Club-run Civic Cup. "I was interested in it as I owned Honda Civics in Malta, so I got into it in 2015 and only moved away from it because last year I was sharing the drive. I'd done some upgrades for endurance racing, like bigger brakes to last the distance, so Hot Hatch is the right place for me now as my car meets the regulations."

Vella had a win at Anglesey in his first year in the Civic Cup, and enjoyed class success alongside fellow Maltese driver Bernard Galea in the 750MC Roadsports series last term. Galea continues to play an instrumental role in Vella's racing.

"My mate Bernard lives here [near Leicester] and he keeps the car and looks after it for me," explains Vella. "We prepare it together but there's not much time because he is busy and I'm not here, flying over every time."

Vella, who lives in the town of Rabat, always aims to take in a pre-event test day before every round to "get prepared for the race day" and is often accompanied

by Galea, who "he can't thank enough". With an eye to his own development, Vella has a keen interest in tin-top racing in particular, and pays close attention to the Clio Cup and British Touring Car Championship. "It's interesting because you can see the progression people are making and moving into the higher categories, people like Ash Sutton – I liked to follow him when he moved up."

Other than having two lonely races, things could have gone little better for Vella when he made his debut at Pembrey, which he describes as "a nice flowing circuit as long as you get the car set up right". He took his Civic to two more victories in Class B – the up-to-200bhp-per-tonne split – picking up fastest lap in both races. Michael Winkworth did likewise in his Saxo in Class C, however, to leave them tied.

Up front, Steve Sawley took the first race in his Class A Civic, although after qualifying dramas Ben Rushworth had climbed from the back to second on the opening lap. The Integra driver passed Sawley on the inside at Brooklands on lap two of the second race, before reeling out a 5s gap, aided when Sawley went off at Senna to avoid a backmarker collision.

IAN SOWMAN





Downing
(left) and Hudson/
Wilcox (12)
have each won at
three circuits

Deflation denies Downing hat-trick

**SNETTERTON
MSVR
JUNE 30-JULY 1**

Gareth Downing claimed two GT Cup victories from three races at Snetterton, though he was cruelly denied a clean sweep by a deflating tyre.

Downing cruised to his pair of sprint-race wins, and an extra alternator belt ensured there would be no repeat of the battery problems that hobbled his Mosler in the

previous round at Spa-Francorchamps. GTO championship leader Nigel Hudson finished second in race one in his Aston Martin Vantage GT3, and likely would have repeated the result in race two. But he spun twice on old tyres, enabling GTC winner John Dhillon finish ahead in his Ferrari 488.

In the following day's pitstop race, Downing built-up a 27-second lead over Hudson, knowing his minimum pitstop time would be 15s longer and Hudson would hand over to Pro driver Adam Wilcox.

But Downing's stop was even slower than scheduled — his team discovered he had a deflating front-left tyre, but the wheelnut refused to disengage in the heat so the crew tried to reinflate the tyre instead.

Downing rejoined in fourth but returned to the pits five laps later for more air, then his tyre failed during the final lap. He still brought the car home sixth overall, as Hudson/Wilcox took the win.

"Very, very nearly!" said Downing afterwards. "It would have been nice to

Burgess and Jackson spar in gruelling Radical contest

**OULTON PARK
MSVR
JUNE 30**

Like a heavyweight-boxing match, the lead of the Radical Challenge Championship ebbed and flowed over the course of the Oulton Park meeting as SR3 titans Steve Burgess and Dominik Jackson traded blows across three races.

Burgess landed the first significant strike, taking his first win following a tough meeting last time out at Spa-Francorchamps. His results from that round meant he did not have to take any pitstop 'success seconds' during the first 40-minute race. Jackson, who had claimed a hat-trick of wins in Belgium, had to endure the maximum 20 seconds during his stop.

Since Jackson led from Burgess by just 5s at the beginning of the pitstop phase, the 20s delay looked like it would prove the deciding factor in the race result. But while Burgess did indeed go on to victory, Jackson lost an additional chunk of time when he ran off at Cascades. Mark Richards and Brian Murphy completed the podium.

"My brakes had boiled from standing still [in the pits] for so long," Jackson said after finishing a distant eighth. "From there on in I had to pump them to slow down — must have been about 30 to 40 times a lap." Round one to Burgess.

Round two, the 20-minute sprint, went the way of Burgess too. Jackson had to settle for a narrow second place, finishing only 1s behind his title rival, before he clawed back some much needed points in race three, which proved to be a role



reversal from the meeting's opener.

This time Burgess was burdened with a 20s success penalty, while Jackson's eighth in race one meant he didn't have any. Jackson went on to take a comfortable victory, 14s ahead of Kristian Jeffrey, but Burgess was sixth, tipping the balance of the championship standings in his favour. He now leads Jackson by eight points as they head into the second half of the season.

Tom Rawlings finally overcame his torrid run of misfortune and unreliability throughout 2018 by taking his first victory in race two of the Monoposto Moto 1000 championship, featuring a grid shared with 1800, 1600 and Classic 2000 models.

finish the weekend off with getting all three. The pace was always there and I think we'd got enough of a cushion."

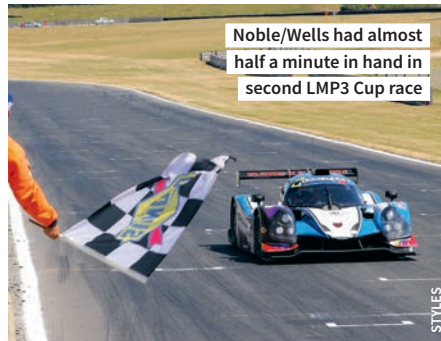
Wilcox, who thought that catching Downing on track would have been possible even without the tyre failure, added: "I was looking forward to a bit of a race, then I came round and it was said over the radio that the Mosler was behind."

Points-leading pair Colin Noble and Tony Wells departed with both LMP3 Cup wins. They won the opener after a close fight with Jack Butel and Dominic Paul in similar Ligier JSP3 machinery. Paul shadowed leader Wells in the first stint, and that continued as Noble led Butel after the Pros took over. Noble edged clear late on to win by 5s, beating the four other cars on the grid, one of which was a Radical RXC taking part in the P4 class.

The following day's race looked like a role reversal as Butel led, holding off Noble in the second stint. But with five minutes left, a mysterious electrical problem brought Butel to a sudden halt. It was resolved by a reset from the cockpit, but by that time he had dropped to fourth and Noble had moved into a comfortable lead.

Mark McAleer and Mark Sumpter took a win apiece in the Porsche Club Championship. McAleer spent all of race one at the head of a close five-car battle, while in race two Sumpter, with worn tyres, just hung on ahead of Simon Clark, with McAleer third.

Jonathan Evans, driving a Boxster, lost his clean sweep of Class 2 wins this year as his seatbelts came undone during the



Noble/Wells had almost half a minute in hand in second LMP3 Cup race

STYLES



McAleer's 996 took Porsche Club opener

STYLES

first race, forcing him to stop to redo them. This let Andrew Muggeridge take the spoils, although Evans made amends by taking class victory in race two.

Ingvar Bjerger was first home in the opening two Superkart races, although he is not registered for the championship. Chris Hulme pipped Tom Rushford on the line for the third win. Meanwhile, Paul Platt claimed all three F250 victories to make it 10 wins from 11 this season.

GRAHAM KEILLOH



Gittings claimed first win of 2018

READ



Taylor headed Lotus field

READ

Rawlings's Speads initially looked to have ended its run of temperamental behaviour in race one, but overheating in the mid-morning Cheshire sun prompted Rawlings to park it before the problem got worse. This gifted Richard Gittings and his Jedi Mk6 a first win of the season.

As temperatures soared for the second race, Rawlings was understandably dubious about his chances – but, though his car continued to run hot, he managed to cling on to the lead and celebrate only his third finish in eight races. "I still had to slow down and manage everything right until the last lap," Rawlings admitted. "But it's great to finally get the win."

"Damage limitation" was how Lotus Elise Trophy championship leader Craig Denman summed up his performance at Oulton as he took a second and a third-place finish.

"We knew it was going to be a tough weekend," he said. "I've got the heaviest car on the grid and she struggles in quick direction changes, which you get a lot here."

Both wins went the way of his nearest championship rival Joe Taylor, who continues to chip away at Denman's points deficit at the top of the table following three consecutive wins.

DOM D'ANGELILLO

WEEKEND WINNERS

SNETTERTON

ALLCOMERS

Race 1 Ian McDonald (Radical SR1)

Race 2 Ian McDonald (Radical SR1)

Race 3 Ian McDonald (Radical SR1)

Race 4 Ian McDonald (Radical SR1)

BRITISH SUPERKARTS

Race 1 Ingvar Bjerger (Anderson/VM)

Race 2 Ingvar Bjerger (Anderson/VM)

Race 3 Carl Hulme (Anderson/VM)

GT CUP

Race 1 Gareth Downing (Mosler)

Race 2 Gareth Downing (Mosler)

Race 3 Nigel Hudson/Adam Wilcox (Aston Martin Vantage GT3)

LMP3 CUP

Race 1 Colin Noble/Tony Wells (Ligier JSP3)

Race 2 Colin Noble/Tony Wells (Ligier JSP3)

PORSCHE CLUB CHAMPIONSHIP

Race 1 Mark McAleer (996 C2)

Race 2 Mark Sumpter (996 C2)



McDonald dominated allcomers races

STYLES

OULTON PARK

LOTUS CUP UK & ELISE TROPHY

Race 1 Joe Taylor (Exige S2)

Race 2 Joe Taylor (Exige S2)

MONOPOSTO MOTO1000/CLASSIC/1800/1600

Race 1 Richard Gittings (Jedi Mk6)

Race 2 Tom Rawlings (Speads)

MONOPOSTO F3/2000/FR2000/MOTO 1400

Race 1 Ben Cater (Dallara F306)

Race 2 Ben Cater (Dallara F306)

RADICAL CHALLENGE CHAMPIONSHIP

Race 1 Steve Burgess (SR3 RSX)

Race 2 Steve Burgess (SR3 RSX)

Race 3 Dominik Jackson (SR3 RSX)

SPORTS 2000

Race 1 Tom Stoten (Gunn TS11)

Race 2 Tom Stoten (Gunn TS11)

For full results visit: tsl-timing.com



Stoten's Gunn took Sports 2000 double

READ

FINISHING STRAIGHT

IN THE MEDIA • ARCHIVE • QUIZ



THE EXTREME TRIBUTE T

For most, simply lapping the infamous Nurburgring is enough of a challenge. With a staggering 170 corners when the Nordschleife and Grand Prix circuits are combined, it takes countless hours just to memorise which way the 16-mile lap snakes next, let alone to master it.

Then throw into the mix another 160 cars across 30 classes fighting for the same asphalt, and repeat it for nine endurance races over a season. For its oddball brilliance, the VLN – Veranstaltergemeinschaft Langstreckenpokal Nurburgring – is a delightfully compelling experience.

“I think the races are so special because the circuit is unique, it’s huge and dangerous,” says Bradley Philpot, who shares a Peugeot 308 Cup car in the VLN. “It’s got extreme elevation change and every type of corner you can imagine, as well as decades and decades of history, mystique and beauty.”

Such is the challenge and prestige of just finishing a race, running out of fuel wasn’t going to stop Michael Schrey from crossing the line in the opening VLN race of 2018. Within sight of the chequered flag, he pushed his BMW 235i across the line before collapsing onto the grass.

It’s also why the VLN is exploited by Nurburgring 24 Hours entrants as a testing ground, bringing to the series such names as Le Mans winners Nick Tandy, Earl Bamber, Romain Dumas and Marcel Fassler, and Macau GT Cup winners Maro Engel and Laurens Vanthoor.

But while the names are a healthy addition to the VLN, it doesn’t rely on them to attract fans. The top class, which is made up primarily of GT3 cars, offers Ferraris, Mercedes, Porsches, Audis and BMWs. It’s a tight field that is impossible to predict, even in the dying stages of a race.

At the most recent event, VLN 3, the race-winning Porsche 911 GT3-R, driven by Felipe Fernandez Laser and Lance David Arnold, provided a win for the local Frikadelli Racing Team. It rose from 11th on the grid, having only just been put back together moments before the race began after Fernandez Laser had crashed in qualifying.

**“IF YOU CAN MASTER IT,
YOU GAIN PRESTIGE”**





O THE 'RING

Further down in the order, the sheer number of classes paves the way for diversity. The front-wheel-drive SEAT Cupra and Audi RS3 TCR cars are able to match the pace of the mid-engine Porsche Cayman GT4s. Premium models such as Aston Martin's Vantage share track space with Lamborghini Huracans and Ferrari 488s. It filters right down to Renault Clios, Volkswagen Golfs and the countless 235s. All different models, all crammed together, more diverse than any other endurance series.

And to enjoy the experience, the entry price is just €15 for full paddock and pitlane access, a grandstand seat and a grid walk. That amazing value for money draws in a crowd. But it can be cheaper still. Because viewing spots sit right by perimeter car parks and main roads, there are places to watch for no cost at all.

The landscape at Breidscheid, Adenauer Forst, Hohe Acht, Brunnchen and Galgenkopf are, in particular, easy to get around and offer spectacular viewing.

All the while, the circuit remains the star of the show. That in itself is enough of an attraction to watch a new series even before you add in the wealth of cars and the spectacle of watching the GT3 pack carve through lapped traffic.

"It's not another race track, it's the Nurburgring," Philpot says. "If you can master it, you gain a prestige that not everybody can or does have in motorsport. It's the only place in the world that I drive where you feel a 3D sensation from the cockpit."

"All these things add together to create a bigger air of importance than other series that are comparable with the VLN."

CHRIS STEVENS

motorsport.tv
HIGHLIGHT OF THE WEEK

SUPER FORMULA LIVE RACING
Set your alarm for 0550 on Sunday, get the coffee brewing and watch all the action from round four of the Japanese Super Formula season at Fuji. In the meantime, you can also catch up with previous races on demand. Go to <https://bit.ly/2u0No0r>

THIS WEEKEND'S EVENTS

INTERNATIONAL MOTORSPORT

IndyCar Series

Rd 10/16

Iowa Speedway, USA

July 8

TV Live BT Sport
ESPN, Sunday 1900

Indy Lights

Rd 6/10

Iowa Speedway, USA

July 8

Super Formula

Rd 4/7

Fuji, Japan

July 8

Japanese Formula 3

Rd 3/8

Fuji, Japan

July 8

IMSA SportsCar

Rd 7/12

Mosport Park,
Ontario, Canada

July 8

Australian Supercars

Rd 8/16

Townsville,
Queensland,
Australia

July 7-8

TV Live Motorsport.
tv, Saturday 0650,
Sunday 0650

NASCAR Cup

Rd 18/36

Daytona, Florida, USA

July 7

TV Live Premier
Sports, Saturday 2330

Euroformula Open

Rd 4/8

Hungaroring, Hungary

July 7-8

TV Live BT Sport 1,
Saturday 1400,
Sunday 1200

International GT Open

Rd 4/7

Hungaroring, Hungary

July 7-8

TV Live BT Sport 1,
Saturday 1500,
Sunday 1300

TCR Europe

Rd 4/7

Hungaroring, Hungary

July 7-8

TV Live Motorsport.
tv, Saturday 1230,
Sunday 1300

24 Hour Series

Rd 5/8

Portimao 24 Hours,
Portugal

July 7-8

Scandinavian Touring Cars

Rd 3/6

Falkenberg, Sweden
July 8

UK MOTORSPORT

British GP

Formula 1 World Championship

Rd 10/21

Silverstone

July 8

TV Live Sky
Sports F1, Sunday
1230. Channel 4,
Sunday 1300.

