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FIRE & ICE

How Williams' warriors are driving the team to the top

PLUS



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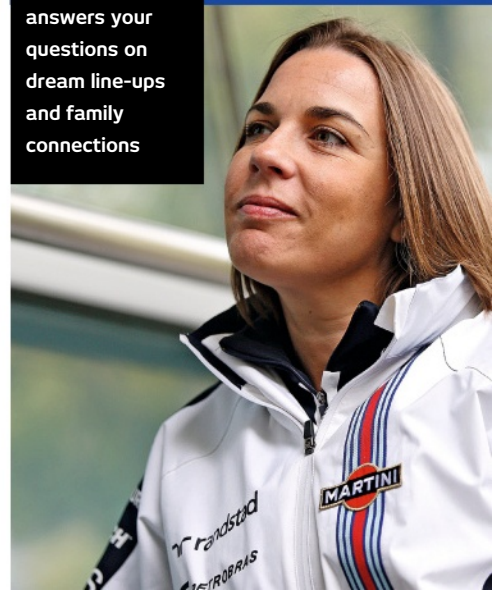
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... WILLIAMS SPECIAL... WILLIAMS SPECIAL... WILLIAMS SPECIAL... WILLIAMS SPECIAL... WILLIAMS SPECIAL... WILLIAMS SPECIAL...



Ignition / Anthony Rowlinson / 06.14

New rules, different game

Have Mercedes changed the F1 game? This is the question

raised by the team's fifth straight win of 2014 and fourth consecutive one-two. So great are the resources being devoted to Mercedes AMG Petronas F1, and so pervasive the inside-out, top-down excellence they are achieving, it feels as if a whole new template for success has been created.

For the past five seasons, starting with Brawn's fairy tale 2009 championship year, the team-plus-supplier model has been the recognised standard: a lean, nimble, well-led and resourced race shop, in charge of chassis and ops, and backed by a punchy engine supplier, has covered every need. Four title doubles for Vettel-Red Bull-Renault, preceded by a one-off double triumph for Button-Brawn-Mercedes were proof positive of that particular concept.

Yet as Mercedes have grown ever stronger since 2012, knitting the Brackley and Brixworth race and engine departments tighter despite 25 miles of separation, the e-generation Silver Arrows have made the old-school approach look, well, rather old-school.

The figures alone are impressive enough: 800 staff are based at Merc's Brackley race HQ; a further 400 at Brixworth. Then there's the technical goldmine of the Merc parent company's R&D muscle being aligned with the F1 team's own technical development programmes. Advice on knotty problems during F1 hybrid development has been, we gather, no more than a phone call away over the past couple of years.

Even more remarkable is the degree of dove-tailing achieved throughout Mercedes' F1 effort. One hand has washed the other during development to produce a holistically integrated racing car, with no one area of performance allowed to take precedence over another.

The groundwork of their success was laid, of course, by the now-departed Ross Brawn who spoke often in a former F1 life of his (hugely successful) efforts as Ferrari technical director to integrate chassis and engine departments. And, my, how Mercedes have run with that ball.

As for the rest... Ferrari, the last team to score four consecutive one-twins, in 2002, were almost two seconds from the Mercedes qualifying pace in Spain and not far off being lapped by their silver rivals. They seem in disarray, for all that they should be equally equipped to adopt a holistic approach to car design. And elsewhere we have no more than a scrap to be best of the rest: defiant Red Bull, still power-shy; plucky Williams, at last on the up; McLaren in flux... With no disrespect to any of these great teams – each of which has enjoyed past periods of prolonged F1 domination – they seem to be playing a different game, as if someone re-wrote the rulebook while they weren't looking.

So let's be grateful Mercedes are letting Lewis and Nico fight. Five races in, they're just three points apart and while Hamilton has won four of five, their on-track tussles are intense and likely to last till season's end.

Quite how anyone can mount a challenge to their dominance in this, or coming years, remains to be seen.



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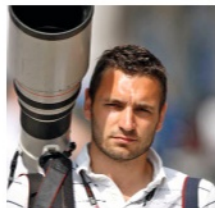
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Contributors



Drew Gibson

Snapper and frustrated Tour de France contender

When he's not crashing his bicycle, Drew shoots fine portrait photography (Martin Donnelly, p92) as well as great action (Bruno Senna, p40)



Maurice Hamilton

Formula 1's pre-eminent genial interviewer

If you're of a nervous disposition, brace yourself for Martin Donnelly recounting the gruesome aftermath of his 1990 crash to Maurice on p92



Adrian Myers

Cover shootist who hotfooted it from the slopes

Fittingly, Adrian was halfway up a mountain in Switzerland when he took our call for this month's 'fire and ice' cover shoot with the Williams racers



Pat Symonds

Our tech guru and Williams chief technical officer

How do engineers unwind after a long day making cars go faster? Pat sits down to write our tech column: learn how fly-by-wire brakes work on p30



Thanks to John Allert, Nicola Armstrong, Matt Bishop, Max Constanduros, Lorenzo Bellanca, Hanspeter Brack, Jenny Brown, Heidi Cohu, Steve Cooper, Didier Coton, Russell Day, James Francis, Oli Francis, Ross Gregory, Alison Hackney, Will Hings, Bradley Lord, Mary Ellen Loscar, Marielouise Mammitzsch, Chris Murray, Sophie Ogg, Fernando Paiva, Anthony Peacock, Sarah Prickett, Paul Stewart and the Brooklands Museum, Lynden Swainston, Nicolas Todt, Fabiana Valenti and Kevin Wood





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Parade

No need to be selfie-effacing If anybody needed reminding of Fernando Alonso's box-office value in Spain, this should jog their memory. Thursday in Barcelona, nothing happening on track, but the fans flock to get a glimpse of just one man. Yup, he's still got it...

Where Circuit de Catalunya, Spain **When** 3.12pm, Thursday 8 May 2014

Photographer Andrew Ferraro/LAT

Details Canon EOS-1DX, 20mm lens, 1/2500th at F3.2







Parade

The reign in Spain Lewis Hamilton begins the Spanish Grand Prix as he means to go on, immediately putting a couple of car lengths on Mercedes team-mate Nico Rosberg as they get away from the grid. Sixty-six laps later, the gap between them will be pretty much the same

Where Circuit de Catalunya **When** 2.03pm, Sunday 11 May 2014

Photographer Steven Tee/LAT

Details Canon EOS-1DX, 200mm lens, 1/40th at F22







Parade

A stampede of bulls Race victories may not be at stake – for now – but Red Bull's pit crew remain among the best in the business. Nimble footwork will help Daniel Ricciardo jump Valtteri Bottas for third place and pave the way for Sebastian Vettel to storm through to fourth from 15th on the grid

Where Circuit de Catalunya, Spain **When** 2.54pm, Sunday 11 May 2014

Photographer Andy Hone/Getty Images

Details Canon EOS-1DX, 30mm lens, 1/500th at F2.8







SEB'S OUT OF SORTS 20



THE DRIVER'S WIFE 24



BRIBERY CASE BEGINS 24

F1 INSIDER

NEWS ■ OPINION ■ ANALYSIS

EXCLUSIVE!

McLaren's plans for 'super-tunnel' revealed

A new windtunnel codenamed 'Project Boreas' could propel McLaren to the front of the Formula 1 grid – if they get permission to build it

McLaren are quietly planning to build a new windtunnel featuring cutting-edge technology as part of their long-term plan to become winners again. *F1 Racing* understands that the windtunnel, which will form part of a larger development on land adjacent to the existing McLaren Technology Centre, could be co-funded by Honda, who are returning to the sport as McLaren's engine partners next year.

But the development plans depend not only on whether Honda decide to invest, but also on gaining permission from local stakeholders to build on the chosen greenfield site – permission that may not be forthcoming.

In 2011, McLaren announced plans for an ambitious new 60,000m² building, to be called the McLaren Applied Technology Centre, which would provide a home for McLaren's rapidly expanding high-tech division – as well as educational outreach facilities for local schools and colleges. Outline planning permission was granted, but the project was put on ice when the local highways authority insisted on a number of tough conditions to mitigate traffic impact, including a strict limit on vehicle movements in to and out of the site. If these exceeded a 'trigger

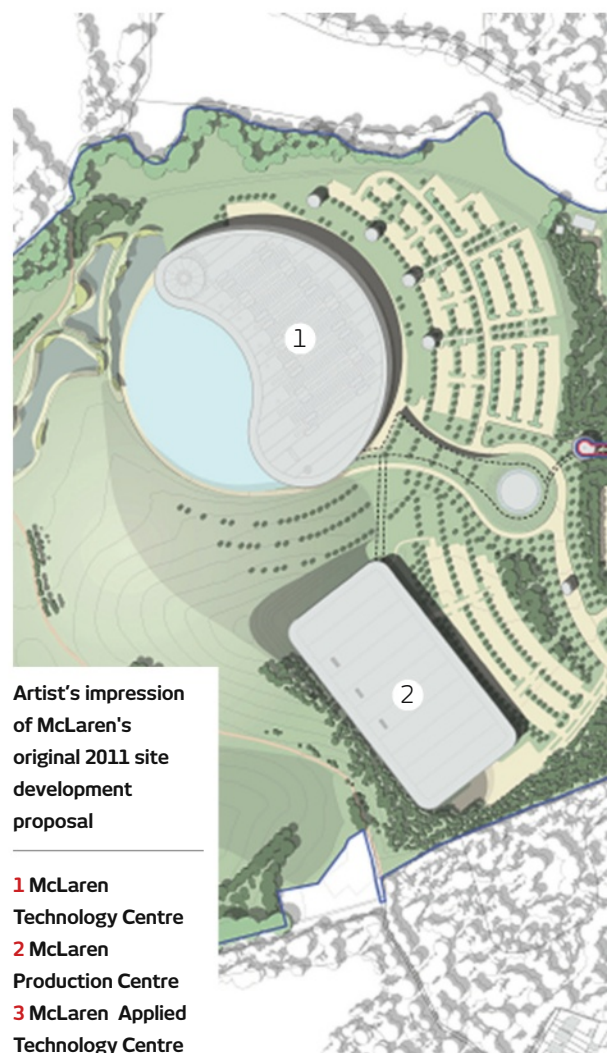
point' of 70 during peak hours, McLaren would have to fund a bus service running between Woking and Chertsey from 6am to 9.30pm daily for a minimum of 20 years.

F1 Racing understands that interim McLaren Racing CEO Jonathan Neale has been charged with thawing out the project and delivering the first phase, which will include the new windtunnel, within three years.

A lack of investment in windtunnel facilities has come home to roost for several Formula 1 teams in recent years since restrictions on aerodynamic research were introduced, first voluntarily as part of the Resource Restriction Agreement, now as an element of the FIA's Sporting Regulations. Model size is capped at 60 per cent and hours of operation are also limited, in addition to the number of runs that can be performed.

Advanced windtunnels offer features such as continuous motion systems, where the angle of the model can be changed during the run without stopping, and particle image velocimetry, where tiny bubbles of oil are released into the tunnel and tracked with a laser. These features yield much more data per run. For this reason, both Ferrari and McLaren have used Toyota's tunnel in Cologne in preference to their own because it features such technology.

The importance of the new tunnel has been made clear in the planning document McLaren's consultants have lodged with the local council. It says: "The facility is critical to the on-going



Artist's impression of McLaren's original 2011 site development proposal

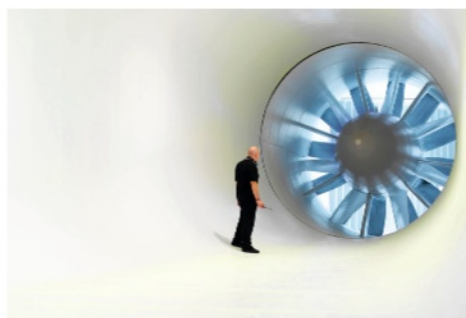
- 1 McLaren Technology Centre
- 2 McLaren Production Centre
- 3 McLaren Applied Technology Centre



Problems for Button in Bahrain (left) were indicative of the investment McLaren urgently need to place in developing new windtunnel facilities

development of the McLaren F1 racing team and it will mark a significant step change for McLaren and their capabilities within Woking.”

The plans reveal the scale and profile of the proposed windtunnel building, which lies at the western wing of what will ultimately become the McLaren Applied Technology Centre, along with a landscaping scheme that will lessen its impact on the environment. It will be connected to the existing MTC by a foot tunnel under the A320, although McLaren boss Ron Dennis is understood to favour a mechanised transport solution that insiders have dubbed the ‘Ronorail’. The windtunnel’s energy consumption will be mitigated by solar panels on the roof and a regenerative braking system on the fan.



A team spokesman told *F1 Racing*: “In order to keep pace with current technology, we are constantly refining the needs of our business.

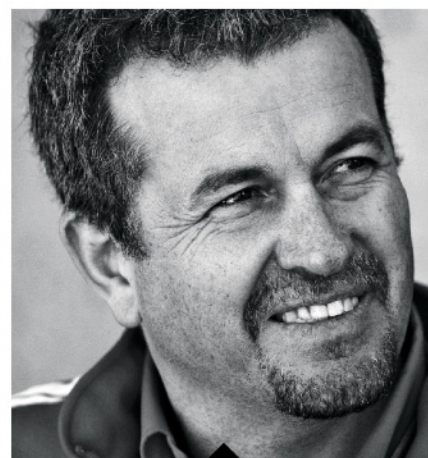
“McLaren is in the final stages of acquiring additional land, the purchase of which will



NEWS DIGEST

The month's big stories at a glance

9.4.14 Red Bull appoint Dan Fallows as new head of aerodynamics **11.4.14** Niki Lauda denounces critics of F1 as “stupid” **14.4.14** Stefano Domenicali steps down as Ferrari team principal **14.4.14** Mercedes announce departure of technical director Bob Bell **19.4.14** Engine manufacturers meet FIA to discuss noise-boosting solutions **20.4.14** Flag error shortens Chinese GP **26.4.14** Simona de Silvestro makes Sauber test debut **30.4.14** Azerbaijan claims to have struck deal to host 2016 European Grand Prix



2.5.14 Nigel Stepney (formerly of Ferrari) killed in traffic accident

6.5.14 Former Williams team manager Dickie Stanford gets Heritage role

be completed by the summer. The planning permission you refer to is the first stage in a series of phased future development plans.

“As with any large project planned far in advance, these plans will be subject to change and modification as we progress over the next two to three years. We continue to work with the local planning authority and all interested parties to ensure that our ongoing positive relationship with the local area continues.”

F1 Racing understands the windtunnel will be discussed by Honda’s board and a decision on whether to invest in it will be taken by July. If the project goes ahead, it could be operational by 2017. McLaren’s nearby road-car production facility took less than two years to build, despite one of the UK’s most severe winters on record.

What's eating Sebastian Vettel?

Absence of exhaust-boosted aerodynamics is thought to be the cause of the world champion's struggle for pace

Sebastian Vettel has known for some time that he would face a difficult start to the season. Engine partner Renault's lack of competitiveness was well known to Red Bull back in December, and pre-season testing was a disaster.

But what Vettel will not have been prepared for is to be under such pressure from his new team-mate. Daniel Ricciardo has impressed from the off, with P2 in both qualifying and the race at the season-opener in Australia, even though he was subsequently disqualified.

Vettel suffered technical problems in qualifying in Melbourne and retired early in the race and was the faster Red Bull driver in Malaysia. But in Bahrain and China he was beaten hands down by Ricciardo – and had to suffer the ignominy of being asked by his team to let the Australian past in both races.

Vettel is clearly not enjoying the situation, and he and Red Bull seem baffled by it. He admitted he is not happy with the car's setup and team principal Christian Horner said: "He's struggling and it's hard to explain why."

Vettel has certainly had some issues with reliability and, according to Horner, has borne the brunt of the issues with Renault's energy recovery system. Even so, in

Vettel exploited to such great effect in his four title-winning seasons, especially from 2011. Red Bull were better at this than anyone else, and Vettel was able to adapt his driving style to get the best from it in a way Mark Webber could not.

It is fair to say that while Vettel is clearly gifted, he was never as good when he did not have this technology. When the Red Bull was just a very good 'normal' car, as it was through most of 2010, or the first half of 2012, he and Webber were much more evenly matched. And even with exhaust-blown diffusers, Vettel's advantage over Webber was only ever in the slow corners. To the end of his career, Webber was better than Vettel in fast parts, as a glance at the sector two times from Austin last year demonstrates.

This year, the Red Bull is once again a very good 'normal' car – and Ricciardo is proving a match for his team-mate. Vettel and Red Bull are even aware of this themselves. Vettel has talked in the past of needing to have the car a certain way to perform his "tricks".

Motorsport boss Helmut Marko said after the 2012 finale, referring back to their early-season struggles to get the exhaust blowing working again: "I told my people, 'Boys, there is no need for Vettel if we can't give him the car he needs in order for his skills to shine.'"

This year, there is no prospect of finding a new way of doing this. What that means for Vettel remains to be seen.



In both Bahrain and China, Red Bull's Daniel Ricciardo outperformed his four-time champion team-mate Sebastian Vettel

China and Bahrain, he was just plain beaten.

A likely explanation for this is the absence of exhaust-influenced rear aerodynamics, which

QUIZ



F1 Mastermind

Your chosen specialised subject: the world's greatest sport



- Q1** In which year did Graham Hill claim the first of his five Monaco Grand Prix wins?
- Q2** Who won the Monaco GP for Ferrari and for Cooper in the 1950s?
- Q3** Bruce Kessler and Paul Emery qualified their Connaughts at Monaco in 1958 but the third car didn't make it. Who was driving it?
- Q4** Which team made their debut at Monaco in 1958 with Graham Hill and Cliff Allison driving?
- Q5** Which Tyrrell driver set the fastest lap in Canada in 1989?

- Q6** James Hunt offended BBC viewers during the 1989 Monaco GP by offering a very forthright opinion on which Ligier driver's excuse for going slowly?
- Q7** Which driver clinched his first pole position and race victory at Monaco in 2004?
- Q8** Al Pease, who died last month, finished the 1967 Canadian Grand Prix 43 laps down. What make of car was he driving?