Radio BBC Radio 5
Live, Sunday 1400.

Highlights Sky Sports
F1, Sunday 2020

Formula 2

Rd 7/12

Silverstone

July 7-8

TV Live Sky Sports
F1, Saturday 1545,
Sunday 0925

GP3 Series

Rd 4/9

Silverstone

July 7-8

TV Live Sky Sports
F1, Saturday 1740,
Sunday 0815

Porsche Supercup

Rd 4/9

Silverstone

July 8

TV Live Sky Sports

F1, Sunday 1135

Thruxton BARC

July 7-8

Caterham Graduates,
Kumho BMWs, Clio
Cup, Mighty Minis,
MGOC, Pickups

Snetterton BRSCC

July 7-8

Caterham Academy,
Alfa Romeos, Fiestas,
Fiesta Juniors, Global
GT Lights, Clubmans,
Civic Cup, HRDC Coys
Trophy, HRDC Allstars

Mondello Park CKMC

July 7-8

Formula Vee, Formula
Sheane, Stryker
Sportscars, Touring
Cars, SEATs, Ginetta
Juniors, Future
Classics, Fiesta STs,
Legends Cars

Lydden CTCRC

July 8

Pre-'66 Touring Cars,
Pre-'83 Group 1
Touring Cars, Pre-'93
Touring Cars, Pre-'03
Touring Cars, Pre-'05
Touring Cars, Blue
Oval Saloons, Classic
and Historic Thunder
Saloons, Intermarque

FROM THE ARCHIVE

The runners and riders muster for the 1925 BARC Whitsun Bank Holiday meeting at Brooklands. Top to bottom: #4 Glen Kidston's Bugatti, #5 Major CG Coe's 30-98 Vauxhall 'Vixen', #6 Woolf Barnato's 3-litre Bentley, #7 Felix Scriven's Austin 20, #8 A Lanfranchi's Alfa Romeo, #9 JC Douglas with 'Razor-Blade', #10 HL Aldridge's Alvis, #11 Dr Dudley Benjafield's Salmson, Francis Samuelson's Austin and AY Jackson's 12-50 Alvis.





TEST YOUR KNOWLEDGE

QUIZ

WHO, WHAT, WHERE, WHEN?



SUTTON IMAGES

WHO IS THIS?

This influential national hero was the champion of his local circuit series before graduating to the national top flight, where he was the five-star class of the field.

With the power of dreams behind him, he was ushered onto the main stage, where he was paired with a legend in waiting.

Another triple champion joined him for his second season, although in difficult conditions he was able to show his speed down under.

An avuncular chief took him onboard, where he would be paired with yet another rising star.

After hanging up his helmet he returned home to set up his own team, which fought with great success on two fronts.

Despite his famous brand loyalty, his racing progeny took the opposing route to the top, which includes breaking a long-run curse.

ON THIS DAY

1 Which future world champion scored his first points-paying GP win on this day in '53?

2 Today is Vincent Radermecker's birthday. How many times during his brief BTCC career did he finish on the podium?

3 Dan Gurney made his F1 debut on this day in 1959. What car was he driving?

4 Which NASCAR driver claimed his first Cup win at Daytona on this day in 2003?

5 Oval racing legend Rodger Ward died on this day in 2004? In which years did he claim his two Indy 500 wins?

NAME THE HELMET



LAST WEEK'S ANSWERS

Who, what, where, when Ian Grob/Guy Edwards, Ibec-Hesketh 308LM, Le Mans, June 10-11 1978. **Who is this?** Frank Biela. **On this day** 1) 13th. 2) 35. 3) Mauro Baldi/Jonathan Palmer. 4) Mikko Hirvonen. 5) Carlos Huertas. **Name the helmet** Gabriele Tarquini.

IN NEXT WEEK'S ISSUE

IT'S COMING HOME!
BRITISH GP TIME

WELCOME TO SILVERSTONE
THE HOME OF BRITISH MOTOR RACING

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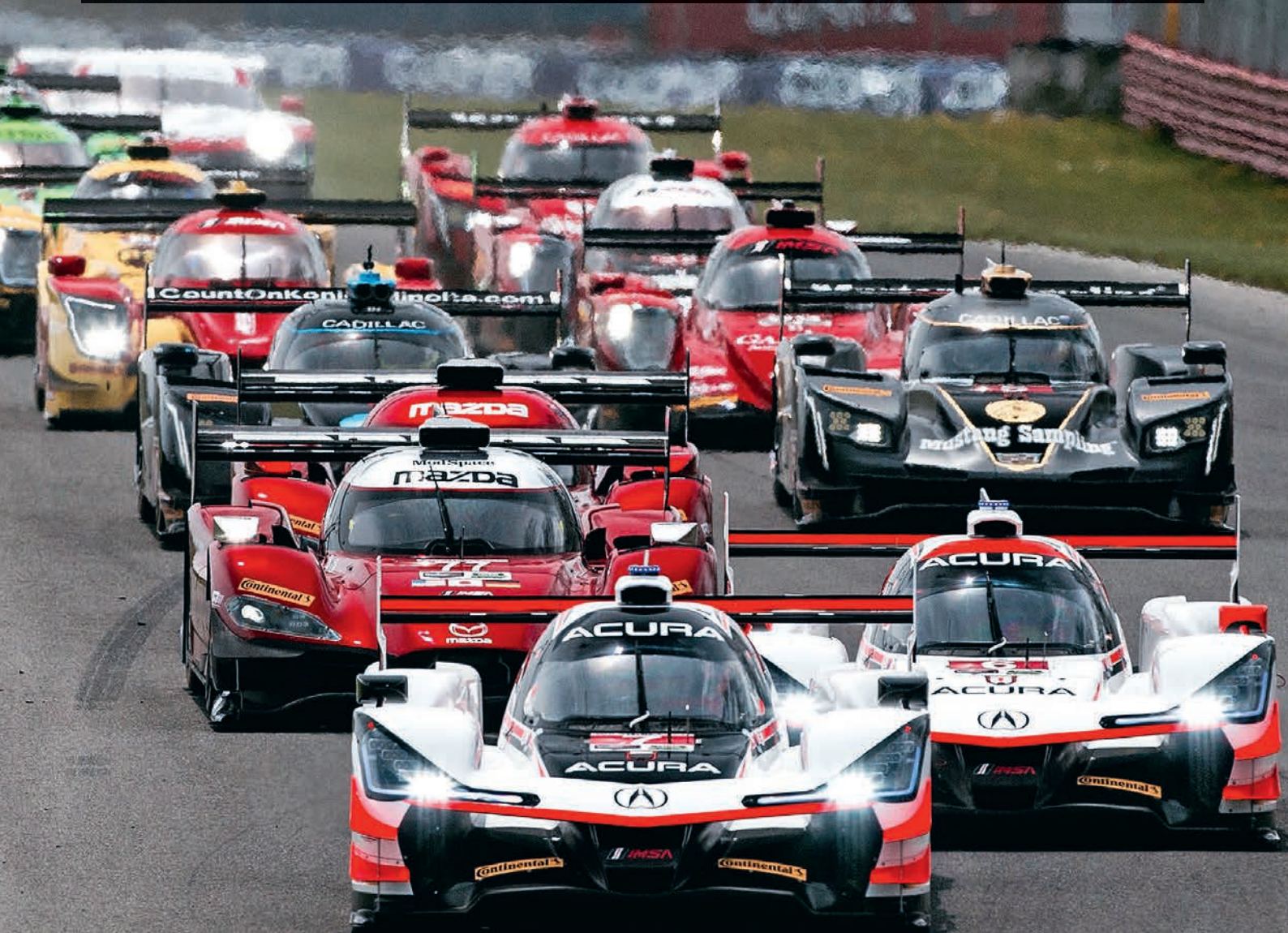


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ENGINEERING

UNDER THE SKIN OF DPI

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A NEW GOLDEN AGE FOR US SPORTSCAR RACING?

When the news broke last July that Team Penske would be making its long-awaited return to sportscar racing in the IMSA SportsCar Championship with Acura, after almost a decade away, it set many a tongue wagging in the Autosport offices. One week later, Mazda announced that it would be starting again from scratch with Le Mans specialist Joest Racing after a disastrous start to the season, signalling that IMSA's new DPi platform was truly on the up.

While its first year was a tale of Cadillac domination as Wayne Taylor Racing won five in a row to open the season, and then cruised to the title, 2018 has been highly unpredictable, with five different winners from six races. Only one of those was an Acura, while Mazda is still waiting to get off the mark despite improving by 2.2s on average over last year.

This openness is in part due to restrictions designed to level the field and entice manufacturer entries. While they can use windtunnel testing and vehicle dynamic rigs before and after homologation, manufacturer entries are based on cost-capped LMP2 chassis fitted with bespoke bodywork/powertrain packages, and have very little

wiggle room to operate outside these set parameters.

Add this to IMSA playing puppeteer with Balance of Performance figures to give the non-manufacturer teams using standard cars a chance – which helped JDC/Miller Racing score only the second win for a non-DPi car at Watkins Glen last weekend – and it means the manufacturers are really put to the test.

With the goalposts continually moving as IMSA tries to appease the stakeholders and keep development avenues out of reach, Penske and Joest will have to play the long game to be a success in a new golden era for US sportscar racing.

Manufacturer involvement is usually held up as a sign that a series is in rude health, but it's not always good news. Late 1990s CART was a typical case, and when tyre and engine manufacturers refused to help the series reduce its speeds, an aerodynamicist from Guildford stepped up. Twenty years on, you can find the remarkable story of Mark Handford's creation on page 18.



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4 **NEWS** Industry update

The latest developments in the world of motorsport engineering

6 **EXPERT VIEW** How to read a race trace

Mark Williams reveals an engineer's get-out-of-jail-free card

11 **DRIVING CHANGE** Why Gen3 must go radical

Lucas di Grassi outlines his views on Formula E's future racer

12 **PENSKE v JOEST** Under the skin of DPi

Why there's more to IMSA's title fight than two grandee names

18 **HANDFORD AT 20** Handford Device remembered

The impact of CART's divisive safety move is still felt today

24 **TRACKDAY MODS** Standard v Modified

How to avoid the pitfalls of trackday modifications with RSRNurburg

26 **SHOT PEENING** F1's invisible advantage

Sandwell has carved a niche in a little-known process

30 **AVL RACING** Redefining simulation

How one company in Austria has created a new level of reality

34 **BE AN ENGINEER** John Barnard

The legendary F1 designer explains how you can make it as an engineer

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FORMULA STUDENT RETURNS

Teams gather for engineering showcase at Silverstone next weekend

One-hundred-and-thirty teams from more than 30 countries will contest the 20th anniversary edition of Formula Student at Silverstone next weekend (July 13-15) as the University of Cardiff seeks to defend its crown.

Staged annually by the Institution of Mechanical Engineers since 1998, the competition to design and build a single-seater for autocross or sprint racing has served as a popular launchpad for young engineers to gain practical experience and is supported by leading industry figures, including Formula Student patron Ross Brawn.

Cars are tested in static and dynamic categories,

which are then totalled to rank the teams. Static events are judged on cost of the car, presentation and design – against a remit of being affordable, easy to maintain and reliable – while dynamic events consist of a figure-of-eight skidpan trial, acceleration, sprint and endurance events.

Against strong opposition from Europe, the United States and other countries including Egypt, Pakistan and Australia, the UK contingent is expected to feature strongly. Cardiff Racing beat a team of students from the University of Birmingham to become the first British team to win the event last year with its CR13 chassis

– named Gwyneth to honour the mother of Wales’ only Formula 1 driver Tom Pryce, 40 years after his death at Kyalami in 1977 – while the University of Bath finished fourth in 2016 and ’17.

New to the event this year is an AI category, to prepare industry-ready graduates to service the increasing demand for autonomous vehicle technology. KTH Stockholm (Sweden) and UAS Augsburg (Germany) are among the initial entrants.

Mercedes High Performance Powertrains will be attending the event to look for the next generation of engineering talent, while 2009 F1 world champion Jenson Button will visit on Saturday.

INDYCAR IMPROVES CONCUSSION DETECTION

IndyCar has moved to improve its protocol for evaluating concussion by adopting the I-Portal Portable Assessment System (I-PAS).

Commonly referred to as the ‘goggles test’, I-PAS is a portable device resembling a virtual-reality headset that allows medical professionals to monitor eye motion, the vestibular system (relating to parts of the ear and brain that control balance) and reaction times.

IndyCar was first introduced to the test in 2016 when Will Power complained of concussion-like symptoms after a practice crash at St Petersburg that was later attributed to an inner-ear infection.

The system, which was created by Neuro Kinetics, can run a test in eight minutes and will be used to inform decisions about when drivers can return to competition.

Safety consultant Dr Terry Trammell described the system as a “game-changer”, but stressed that doctors will still be responsible for the diagnosis.



Trammell demonstrates
the I-PAS system



F1 STOPPING DISTANCES DOWN BY 22% SINCE 2008

Figures released by brake manufacturer Brembo reveal that stopping distances in Formula 1 have been reduced by 22% and that deceleration has increased by 12% in the past decade.

Using data gathered from this year's Canadian Grand Prix at the Circuit Gilles Villeneuve, set against the same race 10 years ago, the trend shows a clear improvement in efficiency despite vastly increased demands on the brakes.

In 2008, the average amount of braking required per corner was 371ft, which has come down to

289ft this year. On the approach to the final chicane and the infamous Wall of Champions, cars travelled an average 322ft while braking, compared to 384ft at the same spot 10 years ago.

Braking time has not reduced at the same rate as stopping distances, but still marks a 15.5% drop, despite Brembo using calipers that are 15% lighter and required to dissipate more heat thanks to the energy retrieval systems. Disc temperatures exceeded 1000C, a 75C increase on 2008.

Helped by a 4% increase in load force, the average peak deceleration per lap increased from 4.2G to over 4.7G in the same period.



WILLIAMS-POWERED BOAT BREAKS MARINE RECORD

Using battery technology developed for Formula E by Williams Advanced Engineering, Jaguar Vector Racing broke the maritime world electric speed record last month (June 14) with its battery-powered V20E boat.

Piloted by Jaguar Vector technical director Peter Dredge, the boat recorded an average speed of 88.61mph across the two runs on Coniston Water, breaking the previous best of 76.8mph set in 2008.

The outright speed record for an electric vehicle on land is 341.4mph, achieved in September 2016.

The boat was designed and built by Jaguar Vector in partnership with Williams Advanced Engineering, which runs Jaguar Racing's Formula E programme and has been the championship's battery supplier since its formation in 2014.

"Williams Advanced Engineering is proud to have supported this new world record by Jaguar Vector Racing by using our award-winning knowledge of electrification to provide the boat's electric power, motor and control systems," said managing director Craig Wilson.

The news follows WAE winning a four-year contract to be the sole battery supplier for the FIA Electric World RX championship from 2020.

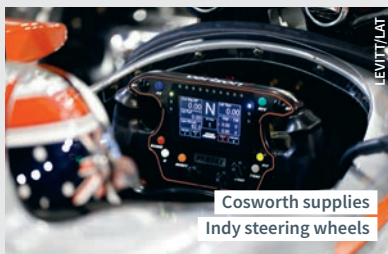
COSWORTH OPENS NEW US HEADQUARTERS

Cosworth marked its 60th anniversary by opening a new North American HQ in Michigan last week.

The British company already has a strong presence in the US in the motorsport and automotive markets. It supplies powertrain control software and data-logging to IndyCar and IMSA prototype teams, test systems for NASCAR squads and has a close collaboration with General Motors, which uses its 'AliveDrive' real-time data capture/analysis software for enhancing driver performance.

The new site in Shelby features an advanced manufacturing centre that will house 130 manufacturing and engineering specialists once fully operational, as the company continues its push to develop sensor technology for autonomous vehicles.

"Our North American headquarters brings us even closer to our tier-1 US partners and reveals what the next generation of high precision, 21st century advanced automotive manufacturing looks like," said Cosworth CEO Hal Reisiger.



IN BRIEF



HORNER HONOURED

Red Bull Racing boss Christian Horner received an honorary degree from the University of Cranfield last month. Horner, who has led the team to each of its 58 grand prix wins and eight world championships since 2005, was recognised for his "outstanding contribution to motorsport", and also launched the University's new Advanced Motorsport Mechatronics masters course.

ASI GETS NEW HOME

Autosport International, the world's biggest pre-season motorsport exhibition, will move to a new part of Birmingham's NEC Arena for the 29th edition of event, due to be held on January 10-13 2019. The show will move to Halls 1 to 5 in the Piazza, allowing for more space and improved transport links for exhibitors and visitors alike, with a newly titled Performance and Tuning Car Show under the same roof adding to the spectacle. Tickets are on sale now.

RICARDO HITS CENTENARY

Engineering consultancy Ricardo achieved a landmark last month (June 5) when it delivered a 100th transmission for BMW's M6 GT3. The six-speed sequential 'box completed over 20,000km of testing prior to its debut at the 2016 Daytona 24 Hours, and won its first 24-hour race at Spa the same year with ROWE Racing.

COLLINS STARTS COURSE

Ben Collins, better known as *Top Gear's* 'Stig', has teamed up with The Smallpeice Trust to launch a motorsport engineering course at the University of Hertfordshire for Year 12 maths students. The three-day course will give students an insight into engineering principles and materials, with activities centred on windtunnel dynamics, hybrid technology and computer-aided design (CAD). Collins entered Le Mans four times, most recently in 2014, and was a winner in British F3.





EXPERT VIEW MARK WILLIAMS

HOW TO READ A RACE TRACE

The ex-McLaren Formula 1 engineer on how a race trace shows you all you need to know during a grand prix

In the late 1990s our strategy team called me over to demonstrate a new tool that would put an end to ad hoc race calls. It basically ran thousands of simulated

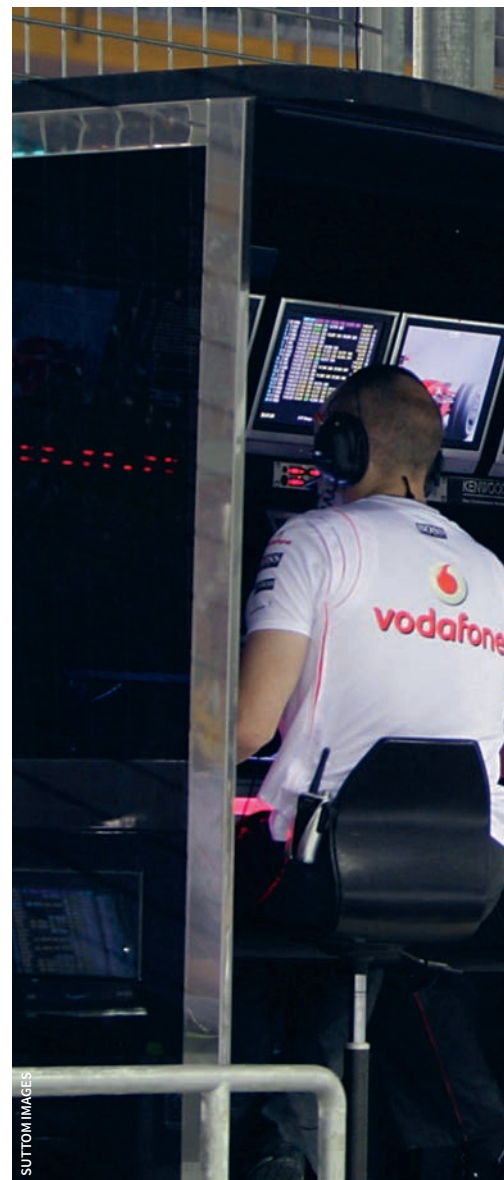
races and came up with the most likely outcome for the race. But the best bit was the user interface, the race trace. When asked what I thought of it my immediate reaction was: "When can I have it?"

I've been fortunate to work with some of the brightest minds in the sport. These people can look at the numbers on a timing screen, follow multiple cars and determine their pace and make good race strategy calls. But when situations get noisy, stressful and complicated, why try and do that when

there's this great visual interface you can use instead?

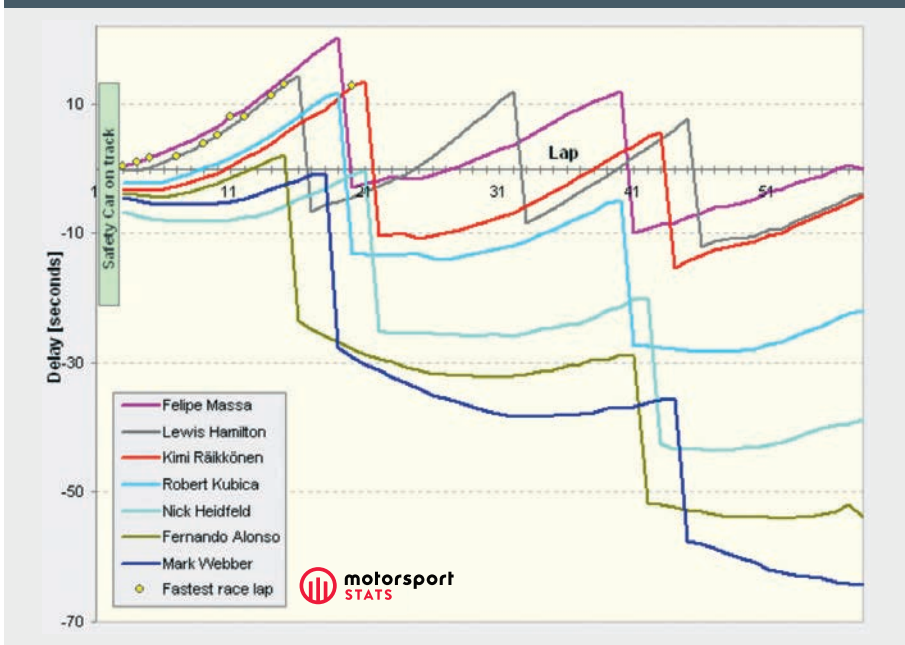
So what's it all about? Fundamentally the race trace is constructed by comparing all the lap times to a base or reference lap. If you are slower than this, your trace has a negative gradient and heads down. If you are faster than the reference then you have a positive gradient and you head up. It's the way pace is captured that sets a race trace far above a traditional lap chart in terms of usefulness. It's easy to see who has better pace than you and to predict when they will become a direct threat. The pitstops are the vertical drops over one lap. The length of the drop captures the fuel-flow time and any pitstop mistakes.

I've chosen four races that I'm familiar with to illustrate these points.



SUTTON IMAGES

TRACE 1 - 2008 TURKISH GP



Trace 1 is Turkey 2008. This is a good example of a two-stop versus a three-stop race. Felipe Massa, the eventual winner, is on a two-stop (as is the leading pack), whereas Lewis Hamilton follows Massa for 16 laps and converts to a three-stop.

Putting less fuel in Hamilton's car, because he is still carrying fuel for a two-stopper and because the next stint is shorter, allows a shorter pitstop relative to Massa. That's the vertical drop in the trace. But Lewis's pace for the three laps after the stop isn't good enough to pass Massa when he pits. He then spends the next three laps behind Massa, who is running slower due to a greater fuel load and is effectively backing Lewis up.

Then Hamilton passes Massa and pulls away. This is clear from the difference in the gradient of the two traces. After Hamilton's second stop he falls behind Kimi Räikkönen and can't run at a three-stop pace. So, although he comes out ahead of Kimi after his third stop due to the shorter fuel-flow time, the McLaren is behind Massa.



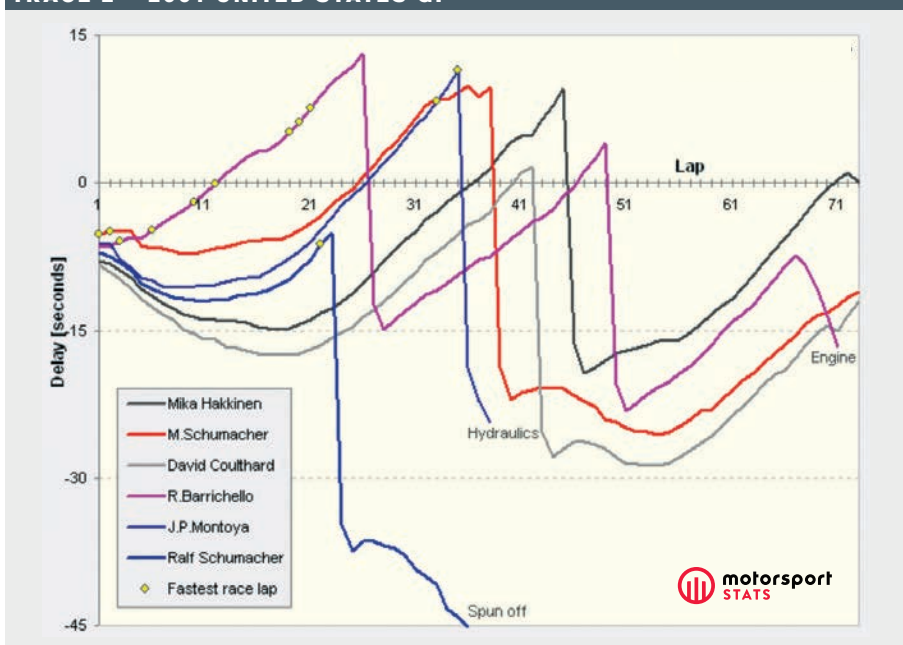
Lewis needed better pace after his first stop to clear Massa rather than get held up and this would have enabled him to come out ahead of Kimi. Those six laps cost him the race win. This is visible from the race trace.

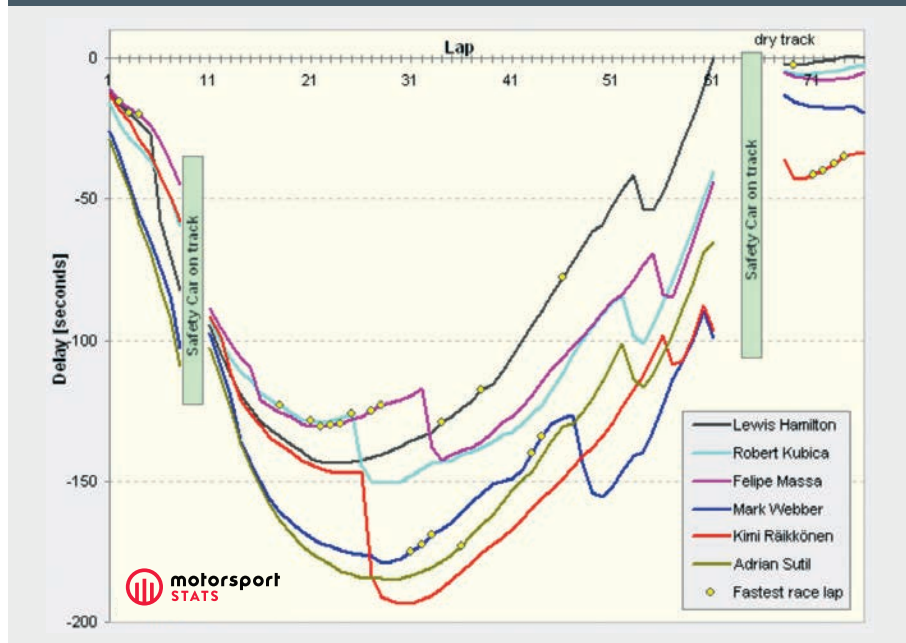
Trace 2 is the 2001 United States GP at Indianapolis. I remember this race well because I had stepped in to race engineer Mika Hakkinen for two races: Indy and Suzuka. It had been a difficult weekend, with an engine failure at the beginning of first practice followed by a crash in the warm-up and losing our front-row grid position due to a pit-exit-light infringement.

Our plan is to run long and one-stop. I tell Mika to bide his time and look after the rear tyres. As we go to the grid I'm really not sure whether we have enough tyre life to one-stop the race. Rubens Barrichello (Ferrari) is on a two-stop and hares away on a light fuel load. But it isn't enough.

Mika's mid-race pace is outstanding, setting his fastest lap just prior to pitting. ►

TRACE 2 – 2001 UNITED STATES GP



TRACE 3 – 2008 MONACO GP


This is impressive considering the tyres are worn to the canvas. He pits into the lead and waits for the challenge from Barrichello. Hakkinen manages the gap and then Barrichello's engine fails.

What does surprise me is the lack of challenge from Michael Schumacher. He clearly has some issue for the five laps before his pitstop and then, as he comes up behind Mika, his pace drops off again.

One thing to note is that after the final stops all the cars have the same fuel load within variations of engine fuel efficiency because they all have the same number of laps to do to the flag. So there aren't the pace variations you see in the early and middle stages of the race.

Trace 3 is the 2008 Monaco GP. Hamilton makes a great start from the second row into second place, then on lap six he tags the barrier. One of the advantages of having strategy software is you can produce what is known as a 'Bail-out table'. This document is produced pre-race and then runs live during the race. The software runs thousands of simulated races and works out the best course of action to recover from an unscheduled pitstop. Quite simply it tells you when to make your next pitstop(s) and how much fuel to put in the car. All the engineer does is choose the tyres and any front-wing adjustment.

Shortly after Hamilton's pitstop there is a safety-car period. The race trace has no value at this point so the traces are converged or, as in this example, missing. After the safety car the gradient of the traces starts to flatten out, less negative, and then becomes positive. The circuit is still wet and it's still intermediate-tyre territory, but the track is slowly drying and getting faster. People can be seen stopping for fresh inters, but Lewis is better positioned

because his tyres, having run longer, are worn and better suited to the fast drying conditions, so his pace is excellent.

However, on lap 44 the first car stops for slicks and then others follow. These guys have pitted super-early hoping to steal a march as the track dries. But there is a risk they may crash out and cause a safety car to be deployed. At which point Lewis, who still has to pit, would end up down the field behind those who have already fitted slicks because the pack closes up under the safety car and your lead is negated. We leave it as long as we dare and finally bring him in on lap 54. Then within a few laps a safety car is deployed. Our worst fears are realised, but we have pitted just in time and Hamilton takes his first Monaco win.