- Q9** Mosport Park, the former home of the Canadian Grand Prix, features a corner whose layout was suggested by an eminent Formula 1 driver and which still bears his name. Who is he?
- Q10** In which year did the Canadian GP officially last more than four hours, due to bad weather?
- Q11** Andrea de Cesaris started his 200th grand prix, in Montréal in which year?

- Q12** Which driver was fatally injured in a start-line accident at Montréal in 1982?
- Q13** Which fan favourite took his first and only grand prix win at Montréal in 1995?
- Q14** Peter Revson claimed which manufacturer's first pole position at Mosport Park in 1972?
- Q15** In which year was Montréal dropped from the F1 calendar due to a lack of funding?

Answers: Q1 1963 Q2 Maurice Trintignant Q3 Bernie Ecclestone Q4 Lotus Q5 Jonathan Palmer Q6 René Arnoux Q7 Jarno Trulli Q8 Eagle Q9 Stirling Moss Q10 2011 Q11 1994 Q12 Riccardo Paletti Q13 Jean Alesi Q14 McLaren Q15 2009



Ferrari in flux as Domenicali quits

New boss but no quick fixes for ailing team

Ferrari's struggle to reclaim their position at the pinnacle of Formula 1 has led to seismic changes at the very top of the organisation.

Stefano Domenicali resigned in the wake of the team's disappointing performance in Bahrain, where Fernando Alonso and Kimi Räikkönen could manage only ninth and tenth places respectively. He has been replaced by Marco Mattiacci, the former head of Ferrari's road-car operations in North America.

Ferrari president Luca Di Montezemolo has also made it clear he will have a closer involvement in operations at the F1 team. *F1 Racing* understands that both Ross Brawn and Flavio Briatore made it known to Ferrari in the days following Domenicali's resignation that they were available should the Scuderia be interested in taking on either of them as a replacement. Brawn has also been seen visiting Maranello.

But parent company Fiat wanted to put their own man in charge. Mattiacci is a friend of John Elkann, the highly rated president of Fiat and grandson of its iconic former boss Gianni Agnelli. Fiat CEO, Sergio Marchionne, who is credited with turning around the company's fortunes in recent years, is also a supporter.

Mattiacci has said that when he received the call from Di Montezemolo, at 5.58am at his home in New York on the Friday after Bahrain, offering him the job, he had initially thought he was joking.

He has spoken of his "humility" and determination to "work very hard". As for his lack of experience, Mattiacci said: "Sometimes you can bring a new perspective." He also admitted: "I need to prove I have the level of Ferrari and F1."

Mattiacci has two fundamental tasks – to work out what is missing at Ferrari and to build a relationship with their biggest

Marco Mattiacci will have his work cut out as Ferrari's new team principal

single asset, Fernando Alonso. Neither task will be easy, and the change of team principal only increases the uncertainty at what was already a time of flux at Ferrari, with James Allison less than a year into his role as technical director.

Keeping Alonso – now four frustrating years into his Ferrari career – on board during that period will be critical. Alonso has demonstrated once again just how much he gives to Ferrari, by completely overshadowing new team-mate Kimi Räikkönen in the first four races.

It is no secret that the relationship between Alonso and Ferrari has hit a rocky patch. Di Montezemolo publicly admonished Alonso last summer, in the wake of his criticisms of the car and his dalliances with Red Bull, but it is believed that the relationship between Alonso and Domenicali had also taken a dive.

There has been speculation that Domenicali was effectively sacked, but in fact he did actually resign. It seems he had had enough of Di Montezemolo's interference, and the president's stance on the new rules, which he had initially backed. Tired of it all, Domenicali wanted to stop, and decided to jump before he received the push he was expecting.

On the surface, his departure has only strengthened Di Montezemolo's position as overlord of the team. But the team principal now has a hotline to the very top of Fiat. Can the two work together to increase Ferrari's competitiveness? Or will Ferrari be consumed by internal politics? At Maranello, these are uncertain times.



YOUNG GUNS



Simona de Silvestro



Finding the stars of tomorrow, today

Simona de Silvestro is 25. She was born in Thun, Switzerland and is the Sauber F1 team's 'affiliated driver' this year

Who is she?

Having started out in single-seaters in Formula Renault aged 16, Simona has been racing in the USA since 2006. She finished third in the Atlantic Championship in 2009, taking four wins, then moved up to IndyCar. She was named Rookie Of The Year at the 2010 Indy 500, where she finished 14th.

What's an 'affiliated driver'?

Sauber's intention is to put Simona through a track testing and simulator programme in 2014 with a view to her getting a superlicence to race in F1 with the team next year.

How good is she?

Much better than her results suggest. She impressed in a GP2 test in 2007 but decided to stay in the US. In 2010 she suffered burns in an accident at Texas Motor Speedway – one of the fastest tracks in Indycar – then in 2011 a car failure in practice for the Indy 500 put her into the wall. She suffered second-degree burns, but still qualified the spare car 24th. Last year she claimed a podium finish and showed she could mix it with the frontrunners.

Has she driven an F1 car yet?

Yes, in a 2012 Sauber C31 at Fiorano. "It was as good a start in an F1 car as you could hope for," said engineer Paul Russell. She'll be behind the wheel again at Valencia in June.

Will we see her in F1?

Possibly, but by not competing in Formula Renault 3.5 or GP2, she's missed out on vital experience in skills such as tyre management. That said, she is brave and determined. Sponsorship may ultimately be the deciding factor.

AERO WARS


PHOTOS: STEVEN TEE/LAT; ALASTAIR STALEY/LAT

McLaren and Red Bull in staff contract wrangle

Office politics thought to be behind aero chief Dan Fallows' decision to abandon McLaren move for a return to Red Bull

Red Bull and McLaren are locked in a bitter legal dispute over the future of senior aerodynamicist Dan Fallows.

Fallows had signed a contract to join McLaren, and he was announced as a high-profile new acquisition at their car launch in January. He then returned to work for Red Bull, causing McLaren to threaten Red Bull with legal action. There was also a public exchange of insults between Red Bull team principal Christian Horner and McLaren chairman Ron Dennis over the Chinese Grand Prix weekend.

Dennis questioned Red Bull's morality, while Horner hit back with a reference to McLaren's poor early-season form, saying: "It's obvious why they are looking for aerodynamicists."

Fallows' about-turn is rooted in McLaren's recruitment of another leading Red Bull figure, Peter Prodromou. Fallows signed his contract to join McLaren in September, and the following month it emerged that McLaren had also signed Prodromou, Red Bull design

chief Adrian Newey's long-time number two – and Fallows' former boss.

F1 Racing has learned that Fallows feels unable to work with Prodromou, with whom he does not get on. So when Fallows discovered that Prodromou was also moving to McLaren (in the midst of the upheaval over the axing of McLaren team principal Martin Whitmarsh, who had recruited Fallows). Fallows approached Red Bull about rejoining them. They rated him highly, so offered him Prodromou's old job title – head of aerodynamics – and a significant pay rise.

McLaren have virtually no prospect of winning a case against Red Bull, since it is illegal to try to force someone to work for a company if they do not want to. And in order to receive any compensation, McLaren will have to prove damages – which would be very difficult in this particular situation.

Aware of this reality, McLaren racing director Eric Boullier has secured Guillaume Cattelani from his former team Lotus to boost the aerodynamic department as part of a wider plan to strengthen the team's performance. And *F1 Racing* understands that Cattelani was initially recommended by none other than Dan Fallows.

"People being induced to break contracts is just wrong" *Dennis*



"I don't think anybody can be forced to do a job against their will" *Horner*


F1 BANTER

PASSNOTES

Your essential F1 briefing
#3: Spectacle



Name Spectacle
Age Long dead, according to the commentariat
Appearance Nebulous concept recognised only when seen

I know this joke: "No, nurse! I said 'Slip off his spectacles!'"

Not quite. The great and the good of F1 are poking their heads over the parapet to say we need to do something to "improve the spectacle" for trackside fans and those watching on TV.

The racing's not good enough for them, then?

What are they after – jugglers? A lion tamer?

Swapping sides at half time? The world championship to be decided by a bake-off?

Actually, a bake-off would probably be less unpopular than the double-points rule, but that's not important right now. We're talking about spectacle. Noise! Vapour trails! Sparks!

Oh, I love Sparks too, but it's been a long time since 'This Town Ain't Big Enough For The Both Of Us'. Have they had any hits recently?

That's also by-the-by. What we've got on our hands is a random selection of bolt-on ideas to gussy up the racing a little bit. It all kicked off with complaints that the engines are too quiet.

What are they going to do about it – fit some Cherry Bomb exhausts?

Not far off. People are talking about the 'good old days' when the cars kicked up sparks off their titanium skid plates and left vapour trails.

You know, I don't mind things being a little bit quieter. Now I can tell which Red Bull is Seb Vettel's because I can still hear the whine when they turn off the engine...

Very droll. But since noise is a form of energy, making the engines noisier would contradict the point of making them more efficient. The reason they're so quiet is that more of their energy is being used to make them go faster.

What... so if they were artificially made noisier, they'd then actually have to race at lower speeds in order to last the distance with the regulated amount of fuel?

Correct.

I bet nobody's thought of that.

Do say: Hand me the vapours.

Don't say: That idea is spectacle-larly bad.

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Model Shown: Civic 1.6 i-DTEC SR Manual in Milano Red Non-Metallic at £24,360 On The Road. **Terms and Conditions:** New retail Civic 1.6 i-DTEC SR Manual registered from 2 January 2014 to 30 June 2014. Subject to model and colour availability. Offers applicable at participating dealers and are at the promoter's absolute discretion. **The 5 Year Care Package includes:** **Servicing:** All scheduled servicing, as detailed in the vehicles service book, will be covered for 5 years or 62,500 miles, whichever comes first. **Warranty:** In addition to the standard 3 year warranty the customer will receive a complimentary 2 year extended guarantee taking the warranty to 5 years or 90,000 miles, whichever comes first. **Roadside Assist:** In addition to the standard 3 years roadside assistance package the customer will receive complimentary Hondacare Assistance for a further 2 years, taking it to 5 years or 90,000 miles, whichever comes first. **The 5 Year Care Package:** The 5 Year Care Package is optional. It is being offered for £500 including VAT (usual value £1,845 including VAT) and is available to finance or non-finance customers. Please note, should you sell the vehicle during the period of cover, the package remains with the vehicle.



**SERVICING
WARRANTY
ROADSIDE ASSIST**

COLUMN


THE DRIVER'S WIFE

I have a love rival: Scott

I am **Adriana Oliveira**, in fact I don't even have to use my surname, I am known throughout the world as just Adriana. How many women can say *that*? Although quite frankly that should be enough, I am one of the longest standing Victoria's Secret Angels (I started when I was extremely young) and have been voted the World's Sexiest Woman four times. FOUR times. So tell me, how the hell did I, international sex goddess, end up in competition with a bloody bike?

His manager always says to me, "Adriana, we [he says that when he means me] have to try to keep his environment as tranquil as possible over a race weekend." That's British for "Leave him alone and don't stress him out." So I do as I'm told, I'm not a total egotistical bitch, but after the race weekend, that means it's all about me and ONLY me.

But still I'm supposed to share him with his manager, physio, trainer and press officer; with the team boss, engineers, mechanics, marketing; with sponsors, media and fans. And that was in life B.S. (Before Scott). Scott is worse than all the others put together because he's taking over his soul.

What about me? I have needs too. What's the point of having this face and this body if nobody's looking?

To him I am 'Adri' whereas the bike is 'My Scott'. "Have you seen the new aero bars on my Scott, Adri?" "I can't go out now, I have to install the ceramic bearings on my Scott." No one is allowed in our apartment without removing their shoes and being forcibly encouraged to wash their hands. But the bloody mud-spattered bike is wheeled into the sitting room, where it is lovingly cleaned with baby wipes. I swear I hear it taunting me: *We've scaled mountains together: don't even try to understand.*

So somehow I found myself pulling out all my best moves to compete against a piece of metal ("Oh, it's carbon fibre, Adri baby"). I lit some candles, put on the ultra-sexy babydoll I borrowed from the last shoot and struck a pose on the bed. Forty-five minutes I waited like that until I got a stiff back and a sore throat from sighing. I stomped around the apartment, finally tracking him down in the bathroom, where he's naked on the scales holding the bloody bike. "Look, Adri, it's 300 grams lighter with the carbon rims!"

The next morning when I wake up yet again to an empty bed, I decide enough is enough. Apart from everything else, no man should be so proud of displaying his assets in skin-tight lycra.

So to all of you early risers in Monaco, sneaking out in rainbow-coloured leotards, I'm on to your two-wheeled cult and I'm staging an Adri-intervention.

I've got a Vuitton hold-all full of tacks and I *will* use it. God bless you (unless you are a cyclist).

Beijos, Adriana

NEWS

Ecclestone trial begins in Germany

Bribery case finally gets under way – but no verdict is expected until later on this year

Formula 1 faces a long, stuttering summer, waiting to discover if Bernie Ecclestone's 40-year stewardship of the sport is about to come to an end. The 83-year-old's trial in Germany on bribery charges began on 24 April, and will run through the summer, with a verdict expected later this year.

Ecclestone was present at the first day of the trial, and is one of 39 people expected to give evidence. Among the others will be Gerhard Gribkowsky, the German banker serving an eight-and-half year jail sentence for accepting a £27.5m payment from Ecclestone.

In a witness statement read out by his lawyer, Ecclestone denied bribery, insisting – as he always has – that his intention was to stop Gribkowsky carrying out a threat to report him to the UK tax authorities. Ecclestone says Gribkowsky threatened to allege that the F1 impresario controlled

an offshore trust called Bambino, which is central to the billionaire's labyrinthine financial arrangements for the sport.

If Ecclestone *did* control Bambino – which he denies – he would be liable for billions of pounds in tax. Ecclestone's counsel said he was threatened by Gribkowsky, adding: "People may ask how can it be that Bernie Ecclestone can be put under pressure. Yes, it's possible if you know where to apply pressure – and Gerhard Gribkowsky knew how to."

Despite the seriousness of the charges, and Ecclestone's position, there were moments of levity. Asked if he was married or divorced, Ecclestone replied: "Both. I like to remember the divorce part."

The first witnesses in the trial are due to give evidence after *F1 Racing* goes to press. CVC, the main shareholders in F1, say they will sack Ecclestone if he is convicted of criminal wrongdoing.

Ecclestone, pictured with his defence counsel Sven Thomas, at the start of his trial in Munich



PHOTO: WILLI SCHNEIDER/REX



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Could the US GP in Austin be graced by the presence of its first US-based team in 2015?

NEWS

New American team granted 2015 F1 entry

FIA accepts US entry from NASCAR magnate, but sceptics question team's ability to compete effectively

NASCAR team boss Gene Haas has won FIA backing in his attempt to run an American team in F1. Four years after the failure of the ill-fated US F1 project, which collapsed before making it to the grid in 2010, F1's governing body has accepted an entry from Haas for 2015.

Haas plans to base the team in Kannapolis North Carolina, not far from Charlotte, where US F1 was based. His machine-tools company has an office in Brussels but this may not be used.

"Ideally," he said, "the main office for F1 would be here in Kannapolis, and there would maybe be a smaller office somewhere in either Germany or Italy for the assembly and disassembly of cars."

Haas insists he can make the project work, and is planning a technical partnership with Italian race-car constructor Dallara.

Gene Haas has enjoyed success in NASCAR and now seeks to expand into Formula 1

"We're new to this," he said. "There is going to be a big learning curve, and to sit there and say we can understand what's going on with these cars within a year or two is not reasonable."

"It's going to take us a while to learn, and we'll lean heavily on a technical partner to help us."

Former F1 and NASCAR driver Juan Pablo Montoya has said the plan is "completely mad", but Haas insists it is possible.

"Haas Automation builds machine tools in California, the most expensive state in the Union as far as taxes go. We're doing it in a place where nobody thinks you can build machine tools efficiently, yet we do that."

"We have set a precedent in terms of making a good product at a reasonable price, and I would hope, going forward, we can put those same parameters to work in Formula 1."

"Lots of people say that it can't be done but, like I say, we do things that other people say can't be done all the time, so we're not afraid of that. That's something that I'm looking forward to. It's one of the challenges presented by trying to run an elite racing team without spending billions of dollars."





Red Bull lose Ricciardo appeal

FIA stand firm on fuel-flow issue. So were Red Bull appealing the unappealable?

Red Bull have failed in their attempt to overturn Daniel Ricciardo's disqualification from the Australian GP. The team's argument that they were correct to ignore the FIA's demands to turn down their engine because it exceeded fuel-flow limits, were rejected by the International Court of Appeal in Paris. Red Bull said they had made the decision because the sensor was giving an erroneously high reading.

Team principal Christian Horner insisted before the hearing that the team had a "strong case". His arguments were based on claims that the rules did not explicitly state that the official sensor was the mandatory way of measuring the fuel-flow rate, that the sensor was not up to the job, and that Red Bull's own measurement of the rate was more accurate.

But it was made abundantly clear that the appeal court gave no weight to Red Bull's arguments. The key clause in their findings read: "The court finds that the appellant did not prove that its fuel-flow model estimates the fuel flow (very) accurately and/or more accurately than the FFM sensor 73 and does not find any element in the present case that could prove that the appellant's car did not exceed the fuel mass flow limit."

There was widespread criticism of Red Bull's stance on the issue, which was perceived by some to be arrogance in the face of the governing body. One very experienced and enormously successful engineering leader said he was "very, very surprised at the position Red Bull took," describing it as "stupid".

"They're saying," he added, "we're not going to take any notice of the umpire because we know better and if we think he's wrong we'll tell our batsman to stay at the crease."

"The FIA stated absolutely clearly that they were not going to transfer to the back-up using the team's engine measurement of injector pulse length and whatever unless they decided that the fuel-flow meter was out. They made it clear that they would be the only people who could say to the team, 'You may use your own measurement control and not our fuel-flow meter.'"

"I'm just surprised Red Bull chose to waste their money on this."