Since refuelling has been stopped there is

less information in these traces and we've lost a great 'get out of jail' card. Now if you have to make an unscheduled pitstop your race is effectively over. With refuelling you got a second bite of the apple. At least now variations in pace (the slope) are only due to tyre effect and inherent car performance as everyone has the same fuel load.

Let's jump forward to the post-refuelling era to prove how these traces are still valuable in visualising a race.

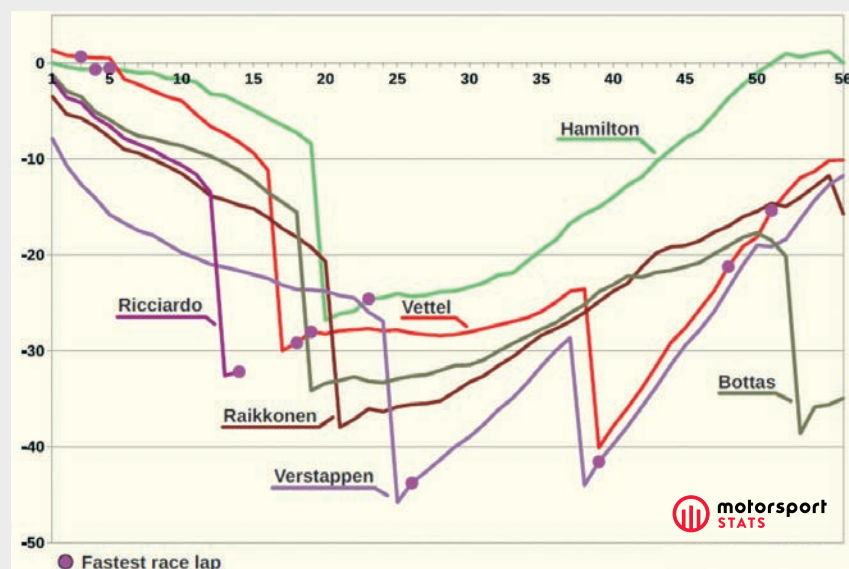
Trace 4 is the 2017 US GP. Hamilton is on pole position and Vettel is second but makes a superb start to pass Hamilton into Turn 1. We see that Vettel can't pull away – his car isn't quick enough.

On lap six Hamilton makes the pass and proceeds to pull away. Clearly the frontrunners decide that this is a one-stop race, in which case you need to push the stop as late as possible. However, Vettel can see Lewis disappearing into the distance so Ferrari takes a chance and pits on lap 16 to try the undercut. When Vettel rejoins, his pace is excellent, setting two fastest laps. Mercedes sees the threat and reacts, almost too late, but enough to keep Lewis ahead.

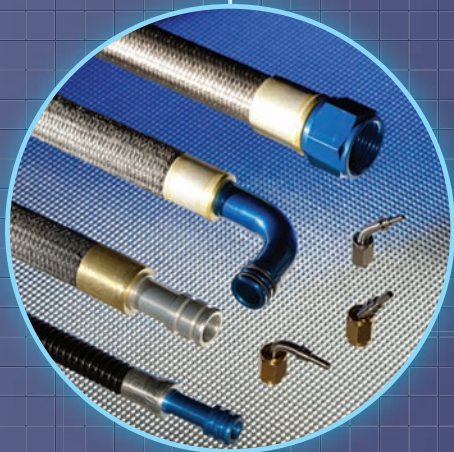
If we look to Valtteri Bottas, we can see how much his pace suffers as he defends from Daniel Ricciardo for the first seven laps before breaking away and running at Lewis's pace, albeit eight seconds adrift.

For some reason Vettel's pace later drops off and he sees Lewis disappearing into the distance again. At this point Ferrari rolls the dice and switches to a two-stop, presumably in the hope that Hamilton has to make a second stop. He doesn't and goes on to win. What this illustrates is that wringing everything from strategy can't make up for a slow car. Only luck helps the slow.

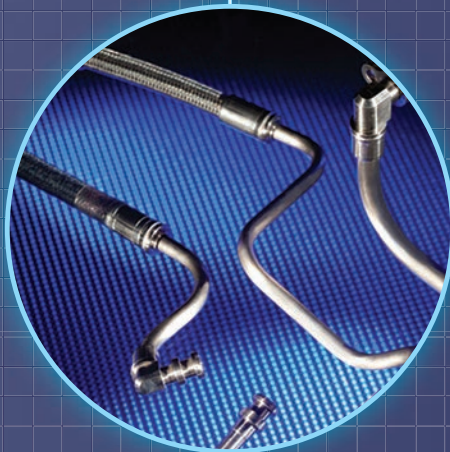
I've been viewing race traces for so long now that I struggle to watch without one. ■

TRACE 4 – 2017 UNITED STATES GP


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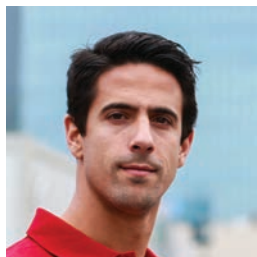


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DRIVING CHANGE LUCAS DI GRASSI

WHY GEN 3 MUST GO RADICAL

The Formula E champion believes a rethink is necessary to ensure the electric series' continued relevance



W

hat do I think should be the basic principle of the Gen3 Formula E car? Well, it must accelerate from 0-200km/h faster than a Formula 1 car and cost a fraction of the price.

To achieve this at the right price point and keep the racing exciting, we need to rethink race car design. How do we do that?

First, people assume the technological evolution of electric motorsport is linear – evolving in the same way as before. But it's almost impossible to forecast which technologies will be available in three to five years, so this is the first false premise – technological development is exponential and costs go down as technology evolves.

The second false premise is that people also think an all-wheel-drive formula car is easier to drive than rear-wheel drive and that all formula cars should be RWD because F1 has been like this for many years.

Assuming these premises incorrectly could lead to a future where FE is not as interesting or relevant to fans or manufacturers.

We should develop an electric race car from scratch – thinking about all areas from a pure physics standpoint, not copying a combustion-based formula car and turning it to electric, as it's done today, including next season's Gen2 car.

For a start, the right approach for an electric racing car is to make it all-wheel drive, with electric motors connected to each wheel – not individually, as we want to control torque vectoring ability, but using a differential. On top of optimising acceleration capacity, the front MGU (motor generator unit) results in more regenerative braking energy production than having the same weight in a battery (this has been verified in simulations). Simply put: a front drivetrain will weigh 70kg, so you can take that 70kg out of the battery because of the extra energy produced in braking.

Counter argument: higher costs. The solution to this is to use the same MGU on the front and rear. Development cost is far greater than producing another motor unit. A symmetrical MGU race car – front and rear same spec, power, etc – is only a little more expensive than a one-motor car.

Looking more into the details, I found out that the total increment in development costs is not much more than €1million, which represents around 10% of development, and if divided by all 11 FE manufacturers, is next to nothing.

Another counter argument: that AWD cars are easier to drive. This is totally false. I have experienced driving an AWD LMP1 hybrid car for three years and I can affirm this is not the case. Still in doubt? Ask any LMP1 hybrid or rallycross driver. There is no evidence that one is easier than the other.

The next important step for the Gen3 race car is that the battery should be flat on the floor, like every other all-electric car out there. Gen1 and Gen2 Formula E cars have the battery in a box replacing the fuel tank, which is not ideal.

By having the battery flat, you can distribute weight in such a way that during acceleration the four tyres have exactly the same load and therefore accelerate at maximum performance. The flat battery has more area for the same volume, which means cooling could be partially

done by surface dissipation.

A further counter argument: this is more dangerous. Not really – if you protect the battery in the same way with its own monocoque, it should be as safe as now.

By my calculations, if the weight distribution is around 56-60% front and 44-40% rear (depending on the centre of gravity) the car will dynamically have 50%-50% distribution while accelerating at a constant, approximately 1.2G, which is enough to beat an F1 car to 200km/h. Again, this is the end goal, so design should target 50-50 dynamic weight distribution.

The good thing about having the weight forward is that you can also shift the aerodynamic distribution forward and therefore have a more aero-efficient car, which also decreases energy consumption.

So how do we fit a car like this with roughly 500kW into super-tight, often super-bumpy, Formula E city tracks?

My vision is that the power output should be modular. For tracks such as Mexico City and Marrakech, we should unleash all the power. For Paris and Hong Kong, power should be shifted down according to maximum-speed safety standards.

In the same fashion as how F1 chooses its tyres, the promoters/organisers will say Paris is a maximum 280kW, Monaco 350kW and Mexico 500kW, for example.

Again, all of this must be done in a way that means only a few parts are open to development. The base technical model we have today is great and should be preserved. In an ideal world, the differences between the fastest and slowest cars on the grid should not exceed 0.5 seconds.

If we achieve this, Formula E will lead the industry. People will be more and more impressed and excitement levels will go up. Racing will stay relevant for manufacturers, as their road cars have similar architecture. And, more importantly, costs will stay in control, teams will be profitable and drivers will be paid. ■



Di Grassi believes AWD used in LMP1 is a must

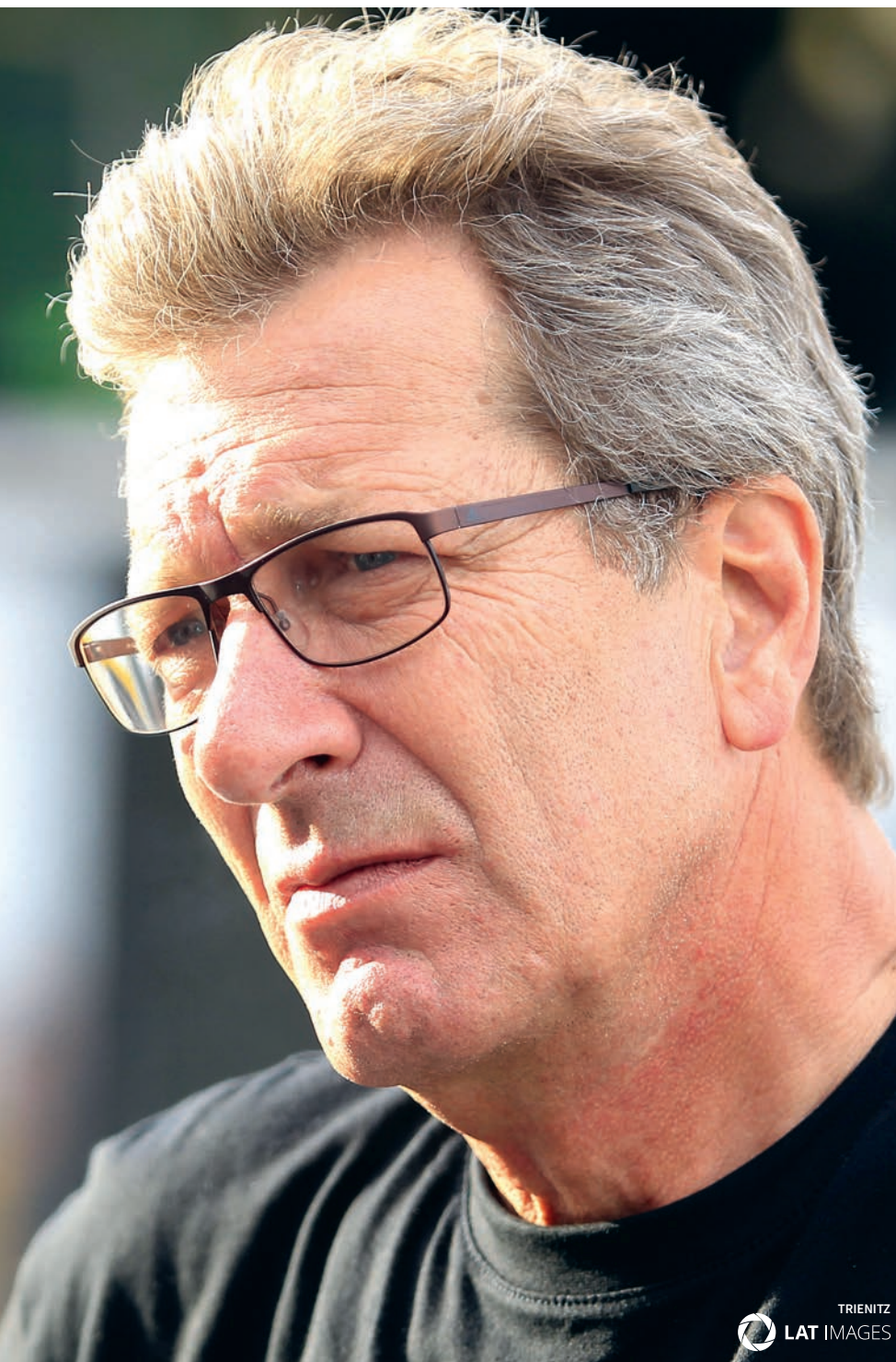
Penske's Tim Cindric
(left) and Joest's Ralf
Juttner in new face-off



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PLAYING A NEW LONG GAME

WHY US SPORTSCAR RACING'S NEW
GOLDEN ERA ISN'T ALL ABOUT
PENSKE VERSUS JOEST



Two of the great names of US sportscar racing are back on the scene, lured by IMSA's highly successful DPi platform. But, as James Newbold explains, the technical challenge has changed dramatically in their time away and reputation alone won't cut it

F or those too young to remember the IMSA GTP days, the Audi versus Porsche rivalry that reached its peak in the American Le Mans Series midway through 2007 was

a high-water mark for US sportscar racing.

On paper, the normally-aspirated RS Spyders in the LMP2 class should have been no match for Audi's revolutionary turbodiesel R10s, but thanks to a series of technical waivers – the ALMS all too happy to see Audi face a challenge for once – and extensive development over the winter, the 150kg-lighter Porsche was a persistent challenger for outright victory on a calendar dominated by tight road and street courses, managing the feat eight times in the season.

Since Porsche's success was the product of a works programme run by Roger Penske's powerhouse team out of the same 375,000-square-foot HQ in North Carolina that also houses its IndyCar and NASCAR operations, it was not the conventional David to Audi's Goliath. But that didn't make it any easier for Audi motorsport boss Dr Wolfgang Ullrich or for Dave Maraj's Audi Sport North America (Champion Racing) operation to stomach being regularly humbled by an LMP2 programme.

A 50kg weight penalty introduced for 2008 to peg back the smaller prototypes ensured normal service was resumed as Audi returned to its previous position of dominance, although Porsche still claimed a scalp by ending Audi's eight-year monopoly of the Sebring 12 Hours.

But with the onset of the global financial crisis, the big-spending budgets required to compete could no longer be justified. Audi only announced its participation for 2008 on the eve of the first race and withdrew at season's end, while Porsche elected not to renew its initial three-year contract with Team Penske, leaving Honda Performance Development (HPD) and Mazda to prop up the prototype class until the ALMS merger with Grand-Am in 2014 resulted in a unified IMSA SportsCar Championship.

So why the history lesson? Sportscar racing in the US is on the up again, talks of a new golden era prompted by the spike in manufacturer interest resulting from IMSA's flagship DPi platform – its influence clear in the ACO's 'hypercar' rules set for 2020-21 – that couldn't be more different to the megabucks arms race of a decade ago.

The comparison is even more pertinent thanks to the names DPi has attracted. Penske is back with its first sportscar programme since 2009 with Acura and HPD, and has been joined at the table by 15-time Le Mans-winning squad Joest Racing. Having concluded its last full season in the US with a fourth straight ALMS title in '03, Reinhold Joest's crew is now in partnership with Mazda after its long relationship with Audi ceased in '16. ►



Penske achieved ALMS success with RS Spyder against might of Audi...

DOLE
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...and its maiden win in DPi came on Acura's home turf at Mid-Ohio

GALSTAD
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Joest has joined the fray with significantly reworked Mazda

GALSTAD
LAT IMAGES

"Since the end of 2009 [in Grand-Am with a Porsche-powered Riley], we've been trying to understand the best way to position ourselves in the sportscar arena and DPi was the catalyst to make that happen," says Team Penske president Tim Cindric. "Sportscar racing is really about manufacturers at the top level – without the factory support, it's not viable. When DPi was created, we felt there was a lot of interest from manufacturers and if we could team up with the right one, it would be a good segue into our next chapter."

The premise is simple. DPi is targeted at manufacturers looking to develop road-relevant technology on a realistic budget by removing the cost of designing a chassis from the ground up. A ready-made chassis from one of the four approved LMP2 constructors – ORECA, Onroak Automotive/Ligier, Dallara or Multimatic – can be acquired for a capped sum of €483,000 (£428,000), with the added enticement of developing bespoke bodywork to reflect the brand's styling cues and integrating pre-existing production-based powertrain and electronic systems.

Manufacturers have responded in numbers – alongside Acura (ORECA) and Mazda (Multimatic), Cadillac (Dallara) and Nissan (Ligier) are also represented on the grid – and each has brought its own distinctive engine philosophy.

Encouraged by IMSA's intricate system of performance balancing, Mazda uses the smallest in the series, a four-cylinder two-litre turbo developed with Advanced Engine Research (AER), safe in the knowledge that it can still compete against reigning champion Cadillac's new 5.5-litre V8, the GT3-based 3.8-litre turbo V6 in ESM's Nissan Onroak DPi and HPD's proven 3.5-litre turbo V6.

In-season private testing is limited to 10 days, freeing up more budget for manufacturers to spend on marketing to promote their racing activities, and contributes towards an even playing field where engineering solutions within small

parameters can make a crucial difference.

For the likes of HPD, which has extensive experience from winning ALMS titles in LMP1 (2009, '12, '13) and LMP2 ('09, '10, '12, '13), plus Le Mans class victories in '10 and '12, the combination of technical challenge and cost is key to the appeal.

"It's a different sandbox to play in than we were used to in the past, but there is room to exercise our engineering expertise," says HPD vice-president Steve Eriksen.

"Compared with our 2007, '08, '09-era LMP2 and LMP1 [Acura] chassis, the cost of getting it certified, and producing and stocking all the parts, it's a significant value proposition to be able to start with a



Diuguid (right) leads Penske engineering effort but Acura has development control

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IMSA'S TRICKY BALANCING ACT

Just as in the ALMS heyday, where a 10% reduction in fuel capacity for the turbodiesel Audis and 5% power increase for Penske's Porsches ensured close racing between different car concepts, IMSA retains the discretion to balance the performance of DPi and spec LMP2 cars in five different areas. Minimum mass, engine restrictor and boost ratio, fuel cell capacity, refuelling restrictor diameter and aerodynamic elements are all subject to change as IMSA tries to achieve parity, but it hasn't pleased everyone.

"The BoP is an embarrassing

waste of time – IMSA must get it sorted if they want teams from Europe to head here," was Paul di Resta's verdict after United Autosports' spec Ligier struggled at Sebring.

It's not hard to see the quandary facing IMSA. DPi attracts manufacturers with budget to run all-professional line-ups, develop their cars and market the series, while spec LMP2 cars are the domain of privateers running largely Pro-Am line-ups that also need to be appeased.

The main exception to the trend came at Petit Le Mans last year, where Penske entered a

standard ORECA and hinted that an LMP2 car could win in the right hands by taking pole and finishing third.

"It's clear that with the budget they have and the freedom in the regulation, the DPis will get quicker and quicker, whereas the P2 will basically be stopped," says ESM-Nissan driver Pipo Derani.

"If the DPi platform doubles in size, it's going to get to the point where IMSA have to think whether it's beneficial to continue to mix a spec car with a car that can be developed."

Most manufacturer-backed teams have been appreciative

of IMSA's efforts.

"You've got such a range of powerplants and that's an interesting challenge for IMSA to balance them, but I think they're doing a good job using data as their decision-making process," says HPD vice-president Steve Eriksen. "Hats off to them for taking on the impossible."

"Everybody understands that it's not about who spends the most, it comes down to the process and making sure that everybody has a fair shot," adds Mazda Motorsports director John Doonan. "They have done a difficult job very well."

"HATS OFF TO IMSA FOR TAKING ON THE IMPOSSIBLE"

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base product and then add our DNA into it.

"From a cost standpoint and a project scope standpoint, that's a big difference from the ALMS era where you had a lot more freedom to develop. This is clearly a different formula, based around creating a product that operates within a defined performance box, but there are still engineering challenges that are appealing.

"Our role is to do the fine-tuning to maximise the performance of the homologated package. Each of the DPi cars has some degree of flexibility with respect to which aero components go on the car. There is a basket of bits that you can choose from, so you're looking at what's going to be best for the conditions at any circuit and fine-tuning the things you can adjust to get the best out of the package."

Compared to the spec LMP2, designed to be an effective plug-and-play customer car, DPi machines are significantly more refined pieces of kit.

Penske turned up to the final round of 2017 at Road Atlanta with a standard ORECA 07, equipped with the universal Gibson V8 engine and spec Cosworth electronics package/engine-management system, so has a clear point of comparison to its Acura ARX-05.

"The LMP2 cars are quite constrained in terms of what they're able to do from a functionality perspective," says Cindric. "When it comes to fuel-mapping, traction

control and all the electronic integration, it's much more complex and integrated in the OEMs than the LMP2 cars are allowed. The number of knobs you can turn with an OEM-specific DPi car is certainly more."

But compared to a decade ago, the teams themselves have a greatly reduced role in this process. Where previously Penske could extensively develop the RS Spyder with in-house Porsche engineers before customer models were made available from 2007, it now operates more as a "support system", according to Cindric. Experienced engineer Jonathan Diuguid is heading up the programme on the Penske side, but it is HPD project leader Matthew Niles who has the most sway.

"We are there as a consultant in terms of the bodykit and the installation, the dampers as well," says Cindric. "The working relationship once the racing starts is similar to what we had with Porsche, although that car was much more complicated due to the openness

of the regulations at the time. With the ALMS programme you could continually evolve and it required quite a developed infrastructure to do that.

"Once the [DPi] car is homologated it's difficult to develop beyond its initial stage."

This is a double-edged sword because, while it keeps costs down, it means teams are at the mercy of their homologated chassis and have limited avenues in which to bring upgrades. For Joest managing director Ralf Juttner, so used to operating within the freedom of LMP1, the constraints of DPi have taken some getting used to.

"You can't do anything outside the aero boundaries you have been given, the same is true with the engine," says Juttner, who provided behind-the-scenes engineering support to Champion in its early days running the R10 in 2006 and '07. "We are restricted by what IMSA is telling us to do, or not to do, whereas in the Audi times it was [engine guru Ulrich] Baretzky who did this! It's true we had much more freedom in the past, but it's not as bad as I thought it would be."

On paper, Mazda has all the ingredients needed to challenge for the championship, but its well-publicised struggles underline that DPi is not an easy category to master, regardless of how good the technical partners in your corner.

One of the few manufacturers that retained a continual presence in US

"Once the DPi car is homologated, it's difficult to develop beyond its initial stage"

prototype racing in the past decade – powering Dyson Racing's Lola B09/86 to the ALMS LMP1 title in 2011 – Mazda's recent history has been disappointing. After the Penske-Acura axis hit the ground running with a debut victory at Mid-Ohio, Mazda remains the only manufacturer in DPi that is yet to get off the mark.

Having spent much of last season hamstrung by inherent issues with the Riley/Multimatic Mk30 – a cumbersome chassis prone to overheating and often unresponsive to set-up changes – Mazda Motorsports director John Doonan took decisive action. He withdrew Mazda's pair of RT24-Ps after Mosport, ended its long affiliation with Sylvain Tremblay's SpeedSource team – a conversation Doonan describes as the “toughest of my career” – and started afresh with Joest, which had become available after the ‘diesel-gate’ scandal forced Audi to can its ultra-successful LMP1 programme.

Doonan admits there were also some “tough conversations” with Multimatic to up its game after taking over chassis development from Riley. After receiving approval from the ACO and FIA to use its allotted ‘joker’, a team of Multimatic engineers headed up by ex-Lola man Julian Sole responded with extensive modifications to the rear suspension and sidepod cooling ducts, while also shedding weight. Although the bodywork

“Everybody thought with Joest involved that we were going to be winning races overnight”

is unchanged, the 2018-spec Mazda is a very different beast under the skin.

“You can ask the drivers that drove it in 2017 and the drivers that are now driving it in ‘18,” says Doonan. “It’s a completely different car.”

But while Multimatic knew that Joest would be joining the programme for 2018, Juttner reveals the team had very little influence on the changes – “a lot of that work started already before we really got our hands on it”. He agrees the car has taken a “major step” forward, even if the chassis remains overly complicated.

“The car was, and in a way still is, very complicated to handle, too complicated for my taste. A lot of it could be much easier – that’s something we are working very hard on,” says Juttner. “Some of it is more complicated to work at than a hybrid LMP1 car honestly, for no reason because its nature should be a pretty simple car!”

“At least now whatever we do to it, the car reacts – it’s behaving much more

like a proper race car.”

Taking a sample of the first three races (IMSA didn’t visit Mid-Ohio last year and Detroit qualifying in ‘17 was red-flagged early), the RT24-P improved by 3.3s at Daytona, 1.6s at Sebring and 1.0s at Long Beach, before Oliver Jarvis and Tristan Nunez took a first podium for the new partnership at Mid-Ohio.

“There was a lot of expectation around the project – I think everybody thought with Joest involved that we were going to be winning races overnight,” says Jarvis, who raced with the Joest-run Audis in the latter years of its LMP1 involvement. “We’d all love that to happen, but it was unrealistic. The car was two to three seconds off the pace, and finding that much over the winter when your competitors are also developing is a tough task.

“Had we had this package last year, we would be winning races, but IMSA has gotten a lot tougher. The great thing is we’re starting to unlock some of the potential of the car and get to those little details that will win us races. I would be extremely disappointed if we haven’t been on the top step of the podium by the end of the year. It’s got that potential.

“Looking at the first four or five races of the season, the cars have been really evenly matched – you could argue that any one of them had the potential at some point to win a race.”

OPPOSITION VIEW

All talk pre-season centred around Penske and Joest entering the fray, but any concerns the newcomers would blow the competition away were dispelled immediately as Cadillac and Nissan shared the opening three rounds between them, prior to Acura's breakthrough win at Mid-Ohio.

Filipe Albuquerque opened Cadillac's account at Daytona for Action Express and took another victory at Long Beach (right, top) to head the standings after the most recent round at Watkins Glen.

“We want to win and we want to win against the best – whenever we win, it’s more tasty,” he says. “Joest is a team with a lot of history and knowledge about endurance racing and Penske is the Ferrari of the United States.

“But it’s great as well to see that these big teams join up

and they don’t beat everyone in a glance. Mazda and Penske were in a different class in Mid-Ohio, but I’m not worried because IMSA is doing their best to balance everyone.”

Pipo Derani is tired of fielding accusations that his Daytona/Sebring double in 2016 (right, bottom) was assisted by elderly Daytona Prototype opposition and having the best engine – the same HPD unit now powering Acura – so was especially happy to win Sebring again this year in the ESM-run Nissan Onroak DPi.

“We proved people wrong that our 2016 success was not because the series was weaker,” says the Brazilian. “By adding Penske and Joest this year you have more teams with high capabilities, but it’s not like they came in and dominated from the start. It hasn’t been easy for them.”





This is, of course, partly by design. With the DPis pegged back to give the standard LMP2 cars a chance to compete, Cindric points out that neither Acura nor Mazda are able to show anything like their true potential at the moment, a situation exacerbated by the fact that Penske and Joest has exclusive use of their respective packages.

While Penske new-boy Ricky Taylor reports that this makes for a more concentrated effort towards individual preferences than was possible at his father's Wayne Taylor Racing team, one of four customer Cadillac squads in the field, Cindric believes it is more

difficult for IMSA to determine the performance of the car relative to the drivers and team – particularly as Penske's full-season roster also includes Helio Castroneves, Juan Pablo Montoya and 2016 IMSA champ Dane Cameron.

"The Cadillacs have all different levels of drivers and teams, so I think it's easier for the series to determine a BoP," Cindric says. "We're always curious about how the Acura would perform in someone else's hands, and there are days when you wish you had another team operating with not such top-shelf drivers to show how well you execute or how well you don't execute some days, because it would

be easier for the series to determine where the car actually performs."

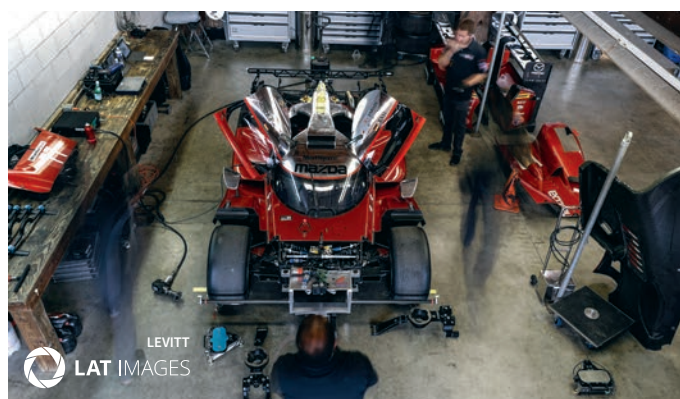
Rising above that challenge will be crucial for lasting success in DPi, and both grandee teams are sure to be a part of the conversation for years to come. But their long-founded engineering expertise in sportscar racing's past eras is no guarantee of that in the short-term against seasoned opposition from rival Cadillac and Nissan teams.

Primarily serving as facilitators for manufacturers and running homologated chassis, factors out of the teams' control will invariably have a part to play. As Juttner points out, Penske has not had the same supply issues with ORECA, where "the shelves are full with parts", that Joest has with Multimatic.

But as its wheel-to-wheel battle with the Acuras at Mid-Ohio demonstrated, Mazda is now a credible challenger that can feasibly meet the weight of expectation Doonan has placed on its shoulders.

"We want and need to win races this season," he says. "We need to be running up front at all times and be a factor. I think we can do that, no question – we just have to execute."

A repeat of the Mid-Ohio duel for championship honours would be a truly unmissable spectacle and, if either of the manufacturers can get near its aims, then the world had better take notice. ■



Clockwise from top: 2018-spec Mazda is new under the skin; Harry Tincknell and Rene Rast have bolstered driver roster; Jarvis believes in the Joest package



WHEN INDYCARS BECAME DRAG RACERS

Twenty years ago, CART's bid to curb speeds led to a deeply divisive aerodynamic 'fix'. Bizarrely, it also forever enshrined the name of a racing car designer from Guildford in Indycar lore

BY TOM ERRINGTON



Mark Handford: creator of a wedge-shaped aerodynamic monster...