F1 STUFF



GRAHAM CHRONOFIGHTER OVERSIZE SUPERLIGHT CARBON

If you worship at the temple of the oversize watch, here's the ultimate: with a nanotube carbon case, this shockproof timepiece (£6,970) weighs just 100g. www.graham1695.com

DOM REILLY WATCH ROLL

Keep those valuable watches scratch-free with this premium leather case (£475), one of a limited edition of just 20. It's inlaid with genuine Williams gear clusters and uses the same padding as F1 cockpits. www.domreilly.com



EXHAUST TAILPIPE LAMP

Honda F1 exhaust pipes from the 2000s have been polished and repurposed as space-age LED lamps (£1099). Each comes with a certificate of authenticity, but be quick – it's a limited edition of just six lamps. www.mementoexclusives.com

SPEEDWAY T-SHIRT

This month we remember the 11 Indy 500s that counted towards the F1 world drivers' championship (p106). Wear your own tribute to Indy with this T-shirt, featuring a stylised version of the famous oval (£25). <http://www.t-lab.eu/>





Nico and Lewis can continue to fight each other, provided their rivals don't get too close



NEWS

Mercedes may have to impose team orders

Lewis Hamilton and Nico Rosberg will still be allowed to race one another – until the other teams start to catch up

Mercedes have admitted that they may have to review their policy of allowing Lewis Hamilton and Nico Rosberg to race freely if it begins to affect the team's advantage over the opposition. The team are determined to stick with the approach as far as is possible, seeing the huge marketing benefits in allowing their drivers to slug it out on the track. Mercedes were widely praised for not interfering in the scintillating battle between their drivers in Bahrain.

But while Mercedes do not care which of their drivers wins the title, it is critical that one of them does, and they are determined to ensure that happens. Executive director (business) Toto Wolff said: "Bahrain was a very particular situation because our package worked very well there and we had quite a competitive advantage,

so it's easier to take a decision for the sake of racing because you know you have quite a margin to the guy in third place.

"The more narrow that margin becomes, the more you have to look out, and our rule is that the competition is enemy number one, not your team-mate. So there may be situations in the race where you have to consider that, and you can't lose time in battle if you have your enemy on your back, but we'll see what happens."

Executive director (technical) Paddy Lowe, meanwhile, has admitted that Mercedes' advantage is big enough to last for "a few races", but the team are wary of the ability of Red Bull and Ferrari to catch up.

"We cannot stand still," said Lewis Hamilton. "We have to keep improving and I'm sure we will."

NEWS IN BRIEF



ROSSI HANDED FP1 OUTINGS IN CANADA AND USA

Caterham test driver Alexander Rossi (above) will drive in FP1 in Montréal and Austin. "We're pleased to give him opportunities to play an active role," said team principal Cyril Abiteboul.

CENTRE ACCESS RESTORED AT SILVERSTONE

Visitors to the British GP can access the centre of the track – including the viewpoint on the inside of Copse corner – for the first time since 2003. Tickets go on sale on 27 May.

DI MONTEZEMOLO: FERRARI WERE CHASING SENNA DEAL

Ferrari president Luca Di Montezemolo has claimed he had been in talks with Ayrton Senna about a move to Ferrari before the Brazilian's death in 1994. "We were both in agreement that Ferrari would be the ideal place for him to further his career," he said.

LONG BEACH 'NOT FIT' FOR F1

Last month, we revealed plans to bring F1 back to Long Beach in California, but former driver Justin Wilson – now racing in IndyCar – believes the track would be too bumpy. "An F1 car won't go around there," he said.

WILLIAMS CREATE HISTORIC DIVISION

A new division dedicated to the team's historic cars, Williams Heritage, will be run by former team manager Dickie Stanford.

SMITH LEAVES CATERHAM

Technical director Mark Smith has departed Caterham and will not be replaced. The team have announced that a management reshuffle will be taking place.

PHOTOS: STEVE ETHERINGTON/LAT; SAM BLOXHAM/LAT; GLENN DUNBAR/LAT

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Model shown Clio Dynamique S MediaNav with optional Flame Red metallic paint. The official consumption figures in mpg (l/100km) for the Renault Clio core range are: Urban 40.4 (7.0) – 78.5 (3.6); Extra Urban 60.1 (4.7) – 94.2 (3.0); Combined 51.4 (5.5) – 88.3 (3.2). The official CO₂ emissions for the range are 127-83g/km. EU Directive and Regulation 692/2008 test environment figures. Fuel consumption and CO₂ may vary according to driving styles, road conditions and other factors.





Pat Symonds explains THE SCIENCE BEHIND... **FLY-BY-WIRE BRAKES**

F1 TECH

We've heard the expressions 'fly by wire', 'drive by wire' and now 'brake by wire'. Generically, what do they mean?

The use of the term 'by wire' generally means that an actuator, be it on the ailerons of an aircraft, the throttle of a car, or, in this case, the brakes, is actuated by a device that is under the control of a computer.

Drive-by-wire throttles have been with us for many years and are an easy way of explaining the technology. In this example, a potentiometer is connected to the throttle pedal. The potentiometer is a simple electrical sensor that measures the exact position of the pedal. This position is fed to the computer in the ECU, which calculates what torque the driver is demanding with the pedal and provides it in the best possible way. Of course, the primary means will be to open the engine throttles, and this is done by an actuator, which may be electrically or electro-hydraulically driven. The electrical wiring connection between the pedal and the ECU and that between the ECU and the actuator gives rise to the expression 'drive by wire'.

Aren't electronic systems inherently more unreliable than mechanical systems?

No. They may be more complex and therefore have more potential points of failure, but they are actually more reliable in the long term.

They also allow for smarter control. With an old-fashioned throttle cable, the position of the throttle was determined by the position of the driver's foot. With modern systems this can be overridden during, for example, a gear shift. In terms of reliability, if a cable broke, the car stopped. With electronic systems, an element of redundancy can be easily built in by having two tracks on the potentiometer. Software then automatically detects if one fails and switches to the second with no loss of performance.

Why has 'brake by wire' come in for 2014?

The 2014 powertrains' complex hybrid systems rely heavily on energy recovery through braking. Essentially, an electric motor and an electric

generator are the same thing. If the armature of an electric motor is turned, it produces electricity; if electricity is applied to the armature, it will rotate. This principle is what the energy recovery and energy release of a hybrid vehicle is all about. However, the recovery of kinetic energy and conversion to electrical energy doesn't come for free. As a generator produces electricity it produces a drag that acts like the brakes on the car. If this drag were constant then there would be no problem, but the electricity produced by the generator is stored in a battery.

This battery must not be overcharged, so as the battery reaches full charge, the generator is shut down. Since this is indirectly connected to the rear wheels it has a major effect on the braking capability of the rear axle. In addition, there is a hard limit as to how much energy can be recovered by the system and when this limit is reached then the recovery is also switched off.

The brake-by-wire system is designed to ensure that, as the electrical energy recovery is switched in and out, the apportioning of braking energy between the electrical 'brake' and the hydraulic brake is managed in a way that does not disturb the car or driver.

Why wasn't this necessary with last year's kinetic recovery system (KERS)?

It would have helped last year, but since the 2013 KERS was only 60kW, it was not powerful enough to cause major problems. For 2014 this power was increased to 120kW, which represents a significant amount of braking power.

So how does the new system work?

It is a complex system but, in essence, the pressure in the front brakes is controlled entirely hydraulically in response to the driver's pressure on the brake pedal, while the rear brake pressure can be modified by the control system to achieve a constant brake balance irrespective of the state of the rear-axle energy recovery system. Safety is always paramount, and even though the rear brakes are subject to electronic control, they always have a direct hydraulic connection so they

will always slow the car even in the event of a failure of the electronics.

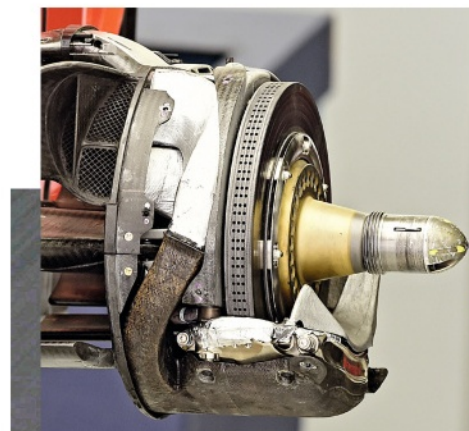
As the energy recovery system switches on to recover energy, the brake-by-wire system will decrease the pressure in the rear brakes and, as the recovery system switches off, the brake-by-wire will allow the full hydraulic pressure to be applied to the rear wheels.

Are there changes to the brake system itself?

Yes. Since the energy recovery system is doing so much more of the work of braking, it has been possible to fit smaller rear brakes. The large six-piston rear callipers that were ubiquitous in previous years have now been replaced by small four-piston callipers. In addition, the complex mechanical systems that used to be employed to shape the brake balance curve as a function of brake pressure have now been replaced with much more simple electronic mapping.

How does the brake-by-wire system affect the feel of the brakes?

The simple answer is that if it is working perfectly, the driver should feel nothing as the control switches in and out. In fact, the system should improve stability under braking and a



pleasant by-product of the layout is that the brake pedal now has much greater stiffness, because it is not exposed to the compliance of the rear brake lines. **F1**



Brake-by-wire manages the brake effort of the rear wheels and compensates for extra drag caused by the recovery systems as they harvest energy. Some drivers, such as Kimi Räikkönen (pictured) are reportedly struggling to get to grips with it



PETER WINDSOR

RACER'S EDGE

Authority, wit and intelligence
from the voice of *F1 Racing*

Standing on the outside of Tabac, on Monaco Saturday in 1984, I watched the marshals waving their arms and the crowd growing restless in the grandstands as they awaited the start of practice. I was there to watch Alain Prost, Niki Lauda, the new Toleman driver, Ayrton Senna, and my friend Nigel Mansell. I'd watch them approach from the chicane, note the turn-in phases – then walk towards the swimming pool.

The turbos had the power, of course. Up the hill to Casino and through the tunnel, a DFV engine couldn't compete. On the other hand, you had guys like Stefan Bellof, Martin Brundle and Marc Surer throwing their Tyrrells and Arrows around in ways you seldom see.

Ayrton was exquisitely precise, skimming the Toleman flush with the guardrail. So was Nigel in the Lotus-Renault – an on-rails flash of black-and-gold that was a counterpoint to the power-sliding brio of Elio de Angelis. There was no question of Ayrton or Nigel seeing the Tabac apex and *then* squeezing-in the power: the commitment began with the first, almost imperceptible, movement of steering.

Martin Brundle was breathtaking. Stefan Bellof was a Ronnie Peterson of a driver; Martin, under pressure, lost none of his Piquet-

Let's set the record straight about Tyrrell

polish. He approached Tabac via a clean exit from the chicane. He braked less on this lap. The Tyrrell looked fast and nimble.

He edged into the apex. The Tyrrell seemed able to take the load... until the back broke away. There was a spectre of opposite lock, then *whack!* – the back of the car thumped against the Armco. I ducked. Marshals ran. The crowd erupted.

I looked up seconds later. The barrier had eaten the car's front and rear outside wheels. The Tyrrell had skated along the track on its side. I could see Martin's arm hanging out of the cockpit. He wasn't moving. Marshals waved flags. Practice ground to a halt. Sirens drowned the bubbling French commentary. I was by the car. Still no movement from Martin.

Suddenly, he shook his head. The marshals lifted the car back into a horizontal position and I could see then that Martin's arm had been saved only by the car having rested during its skate on its exhaust manifold.

He unclipped his belts and the marshals lifted him from the car. Then he *ran* back to the Tyrrell pit, still wearing his helmet. It was only when Ken Tyrrell asked him what had happened that Martin realised he didn't even know how he'd got back to the pit. Driving the spare car then was out of the question.

Stefan alone of the Cosworth runners made the cut. He would drive from the back of the grid to finish third behind Prost and Senna. He was up there with the best.

That was the start of it. Photos were snapped of the Tyrrell all akimbo with two slots evident in the middle of the chassis. Technically, these infringed the flat-bottom chassis regulations. But as Tyrrell pointed out, they were just breathers for the car's water tank (used in those days as injection-cooling for the engine, but in reality to load the car over the weight limit in a quick top-up in the closing phase of the race), nothing more was said.



"Balestre didn't like Tyrrell because they were Cosworth, English and anti-establishment"



Team owner Ken Tyrrell (above and above right) fought hard to prove his innocence after Martin Brundle's terrifying crash at the 1984 Monaco GP (below) revealed holes in the Tyrrell's chassis that the FIA insisted were evidence of the use of illegal fuel additives



At the Detroit GP, three weeks later, Brundle's Tyrrell was found, during a water-sample check, to have a contamination level of *0.0005 per cent*. Within hours, FIA president, Jean-Marie Balestre, said Tyrrell had been running nitro-methane in the water tank, injecting it into the engine then draining the tank late in the race through one of the floor holes discovered after the Monaco shunt.

Ken Tyrrell, flabbergasted, argued that the team had used impure water in Detroit rather than clinically filtered water. He conceded he had been adding lead shot to the water but that this was "fixed" to the car – and so legal – in the sense that it still required tools to remove.


The FIA was insistent. Tyrrell would be disqualified from the 1984 world championship and lose all their travel and prize money concessions. Ken Tyrrell appealed.

It is a great shame, I think, that his appeal was not upheld. Evidence from the SCCA (Sports Car Club of America, which ran the Detroit GP) was discarded. Had the Appeal Court listened to the SCCA's John Tomanis, they would have heard that hydrocarbons in the tank were limited to less than 0.0005 per cent. The FIA, prior to the hearing, stated that *up to 27 per cent* of the water had been contaminated. Tomanis was then banned from communicating with the press or Tyrrell. "I'm at a total loss to explain," said Tyrrell afterwards. "I've been stitched up..."

We all knew what had happened. Only Tyrrell and Arrows ran Cosworth DFVs in 1984. The turbo teams wanted to fight the FIA's new 220-litre fuel tank limit for 1985. In a vote that required unanimous agreement (or disagreement), Ken stood his ground.


It was F1's perfect storm. Balestre didn't like Tyrrell because they were Cosworth, English and to his mind anti-establishment. The other teams didn't like Tyrrell because he wouldn't vote against the 220-litre fuel limit. Ken was therefore hung out to dry. He didn't run fuel additives; and his cars were as legal, in a clever F1 sense, as any others at the time.

Thirty years later it's time, I think, to undo the damage. Someone should apologise to the Tyrrell family and F1 in general ought to remember the part played by Ken in the good years and the bad. After the 1984 lunacy, Ken kept on fighting, for that was his way. The permanent damage, though, had been done.

A deputy team principal said recently that it would be awful if their team "went the way of Tyrrell". I found that to be unspeakably sad: going "Tyrrell's way", with Ken's level of dignity would, for anyone with racing blood in their veins, be the greatest of compliments. 



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EMERSON FITTIPALDI

SPEED KING

The double world champion writes exclusively for *F1 Racing*

Not every grand prix can be a thriller. The racing in China was not as exciting as it had been in 2012 and 2013, but Bahrain was one of the best grands prix I've watched in the past 20 years. It seemed as if drivers from every team were dicing with one other: Red Bull, Mercedes, McLaren, Ferrari, Force India, Williams... another demonstration of how the new rules produce more exciting grands prix.

To see Sergio Pérez on the podium was a pleasure. I've known him since he was in karts in Mexico. He has a tremendous talent and that performance was one of his best. Beating Nico Hülkenberg – who I believe is one of the most underestimated drivers in F1 – in the same car was a great achievement. Sergio really showed his potential and it was an exciting, open race between the two Force India team-mates.

The dynamic at Ferrari is different at the moment; sometimes Kimi Räikkönen is very close to Fernando Alonso, sometimes he is a little way off. To my mind Fernando is among the most complete drivers out there. He can get the maximum out of the car under any circumstances. He'll be there at the end of the race, even if it means carrying the car on his back. And he knows how the team works. Kimi, having been away from them for several

F1 2014 is shaping up very nicely

seasons, needs some time to adapt – and I'm sure he will, no doubt about it. The talent is still there.

There has also been a big change in team management at Ferrari, with Marco Mattiacci arriving at short notice to replace Stefano Domenicali. When you're outside a team looking in, it's hard to know exactly what's happening in a situation like this. It's like commenting on somebody's marriage – you can give an opinion but you don't know what's happening inside the house!

I have great respect for Stefano, and although I haven't spoken with him since he left, I wish him all the best. I also know Marco very well. He's a great guy and a very successful businessman, with a great track record at Ferrari North America.

Why do this now? Only Luca Di Montezemolo can answer that. But when a team needs results, or a public explanation, or some positive PR, sometimes you have to provoke a reaction within the team. This has sent a clear message, from the very top, that changes have to be made.

McLaren are also not quite where they need to be after a positive start to the season. And once again, without access to inside information it's hard to say whether they have lost performance or just been overtaken in the development race. But they have the resources, the experience and the people to return to the front. As I write, we're coming to the end of the three-week gap between the Chinese and Spanish Grands Prix, and they will have been busy filtering all the data to see where they've been losing out, and what they need to do to recover.

Of course, all their rivals will have been trying to do the same thing, and it was interesting to see that Red Bull's Adrian Newey stayed away from the Chinese GP so he would

have more time to drive development back at the factory. The RB10 has a lot of downforce – you can see it in the corners and under braking – but it lacks speed on the straight. So there's a compromise there that is perhaps not the best. Still, it seems Renault are finding the technical solutions to the system-integration problems that held them back at the start of the year.


When you have a team-mate who's giving you a hard time, it's a real incentive to raise your own driving to a higher level. Daniel Ricciardo has been doing a fantastic job of challenging Sebastian Vettel and really making him work hard. It must be difficult after four consecutive title wins to face this kind of pressure, but Sebastian is mentally strong and



"To see Sergio Pérez on the podium in China was a great pleasure"

he will cope. And this competition will drive the team forward as well.