Enough was enough, and the breaking point was 240.942mph. That was the speed at which Mauricio Gugelmin lapped the Fontana superspeedway to take pole position for the 1997 CART season finale and claim a new record for fastest lap in motorsport history. To get that average speed, the PacWest Reynard-Mercedes driver had hit 250mph on the straights and 230mph in the corners. For context, it was well above the previous record qualifying lap, 236.986mph set by Arie Luyendyk in the 1996 Indianapolis 500, and comfortably ahead of Gugelmin's nearest rival on the day, Jimmy Vasser, who qualified at 239.222mph. Considering that this year's Indy 500 pole was completed at 229.125mph, and Penske's Helio Castroneves reckons the upgraded 2.4-litre engines set to be introduced from 2021 will lead to laps in the region of 235mph, Gugelmin's was a staggering figure. CART had realised that the racing speeds were getting out of control – hardly surprising considering engine output was hitting 1000bhp – and had been looking at ways to make speedway racing safer. But in a three-year spell, the unintended consequence of its safety push had defined an era of dramatic racing. Come Michigan in 2000 – another superspeedway where

speeds had hit astronomical levels and caused safety concerns – 62 passes for the lead in a manic pack race prompted Gordon Kirby's *Autosport* report, amusingly titled 'You CART touch this', to open with: "It is difficult to avoid hyperbole in describing last Sunday's Michigan 500. The fact is, this may well have been the greatest motor race in history."

But the man central to the spectacle was not Juan Pablo Montoya or Michael Andretti, the chief protagonists up front battling for the lead on that memorable occasion. It was actually a man from Guildford at Swift Engineering, who later became the chief aerodynamicist of the current Ford GT.

Mark Handford first got involved in Indycars in 1992 after working with famed Ferrari and McLaren designer John Barnard, who had been angling for a future TOM'S Toyota Formula 1 deal that never materialised. Having worked his way up the ranks at chassis constructor Swift, Handford had built a good relationship with CART's then-technical director Kirk Russell and they began quietly working on ways to lower the oval pace set by Gugelmin and co.

Their research initially led CART to look at tunnel blockers, a form of underbody filler that was fitted to the rear of the cars and reduced underbody suction. But it quickly became a lesson in how



Handford device made its first appearance at Michigan in 1998

“We were trying to negate the grip and power that tyre and engine companies refused to peg back”

motorsport engineers can find loopholes in every attempt to close off development.

“We were testing at Fontana in the speedway configuration, and to get the car

aerodynamically balanced we had to turn the front wings upside down to create lift,” explains Vasser. “There was one moment where I really felt like a test monkey! I said to Julian Robertson, who was my engineer, ‘Are you sure, Julian?’ and he said, ‘Yeah, just lean into it easy the first few laps...’”

It was exactly the sort of radical thought that allowed Reynard, in particular, to circumvent the rules, with its narrow-track, reduced-drag car playing a key role in Gugelmin’s stunning pole lap.

That stunned Handford. Swift supplied just one team, Newman-Haas Racing, whose

performance at Fontana suffered as a consequence of having the tunnel blockers fitted the way Handford had intended, with Christian Fittipaldi finishing ninth of 12 classified runners and Michael Andretti retiring with an overheating car while leading.

“I had written the rule, so we at Swift looked like complete lemons as we delivered parts to Newman-Haas that respected what I meant the pieces to look like,” says Handford. “Poor old Andretti and Fittipaldi were well and truly stuffed that weekend!”

“We were staggered to find that, rather than reducing downforce and forcing the drivers to lift [for the turns at Fontana], the guys at Reynard had driven a coach and horses through the intent of that filler [tunnel blocker] and still had abundant downforce, meaning that they could lap on fresh tyres completely flat.

“Incidentally, the design of that filler was a lesson in how difficult it is to write rules that can’t be interpreted in a perverse manner to circumvent the intent. But Kirk ignored some of my text when he drafted the official rules and Reynard spotted an ambiguity in the resulting wording that allowed the roof of the tunnel to be ‘packed down’, thus hiding the blocker behind an aerodynamic fairing.”

That failed attempt to restrict speeds led to what would become known as the



“This may well have been the greatest motor race in history”



Montoya used Tarso Marques's slipstream to defeat Andretti in a memorable US 500 in 2000

Handford device used at the Michigan and Fontana superspeedways — often referred to as the *Handford* device because, according to Handford, “they often misspelt my name”.

With rumblings that CART was getting increasingly dangerous on the two circuits, there was political angst behind the scenes. Both Toyota and Mercedes (Ilmor) refused to accept a power-containment formula, with even a 10mph reduction requiring a loss of around 100bhp. Tweaking the tyres to help cap speeds was a no-go too, with Goodyear, Firestone and Bridgestone putting aside their tyre war to agree on refusing such changes.

Handford described such talks as “fraught” before he and Russell agreed to simulate laps and figure out how to better balance drag and downforce to lower speeds. That then led to a range of cheese-wedge shaped “rear wing things” that added more drag and reduced downforce. The final device stretched the full length of the rear wing, thickening it and altering its profile. Its ‘lip’ caused the air pressure to be higher under the device and, in the process, reduced downforce.

Wanting to avoid cheese-based names, it was provisionally called the parachute wing — aptly named considering its intended effect — before further tweaks led to it being called the ‘Wensleydale’ behind the scenes. But when it was

launched to the media, Russell named it the Handford device.

“Kirk, without asking me, launched it to the press as the Handford device, which was and still is rather ironic, as I’ve now spent 30 years working to make various cars more aerodynamic, but the only thing I’m known for is a thing that was an aerodynamic anchor,” recalls Handford.

The target for its debut at 1998’s Michigan race was to generate an overall aerodynamic package that had 1700lb of downforce at 200mph, two thirds of what the IRL was typically running at the

Indy 500. The aim was also to add 1000lb more drag, an increase of 15% on traditional speedway configurations.

All in all, it was expected that the cars would be able to lap without lifting off the throttle, but that corner speed would hit 215mph — as opposed to the 230mph reached by Gugelmin’s Fontana pole lap. The behaviour of the Handford device would also reduce the likelihood of high-speed spins, because even an aggressive approach to full-throttle would only increase thrust more gradually.

But just as importantly, the Handford



Gil de Ferran uses the Handford for the first time at Michigan '98



device would prevent a full-scale war between the engine manufacturers and tyre suppliers against CART, while achieving the goal of lowering speeds.

"You can see that we were simply trying to negate the grip and power that the tyre companies and engine companies were refusing to peg back," says Handford. "Anyway, what we never cottoned on to was that the device itself was making neither lift nor downforce; we didn't have the budget to install load-cells in the rear-wing mounting mechanism. So, come the Michigan race in 1998, the wake from the devices just 'sat' at almost exactly the height of the device."

That single oversight dramatically altered CART, creating a new slingshot effect that comprehensively changed the face of the racing, first seen as Forsythe Racing's Greg Moore narrowly defeated Chip Ganassi Racing twins Vasser and Alex Zanardi at Michigan, at the end of an event that was overshadowed by the deaths of three spectators after Adrian Fernandez crashed and a loose wheel went into the crowd.

It had become CART's answer to NASCAR's restrictor-plate racing. No-one wanted to lead, as it hurt fuel mileage and made the car up front a virtual sitting duck to the frantic pack in the mirrors.

"To an extent, it lowered the value of a pass," explains IndyCar's current vice-president of competition for engineering ►

'LIKE FORMULA FORD, BUT 10 TIMES AS FAST!'

If ever there was a time CART's Indycar races resembled NASCAR, it was during the early years of the Handford device, with 63 lead changes the headline feature of its dramatic debut at Michigan in 1998.

Forsythe Racing's Greg Moore managed to finally break the tow – "a stroke of genius", reckoned Dario Franchitti – to win the race in the final laps, but the mercurial Canadian and the Chip Ganassi Racing duo of Jimmy Vasser and Alex Zanardi had perfectly demonstrated what could be expected from the Handford device.

The slipstreaming would launch a car into a closing-speed advantage of 10-15mph, which made breaking clear difficult.

Walker Racing's Gil de Ferran, who went on to set a closed-course speed record of 241.428mph with the Handford device at Fontana in 2000 – a mark that still stands today – makes a comparison with 10-car

"You didn't want to lead because you'd use more fuel, so you would try to fall back into the pack," says Vasser. "On a couple of occasions, there was an accordion effect in with the closing rates and somebody tried to essentially back up the pack by lifting. It was really anti-engineering, wasn't it? It wasn't pure racing, you couldn't just pull away."

Bobby Rahal retired from racing at the end of the Handford's first season in 1998 and remembers the device as unnatural for drivers.

"It was strange having to fight so hard to not lead," he says. "It goes against every principle you've learned as a driver. We'd just be in huge packs going around at three-quarter speed, and not wishing to do the work of cutting into the air at the front. Then of course in the last two laps everyone went crazy!"

But Franchitti, then of Team Green, refutes claims that it turned CART into the pack racing that had become commonplace in the rival Indy Racing League during the same period.

"When you were racing at full speed there wasn't a pack," he recalls. "You couldn't get close enough in a corner. If there were two cars in front of you, you had to be careful as to where you positioned the car. Pack racing was a product of the IRL – we didn't really have that in the CART series, I don't think."

But the trapped air generated by the Handford device did create other, unforeseen problems.

"The air going through the sidepods was trapped and looking for an outlet, and it would end up coming from places like the slot where the sequential gearbox was," he says. "I've still got scars on my legs from where I was embroiled in a race at Michigan, and that was because the air became stalled behind the Handford."

"IT WAS STRANGE HAVING TO FIGHT SO HARD NOT TO LEAD. IT GOES AGAINST EVERY PRINCIPLE YOU'VE LEARNED"

FF1600 slipstream-fests at Silverstone.

"It was a similar thing, but 10 times the speed!" he says. "It was unbelievable: you got behind someone and literally could feel the car speed up. It was difficult to gear the car, because the difference between having air in your face or not was enormous. If you had three cars ahead, it was even bigger."

Vasser adapted well to the Handford device's draft-racing characteristics at Michigan and Fontana, where he was consistently among the quickest drivers, but the 1996 champion was not remotely a fan of the artifice from the moment it was mooted as a solution to slow the cars.

LAT IMAGES



Franchitti (right), pictured with engineer Don Halliday, has scars from pockets of air

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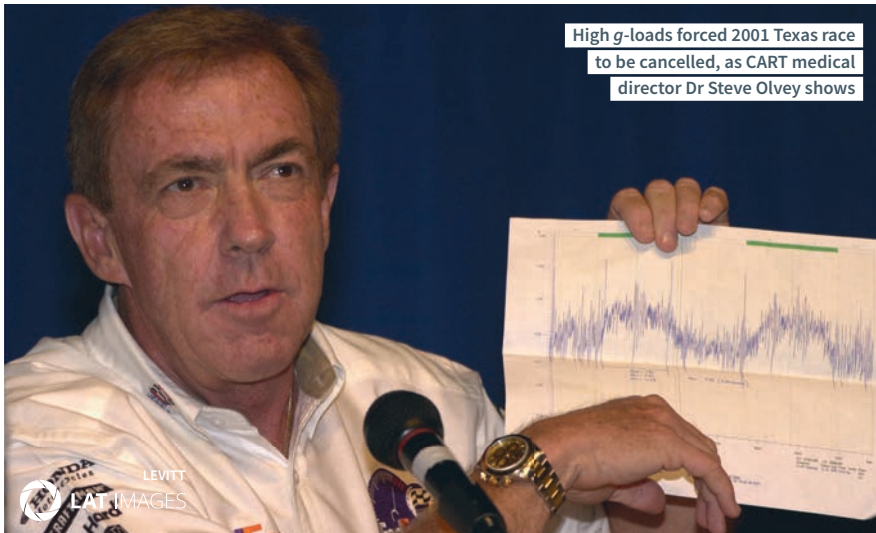
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Bill Pappas, who switched from Walker Racing to work on Montoya's car at Ganassi in 2000. "The guys behind didn't need to think about how to plan and execute a pass — they were just going to get sucked along anyway. You ended up with this huge merry-go-round and it was too easy to pass."

"It also meant the engineers didn't need to work with their drivers to perfect their set-ups — everything was going to get dictated by the Handford device."

But it didn't make Indycars any less fearsome. The 2001 Texas 600 was famously cancelled two hours before the start with all but four drivers having suffered from some form of disorientation due to excessive *g*-loads on the 24-degree banking after running more than 10 laps, not helped by the unseasonably high April heat. CART never returned to Texas Motor Speedway, its three-year contract torn up, and had to pay \$3.5million in legal fees.

As for the Handford device itself, driver reaction was always mixed during a wild, exciting era, even when CART introduced a 'MkII' version in 2000 (see left). The device survived until CART imploded in '03.

But on the 20th anniversary of its introduction, Mark Handford's unloved creation remains pertinent. While the 2018 IndyCar has won praise for its simplistic look, generating most of its downforce from

"You ended up with this huge merry-go-round and it was too easy to pass"

the underbody and improving the racing at most circuits, it still has a flaw. IndyCar has yet to firmly get to grips with the car on ovals, opting not to add on downforce for the Indy 500 after driver concerns.

Some even suggested the Handford device, or a derivative of it, should make a return, but those in IndyCar who remember the original do not agree.

Bobby Rahal, who was transitioning from owner-driver to focusing on running his team during the Handford era, is unequivocal on the subject.

"It's too artificial — slowing our cars in a straight line is not an issue," the 1986 Indy 500 winner says. "We've worked hard to get the technical package back to where the driver makes a difference, so if you create something that slows the straightline speed but the grip in the turns is the same, then you've just made the terminal speed closer to apex speed, which is the opposite of what we want. We want the driver to have more input."

But the fact the Handford is still raised whenever IndyCar has a sustained run of poor oval races suggests it will forever be etched in the category's lore. ■



A SHORT HISTORY

A revised Handford device was fitted to the CART cars at the turn of the millennium as the key to a new aerodynamic package.

The Handford MkII, as it was commonly called, replaced the original and the 'superspeedway wing' used in short-oval competition during 1999.

"I went on to create a derivative to the superspeedway Handford device that did something similar to slow down the short-oval lap speeds," explains Mark Handford. "But it created a significant upwash [because it created downforce] and was abandoned after only a couple of races."

The updated MkII was slated for use on all small and intermediate ovals, as well as the Road America road course, and it was expected to lower development costs and wing inventories by being a 'spec' part.

There were two versions: a high-downforce wing for Nazareth, Rio de

Janeiro, Milwaukee, Chicago and Road America, which generated a further 700lb of downforce and 260lb of drag compared to the superspeedway wing in testing; and a low-downforce version slated for Homestead, Motegi and Gateway, which produced 150lb less downforce and 145lb more drag than the superspeedway wing.

But like the original Handford device, there was a problem. In this case, it had not been tested in traffic. That meant on ovals with just one racing groove, it exaggerated the 'follow-the-leader' racing.

"When we started using it on the short ovals, that wasn't very good," remembers Dario Franchitti. "It was completely unsuited to short ovals, they missed the boat with it."

It was quickly dropped from short ovals and never raced at Road America, then was quietly phased out — along with the original device — before CART's collapse in 2003.