At Mercedes, there is a fascinating contrast between the two drivers. Nico Rosberg is cool and technical, while Lewis Hamilton is a very emotional driver. Yet it was Nico who made the mistakes under pressure during qualifying in China. Lewis has a vision that he can be world champion again and this has given him great strength and motivation. You see him giving 110 per cent every time.

That's because Lewis knows you don't always get all the right circumstances to win the title – having the best car and a great team running it – and when you do, it's up to you to perform. Nico knows this too. That's why they'll fight over every inch, every hundredth of a second over the races to come, and it's looking like Mercedes are going to let them do it. That's very good for the fans and for the sport. 

"In Bahrain, it seemed as if drivers from every team were dicing with one another"



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DIETER RENCKEN

POWER PLAY

The stories F1's bigwigs would rather you didn't know...

Cost control, budget capping, resource restriction. Call it what you will, it's F1's recurring topic and a highly emotive one. On one hand the main teams, existing primarily to drive commercial messages for their owners, will spend their ways to multiple titles; on the other, the independents struggle to stay in business.

Formula 1 has always been a battle – not only to win, but also to survive, as proven by the fact that over the sport's 64-year life around 120 entrants (ie an average of two per season) have disappeared. Its survival-of-the-fittest credo has ensured that only the best fought another day.

It's sobering to realise that a single team (Ferrari) survives from that maiden season, with McLaren and Williams the only survivors from the 1960s and 1970s, respectively. True, there's room to quibble; Mercedes were active in the 1950s, but the present team is rooted in Tyrrell, who arrived in the 1960s but have passed through several owners before Stuttgart bought in to recreate the magic of the 'Silver Arrows'.

As for the rest: Lotus hark back to the 1980s as Toleman, via interludes as Benetton and Renault, sharing

Why F1's funny money is no joke

no DNA with the original outfit carrying that name; Toro Rosso (Minardi), too, date from the era of bubble perms and shoulder pads; Force India (formerly Jordan, Midland, then Spyker) and Sauber arrived in the 1990s; and Red Bull began as Stewart GP in 1997. Marussia and Caterham are F1's millennial kids.

Tellingly, since Eddie Jordan and then-Minardi boss Paul Stoddard first agitated over costs in the early 2000s, only two teams – Arrows and HRT – have folded, while Toyota, Honda and BMW made strategic withdrawals for other reasons. Compare this to the 1990s, when no fewer than nine teams simply ran out of money and closed their doors.

That said, F1 tsar Bernie Ecclestone recently indicated that two current teams could go under – hence the FIA's decision to allocate a 2015 grid slot to NASCAR team owner Gene Haas and to re-examine an application lodged by serial team boss Colin Kolles. This suggests that F1's life-support system is dysfunctional, hence the FIA's stated determination to regulate costs.

Purists decry such initiatives, believing that (in the words of one team boss) "you eat what you kill", but surely such sentiments should reign only where sporting, commercial and regulatory factors are equal. This is not so right now. A privileged few sit on the Strategy Group while receiving premium slices of the sport's revenues; the rest are disenfranchised and take home lower rewards for the same results.

Ferrari are expected to bank an estimated £66m more than Force India this year, despite their close relative performance




In the past, only Ferrari enjoyed a regulatory veto and a premium revenue slice on account of their historic role, while the others shared a payment structure: whether McLaren or Minardi, the payout for any result was identical. But now, the big four – Red Bull, Ferrari, Mercedes, McLaren – skim the cream while the rest starve.

Indeed, so large is the earnings gap between those teams and, say, Force India, that this year each will each bank an estimated £66m (or 150 per cent) more – even though Force India are (at the time of writing) ahead of Ferrari in the constructors' championship and not far off Red Bull. Put differently, Force India would need to acquire one of the largest sponsors in F1 history simply to fight Ferrari on equal terms – and still wouldn't enjoy primary input into the regulatory process as part of the Strategy Group.

So it's no wonder Force India (plus Sauber, Marussia and Caterham) are pushing for larger slices of F1's pie while urging the FIA to regulate spending. But the big teams are pushing back; the heads of Ferrari and McLaren have both spoken out against the very principle of cost restrictions. In last month's *F1 Racing* Ron Dennis said, "If you can't afford to race in F1, there are plenty of other categories you can race in."

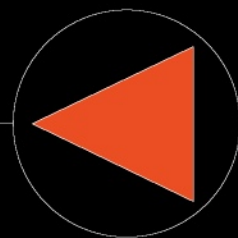
Thus the FIA called a team meeting to coincide with the most recent sitting of the Strategy Group on 1 May. On the agenda were cost-cap proposals versus the alternatives proposed by the Strategy Group – 'cost restriction' items that range from increased manpower curfews and tyre-warmer bans to standardised parts such as steering racks and crash structures.

An interesting divide is developing. The Strategy Group consists of six teams – the aforementioned four, plus Williams (on heritage grounds) and Lotus (as highest-placed other team), although these last two are junior members of the Group, and receive either a much reduced premium (Williams) or nil (Lotus). Cost capping is clearly crucial to their survival – just as it is for the teams *outside* the Strategy Group.

So Williams and Lotus face a major quandary. Do they follow the status quo and continue to enjoy (limited) regulatory input into the Strategy Group, or do they break away and join the push for increased revenues and budgetary controls? It's status versus survival... 

"Formula 1 has always been a battle – not only to win, but also to survive,"

Now that was a car



No. 27 The Maserati 250F

The F2 hybrid and enduring privateers' favourite that defined an era

"A great car," was the verdict of Stirling Moss on the Maserati 250F, "but built from crappy materials."

Neither as quick nor as successful as the majority of its rivals, the elegant, front-engined 250F nevertheless came to epitomise an era. It won one drivers' championship, contributed to another, and was on the grid for both the first grand prix of the 2.5-litre era in 1954 and the last in 1960. It enabled some of the most talented drivers of the 1950s – Moss included – to make their mark in the sport and move onwards and upwards, and enabled privateers to race competitively and cost-effectively at a time when F1's very existence was in doubt.


Grids had dwindled over the first two years of the championship, with manufacturers unwilling to build new machinery to the existing formula of 1.5-litre supercharged and 4.5-litre naturally aspirated engines. By early 1952, after Alfa Romeo's withdrawal from the sport, it became necessary to throw the championship open to Formula 2 cars before the new F1 formula for 2.5-litre normally aspirated and 750cc supercharged engines began in 1954.

Maserati spotted a gap in the market and filled it with the 250F, a development of their F2 car that even used the same suspension for a while. Legendary engineer Gioacchino Colombo had a hand in both this and the straight-six engine, before departing for Bugatti. The tube-frame chassis, clothed in bodywork built by Medardo Fantuzzi, relied on drum brakes all around, as was conventional at the time.

The plumbing for the oil system on early cars was not quite up to the harsh rigours of racing, but even so the 250F quickly found customers – so much so, that at the first grand prix of 1954, which Juan Manuel Fangio won in a 250F, their customers had to make do with F2 chassis hastily adapted to accommodate the F1 engine and transmission.

Fangio soon received a better offer from Mercedes and jumped ship once their all-conquering W196 was ready. Lancia, too, pitched in with a better car than the 250F, but quickly ran out of money, while Mercedes withdrew from motorsport in the aftermath of the 1955 Le Mans disaster in which one of their cars struck an embankment, killing 84 people. Fangio demonstrated his knack for finding the best car by moving to Ferrari for 1956 while they ran the ex-Lancia D50s, then on to Maserati when Ferrari's development faltered.

For 1957, Maserati redesigned the 250F's chassis to make it lighter and stiffer, and liberated another 30bhp from the straight-six engine. Fangio won four races – including the German GP in which he staged an epic comeback after a slow pitstop, clawing back a one-minute deficit to the leaders to claim his fifth world championship. But Maserati, like Lancia before them, had run out of money.

The remaining 250Fs were sold to privateers and continued to help fill F1 grids until the new generation of rear-engined machines rendered them obsolete. 



WORDS STUART CODLING PICTURES JAMES MANN



MASERATI 250F TECH SPEC ◀

Chassis	Steel spaceframe
Suspension	Wishbones and coil springs (front), De Dion axle and transverse leaf spring (rear)
Engine	Straight-six
Engine capacity	2,494cc
Power output	240-270bhp
Rev limit	7,600
Gearbox	4-speed manual
Weight	670kg
Wheelbase	2,280mm
Notable drivers	Juan Manuel Fangio Stirling Moss Jean Behra Alberto Ascari







ECHOES OF AYRTON

Driving Formula 1 cars previously raced by Ayrton Senna would be a special experience for anyone; for his nephew, even more so.

Bruno Senna climbs behind the wheels of the iconic Lotus 98T and Toleman TG184

WORDS MAURICE HAMILTON PICTURES ANDREW FERRARO & DREW GIBSON/LAT

Being five centimetres taller than his late uncle, Bruno Senna sits that little bit higher in the cockpit. The Lotus 98T and the Toleman TG184 may be a tight fit, but the overall effect is not compromised: a combination of the iconic yellow crash helmet and two classic F1 cars instantly rekindles emotions that are both heart-warming and confusing.

We may be going back in time, but the sight and the sound symbolising a unique chapter in F1 history make it seem like ten years ago, not 30. It's a reminder

that F1 cars have changed significantly, yet the assault on the senses makes the Toleman and the Lotus seem part of the here and now. As the turbo tones resonate on warm-up in the garage, the lovingly prepared cars are crying out to be driven. It is a huge moment for the nephew of the man who captivated the world's imagination in these very machines.

Bruno was just one year old when Ayrton came so close to winning the 1984 Monaco Grand Prix in a Toleman-Hart; a stunning drive in the wet that gave the →



wider world a first hint of his future greatness. Bruno knows of this car only by reputation. It's a practical machine produced by a small team who, by their very nature, allowed Ayrton to make his F1 debut without the pressure that would have come from either McLaren or Brabham – two teams who also made him offers for 1984.

Bruno also knows that the Hart four-cylinder engine, with its Holset turbo perched high on the exhaust, needs a respectful right foot. The conditions at Donington Park are chilly and he is not alone in being thankful the track is dry.

Alistair Davidson, the TG184's owner, is keen for his car to be used – but he would like it returned in one piece. Apart from the obvious, he would find it heart-breaking to replace bodywork still in as-raced condition, stone chips and flaking-round-the-edges paintwork included. As Bruno climbs on board and gingerly threads his legs over the top of the massive fire extinguisher, he sees elbow pads, secured with aging black tape, that are unchanged since Uncle Ayrton gave them a bashing three decades before.

The image takes on a new dimension as he lets out the clutch and the emotive combination of

Senna and Toleman head down the Donington Park pitlane. It's a new experience for Bruno. This is all about the joy of driving a classic F1 car while being enveloped by a flood of memories.

"As a kid, you have this romantic vision of how things are," says Bruno. "I had great memories of cars that were bringing Ayrton success in F1. I was racing karts, but couldn't begin to imagine what these cars would actually be like.

"Like all drivers, I enjoy the chance to try different race cars. But this is special because of the connection with Ayrton, and that in turn makes it daunting because you are getting behind the wheel of a car that is a priceless piece of history. You don't want to damage it or do anything silly. When you see how lovely it looks, how well-maintained it is, you really don't want to grind the gears or miss a gear and buzz the engine. You are always on the back foot a bit. But yet you want to *feel* the car; experience the power; try to understand what he must have felt.

"All I knew before this was how we felt at home, watching the races on TV. We have so many good memories, especially when Ayrton won his first grand prix in the Lotus 97T in



Portugal 1985. And then there were all the pole positions. The thing about the JPS Lotus was that whenever you saw it on TV, it *looked* special, even though it didn't take Ayrton to the title. He would always be in the running, sometimes at the front, then a problem would strike. But he was able to shine and show what he could do."

The Lotus-Renault 98T, raced in the latter half of 1986, looks the part, right down to the Avon tyres with 'Goodyear Eagle' stencilled on the sidewalls. If the Toleman was a tight fit, this is even more cramped but it's clear Bruno will suffer whatever discomfort is necessary for a run in this evocative car, now owned by Patrick Morgan, son of Ilmor co-founder, Paul Morgan.

The settling-in routine is the same; the image even stronger as the yellow helmet with blue and green stripes seems as much a part of this car as the striking black and gold livery. Several laps, faster and faster, and Bruno has returned, briefly lost in so many thoughts before that deep mellifluous voice delivers them in a rush.

"This is an incredible experience," he says to no one in particular. "I'm just loving it. Both cars have different characters. The Toleman →

"With the Toleman, you feel it's a more honest car because it gives you more feedback. It's still going at the end"



Gillette
Embratel
Embratel

+1

+1

Segafredo
ZANETTI
MAGIRUS
GT

19
Toleman

MICHELIN

MICHELIN

GT

SERGIO TACCHINI
GT

"With the Lotus, you have to be very precise... you have to know exactly where the gears are or you'll miss one"

seems a bit more nimble and the Lotus seems a bigger car, mainly because it has Ayrton's seat, which is a bit too small for me. While I love to be in his actual seat, I can't drive the car properly like this! I'm sitting quite high. With the Toleman, there is no seat as such; just bits of foam, so I'm kinda loose in the car. There is nothing under my legs. The seating position for both cars is more sit-up than current cars and it's high and exposed, although with the Toleman, you sit a bit more inside the car; with the Lotus, you feel you are completely outside the car.

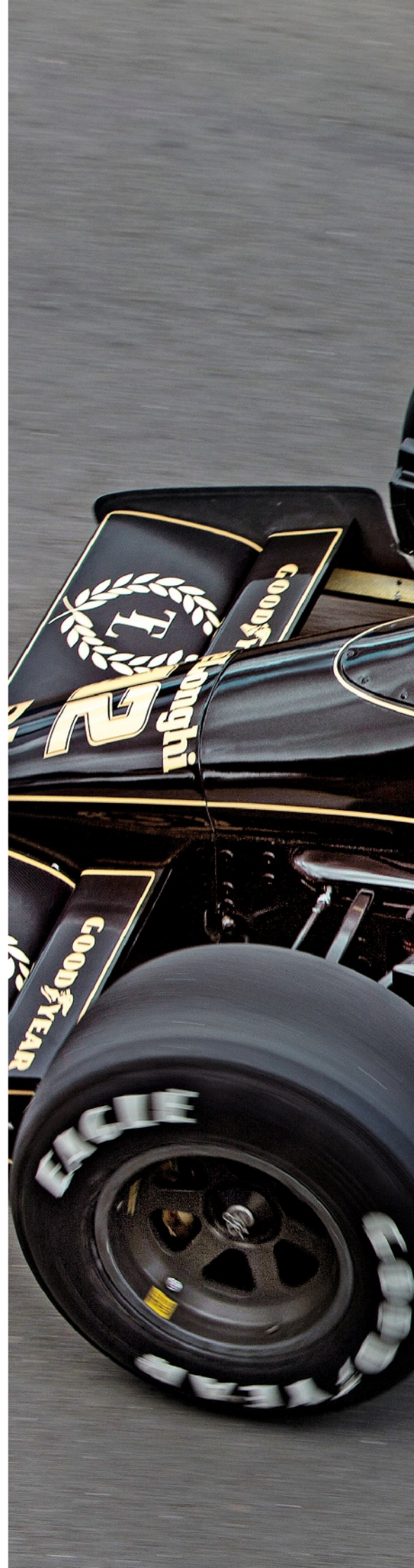
"But the thing you notice more than anything is that the driving position is so far forward. When you're driving a modern car and you steer into a corner, the momentum you take is like a rotation and you know where the rear is going. On these cars, it's a lateral movement; you get pushed across the corner. There is a very big difference because the rear feels so far behind and you don't know what it's doing.

"With the Toleman, you feel it's a more honest car because it gives you more feedback. You keep upshifting and it's still going at the end. The Lotus is carrying a huge Monaco rear wing and when you get to fourth gear, you hit a wall as the drag really comes in. With the Lotus, you have to be very precise with the gear changes. It's not stiff, but you have to know exactly where the gears are or you'll miss one. You keep punching the side of the cockpit; by the end of the day I'm going to have a few bruises!

"This experience gives you an idea of how the dynamics of the cars then were different; of how hard they were to drive. The mental effort required was high because you always had to think about the fragility; it was easy to over-rev an engine, break a gearbox, run out of brakes or get into trouble. These cars may not be as fast as today's, but they required huge concentration because you had to go through a whole race without making mistakes. Not just missing a gear, but having a bad downshift. You were focused on so many things at the same time."

The Hart 415T and the Renault V6 twin turbo may have been detuned slightly for the purpose of this exercise, but there is enough performance to catch the driver's attention.

"The boost is sudden on both cars and comes in really hard," says Bruno. "But you can feel it coming more with the Toleman and there is less turbo lag than with the Lotus. The bottom →







end of the Renault has more torque because it's a bigger engine. The downshifts are nicer with the Toleman because it's hard to get the Renault to rev up to where you need for downshifts.

"Going down the Craner Curves, I got the rear of the Toleman moving a bit whereas the Lotus is planted because of all that downforce. Saying that, the Renault has so much power that you can get the rear to kick out. You don't want to be pulling any lateral G when the turbo kicks in because you might get a snap sideways. In those days, the drivers probably wouldn't be pushing at the maximum on the exit of a corner. They would know how much time they had before the turbo kicked in coming out of the corners. I think Ayrton was one of the masters at controlling this.

"People say how he was always stabbing the throttle – bap-bap-bap-bap – through the corners and, from what he said, and from what

I've learned today, he was not only trying to cure understeer on the low speed, but also keeping the turbo at the max. I reckon they set these cars up with understeer because there is no way you could drive them with oversteer. If you have a moment in the corner and you have to steer out of it, you're going to have your body moving outwards as well. It's a really weird sensation not knowing exactly where the rear is going to go.

"That throttle technique worked well for Ayrton, but he did it even after turbos were no more; it was something that was built into his way of driving. He was not only a gifted driver, but also clever; he knew what he needed to go fast and I think, in his mind, that was all that mattered. He knew exactly what was going on and had a great memory of what the car was giving him. There was no telemetry then, of course, but he would tell the engineers every →

"I reckon they set these cars up with understeer because there is no way you could drive them with oversteer"



INSET: LAT ARCHIVE

Toleman TG184 tech spec

Chassis	Carbon-fibre monocoque
Suspension	Independent double-wishbone, pullrod-actuated coil springs
Engine	Hart turbocharged inline four
Engine capacity	1,459cc
Power output	650bhp
Rev limit	10,750rpm
Gearbox	5-speed manual
Weight	540kg
Wheelbase	2,800mm
Tyres	Pirelli, Michelin

RACE HISTORY

AYRTON SENNA 1984

Race	Grid	Finish
France	13th	DNF – turbo
Monaco	13th	2nd
Canada	9th	7th
Detroit	7th	DNF – accident
Dallas	6th	DNF – clutch
Great Britain	7th	3rd
Germany	9th	DNF – accident
Austria	10th	DNF – engine
Netherlands	13th	DNF – engine
Europe	12th	DNF – accident
Portugal	3rd	3rd

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"Ayrton would tell the engineers every detail of every lap. It was as if he needed only 20 per cent of his brain for driving"

detail of every lap. It was almost as if he needed only 20 per cent of his brain for driving with 80 per cent available for everything else."

Bruno spends considerable time walking slowly round each car, the sight before him clearly evoking special personal memories.

"The cars look great and run so well," he says. "People really take care of them; they love them. When you look at the Toleman specifically, you wonder why it didn't break down on every lap. The rear is so exposed to the elements. You'd think stuff would fly out and cut electric cables and oil lines. But it finished races of around 185 miles and that's incredible. Ayrton finished third at Brands Hatch; I can't imagine what it must have been like going through Paddock in this!"

Bruno has been running the Hart engine to 7,500rpm, the Lotus to 10,600 rpm. He becomes lost in thought when told that Ayrton raced the

Toleman with 10,750 rpm in 1984, including at that wet race at Monaco.

"He said he turned the boost down at Monaco," says Bruno, pointing to a little yellow knob in the cockpit. "He took the power away so he didn't get snaps every five seconds. He knew a lot about how to make a tyre work and he would have been in a good situation with the wet-weather Michelins. But it was still a challenge to drive in those circumstances."

Then another long silence as Bruno stares at the Toleman-Hart, then across at the sleek black Lotus. Finally, he shakes his head before summing up the entire experience.

"Awesome," he says softly. "A-maze-zing. This has been such a nice thing to do." 🏁

The Monaco Grand Prix on 22-25 May will be shown live exclusively on Sky Sports F1



INSET: LAT ARCHIVE

Lotus 98T tech spec

Chassis	Carbon fibre and aluminium honeycomb monocoque
Suspension	Independent double-wishbone, pullrod-actuated coil springs
Engine	Renault turbocharged V6
Engine capacity	1,494cc
Power output	1200bhp
Rev limit	13,000rpm
Gearbox	6-speed manual
Weight	540kg
Wheelbase	2,718mm
Tyres	Goodyear

RACE HISTORY

AYRTON SENNA 1986

Race	Grid	Finish
Brazil	1st	2nd
Spain	1st	1st
San Marino	1st	DNF – mechanical
Monaco	3rd	3rd
Belgium	4th	2nd
Canada	2nd	5th
Detroit	1st	1st
France	1st	DNF – accident
Great Britain	3rd	DNF – gearbox
Germany	3rd	2nd
Hungary	1st	2nd
Austria	8th	DNF – engine
Italy	5th	DNF – transmission
Portugal	1st	4th
Mexico	1st	3rd
Australia	3rd	DNF – engine

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Meet the most exciting driver line-up in Formula 1: Latin passion meets ice-cool Finnish *sisu*. A veteran fighting to reboot his career and a hotly tipped young talent desperate to shine. Plus: the team principal who's wrangling them answers *your* questions...





FIRE IN THE BLOOD

A change of scene and a new challenge has rekindled Felipe Massa's self-belief, not to mention his passion for Formula 1... and for winning

WORDS JAMES ROBERTS PORTRAITS ADRIAN MYERS

Sometimes in high summer, there is a relentless heat in central Italy that is insufferable. Day after day, blistering temperatures and bright sun scorch *terra firma*. Residents of Maranello and Modena are used to it, but still they yearn for respite from the oppressive furnace.

Contrast that with a fresh, blossom-strewn spring day in rural Oxfordshire. Invigorating and full of promise. Into this fine morning walks Felipe Massa, once of intense, blood-red Ferrari but now dressed in the cool, airy blue of Williams. He crosses the Grove factory car park with a confident swagger, team-mate Valtteri Bottas in tow, ready to be photographed as *F1 Racing* cover stars.

The change in air – and colours – has given Felipe a new purpose. His duty now, as he sees it, is to lead his team in the way he saw Michael Schumacher successfully galvanise everyone at Ferrari. He has new allies and old friends helping him to achieve this, and despite some bad luck in the opening races of the year, there is a sense of great optimism for the months ahead.

There is a passion for racing that you sense had dwindled for him somewhat at Ferrari. There was a need for a change. And while Grove is a world away from Maranello, it has at its oh-so-British core an engineering-driven team with a racing heart. Here, Felipe can be himself. Here, he can rekindle his passion for racing – and *winning*.

Felipe has been given the chance to thrive again. And after being reminded, in no uncertain terms, who was faster than him at Ferrari, he now has the opportunity to fight for his own cause and to build a team in his mould. The flame inside burns brightly once again.

"I hope it does," says Williams chief technical officer Pat Symonds. "You can get stuck in your comfort zone. Felipe was at Ferrari for a long time in driver terms – there are some parallels with the time I spent at Renault – so it's good to get out and do something different and re-invigorate yourself. I think he does see it as a second coming. A chance to press the reset button and go again."

Symonds has also been impressed with what he's seen of Massa so far. "I know Fernando Alonso as well as almost anyone and if Felipe can race as well as Fernando – which he did plenty of times – then I think he's got some ability. That, coupled with the way he was treated at Ferrari and the sort of hunger that's going to bring on, I thought we were getting a pretty good guy. I didn't realise *how* good until I started working with him.

"Not only is he quicker than I expected, but he's such a personable guy and a team player. And his feedback is good; it's succinct. There are no airs and graces. This is what he thinks and is feeling – get on and fix it. That's how I like to work."



Massa stands in a newly built part of the Williams complex in Grove, which will house Williams Advanced Engineering, the company's lucrative customer solutions arm. As he talks about his new home, the 33-year-old displays a bubbly, boyish enthusiasm, his delivery energetic. It's reminiscent of those early days at Sauber. Cast your mind back and recall flashes of incredible speed, offset by wheels in the dirt, or carbon fibre flying through the air. Raw pace that needed to be controlled. →

But after eight years racing for the most famous team in Formula 1, Massa's attributes have been bolstered by experience and maturity. This is a man who showed incredible humility following that last-second world title defeat in 2008; a man who still bears the scars of an accident that nearly cost him his life in 2009. Lesser men would have stopped, but within Felipe is a burning desire to keep on racing. This is a different Felipe. A more relaxed Felipe. A Felipe who has escaped the stifling intensity of Ferrari and has found a calm new environment at Williams. And who better to concur with that, than his old mucker Rob Smedley, himself a recent Maranello *émigré*.

"It's no secret that I know Felipe Massa very, very well," says Smedley in his immediately familiar Teesside tones. "I know him inside out and I can tell you he is a very good driver. He's been given the freedom here – freedom of headspace you could call it – to do just that. Drive. And he's delivering."

A podium could have been on the cards in Australia if it hadn't been for that pesky Kobayashi. A podium could also have been a possibility in Bahrain, had the Safety Car not put paid to Williams' strategy. And in China, things were out of his control during a pitstop tyre mix-up (also not helped by a wheel banging courtesy of his old sparring partner, Fernando Alonso). And Malaysia? Familiar territory. Another 'your-team-mate-is-faster-than-you' radio call, but this time the response was different. For too long he has been the obedient number two. This was Felipe stamping his authority on his new team.



We're speaking the day after Felipe's long-haul flight back home from Shanghai, ahead of the start of the European season. Today and tomorrow present a chance to debrief the early

races, to look at developments for Spain and to hone the simulator. Oh, and to have a quick chat about racing with Sir Frank. Then it's back home to Brazil to relax and celebrate his 33rd birthday with family and friends. His new home is different – but surely not such a bad place to be?

"The mentality of the people here at Williams is quite different to the Italian way. The style in which they talk and the fact they are a lot more organised. But I have worked with many English people before – like Rob [Smedley]. I'm enjoying my decision to move here," he says, smiling.

"The people here are very intelligent. They're very good engineers, but there are a lot of new people so there is a lot of work still to do to fix the organisation," he adds. He lists the new faces that now pass through the factory gates each morning: Pat Symonds (chief technical officer), Rob Smedley (head of vehicle performance), Jakob Andreasen (head of engineering operations), Craig Wilson (head of vehicle dynamics) and Rod Nelson (chief test and support engineer). They arrive, respectively, from Marussia, Ferrari, Force India, Mercedes and Lotus. A melting pot of ideas and practices to fuse together. "When you bring in new people, you need a bit of time," says Felipe. "Nothing will be perfect on the first day, but it's very good for the future."

Behind the scenes at Williams, work is under way to bring back fading memories of success to the forefront of everyone's minds once more. With the fiery experience of Felipe and the icy edge of Valtteri, the combination is driving everybody forward. In personalities they are polar opposites, from different continents with different cultures, but out on track they are mighty close. Too close, perhaps?

"Felipe and Valtteri are quite equal. That's a good thing, because it keeps both of them honest. If you have two drivers who are miles apart, they don't push. When they are snapping at each other, it's great" *Pat Symonds, Williams chief technical officer*



In Q2 in Malaysia Felipe and Valtteri's lap times were identical, to the thousandth of a second. And that, according to Felipe's new race engineer Andrew Murdoch, is just what the team needs. "It's better for us when both guys are pushing and are so close. The difference comes down to really small areas, such as the setup with the differential or other electronic controls," says Murdoch. "And when you overlay both drivers' telemetry, you notice that Felipe is perhaps a little smoother – but that's down to experience."

Their closely matched performances have also impressed Pat Symonds, a man who has guided





both Michael Schumacher and Fernando Alonso to world title success.

"Knowing Fernando's ability I had a high regard for what Felipe was capable of but, equally, in the short time I've worked with Valtteri, I've been continually impressed with him. I really didn't know how it was going to balance out, but the reality is they are quite equal, aren't they? That's a good thing, because it keeps both of them honest and I like that. If you have two drivers who are miles apart, they don't push. One gets comfortable, the other gives up. When they are snapping at each other, it's great.

"Working with Felipe, he gives feedback the way I like to hear feedback. I don't want opinions and I don't want 'maybes' I want: 'I know this is happening. Or I don't know.' And that's what he's very good at. I think Valtteri is quite a deep thinker, but he suffered last year because in his rookie season he didn't have the best role model. But Felipe brings a lot of experience – he's very solid – so things are definitely improving."

Andrew Murdoch also engineered Pastor Maldonado last year and is quick to compare the two South American racers, citing their similarity in character. But behind the wheel,

Felipe displays greater refinement and smoothness, putting less energy into his steering and pedals.

"Personality-wise, Felipe is very open and very friendly. He's a typically Latin type of guy," says Murdoch. "When I take him around the factory he's always shaking everybody's hands and hugging them. He's very open, gregarious and warm."

Warm. Not a trait often used to describe the racers who come from the Scandinavian nations. So how does Felipe agree feel about his teammate, the ice-cool Finn, Valtteri Bottas? →



"We work well together, but we are completely different," acknowledges Felipe as he stands beside Valtteri under the flashlights. "The way I am, the way he is, we're really different. It's the mentality, from country to country. For sure, I talk a lot more than him – and I'm not a guy who talks a lot, but I do talk a lot more than him."

"I am a little bit easier meeting people, getting along with them because I am like that. I have no problem to meet a guy today and within ten minutes have a good relationship with them. I'm like that and I'm sure it's a little bit easier for me to change the team compared to him..."



Rewind a couple of weeks and in the warm, floodlit Bahrain paddock, just a few hours after the chequered flag has fallen, drivers are giving their post-race debriefs to small huddles of journalists. In the paddock, fork-lift trucks noisily remove the remnants of garages as the F1 circus packs up for another weekend.

Felipe comes over to speak to us, scoops up his four-year-old son (also called Felipe) and plonks him on his lap. As he bounces him up and down it feels more like a Sunday dinner in the Massa household, not the final few hours of an F1 weekend. Many drivers hide their families and private life away from the spotlight. But that's not the Brazilian way and it's significant that Williams allow Felipe the freedom to enjoy himself – something he says he lost at Ferrari.

"If you are not 100 per cent happy with a job, you are not able to give everything. Now I feel I can. A step back can actually be two steps forward" Felipe Massa



"Well, I think I am able to be myself now and this is very important. The mentality, the motivation... you need to be relaxed, you need to be yourself. You cannot try to be something you are not. You cannot solve the pressures that are not your problem, you know? It's true, I feel I am really light [he points to his shoulders]. There has been a big weight taken away from my back. It gives me a lot more happiness."

"Sometimes you need to remember you have the most incredible job that everybody in the world would like to have. But if you are not 100 per cent happy with your job, as a result you are not able to give everything you are able to. Now I feel as though I can. A step back can actually be two steps forward."

It's honest stuff from Felipe. Ferrari was his home for eight seasons, but clearly there were pressure and politics that affected his driving. Imagine the pain of being told to concede the lead of a grand prix on the anniversary – to the day – of the date you almost lost your life on track. Risking your life on behalf of the team and this was the way they thanked you for it. Rob Smedley, a key figure that day, can see the change for the better in 2014.

"What I see now is a very relaxed Felipe," he says. "He's incredibly experienced and there is a maturity about him. He understands that the job he has to do here is not just driving the car. It's about driving the people as well. He knows how to do that. He's a mature and sensible guy, but he's able to motivate people in the right direction. He's had some very good teachers in that area – I would cite Michael Schumacher as being one of them. Now it's his time to do that, and he's doing it very well."



Back again at Williams, this talk of learning from others gets Felipe very animated, demonstrating the fire that burns in his belly. As we begin to talk about developing the FW36 and building a team, he bangs his hand on the table, as if to emphasize the need for action.

"Yeah, sure. With experience you always learn from all the people you've worked with, including Michael. He was very professional, but I didn't just learn from him. It was from other people as well, other drivers, other engineers. When you go to a team you need to build the new infrastructure, the new mentality as well, you need to try to use everything you have – so that's what I'm trying to do. I'm trying to apply the little things that I've learned in all these years and all my experience."



Smedley's best radio calls to Felipe Massa

Spanish GP, 2007

"Pole position.
Fastest lap and the race win.
Job done.
Hahaha! Have that!
Well done sunshine."

Brazil GP, 2008 qualifying

"Who is the daddy of Brazil?
Well done son."

Brazil GP, 2008

"I think you've done, well, what I can only say is a very good job.
You've made a lot of friends this year and done a very, very good job.
Well done son.
Very proud of you."

Malaysian GP, 2009

"Felipe baby, stay cool.
We're bringing you the white visor, stay cool."

German GP, 2010

"Fernando is faster than you.
Can you confirm you understand that message?"

He knocks his fist on the table again: "This team has potential to be competitive and to fight with Ferrari, Mercedes, Red Bull and McLaren. When I came here and I drove the car at the test, we were pretty competitive. We were not 100 per cent sure we had everything correct to fight for the championship, but what counts is developing from the first race to the last race. It's not easy to make it happen, but we have the potential to do it. We have to fix all the different areas and we *will* do it. And this team will grow. And things will get back to how they were at Williams before."

And with that he goes back to work. He heads back inside the factory, to ask questions of his engineers, to embrace the mechanics who work all-nighters on his car, to push the workforce, to demand the upgrades that will drive the team forward. You sense the urgency, the desire and the passion that exist within him. Nothing would give him more pleasure than to take Williams to the top of the podium, and to let everyone else know that *he* is faster than them. **F1**



ICE IN THE VEINS

He's the cool-headed hotshot with a skill set that bears the hallmarks of a champion. **Peter Windsor** dissects F1, Bottas-style

PORTRAITS ADRIAN MYERS

I think Valtteri Bottas is going to be a major star; I'll try to tell you why.

He has the technique.

Watch him from the outside of the Lesmo Curves at Monza; watch him into the pool section – and La Rascasse – in Monaco. The movements are seamless, almost Trulli-like. The precision is absolute. And he is *fast* – a crucial modifier in this case, because there's nothing easier in F1 than being smooth and slow.

Of course, the Gilles, Ronnie and Lewis fans among us would say that he doesn't have that final, tyre-chattering edge – that he doesn't lean on the car even as Mika Häkkinen leant on a McLaren, or Fernando pitches a Ferrari. I think that's true – but then Jackie Stewart, Alain Prost and Niki Lauda were not particularly visual either. Valtteri has already found his harmony. His driving has depth. It therefore has scope for exponential growth.

I hear you also cite the early-season pace of Felipe Massa – a driver largely trounced by Fernando Alonso at Ferrari. If Valtteri is *that* good, you ask, why hasn't he instantly upstaged Felipe, particularly given Valtteri's familiarity with Williams? The answer here is that we're seeing in 2014 a rejuvenated Felipe – a Massa Ferrari failed to bring out from the day they asked him to hand that Hockenheim win over to Fernando. Valtteri is racing, in

other words, against a very fast team-mate. Massa outqualified Alonso towards the end of 2013 – and several were the days when Felipe outdrove Michael.

So that's the level. Massa is very reflexy and very fast. His foot and hand inputs are larger than Fernando's, but no less quick; Valtteri's driving is less reactionary and founded on more subtle inputs. Over time – over a race distance even – it should, in most circumstances, rise to the top.

I think Williams are also in an unusual condition this year – or this first half of the year – because of their choice of gear ratios. By running substantially shorter than the other Mercedes teams, the Williams drivers by definition are putting more load into the tyres mid-corner (given the closeness of the eight-speed gearbox and the laterally loaded upchanges they are obliged to make). This is particularly obvious on long corners of decreasing radius and in the wet. Some – like Jenson Button – will argue that ratio choices in 2014 make no difference at all because the new power units develop so much torque. This is true, but it sidesteps the issue of what actually happens to the rear tyres during a seamless upshift. Energy is still dissipated; it doesn't disappear. It just dissipates faster.