GETTING THE BEST OUT OF A TRACKDAY

There are many pitfalls to tuning your own car for trackday usage and these are what RSRNurburg's Standard vs Modified programme is designed to avoid

BY MATT KEW

Founded by racer Ron Simons, from whom the company takes its first two initials, RSRNurburg offers keen drivers a chance to rent performance-based cars and push them as their engineers intended on some of the world's most revered circuits.

With workshops at the Nurburgring and Spa-Francorchamps, RSRNurburg sees all manner of drivers, cars and indeed mistakes take place on its doorstep.

On the big compressions and bumpy surface of the Nordschleife, simply lowering a road car doesn't mean it'll work on track. In fact, with the wrong set-up, a modified car can be more unforgiving through the corners and over the crests, and as a result be more likely to spit you into the barriers.

That's why RSRNurburg has launched its new 'Standard vs Modified' YouTube

series. The videos follow the progress of taking a stock Mk7 Volkswagen Golf GTI and show the host of upgraded parts, work and tuning that go into making it fit for extensive trackday use.

"It's not just about entertaining or getting lots of views – that's not the main target," says workshop manager Thomas Wenzel. "It's about passing on knowledge and technical information."

"We get a lot of customers asking us what parts we use, what suspension, alignment and so on that we run on our cars. We want to answer these questions properly and let the people see how we modify a track car."

With the fleet of cars offered by RSRNurburg spanning from the 240bhp, front-wheel-drive Golf GTi up to a 991-generation Porsche 911 GT3 RS, customers can lean on the guidance of the company's instructors to make them a much faster and safer circuit driver as

they progress through the range.

The 'Standard vs Modified' programme adds another element to that. Customers can test a modestly priced performance car such as the Golf, view the modifications – most visible are the new bolt-on wheelarches to house wider tyres and a stripped-out interior – and feel how they improve the driving experience. Afterwards, they then copy them with their own car.

That makes the programme "a true win-win-win situation", according to Simons. "The first who is benefiting is the customer who drives the car. Now they can test something on a certain model before they actually buy it. That is unheard of."

"Since we have most of the top-of-the-line cars in a segment where people do modify their cars, it's likely that we have exactly the car the customer has in standard trim. Now they can drive it to test the suspension or the tyres, the BBS wheels,



Clockwise from top: saving weight and adding a rollcage are first steps to improved performance; Wenzel marks out enlarged wheelarches; company works with top partners



everything. We can test all these add-ons before they buy them, and the suppliers can showcase their products on the best cars in the world and at the best tracks.”

What makes the ‘Standard vs Modified’ programme different to the rest of the cars RSRNurburg extensively develops is that achieving the quickest possible lap time is not the ultimate goal.

“Contrary to many builds we do, with the Golf we aren’t focusing on absolute numbers,” Wenzel adds. “Instead, we want to offer the most rewarding experience with the car providing better feel, fun and driveability.”

It’s a smart trade-off. As the Golf becomes more uncompromising, it is undeniably no longer quite as comfortable and refined as its unmodified counterpart. But, crucially, it remains totally road legal, which puts a natural limit on which tweaks are made. Fitting new coilovers, upgrading to a Big Brake Kit, and engine remapping are relatively low-hanging fruit for tuners, but it can soon turn into a law of diminishing returns.

It’s why the ‘Standard vs Modified’ Golf features the installation of adjustable suspension from VLN supplier KW and treaded Michelin Pilot Sport Cup 2 tyres, which offer the best balance of price against performance. “You’re not guaranteed more fun if you put more money into a car,” says Wenzel. “With the Golf, you get a car which is really good on track

and you enjoy a lot. But you spend a lot less money than on a Cayman GTS or a 911.”

An upshot of not blowing the bank balance is that it leaves more money for modifications that do not follow the road-car market. Whereas a Golf GTI is more than £100,000 less expensive than a GT3 RS, a rollcage costs about the same regardless of which car it’s being fitted in, likewise the Recaro bucket seats that save half the weight of the Golf’s standard seats.

“The goal is to have a very capable car without it being too aggressive,” Simons concludes. “It has to function in the hands of everyone to be the best for a mainstream experience.”

Like many project cars, the GTI is still a work in progress as refinements to the set-up are continually being made. But when RSRNurburg brought out the stopwatch at Spa for a comparison between a standard Renault Megane RS265 and one that had received the modified treatment, the end result was a six-second saving in lap time. ■



SIMONS'S TOP TIPS

The top six ways to modify a car for the track, according to RSRNurburg founder Ron Simons.

1 Get tuition from an expert.

The best place to start is actually with the driver. Modifying a car stays with that car, so as you sell it on you lose your investment. But improving your own skill stays with you for life. It’s not only making the package fast but also safer at the same time.

2 Strip out excess weight.

It’s the cheapest way to go quicker. Throwing out everything you don’t need helps with braking, cornering and acceleration.

3 Upgrade your tyres.

They are your only contact with the road, so every input and force goes through them. It’s simple: the more grip the tyre gives you, the faster you go.

4 Better suspension.

You need to help the tyres out and the best way to do this is with revised suspension – uprated springs, shock absorbers and anti-roll bars allow the tyre to do its best work in the corners.

5 More stopping power.

Modern road-car brakes are quite good already, but they tend to collapse when used on a track. Fitting a better set of pads gives huge improvements, but if you’re serious about this then you will need new calipers, discs and even enhanced cooling.

6 More power.

The last thing to upgrade is the engine. A lot of power means nothing for your lap times when the car is heavy, has no brakes, no suspension and bad tyres. Luckily, modern turbocharged engines are cheap to tune.



COLIN MCGRORY

THE MAN BEHIND FORMULA 1'S INVISIBLE ADVANTAGE

There's far more to the Sandwell technical director's story than his passion for shot peening

BY JAMES NEWBOLD

Thriving surface engineering company Sandwell UK was only ever meant to be a fallback option in the event that Jackie Stewart's efforts to launch a grand prix team for 1997 didn't come to fruition. That's just one of the startling revelations from a frank chat with its founder and technical director Colin McGrory about his career in Formula 1, which spanned more than 20 years before he grew tired of the internal politics at Jaguar and left to focus on his growing business, which today services almost every F1 team on the grid.

So named because McGrory "wanted something positive in the name", Sandwell's success is the result of a single-minded fixation with finding solutions and optimising them, a passion held since a young age when, as a 14-year-old, he designed and built a hovercraft in his parents' garage.

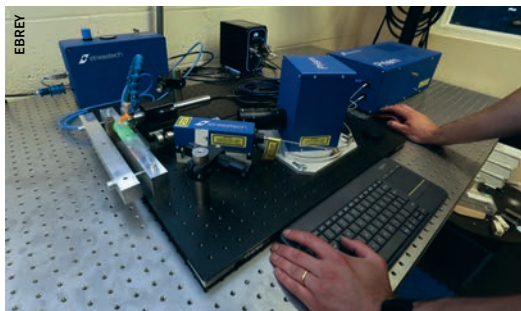
A qualified metallurgist at the University of Birmingham, McGrory transferred into motorsport after cutting his teeth in aerospace, where he became frustrated with the pace of his work specialising in non-destructive test methods.

"Aerospace by its very nature has to be methodical because everything is in the air and if anything does fail, it's pretty serious,

so it has very set procedures and resists change at every stage," he says. "Motorsport takes its safety very seriously, but it wants to adapt and change as quickly as possible to beat the competition. That was the attraction for me."

Joining Arrows in 1979, McGrory was primarily responsible for quality control and materials, but also helped out trackside. As the prominence of data-logging grew, he was tasked with studying the transfer of loads in relation to rideheights.

He remained there for nine years before joining Leyton House, where he stayed until the team's bitter demise in 1992 and then returned to Arrows. It wasn't long before team financial trouble began to rear



Clockwise from top left: residual stress testing is key first step; RoboPeen is the result of three years' work; shot peened components are more durable

its ugly head again, but an intriguing offer from Stewart caught his attention.

Preferring to start from scratch than buy an existing team, Stewart needed a production manager to set up and run an F1 facility for him in Milton Keynes. For McGrory, who would report to technical director Alan Jenkins, a familiar face from Arrows, it was too good to miss.

"It was a great challenge and a compliment to be offered such a role," he says. "I set up the factory, the machine shop, inspection, composites, the sub-assembly, car build and employed people to do those roles as well as most of the design team.

"I looked after all the systems and people within the factory and ensured that the car was designed and built on time."

Yet, given his previous experiences with F1 teams hitting the skids through funding issues – having watched as the coffers ran out at Leyton House, before Lotus, Larrousse, Simtek, Pacific and Forti succumbed to a similar fate in the space of two years – McGrory had a degree of caution about the project, so set up Sandwell in a rented unit on Lord Hesketh's estate.

As the materials used by F1 teams had evolved into ultra-high-strength steels, alloys and titanium alloys, McGrory had noticed a gap in the market for shot peening, a subtle but highly intricate process that improves the performance and durability

of a lightened component by adding negative stress that can make up the deficit from the material taken out and even double its lifespan.

A member of the SAE International Committee for Shot Peening, McGrory is a highly respected expert in the process, which he introduced to Arrows in 1984 when it was almost unheard of outside aerospace applications, and immediately noted a marked improvement in the reliability of the gearbox – although problems with the team's new BMW turbo often intervened anyway.

Combining shot peening with different processes, including superfinishing – a refined polishing process that helps reduce friction and resistance, thus reducing loads

"Shot peening is such a low-cost added value to the performance of a component"

– McGrory built Sandwell into the go-to company for surface engineering solutions.

"I loved the engineering in F1, the positive, 'we can do anything' culture, but to me it comes down to the basic materials, the basic grain structure, the heat treatment, the processing that gives you that performance of a component," he says.

"Shot peening is such a low-cost added value to the performance of a component. What we're essentially doing is putting a negative stress into the surface so the material can take increased loads, or you can increase the life on it.

"It does change the look of the surface appearance of the material, but most people would not know that a part had been shot-peened unless you were an engineer – it's really hard explaining to people the difference between a smooth finish and a blasted shot-peened finish. In a way, it is an invisible advantage."

Managing full days at the Stewart factory in the lead up to Melbourne 1997 with evenings and weekends at Sandwell was a constant juggling act, but both proved a great success. Stewart had established itself as the fourth-best team by '99 and memorably won that year's European Grand Prix with Johnny Herbert.

But under Ford ownership from 2000, the renamed Jaguar outfit regressed to ninth the following season and didn't improve much thereafter. McGrory even wrote scripts for technical director Gary Anderson to take to debriefs in Detroit to present a united front, but eventually gave up the uneven struggle in '02.

"They felt that because they built cars, they understood F1 cars, but they're totally different animals," he says. "They brought in guys like Bobby Rahal and Niki Lauda ►



1984 Arrows A7, driven here by Thierry Boutsen, was the first to use shot-peened gears

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WORKING WITH BRAWN AND NEWHEY

Ask your average fan to name the two engineering minds that have had the biggest impact on Formula 1 in the past 30 years and the names most likely to crop up are Ross Brawn and Adrian Newey. Sandwell's Colin McGrory is among a select group to have worked with both.

Joining Arrows in 1987 from the moribund Haas team – where he had briefly crossed paths with Newey – Brawn's first design, the A10 (below), was plagued by problems with the pop-off valve that limited the boost levels, although Eddie Cheever took it to third at Monza in '88. McGrory enjoyed working with Brawn, but found that he could frustrate the designer.

"I do like to stop and think and that drove Ross mad because sometimes I'd be pondering something and he'd just want to get the car back out on-track. I think he was a little bit frustrated with me!"

By the time Brawn left Arrows for Jaguar's sportscar programme in 1989, McGrory had also departed for Leyton House, where he got an early insight into Newey's modus operandi. His normally aspired 881 yielded sixth in the constructors' championship in

'88, but '89 was a disappointment and Newey left for Williams shortly before Ivan Capelli's valiant second place at the French Grand Prix in 1990.

"Adrian chased every gram of weight on the car, so credit to him, I think he moved F1 on quite rapidly during that time," says McGrory. "He started using much smaller bearings, much smaller nuts and bolts, which meant that the components could shrink down as well."

McGrory found Brawn and Newey contrasting personalities to work with, but both were "absolutely focused on the end result" and were open to ideas.

"They both listened a lot, you would go to them with an idea and they would say, 'Let's try it,' he says. "It was that really positive approach all the time that they both had – and still have!"

McGrory says he was impressed by their "great presence" and impact on others during his time working with both: "It's that totally focused brain, nothing will take them off course. They're going to make the fastest car, the best-performing car there is, whatever it takes."

**"I THINK HE WAS
A LITTLE BIT
FRUSTRATED
WITH ME!"**

"A lot of people still don't understand the benefits of it or how much weight you can take out"

who both understand racing and were great to work with, but they never had a free hand, they were at the mercy of Ford.

"Jackie in particular was great at saying 'Get on with it', so it was like having your own business. I liked being able to make decisions and make things happen, but it was hard because you're running such a large operation, you can't get involved in the detail of how something is designed or made, so there are compromises all along the way."

Determined that it wouldn't be the same with Sandwell, McGrory has taken a very hands-on approach. He invested in one of only four residual stress measuring devices in the country last year, adding to an impressive workshop featuring his pride and joy, an eight-axis shot peen machine, coined RoboPeen, that works from a CAD model and generates the most efficient "robot path" to treat a part and took three painstaking years to build.

"Any project that has its great challenges is very satisfying to see the end product," he says. "With the robot, I've probably annoyed a lot of people along the way. I didn't mount it the way the robot people wanted me to mount it, I didn't use their software because I wanted better software, but I haven't compromised on it. I got what I wanted and you get rewards for that."