To take this to the opposite extreme, consider the conversation we can now re-hear between Jackie Stewart and François Cevert after first practice at Monaco in 1971, in the recently re-released *Weekend of a Champion*, directed by Roman Polanski. François is asking Jackie about whether he should take a corner – I think it's Portier – in either second or third and Jackie's response is instant: "Third". He basically says, 'always use a longer gear when in doubt'. It gives you a more stable platform

on which to balance the car. You're asking less from the car with a longer gear; you can impart more with the steering and throttle.

My view is that the shorter gearing of the Williams this year is not hurting Felipe at all because he's always been 'that sort of driver'. He balances the



car on the edge of oversteer. He needs to feel the engine at the absolute point of peak power at any stage of the corner.

I don't think these ratios actually hurt Valtteri, but they limit his ability to manipulate the car or to develop any sort of tyre-wear advantage over a race distance. If we take one corner in isolation – Turn 11 at Bahrain – you would have seen both Williams drivers changing from fourth to fifth just after the apex, thus inescapably loading the rear tyres and obliging both drivers to operate within a very defined path. Had they been obliged to hold a much longer third throughout that corner, the door would have been open for a driver like Valtteri to manipulate a more gradual weight shift on approach, then to control the front end of the car with footwork against steering load.

Without this scope, Valtteri is having to drive like Felipe. And that is why you see Felipe initially upstaging him.

There's another point here, too: the less a driver like Valtteri is able to do with a car – the more line- and input-locked he is by the limits of the technical →

INSET: ANDY HONE/LAT

INSET: LAT ARCHIVE



“Valtteri is one of those rare drivers who is able to deal with anything that may arise”



PHOTO: ALASTAIR STALEY/LAT

sophistication of the car – the less adept he will be with the driving components that can make a difference. I say this not only in the context of racing in general, but also to the background of Valtteri still being a comparative rookie. He is, in my view, one of those rare drivers who is able to deal with anything that may arise.

The downside to this degree of talent is nonetheless not to rely on it, because eventually it will slow you down. If you use up a bit of car control, it's going to activate what Rob Wilson calls 'the survival instinct'. And probably that's going to be on the same corner on the next lap. Fernando Alonso and Mika Häkkinen are/were good examples of drivers who nicely balance(d) their latent car control against manipulation (when required). It's a task of astonishing complexity and difficulty; once achieved, though, it is the key to greatness – the key to those last few hundredths of a second under pressure and to the sort of race consistency that can win championships. The important thing for Valtteri – particularly in the first phase of the 2014 season – is not to fall too far into the realms of car control. Given all that's going on around him, this won't be easy.

Valtteri has phenomenal feel for brake cadence (for the correct modulation of the brake pedal) and for the rate at which brake-pedal pressure can be reduced. You've only got to spend a few laps watching Felipe and Valtteri braking from high speed to see the difference between the two: Felipe will usually brake a metre or two later but on two laps out of five will lock a front or bobble the rear. Valtteri will appear, for all the world, to be 'more stable'.

In reality, he's feeling the brake modulation with great touch and then releasing

the pressure earlier. A lot of techno-talk concerns braking-by-wire this year and, indeed, some drivers will look for an engineering solution to every mistake they make. Ultimately, though, there is no magic: brake-by-wire or not, the greatest of drivers probably find exactly the right brake modulation about 50 per cent of the time, so wide are the variables dividing initial pressure, bumps on the road, temperature of the tyres, track surface, brake fluid and disc temperatures, etc. And from what I've seen of Valtteri, I'd put him in that top bracket.

He also has, as I implied earlier, a Trulli/Reutemann/Mansell-like feel for initial steering input and brake decrease (relative to front-end grip); and he looks pretty good, too, in the linear power/load application department. All this shows up in the wet (short ratios notwithstanding) but it is there in the dry, too, clearly evident on the right sort of corner.

His biggest weakness right now – one he shares with Felipe – is his propensity sometimes to use more road than is necessary – particularly on entry. I think this is exacerbated by the short ratios naturally inviting a driver to 'lean' on the outside rear – although Felipe has always driven this way. Oh yes. And his starts aren't as good as Felipe's – but then no one's are. This is an art he can definitely learn from his team-mate.

BACKGROUND AND APPROACH

Valtteri's background is straightforward and uncluttered: Rauno, his father, was a quick 800m runner, who also worked very hard at earning a living (as an independent contractor in the cleaning industry). Valtteri, too, is dexterous and athletic.

The pair of them saw a kart race in a local town. Valtteri ➔

was rapt. His father spent all the time and money he could on a kart and then on a kart-racing season. Valtteri was fast and successful from a very young age. He loved the speed initially – and then he loved the competition. Despite being a Finn, and therefore very much exposed to rallying, Valtteri always wanted the one-on-one competition of racing. His mother, who now lives in Spain, remembers Valtteri at the tender age of ten, announcing: “I want to be world champion!”

Ice hockey was another sport at which Valtteri could have excelled, but it was motor racing that now fully absorbed the Bottas family. The two labradors were duly named René and Rubens; and the Bottas cat today is called Turbo. Valtteri progressed to car racing via the NEC Formula Renault championship, created by Mick de Haas, the Dutchman who brought the initial Canon sponsorship to Williams in 1985.

You know the rest. In a Lewis Hamilton fairytale of a story, Valtteri received a phone call one day from Mika Häkkinen, who was by then in the management business with Didier Coton and Toto Wolff. Providing Valtteri delivered – and listened – he would be on their radar. He was on his way.

The drives came – the budgets were there – as were the results. The first real test arrived mid-way through 2011, when Valtteri should have been winning the GP3 championship with ART. Hurt by poor qualifying runs, he was, by mid-season, only 11th. His career was on the line. He had a quick team-mate, too, in James Calado. The pressure upon him was massive.

Valtteri dug deep and worked on the basics – tyre pressures on a new set, warm-up pace, feel for the car at Turn 1, when the grip level is still an unknown. He won four straight races. He


clinched the championship in the final round.

This was his making, and 2012 was a linear progression as a Williams third driver without any racing. Perhaps this lack of road dust still colours him a little today; equally, he was able to mature mentally in 2012, to think about his technique away from the vortex of job lists, short runs and mechanical dramas. On balance, I think his 2012 sabbatical was a good thing – but only because he knew that, on 1 January 2012, he would definitely be racing in F1 one year later. That was what made the difference – and that sort of security is rare in F1.

THE FUTURE

Toto Wolff was an early believer in Valtteri, and so you have to think that the two of them will be linked for many seasons to come. Valtteri wouldn't have had the Williams drive but for the money Wolff invested in the team – and Williams wouldn't have the Mercedes engine in 2014 but for Toto. Should Lewis or Nico ever decide to leave the factory team, assume Valtteri will be the logical replacement.

Valtteri has the kind of very quiet, very calm approach that can withstand pressure. He's happy to say nothing if the option is merely to make conversation; but there's nothing vague about him, nothing boring. When Williams invited him to drive the historic 1992 FW14B at a secluded airfield, he not only turned up ahead of time but filmed the day himself for posterity: he loves his motor racing to the core. He is completely uninterested, I think, in anything remotely concerned with 'glamour' but he is both sophisticated and methodical in the way he goes about his life.

We're talking potential championships here... not just the winning of races. 



“Valtteri has a very quiet, calm approach that withstands pressure”



Bottas owes his Williams tenure to shareholder Toto Wolff



INSET: GLENN DUNBAR/LAT

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Claire Williams

The deputy team principal and daughter of Sir Frank on keeping Williams in the family, encouraging more women into F1 – and why winners never make their own beds...

WORDS JAMES ROBERTS PORTRAITS GLENN DUNBAR/LAT

When we first enquired whether Claire Williams would like to be interviewed by the readers of *F1 Racing*, her immediate response was: “What on earth will they want to ask me?”

But as Claire was to discover when we sat down with her at the Bahrain Grand Prix, you’re a curious lot – and certainly not backwards about coming forwards. Hence in among queries about the Williams family ruthless streak and those wince-inducing team orders to Felipe Massa in Malaysia, there were a number of marriage proposals – adroitly handled, incidentally, with a “Yes – but only if you ask my dad for permission.”

In fact, so much did the Williams deputy team principal relish her interrogation-by-reader, that when our allotted time was up and she was called away to give an interview for Brazilian television, she returned later, to ensure every question was answered. And this, dear reader, is how they started...

Are your family’s connections within the team a help or a hindrance?

Paul Hayes, UK

I can’t believe this is the first one – that’s so tricky! It’s twofold. I think it’s very important we are seen as a family team. It’s important there are different generations within that and to make sure the DNA of the Williams family continues. But, personally, it is sometimes a hindrance because there have been accusations that I’m only in the job because of my surname. When I first started, it wasn’t like that. Frank didn’t want me working at Williams so he gave me a hard time. But I love my job and I’m lucky to work here, so I won’t complain either way.

Do you possess the same ruthless streak as your father?

Jonathan Reynolds, UK

No, I don’t think so. But I don’t think Dad was particularly ruthless either. He just always did whatever was in the best interests of his team.

And that’s what I will always do. Whether that’s regarded as ruthless... well, it’s a ruthless, cut-throat sport, isn’t it? You sometimes have to make hard decisions. For example, you build a relationship with a driver and for whatever reason it doesn’t always work out. I was close to Pastor Maldonado last year and it was difficult for me to see him go but, at the end of the day, that’s what we are paid to do: our jobs.

Pastor Maldonado. Discuss.

Paul Cox, UK

He’s a lovely guy and I think he gets a bad rap in Formula 1. I have a soft spot for him, maybe because I was his press officer when he joined Williams in 2011, but I see the challenges he faces that a lot of people don’t, because he tends to keep quiet about them. He’s protective of his situation, but that guy has the weight of his nation [Venezuela] resting on his shoulders and he carries it really well. All he wants to do is win. He has that single-minded focus and I have a →



huge amount of respect for how he deals with that. And I personally wouldn't have a bad word to say about him.

Did you ever get to meet Ayrton Senna?

Nick Warner, UK

I was a teenage girl when Ayrton was around and I remember talk of him coming to Williams. I've heard from Dad what he was like and how he was always one step ahead in things like salary negotiation. I had huge admiration for the way he went about things. He was so dedicated, so determined, so single-mindedly focused on everything. I was lucky to have memories of drivers like Ayrton coming to the house and stuff like that. Although it's a little embarrassing when you're 14, you meet your childhood hero for the first time and you're in your pyjamas.

This season, Susie Wolff will be driving in two practice sessions for Williams. Can you see women racers competing in F1 within the next five years?

Liam Higgs, UK

I don't know. I think it's up to women to come out and show us what they can do. It's all about coming up through the ranks in the junior formulae. I don't think there are a huge number out there who are doing that, but the more who do it, the higher the likelihood of them getting into F1. We need to encourage them to come up through racing as then we'll be more likely to see one of them in Formula 1. It would be great to see a female driver in F1, it's been too long. [The last woman to qualify for and start a world championship grand prix was Lella Lombardi in Austria 1976 – she finished 12th.]

What part of "Valtteri is faster than you" did Felipe Massa not understand in the Malaysian Grand Prix?

Paulo Felix, Portugal

I think he did understand it, but I don't think he understood why he was given that message because it wasn't explained to him and that's where we let our drivers down. So I love the fact that Felipe came on the radio and said: "I am going faster." The only thing I want to say about it is that we did hold our hands up after the event. We said we'd made a mistake. We rectified it and we'll move forward from there.

FIR: Were you surprised at the negative reaction to the call?

CW: Not really. I'm disappointed that we created a situation that generated negativity towards us, because we're lucky to have such great fans. To make a mistake like that so early on in the season when people want to see Williams do well, I'm disappointed we did that to our fans. I hope they will forgive us and continue to support us.

Have you ever wanted to drive an F1 car? You're the boss – you can!

Jakub Kurowski, Poland

It's really weird, and I don't think I should say this, but I've never wanted to. They are so complicated, so expensive and so valuable – you don't just get in and drive it. The guys who do, blow me away. I've always been in awe of racing drivers and I've never felt that I could do what they do. I also know that if I crashed it, my dad would never talk to me again. Could you imagine the headlines... it would be mortifying. It's bad enough worrying about crashing my own car.



"It's up to women to come out and show us what they can do. It's all about coming up through the ranks in the junior formulae"

Has a Formula 1 driver ever asked you out on a date, or have they all been too scared of your father?

Matt Lloyd, UK

[Laughs] Brilliant! I love this one. No. No F1 driver has ever asked me out on a date. I'm going to say that it's because they're all scared of FW rather than them having no interest in me!

Do you find it stressful or enjoyable to watch the races?

Robert Wood, USA

I was at a wedding once when someone asked me what I did and I told them I worked at Williams. They said: "My God, is Frank as much of an arsehole in real life as he looks on the TV? Why does he pull those grumpy expressions?" And I had to say: "I'm so embarrassed to tell you this, but that arsehole is my dad!" And he's not, it's just that he's doing his job. When anyone else is at work, they don't sit at their computer screens with a happy, jovial look on their face, do they? So I know I might look a bit panicked on the TV, but we are fighting for points and fighting for our team. If we don't do well on the racetrack, we might not get the budget for next year, so of course I'm stressed when I watch a race. →



Felipe Massa leads the allegedly "faster than you" Valtteri Bottas in Malaysia







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How often do you have to go to your father for advice?

Mark Edwards, UK

Never, because he gives rubbish advice – he comes to me for advice. No, I'm teasing. It's rare that I go to him for personal advice – he's not that kind of dad. We have

nice father-daughter chats, but in terms of professional advice, we talk all the time. There's so much I can learn from him, so I talk to him all the time about what's going on, particularly on the commercial side. He's overseen that side of the team for so many years through difficult times and he always kept us racing. What I learn from Dad is more than I can learn from most people. So I take a lot of his advice.

Were you sad to see Dickie Stanford [a Williams stalwart since 1985] leave?

Steve Bates, UK

I really was, but he hasn't left altogether. He's going to be doing something else within the team. He can never leave – he's too much a part of the furniture. I've always considered Dickie to be a surrogate dad. He's always looked after me, especially when I came to races as a kid. In so many ways he has done so much for Williams – he's a part of our history.

Did you pass your driving test first time?

Bruce Nutter, UK

[Laughs] I didn't. I went round a roundabout without due care and attention and got a big red cross on my form. I was really annoyed. But I passed second time. I used to be a much more confident and speedy driver than I am now, but as you get a little bit older you become more sedate. Actually I'd like to do an advanced driving course. That would be good fun.

Not a question, a request: Please never sell the team. Keep Williams forever.

Alejandro Jorge Ortu, Argentina

Well it's not mine to sell, it's Frank's. But as everyone knows, Frank has been racing for 45 years. Williams is in our family and I hope it's

always going to stay in our family – the team is like another brother or sister. We are the majority shareholders in the company and I always want Williams DNA in our team.
F1R: What is the current make-up of the shareholding?
CW: Toto Wolff has 16 per cent, Patrick has about nine per cent, 21 per cent is on the stock exchange. Frank has 52 per cent and there are a few minor shareholders who own the remainder.

If you could choose two Williams drivers from any era and run them together as team-mates, who would they be and why?

Anna Hunt, UK

Easy. Juan Pablo Montoya and Nigel Mansell. I absolutely love them both.

F1R: Wouldn't that be a nightmare?

CW: It would be fantastic fun! It would be two racing drivers who were brutes in the car. They're bullish, they do what they want to do, and, yes, it would be difficult to manage – but that's part of the fun, right? I'm still in touch with both of them: they were brilliant characters and archetypal Williams drivers through and through. They were fantastic drivers in their era and to see them as a pairing in equal machinery would be fantastic. It wouldn't be an easy life, but I like a challenge.

How do you unwind in your spare time?

Jayson Cahill, UK


I watch the Sky F1 channel... I'm such a loser! [Laughs] Formula 1 is an addiction isn't it? You think you can't wait to come home from a weekend but, actually, when you get home you just want to go back. But I love being at home and in my house and closing the door on the world and just chilling out and watching crap TV. I love reality shows like *Made in Chelsea* and I have a bad habit of watching game shows like *Supermarket Sweep* and *Family Fortunes*. I did ask Vernon Kay if I we could go on *Family Fortunes* – although I don't think Dad would agree to it.

Among the F1 drivers you've known, who was the most humble?

Paul Culp, USA

Michael Schumacher. I've met him only a few times, and every time he has been so generous and so considerate. We went to an event at his Kerpen kart track in 2000, and he spent the whole afternoon looking after us.

We've had a lot of lovely guys racing for us at Williams. My mother used to be quite instrumental in some of the driver decisions. She overheard one conversation between Dad and Patrick over a certain driver they were going to hire. They had agreed to phone him the next morning and offer him a contract.

A few weeks earlier, he had stayed over at our house to discuss the drive. Mum said to Frank: "You cannot employ that driver!" Dad said: "Why not?" and Mum replied: "Because he made his own bed when he came to stay. Winners don't make their own beds!" Dad ignored her, employed him anyway and he wasn't that good. I can't remember who it was, it may have been Thierry Boutsen... 

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INCONVENIENCE

Eight years after his second title, Fernando Alonso must wonder if he'll ever win a third. We examine what went wrong between Alonso and Ferrari and ask: are they stuck with one another?

WORDS ANDREW BENSON

Late in the summer of 2007, Fernando Alonso had a big decision to make. Although only partway through the first season of a three-year contract with McLaren, his relationship with the team was already in tatters as a result of fall-out from the 'Spygate' scandal. When it all came to a head at a cataclysmic Hungarian Grand Prix, it was clear he needed to find another team for 2008. He had two offers on the table.

Should he return to Renault, the team he'd left for McLaren, where he had won two world titles, and knew what to expect? Or should he move to Red Bull – young, rich and ambitious, but at that stage still 18 months away from their first win?

Renault were offering him a one-year deal; Red Bull were insisting on two. It would be worth it, they said. The rules were changing in 2009, and Adrian Newey already had a few ideas up his sleeve about the best way to approach them. But Alonso was determined to sign for one year only. A Ferrari drive at some point in the future was a given – and Ferrari's record over the previous eight years had been much more impressive than Newey's before he left McLaren for Red Bull.

Alonso wanted flexibility, and Red Bull would not give it to him. Having reached an impasse, he went back to Renault and the Ferrari seat duly opened up at the end of 2009. →



The F14 T has been unable to match the pace of Mercedes-engined cars, such as the W05 (above left) and the Force India (above right) as a result of an

But how different would the historic landscape of F1 look now had Alonso plumped for Red Bull? Even as team-mate to Sebastian Vettel, as must be considered likely, Alonso might already be at least a four-time world champion, whatever your view of their relative abilities. With Alonso's experience, he would almost certainly not have made the mistakes that stopped Vettel beating Jenson Button to the title in 2009. And he could well have beaten him again in 2010, when more errors from Vettel so very nearly handed the title to Alonso in his first Ferrari season.

But having opted for the Renault-Ferrari route, Alonso ought to be a four-time champion by now anyway, and Vettel merely a double winner. Only two twists of fate stood in the way of it – a catastrophic Ferrari strategy error in Abu Dhabi in 2010, and Romain Grosjean's flying Lotus at the start of the 2012 Belgian GP. With Alonso's fifth season at Ferrari now well under way, the third title he craves looks as elusive as ever.

Who would have predicted at the end of 2006 that the new yardstick in F1, an intense and brilliant two-time champion – the youngest ever – would still be searching for his third title eight years on? Even fewer would have thought at that stage that Alonso might never win another. And yet, as Ferrari continue to lag behind F1's pace-setters, that now looks all too possible.

With new rules, new engines, and reduced aerodynamics, this was supposed to be the

year Ferrari got it right. So it's ironic that after years of Ferrari president Luca Di Montezemolo demanding F1 be less focused on aerodynamics and more relevant to the road cars his company makes, with engines and mechanicals more important, the new formula is exactly that – yet Ferrari are as far away as ever in the Alonso era.

What's even more ironic is that it is their engine that is causing them the most trouble. The Ferrari F14 T – as much as it can be separated

Had Ferrari done as good a job with the engine as Mercedes, Alonso would be up there battling with Hamilton and Rosberg





opportunity being missed when separating the compressor from the turbine in the Ferrari engine

from its motive power – is the most competitive chassis to come out of Maranello for some time. The GPS overlays now available to all the teams suggest it is one of the fastest cars in the field through the corners: only the Red Bull and the Mercedes are better, and only by small margins.

Had Ferrari done as good a job with the engine as Mercedes, Alonso would likely be up there battling with Lewis Hamilton and Nico Rosberg, instead of hanging on by his fingernails trying

to fend off the straightline speed of Force India, Williams and McLaren.

It doesn't stop there. Mercedes' superiority stems from a unique innovation in the engine, separating the compressor from the turbine, which has a number of benefits to do with engine and electric power, packaging and chassis dynamics, that add up to the one-second advantage they have over Red Bull and Ferrari.

But Ferrari also had this idea – their compressor is similarly separated from their turbine. But instead of the two being either end of the cylinder head, with the compressor up front, Ferrari have moved theirs only a third of the way along. So the benefit is not as significant.

This accounted for two of the three failings of the F14 T in the early stages of the season. The engine does not produce as much power per unit of fuel as the Mercedes and lacks top-end grunt →



PHOTOS: GLENN DUNBAR/LAT; ALASTAIR STALEY/LAT; CHARLES COATES/LAT

Meet the new boss (or not)

Naturally there were questions about Ferrari's new team principal when his identity was unveiled during the week of the Chinese Grand Prix. But it was Fernando Alonso's response that was most surprising.

Asked whether he had spoken to the new man, Marco Mattiacci, in the week of his appointment, Alonso said he hadn't, and added: "I don't know if he's coming here [to China]." He then said that he'd spent most of the week talking to the outgoing head of the *Gestione Sportiva*, Stefano Domenicali.

If that was hardly a ringing endorsement, Alonso then proceeded to give Mattiacci the cold shoulder as they left the garage after FP3 on Saturday morning. Mattiacci moved towards him, only for Alonso to be distracted by something on his mobile and drop back. In this case, actions spoke louder than words...

Kimi Räikkönen then deadpanned that he couldn't remember whether he'd met Mattiacci in the past or not. Photos emerged soon after to serve as a reminder: he had.

Mattiacci, a man with no Formula 1 experience, needs to win the respect of his drivers quickly, or he'll struggle to exert any authority over his team.

James Roberts

because the motor-generator unit attached to the turbo cannot produce enough energy to keep the supply going to the end of the straights. That's partly because more of its power is needed to spool up the turbo to operating speeds before the driver gets on the throttle. Meanwhile, a benefit of the Mercedes design is less inherent lag, so more electrical power is free to drive the wheels.

On top of this, the power delivery of the engine out of corners is far from ideal, creating a drivability problem that exacerbates the car's lack of traction. This last niggle will be familiar to seasoned Ferrari watchers and to Alonso himself – poor traction has been a bugbear for some years now and Ferrari seem unable to address it.

That is one example of what seems to be a historic weakness in Ferrari's chassis design department. There have been mitigating circumstances though, specifically problems with their windtunnel, which was producing data that did not correlate with the car's behaviour on track. This is an issue for all F1 teams to one degree or another, but Ferrari seem to have been particularly badly afflicted in recent years.



James Allison believes Ferrari can return to dominance – but says he will need a season or two to turn things around

Ferrari went to the lengths of closing their windtunnel last year to fix the problem. That work is now complete and Ferrari are pleased with the results, confident that the windtunnel is now doing what it is supposed to do – although its impact on the design of the 2014 car will have been minimal. That the F14 T seems to be not far off a Red Bull as far as cornering performances is concerned, is something of a triumph, and further reason to be optimistic for the future.

James Allison, who joined Ferrari as technical director in September 2013 after leaving Lotus that May, has necessarily had limited input into

the design of this year's car. He is not Adrian Newey, but is probably the next most highly rated aerodynamically trained technical leader in the sport – and he has been given pretty much carte blanche to change the team as he wishes.

Allison worked under Ross Brawn and Rory Byrne in the early 2000s, before returning to the UK to join Renault, where he was deputy technical director on the cars with which Alonso won his two titles. He has insisted publicly that there is no reason Ferrari cannot return to the sort of dominance they enjoyed during his previous spell at the team. Privately, he says the

same thing – but with the caveat that it will not happen overnight. He believes he will need a season or two to turn things around to get them the way he wants.

The problem for Alonso is that time is not on his side. At 32, he is at his absolute peak as a driver, but he will be 33 in July and probably has only another couple of years before the effects of age begin to creep in. Even so, Alain Prost did not win his fourth title until he was 38. Nigel Mansell was 39 before he won his first. But Alonso has already been in F1 for 13 years and does not want to wait that long for another title, even if he could keep up his fabled motivation and consistency.

The third championship is extremely important to him. He admitted only last November that he would be "sad" to leave F1 with only two titles. He wants more titles, and his frustration at not getting them has started to show.

It is now well known that last summer he had serious conversations with Red Bull about joining them for 2014 – only to be rejected in favour of Daniel Ricciardo. The ramifications of those talks have been significant. Fearing they could lose Alonso was one of the reasons the then team principal Stefano Domenicali insisted Ferrari signed Kimi Räikkönen last summer – they could not afford not to have a world champion in the team.

But they did not lose Alonso, and bringing in the Finn did not go down →

Poor traction and a malfunctioning windtunnel mean the Ferrari F14 T is not quite the car it could have been



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If Alonso never wins another title, he's in good company...

Alberto Ascari 1952, 1953

Between the 1952 and 1953 Belgian Grands Prix, Alberto Ascari won every world championship F1 race. He'd even tried his hand at the Indy 500. But a move from Ferrari to Lancia in 1954 left him without a car, because the D50 failed to arrive until the end of the season. Then, in May 1955, he died testing a Ferrari sports car.

Jim Clark 1963, 1965

Like Ascari, Jim Clark was peerlessly quick – in 1967 he put his Lotus 49 on pole at the Nürburgring by nine seconds. He was in his element at the most demanding tracks, winning at Spa for four years in a row, and would have been champion in 1964 and '67 had his cars been more reliable. He was killed in an F2 race at Hockenheim in 1968.

Graham Hill 1962, 1968

Although perhaps not as naturally gifted as some of his contemporaries, Hill earned his success through grit and determination, taking BRM by the scruff of the neck to develop a title-winning car in 1962, and galvanising Lotus in the aftermath of Clark's death in '68. His F1 career declined after he overturned his Lotus at the 1969 US Grand Prix and broke both his legs.

Emerson Fittipaldi 1972, 1974

The talented Brazilian won his first world title just three years after touching down in Europe as a promising rookie. In 1972 he had the best car in the field – the Lotus 72 – and made the best use of it; at McLaren in '74 he honed the extant M23 chassis into a championship winner. Then he joined his brother's newly formed team and the cars were never competitive enough.

Mika Häkkinen 1998, 1999

F1's quintessential 'Flying Finn' remains an enigma; his F1 career was seven seasons old by the time he found himself in a car capable of winning races regularly, and by then he had already come back from a life-threatening accident. He blew hot and cold during 2000 and 2001 as McLaren lost reliability, then went "on sabbatical", never to return.

well with the incumbent, who did not trouble to deny that he would have preferred Felipe Massa to stay on.

At that time, Räikkönen joining Ferrari was perceived to be a threat to Alonso's position as the main man at Maranello. But in the early stages of the season it did not work out that way. Räikkönen was not comfortable in the car, and Alonso effortlessly outqualified and outraced him in both Australia and Malaysia. Räikkönen was ahead of him on the grid in Bahrain, after Alonso's engine lost power through qualifying, but Alonso passed him at the first corner, despite starting four places behind. By lap 40 of the race, one lap before the Safety Car came out, Alonso was 18 seconds ahead of his team-mate. In China, the gap turned into a chasm; Alonso finished third, a troubled Räikkönen eighth – more than 50 seconds adrift.

The relative performance of the two men may change as Räikkönen becomes more at ease with the car and it will probably fluctuate from track to track. But so far it seems as if Alonso will hold on to his position as Ferrari's number one, through the sheer force of his on-track performance.

Off the track, it may be another matter. The events of last summer harmed the relationship between Alonso and Ferrari. One seasoned Ferrari watcher, with contacts at the very top of the team, likens their relationship now to that of "a couple whose marriage is on the rocks but are forced to live in the same house".

Alonso admits Ferrari's competitive position is "not good" but says they can close the gap to Mercedes in time for him to mount a title challenge. "It is not possible to catch them in this first part of the championship," he says, "but there is a long way to go. We saw Brawn dominating the first six or seven races in 2009 then they struggled a bit at the end of the year. We have the resources, we have the potential."

Already, the paddock is bubbling with gossip about where Alonso will go if Ferrari cannot make progress. Three races in, their progress was already considered bad enough for Domenicali to resign. Alonso is contracted until 2016, but no company can force an employee to work for them if he does not want to, no matter how valuable he is. And with a salary of a reputed £23million – more even than Lewis Hamilton's £19.7m Mercedes retainer – Alonso is certainly that.



Despite his insistence to the contrary, Alonso saw Ferrari's recruitment of Räikkönen as a threat to his own position

And where would he go? Red Bull have already said no. McLaren were courting him last year, but that was when Martin Whitmarsh was in charge. Now, even if Alonso could be convinced McLaren's chassis department was a better bet than Ferrari's (and it doesn't look it), sources say Ron Dennis won't have him back. As for Mercedes, why break up Hamilton and Rosberg – a marketing dream, manageable off track and effective on it – to recreate the combustible mix of Hamilton and Alonso?

"Ferrari are doing 100 per cent," says Alonso. "We will work day and night to improve because no one is happy. We are united."

Whether out of necessity or desire, in reality, Ferrari are Alonso's best bet and he theirs. Together, they *have* to make it work. **F1**

Andrew Benson is the BBC's chief F1 writer

PHOTOS: ALASTAIR STALEY/LAT; ANDY HONE/LAT; LAT ARCHIVE

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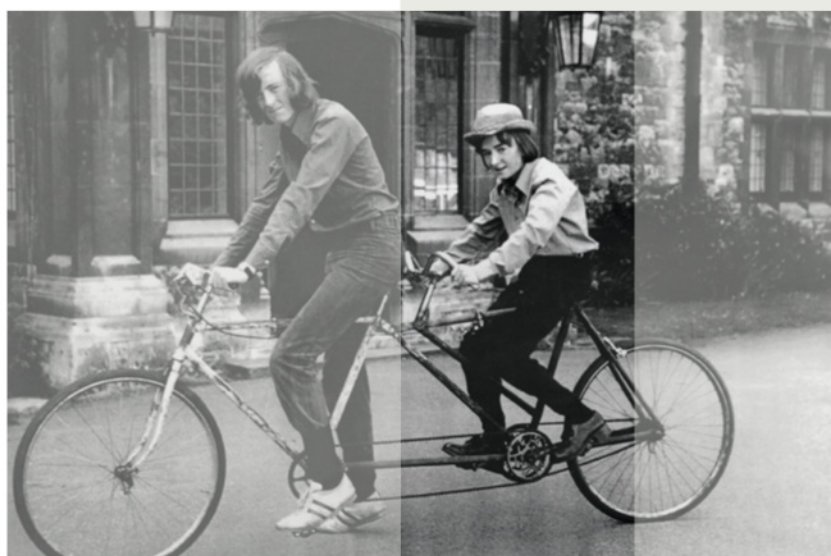


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THE LOWE I KNOW

WORDS PETER WINDSOR



Mercedes technical boss Paddy Lowe and Peter Windsor go way back – back to when they both worked together at Williams in the late 1980s. Here Peter reflects on a career devoted to a fascination with creative engineering



PHOTO: ANDREW FERRARO/LAT



Altitude, ironically, was on his side: he was used to running around at 6,000ft. He'd been doing it all his life in the Kenyan highlands. Hockey. Football. Out into the bush with his brother, Mike (pictured with Paddy, above left), bicycles pushed to the limit, their only directive to be home before dark.

He loved the cars, too. Every year they'd blast past his house, raising dust and scattering birds.

The East African Safari Rally. Nothing bigger. The whole school stood still as the rally thrashed its way across the land; and then, in the months that followed, plans would be drawn for the school's own version.

Here he was, then: 12 years of age and at the start of the Great Adventure. The course seemed to stretch for miles – first through the

grounds of the college, then out into the bush and back in a big, dusty loop to the football pitch. He'd tested as much as possible, checking that the Dinky was more adaptable than the Corgi. And he'd made his selection. It had to be something exotic and it had to be low and wide.

The Dinky DeTomaso Mangusta – but it wasn't just any old Mangusta. He'd never liked the bobbing effect created by the "real" suspension highlighted on the packaging. And so, delicately and with patience, he had removed the front springs and set up the car to run almost flat to the road. Then it was a simple matter of connecting the two elasticated wires to the nose of the Mangusta and making sure that everything was set at the right height and length.

The event was self-regulating. Hundreds of boys ran the course, pulling and directing their little cars while the rest of the school cheered and →

acted as marshals. It would be decided by time versus points deducted for the car flipping over or in some other way having to be rescued.

He finished second. He should have won it – could have won it – but he crashed the Mangusta once too often. The suspension, though, was perfect. His mod soon became the East African norm.

Shortly afterwards, Patrick Lowe's parents received notice from the Church of Ireland that their mission in Kenya had come to an end. The family would return to a new parish in Sevenoaks, Kent. Patrick would bring with him his independence, a burning desire to win... and an urge to create the things that could facilitate that independence and desire.

When you were born a Lowe, you had the choice of being either an engineer or a vicar, although one of Patrick's uncles had nicely taken a middle road by designing and creating church pipe organs. Patrick – Paddy, as he was known at Cambridge University, where he studied at Sidney Sussex College – definitely felt there was more to life than what we see or touch; he knew, though, that a prescribed religious doctrine was not for him: he was drawn to engineering like a magnet. He earned his place at Cambridge through his blazing results at Sevenoaks School – A grades in maths, further maths, physics and chemistry – and at university he went on smoothly to receive his MA in Engineering.

What next? So many engineers – so many people out there, all wanting to be a part of F1. In order to earn a living, he applied to a tech company in Grove, Oxfordshire (Metal Box – close to the current Williams factory) and was quickly hired. He worked there for six years, establishing himself as a first-rate systems engineer. His confidence growing, he then wrote to every F1 team, enquiring about openings. The only person to reply was Williams' Frank Dernie. It was late 1986, and Williams were developing a new active-ride car for the 1987 season. They were winning races with Honda; technology was moving quickly. Without even having to switch homes, Paddy slotted in seamlessly.

These were golden times. The Williams active-ride department was basically three people – Paddy, Steve Wise and Philip Farrand. "Looking back," says Paddy today, "we were right at the beginning of it all, although of course, even by then, we were using computer memory far in excess of anything they'd seen on, say, the Apollo missions."

In other words, creative engineers will always *create*, regardless of the circumstances.

Paddy's output (first at Williams, and then, from mid-1993, at McLaren) was thereafter spectacular. The Williams FW14B was a masterpiece that combined Patrick Head's overall engineering management with Adrian Newey's aerodynamics and Paddy's active-ride and traction control. We'll never see its like again.

That success, though, had a further impact. As much as Paddy enjoyed creating and contributing he also liked managing his little team within a team – he liked the problem-solving, liked motivating the people around him, steering the team through the internal politics of the company and the external forces of the sport. Paddy wanted more of this. He wanted greater responsibility. Clearly, that wasn't going to happen at Williams.

I remember chatting to Ron Dennis about Paddy late in 1992. Ron was vaguely aware of him but unsure. I said something about Paddy being a salt-of-the-earth kind of engineer who was capable of much more than mere design. "Is that so?" replied Ron...