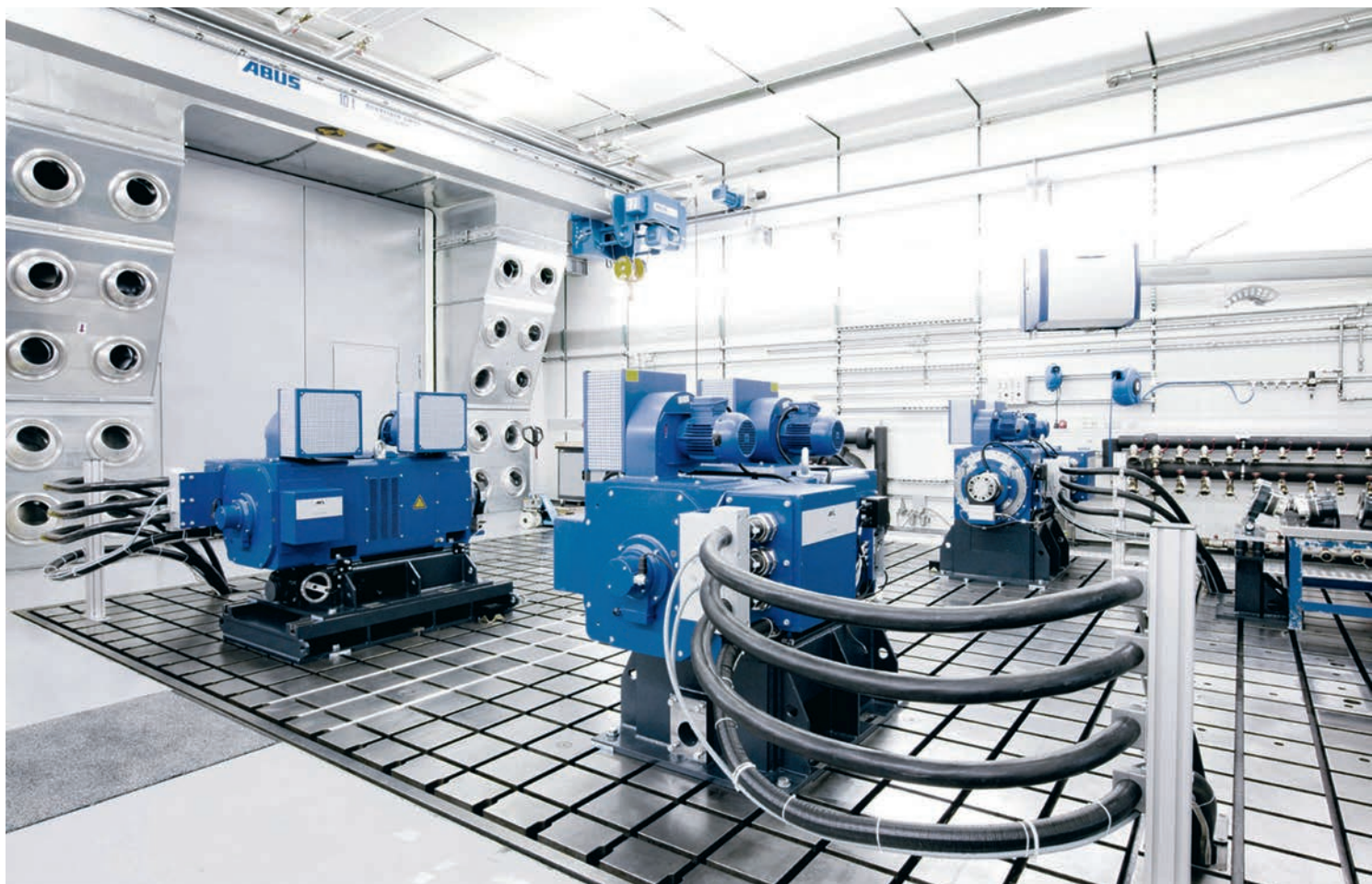
Although McGrory chose to leave F1 behind him, Sandwell's growth is intricately tied with the industry. McGrory still has plenty of contacts in F1 and a decent portion of the Red Bull design team have been there since the Stewart days – which explains the prominent placement of Stewart GP and Red Bull posters he keeps proudly on the wall of his office.

That mutual trust helps secure business, but also carries weight in other industries too – not least in prosthetics, where there is a high demand for shot-peened components.

"To develop a technique that significantly increases the life of a prosthetic foot, it's the true application of the process," he says. "I think a lot of people still don't understand the benefits of it or how much weight you can take out of a part, then shot-peen it and regain the performance of all that weight that you've taken out. There are many opportunities that I think are still missed."

"The problem I have is I can't stop the ambition, I can't stop the drive. Every day, I have to do it." ■





WHEN SIMULATION VIRTUALLY BECOMES REALITY

Austrian company AVL has further blurred the boundaries between simulation and real-life track testing with its cutting-edge technology

BY JAMES NEWBOLD

Even for the most stringent technology sceptic, the benefits of simulation in motorsport are by now well-known. As on-track testing is increasingly limited in the name of cost control, the benefits of a well-optimised simulator with strong correlation to the race car can make all the difference between challenging at the sharp end and languishing in the mid-pack.

But short of spending thousands of hours gathering data on individual component testbeds, modelling all the components that make up a modern Formula 1 powertrain and all the settings on every knob and dial

to ensure it exactly matches the real car – until the next race when a minor modification renders it void – how do teams get the most from sim set-ups?

The answer can be found in Graz, at the HQ of Austrian engineering powerhouse AVL RACING, which celebrates its 70th anniversary this year. When Autosport first ventured to its 3km-square campus in February, nestled under a thick blanket of snow, it appeared an idyllic picture of tranquillity, but the contrast inside couldn't have been more pronounced.

It's a hive of constant activity, with waves of highly qualified engineers and technicians buzzing around its maze of corridors, while this writer was politely

instructed to cover over his iPhone camera with a sticker to guard against any confidential leaks. You would be forgiven for thinking that you were at NASA, and the reality is not far off.

Although it has historically specialised in combustion engines, AVL has broadened its portfolio to cover hybrid/electric powertrains, vehicle dynamic simulation (including Cloud capabilities) and full-vehicle testbeds, as well as CFD modelling and precision manufacturing.

You could legitimately ask what a top-of-the-range driver simulator in a side room would have to do with this business model, but it's not some half-hearted segue into an already overcrowded market.



AVL's sim set-up connects to full-vehicle testbed for improved realism

RIEDLERPETER

At first glance, it looks like any other driving simulator, based on a Formula Renault tub on a rotating platform, but it's what you can't see that AVL is most proud of. One floor below is a full-vehicle testbed for the actual car, which is physically connected to the master cylinders from the driver simulator pedal box, to ensure that throttle and braking inputs in the virtual world are transferred through the real vehicle and then transmitted back to the driver simulator.

The facility, which is available for teams in premium categories to rent all year round, makes for an ultra-realistic driving experience and is the closest a car can get to replicating the stresses it would experience in competitive conditions without leaving the laboratory. With unparalleled accuracy and repeatability, the combination has earned rave reviews, as Guillermo Pezzetto, product manager of racing, engineering and technology powertrain systems, explains.

"The driver can drive the car as close to reality as possible because the next step from our coupling of full-vehicle testbeds and driving simulator is reality, the real track," says Pezzetto, who first came to Europe from Argentina as a race engineer in Formula 3000.

"We had a very nice comment from a

driver— 'it's amazing how good your power unit model is' — and that was exactly what we expected because there is no model; it's the real power unit. Obviously their simulation was not capable of representing what the power unit was doing.

"The torque is a real output of the power unit, including of course the gearbox and the braking. The feedback the pedal gives the driver is real because we are braking the real calipers. These values are not a simulation anymore, they are real. It's like you are braking the real car, but you are sitting in the driving simulator."

The potential advantages to a constructor looking to extract maximum performance from a fixed budget — without the luxury of a dedicated test team to trial in-season developments — are obvious. Even with massive investment into a top-of-the-range simulator, it only takes a small discrepancy in the torque delivery to have major

repercussions for the handling and alter the way drivers use the sim, thus allowing them to take advantages that don't exist in real life, or force them into making unnecessary compromises.

Regardless of how good the hardware is, if the software is not up to scratch then the correlation will be compromised. Therefore, it makes perfect sense for teams to conduct testing using the real components, operating at the same temperatures as real life, where feasible.

"To run a driver simulator is a huge effort, to run a full vehicle is a huge effort," says Matthias Dank, global business segment manager of racing, instrumentation and test systems. "To put this on a testbed is an even bigger effort and to combine all three is the biggest effort you can imagine, but it's more effective and it's cheaper."

"Most of the time customers try to replicate the failures they have seen in the past season to see if they could have anticipated these problems, and every team has left having experienced new failures on the testbed they might have encountered during the next races. It's not only a back-to-back comparison; they also come away with new results after using it for a couple of days, so the value is very high."

"There is always this false thinking that motorsport spends stupid money, but if ►

"The next step from our coupling of full-vehicle testbeds and driving simulator is reality, the real track"



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HOW A TESTBED WORKS

The world of testbeds may seem unglamorous next to the sight of a brand-new Formula 1 car taking to the track for the first time on a crisp February morning in Barcelona, but when trial integration runs in a simulation setting produce faults that can be rectified before resulting in costly stoppages during real-life testing, an effective testbed set-up becomes worth its weight in gold.

"It's much more efficient because we remove everything from the real world that induces uncertainty to the test," explains AVL RACING's Matthias Dank. "If you want an objective comparison of changes on your engine or your battery, ideally remove everything else and simulate it with devices that mimic the physical influence on it. If you have to build an entire car to see the effects of changes on the combustion engine, you spend a lot of money on your set-up."

In addition to selling testbeds to customers, AVL has more than 90 specific testbeds for all purposes – from batteries to inverters and turbochargers – that can be run simultaneously at its Graz HQ, many of them unmanned and around the clock.

But while the driver simulator-full vehicle testbed hook-up is AVL's main attraction, around 80-90% of its testing is done without a driver in the loop. Instead, it makes use of AVL's dynamic Vehicle Simulation Model (VSM), "a dynamic driver that is a close representation of a human" accurate to within four milliseconds, which provides greater repeatability of results and saves the driver for when they are required to give the final sign-off.

AVL ambassador Ferdinand Habsburg is a regular visitor to the simulator as the company seeks to assist the next generation of Austrian talent, but the F3 regular would soon burn out if he was called upon every time AVL needed to run a simulation.

"What you want to avoid is having a driver booked up for four hours of testing, and spend three hours troubleshooting," adds Dank. "We let the driver focus on what he really has to do."



you invest in a new test system, you want to get more performance, or save money, or ideally both at the same time, so they actually spend their money very wisely."

Mating a simulator with a full-vehicle testbed sounds like a brilliant idea, but there's a good reason why it hasn't already been done many times over. It took AVL three years and 25 people working solely on the project to realise its vision, initially conceived in 2011 when the introduction of V6 hybrid powertrains in Formula 1 for '14 was first mooted. That's not something many companies can afford to dedicate so much time to, even if they have the requisite pool of expertise and multi-million pound investment available.

"The mix of skills and know-how is quite complex," says Pezzetto. "At AVL, we have the luxury where testbed engineers work very closely with our department in powertrain and vehicle dynamic engineering; you have vehicle dynamicists, programmers, project managers, electronic engineers, power electronic engineers, mechanics; it's one company providing a single solution."

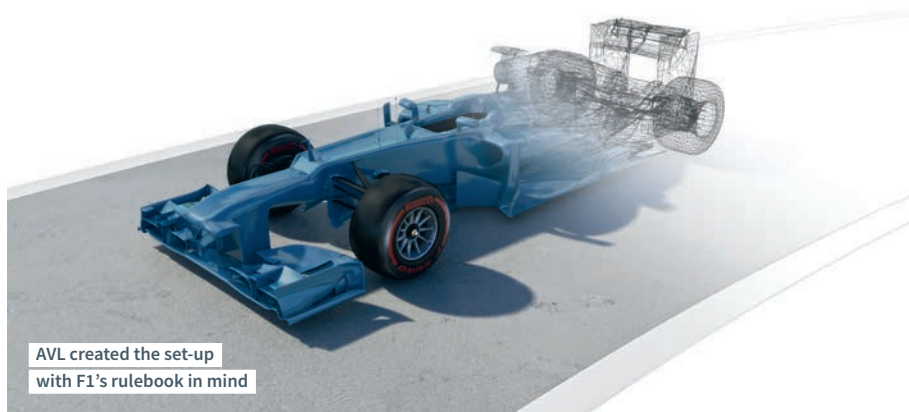
But even a company the size of AVL, with 9500 people employed worldwide

and more than a third of those based in Graz, did not initially possess the competencies in its portfolio to turn its ideas into a working prototype. It was one thing anticipating that systems integration between the driver, the hybrid powertrain and newly introduced brake-by-wire system in the 2014-spec cars would be problematic, but having never worked with braking test systems prior to '11, AVL had to return to the drawing board.

"If you take a step back and take a look at it, it's pretty straightforward, but the devil is always in the detail," says Dank. "We took it step by step to master any new technologies that we needed to have in our portfolio, because so many different aspects have to work together at the same time. If you work on too many projects simultaneously, you will never go anywhere."

"So we had this whole idea in 2011, then we started to do a single-corner brake testbed in '12. The final goal was always this brake integration on the entire testbed, but we had to manage this technological gap and take it step by step."

The result is a tool that AVL is rightly proud of – the *pièce de résistance* keeping it at the cutting edge of innovation. ■



HOW TO BE AN ACE ENGINEER

F1 innovation legend John Barnard shares his wisdom

BY GRAHAM KEILLOH



John Barnard has never been one constrained by convention, fitting for a designer responsible for some of motorsport's greatest innovations.

At the outset of his career he was rejected by McLaren, yet this proved a blessing as he instead went to Lola, where he crossed paths with Patrick Head.

"We tended to share out a lot of the work," explains Barnard at the launch of his biography, *The Perfect Car*. "I did a lot of work on the T260, the Can-Am car that Jackie Stewart drove; the two and three-litre sportscars; the Atlantic car.

"I was able to get this all-round experience, which was priceless."

Underlining the range of tasks, Barnard designed the SuperVee T250 from scratch, loaded it on a trailer and drove it to a racing car show to sell. From there, after a brief stint at McLaren, he went to the US to work for Vel's Parnelli Jones and then onto Chaparral, where his ground-effect 2K design won the CART title and Indy 500 in 1980.

"At Vel's Parnelli my first job was to take the Formula 1 car, redesign all of the uprights and suspension, and then the next job was to finish Parnelli's off-road racer. We jumped from an F1 car to this thing that thunders over rocks and gulleys at 140mph!"

Only then did Barnard put down roots in F1, again with McLaren, his revolutionary carbonfibre-composite chassis winning three straight titles from 1984-86. He feels that the risks for an engineer getting into F1 too early are even more acute today.

"In an F1 team you're going to get pigeonholed," he warns. "Unless you can fight your way out, that's going to be your bag. I'd want to get some experience first, whether it's smaller formulas, or sportscars.

"It's good to get some track experience; you can do that in Formula 3 and these other formulas. You can go to IndyCar and learn a very different approach."

It gets to the core of Barnard's success – being convinced by your solution even if it's not the 'usual' way.

"If you come up with the right answer in your own mind you need the determination, the guts and the drive to see it through," he says. "If it's different in any way, you will have half a dozen people saying, 'That's no good, it won't work'."

"You can have all the qualifications under the sun, but without that determination and bloodymindedness you won't get there."

Barnard adds that engineers must also learn from others continuously.

"Don't think that when you've left college or university that you know it all, because you know nothing!" he says. "Be prepared to learn and pick up information all the time.

"Things [in a team] may seem different to what you learned, but they're different for a good reason – nobody at college has taught you, because you can't teach it really, a lot of it has to be absorbed as you go along.

"Somewhere along the line you have to come up with an answer to a problem and be convinced that you've got the right one."

Unsurprisingly, Barnard's favourite cars are his most ground-breaking: the Chaparral, his 1983 'Coke-bottle' McLaren MP4/1 – "the prettiest of that series" – and the paddle-shift Ferrari 640, a winner on its debut in '89. But there's one he feels doesn't get due credit, the high-nose '91 Benetton B191.

"People I know say that wasn't such a good car, but if you look at the Benettons after that, they were a development of that, so it led to a line of successful cars." ■



SUTTON IMAGES



Piquet won 1991 Canadian GP in Barnard's unheralded Benetton

LAT IMAGES

TOP TIPS FOR ENGINEERS

- Get varied experience. That way you learn more and become a better designer.
- It's not only about brains and qualifications.

Being bloody-minded and absorbing all the time, from day one, is crucial. Look at what others have done and learn from it.

- Learn to delegate. It's a thin line between letting people do enough to feel they own it, but ensuring they're not doing anything that you wouldn't.



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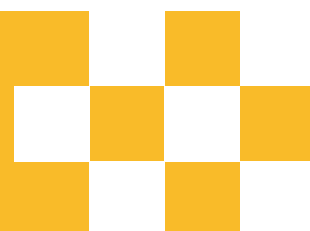
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