By this stage I knew Paddy well. We had joined Williams at about the same time and quickly became water-cooler close, bonded, I think, by Paddy's total respect for Nigel Mansell. Paddy, to me, was also very different from the engineering norm: he was a person with whom you could talk rather than an engineer you were obliged to try to understand. We came back once from a pub lunch and as we climbed from my car I looked up at the big cooling towers of the Didcot Power Station and said, "Do you think all that steam is harmful in the medium-term?"

"Not really," said Paddy. "Besides, I like those towers. People are always moaning about them, but did you know that Didcot Power Station is one of the most efficient coal-to-electricity units in the country? I think it's quite inspiring to have it right by our factory..."

And so Paddy joined McLaren, heading up the R&D department there. Obviously Ron's plan was to develop the best possible active-ride system in the shortest possible time... but then active ride was suddenly banned by the FIA. Paddy, at this point, could have disappeared into engineering obscurity, having made the wrong move at decidedly the wrong time.

Instead, he created. Industrious. First there was a power brakes project. Then electronic power steering. Then an active differential. Then

At Williams, Paddy liked managing his little team within a team. He wanted greater responsibility

Lowe's creative genius at work in the 2014 Mercedes W05 (below left); the 2005 McLaren MP4-20 (below right) and the 1992 Williams FW14B (bottom)



the famous brake-steer device that Mika Häkkinen used so well. Then various ongoing simulator programmes. Then mechanical power steering. Then the 'electronic-shift' power shift. Then the 'F-duct'. Along the way, Paddy was also of course at the cutting-edge of electronic programming and development, which meant his work laid the foundation for today's standard ECU. Equally, he was the engineer who developed the code base for its software, using high-level graphic tools that at the time were considered too risky for the establishment.

By the end of it all – the end of 2012 – Paddy had climbed to the position of technical director at McLaren. Races and titles had been won. And the feelings were familiar: if he could run a 200-strong engineering department at McLaren, and could feel that perhaps he would have made a different decision here (so far as driver choice goes) or another move there (so far as an FIA ruling went), then definitely he should be pushing himself harder.

Easy to say; more difficult to enunciate.

What was really happening was that by 2012, Paddy was as much about people – caring about them, thinking about them – as he was about high-level code. He famously came up against Max Mosley at the 'Spygate' hearings in Paris in 2007, yet came away not chastened but full of respect. "Max Mosley is one of the cleverest people I've ever met," he said at the time. "I've learned a lot from him. I've always tried to learn from people like him – to look at the things they've done well and to wonder if I would have done things differently."

How, though, to take that next, massive step? He certainly felt ready to run a complete F1 team but the jump from engineering to the other side of the Formula 1 spectrum still seemed discouragingly vast. "I'm sure you feel this way at every level at which you grow in your career," he says. "It took me a number of years to arm-wrestle McLaren into giving me →

"It took me years to arm-wrestle McLaren into giving me a title that reflected my position there"

a title that reflected my position there, even though I effectively took the responsibility of technical director when Adrian [Newey] left. As time goes on, your horizons expand. In my last two years at McLaren I had a sufficiently good team around me to enable me to look at some of the decisions being taken above me and to begin wondering if I would have done things that way or not. For me this was a good sign. It was a sign that it was time for me to try something different.

"And in the context of what I've just said, I don't mean any discredit to Martin Whitmarsh. I learned a lot from him in the 20 years I worked for

Over a cup of tea a couple of weeks ago, Paddy was telling me that he had just spent the morning getting to know the most recent nine employees to join the team; none of them were in engineering. All of them welcomed the chance to sit and chat with the man who makes decisions. Few are the middle-management layers – or interminable, leaderless meetings – at today's Mercedes AMG Petronas.

Paddy lives a quiet life. A new apartment in Oxford. A drive along the M40 for an 8.30am start. A Hitchcock movie or two and a beer when there's time for that in the evenings. A trip to Edinburgh to see his daughter


on stage. Chats with his brother, who is an engineer at Imperial College, London. Meetings with Toto at least three times a week. Less time, perhaps, for innovative technical thinking, but more time for ensuring he has the right people with him and thus the right environment for the propagation of creativity.

Talk to Paddy about the new engine regs, the fuel-flow meters, the engine note, the TV feed, and you come away thinking this: 'I love his F1. I love the technology. Now I understand this. I understand energy storage. I appreciate fuel-flow. Lewis versus Nico. Nico versus Lewis. I understand Nico's engineering team. I understand Lewis's engineering team.'

I asked him, over that cup of tea, what the closing moments of this year's Australian Grand Prix in Melbourne were like. How were his nails, in other words? "Actually it wasn't too bad," he said with his familiar sparkle. "We just came up with

lots of devices to distract us from thinking about all the things that could go wrong. First we all had a laugh about how we had to avoid the Christian Horner foot-tapping moments. Then I had the pleasure of calling Andy Cowell (who we'll hear from on page 84) to say that he should be ready for the podium. That took a bit of time, so that was another couple of laps gone. Then we had a laugh about something else and then Nico crossed the line. It was only when he was half-way round his slow-down lap that I remembered I had to get on the radio to congratulate him..."

He could have been talking about a Dinky DeTomaso Mangusta and the way you improve its performance by removing the front suspension. He could have been discussing the way contemporary vacuum systems actually make it harder to cut the grass evenly.

Such is life for Paddy Lowe: detail. Persistence. And always a balance between engineering it and putting it into play. 



People-person Paddy with new team-mates: Lewis Hamilton, Toto Wolff, and Nico Rosberg

him and if, in the end, I needed to grow beyond that, it's a sign, I think, that he was a good teacher."

As if by magic – but in reality because of connected events – Paddy was approached by Toto Wolff. Toto, by then, was at Williams, working around his minority shareholding. Toto saw in Paddy a quality that probably no other person of F1 influence had seen or would allow themselves to see.

The Williams talks went a fair way; then, in the late summer of 2012, Toto received his Mercedes offer. His considered response was that Paddy should be a non-negotiable part of the new package. To his credit, Niki Lauda was quickly convinced.

And so we have it: this amazing combo. Team orders on the pitwall? Paddy's call (but it'll be a logical call, you can be sure, based on all those years of hard work and a feel for what is right for the cars, the team and the drivers). Team structure and factory organisation? Paddy again.

PHOTO: STEVE HERRINGTON/LAT



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BRIGHT SPARK

The power, efficiency and reliability of Mercedes' 2014 power unit has left rivals gasping. Mercedes AMG High Performance Powertrains MD Andy Cowell explains the secrets behind their success

WORDS STUART CODLING PORTRAITS THOMAS BUTLER

Some engineering companies hide their light under a bushel, tucked away in anonymous units in industrial estates. But pass by Brixworth, along the winding A-road that connects Northampton with Leicester, and there's no mistaking the sweeping roofs of the elegant buildings that contain Mercedes AMG High Performance Powertrains. This is a company unashamed to bear testament to past, present and future: turn left into Mercedes Avenue, then left again into Morgan Drive, named after company co-founder Paul Morgan, killed in a plane crash in 2001.

It's amusing to note, given the bluster directed at the noise – or lack thereof – of the 2014 F1 power units, that within the factory is a calm hush. Alongside reception,

the Mercedes V8 that powered Lewis Hamilton to championship glory at the 2008 Brazilian GP sits on a plinth; to the right is the engine that helped Jenson Button attain the same feat one year on. And behind the stairs is the pushrod 500L that propelled Al Unser Jr to victory in the 1994 Indy 500.

"We're just getting on with it," laughs Mercedes AMG HPP managing director Andy Cowell. "Down by the dynos, that's where all the excitement is."

"Getting on with it" is a recurrent phrase in the Cowell lexicon. He joined the company, then Ilmor Engineering, as chief engineer the January before Unser Jr's Indy victory. Back then, Mercedes' involvement was only just shifting from an enigmatic 'Concept by Mercedes-Benz' logo on the air

intakes of the Sauber into something more like an explicit involvement in F1.

Cowell talks like a no-nonsense engineer – grounded in practicalities but unafraid to think big. He's focused, too. And so far this year, it's job done: the Mercedes PU106A Hybrid power unit is the one to have if you want to win races. It's no surprise, therefore, that the man in charge at Brixworth was given the honour of picking up the trophy for winning constructor at 2014's first race.

"That was surreal," says Cowell. "We'd done winter testing, gone through practice, had a few issues, had the excitement of wet qualifying and then pole position for Lewis – but then the heartbreak of Lewis's misfire. That was bearing heavily on us even as we were watching Nico storm away."

Last month in *F1 Racing*, we pondered whether Mercedes had overperformed relative to expected performance, or whether their rivals had underperformed. Renault's Rob White admitted that they had fallen short of the benchmarks they had set themselves, leading to slipped deadlines. Certainly in early January, *F1 Racing* received word that Renault were encountering problems that Mercedes and Ferrari had already experienced and fixed. →



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"There was a motto on the assembly hall wall of my son's nursery school: 'Shoot for the stars and you'll clear the trees.' At Mercedes, all our targets for the new power unit were set like that"

The development of the Ferrari engine was also pretty eventful. Shell's frank promotional documentary *Horse Power* reveals the moment it was fired up for the first time – and promptly went up in smoke. Mercedes, conversely, have done their learning behind closed doors – among other things, quietly developing an in-house second-generation KERS while that technology lay fallow during the 2010 season.

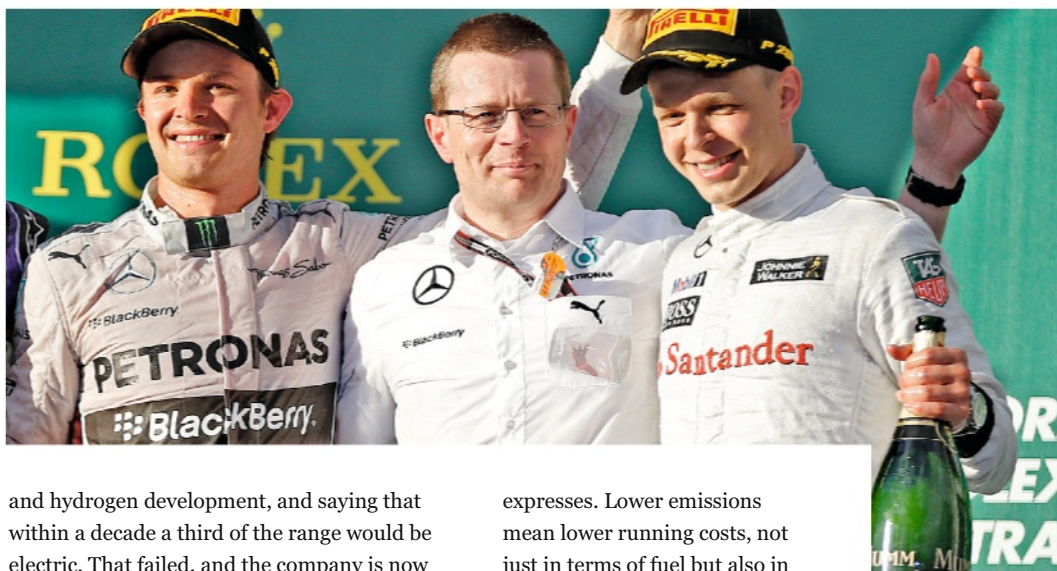
"There was a motto on the assembly hall wall of my son's nursery school: 'Shoot for the stars and you'll clear the trees,'" says Cowell. "That's an approach I've always tried to follow but I hadn't seen it phrased like that until then. I thought, 'Yeah, that sums it up.' When anyone joins this company they're shown a values video about what we stand for – innovation, striving for success – and everyone hears that motto.

"All our targets for the new power unit were set like that. If there was an FIA limit, we were going to be right on it. We weren't going to dance around in between. So, on the mass, we were going to be right down on the minimum. On the power – right there on the maximums. On efficiency, we shot for stuff people didn't think possible – that *we* didn't think possible.

"We were ready to put up our hands if we needed support. The Stuttgart R&D group have experience with hybrids, turbochargers and direct injection. If anything went wrong Dr Thomas Weber and Bernhard Heil [directors at Mercedes HPP] offered up experts who were enthusiastic *and* determined to help us. Some good relationships have been built up between Stuttgart and engineers here through that."

This is the crux of the problem facing Renault and Ferrari. Neither have invested in hybrid technology at Mercedes' level – in the road-car world – or built up the necessary expertise.

In 2009, Renault bet the farm on all-electric vehicles, publicly announcing the end of hybrid



and hydrogen development, and saying that within a decade a third of the range would be electric. That failed, and the company is now playing catch-up on hybrid technology, with new models anticipated this year.

Ferrari have one in the range, the LaFerrari, which uses a development of the existing F1 KERS to reclaim energy from the brakes and deliver a mild boost to acceleration. Ferrari's parent company, Fiat, have just one hybrid on the road – the 500e, and that (by admission of CEO Sergio Marchionne) exists only to satisfy regulations for marketing cars in California. So even if Ferrari's F1 engineers went cap in hand to their parent company for support, they would, like their Renault counterparts, find the cupboard of hybrid expertise is bare.

Budget is also a factor, although Cowell denies their strong start has come through outspending the opposition: "It hasn't required a crazy amount of investment in terms of hard cash going out the door or being spent on equipment inside the factory, or huge numbers of people."

Mercedes have pushed ahead with hybrid development of road cars because the majority of their vehicles become taxis or plutocrats'

expresses. Lower emissions mean lower running costs, not just in terms of fuel but also in emissions-linked vehicle tax. One current E-class hits the 0-62mph acceleration benchmark in under eight seconds, but qualifies for £20-per-year vehicle tax in the UK and is exempt from London's congestion charge. Their current print ad campaign, pegged on the back of successive F1 wins, draws an explicit link between the race-winning W05 and the forthcoming S500 super-hybrid.

No surprise, then, that Mercedes were among the cheerleaders for introducing this technology to F1, and board member Dr Thomas Weber recently admitted the company would have withdrawn from the sport in 2009, along with BMW and Toyota, if the new technical package hadn't been in the offing. "We had the discussion [about withdrawing]," he told the BBC. "Now with these new regulations I can clearly convince the supervisory board that the [F1 team] are doing exactly what we need – downsizing, direct injection, lightweight construction, fuel efficiency on the highest possible level, new technologies and combining a combustion engine with an e-motor hybrid."

But, since F1 is a sport largely run by wealthy and out-of-touch old men, it isn't even using the word 'hybrid'. Instead, its principals bleat about engine noise and "taxi-cab racing". Few of them are able to grasp the tremendous engineering →





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Brixworth's landmark engines



2175A

Before Mercedes-Benz bought into the company, Ilmor made a low-key entry into Formula 1 with the 3.5-litre 2175A V10 engine, which powered the Leyton House CG911 (left) in 1991. It wasn't an especially competitive car, but Ivan Capelli claimed the first points

with an Ilmor engine by finishing sixth in Hungary. For 1992 Ilmor also supplied Tyrrell, then moved exclusively to Sauber in 1993. Mercedes took a 25 per cent stake in the company at the end of the year, and all Ilmor engines carried the Mercedes logo from then on.



FO 110E

Mercedes kicked Sauber into touch for 1995 and partnered with McLaren, but it wasn't until the second-generation 3-litre V10 arrived in 1997 that they started winning, with David Coulthard claiming the honours in the MP4/12 (left) at the season-opener in

Australia. But the FO 110E and its successor, the FO 110F, weren't paragons of reliability: Coulthard and Häkkinen each suffered four engine failures during races, plus many more in practice sessions. At the Luxembourg GP, McLaren were in the running for a one-two... until both engines failed.



FO 110H

Even as Mika Häkkinen dominated the 1998 championship in the FO 110G-powered McLaren MP4/13, Brixworth were already in the process of developing the lighter, lower and much more powerful FO 110H. Häkkinen would need it – the new MP4-14

(above) was an edgier car than its predecessor and a bit less reliable, which would mean the world championship would go down to the final race.



FO 110R

Having lost out in the power stakes to Ferrari during the early 2000s, Brixworth hit back with the final iteration of the FO 110 family in 2005. Now producing over 900bhp and revving up to 19,500rpm, this version of the V10 was now reliable enough to

last the mandatory two races. In spite of the fragility of the MP4-20 (left), Kimi Räikkönen pushed Fernando Alonso hard – just missing out on the drivers' title.



FO 108W

It was all change for 2006 as Mercedes introduced the 2.4-litre V8 FO 108 family in line with the new engine regs. Along with a standard ECU, homologation arrived in 2007 – the so-called 'engine freeze' – and a rev limit of 19,000rpm. Although both 2007 McLaren

drivers fought for the title, which Lewis Hamilton won in 2008, perhaps Mercedes' most dominant year was 2009 thanks to the Brawn BGP 001. The FO 108W, now capped at 18,000rpm, won ten out of 17 races, letting Hamilton take the first win for a hybrid engine in the MP4-24 (above left).


"The road-car world is now all about hybrids. We embraced that and are seeing results on track. For a group of engineers, that's hugely motivating"

that they lie at each end of the engine block, connected by a shaft running through the vee. This must have been hard to engineer, because the shaft has the exhaust gases and MGU-H trying to spin it in one direction, while the air coming into the compressor provides resistance – so the longer the shaft, the more likely it is to fail due to vibrations and torsional stress. How much this system contributes to the W05's pace advantage is tough to quantify – Cowell, naturally, is cagey – but it must have been worth the pain.

"Sometimes you come up with an idea where you think, 'How on earth will we make that work?' but you understand the benefit if you *do* make it work," he says. "What you're describing [the split turbine and compressor] is one of many ideas, and probably many unique features, that sit in the back of that car. It happens to be visible – there are now a couple of photos of it. That's life in motorsport. But it's one of many and they were all challenging."

Renault and Ferrari have a lot of ground to make up, but the task isn't impossible. Power-unit spec will be frozen – but gradually, in annual stages, so as not to close the door to new manufacturers.

For now, 92 per cent of the present power unit design is open to development for next year. So the development race is still on.

"There isn't a single engineer in this business who develops a system then stands back and says, 'That's the best I can do,'" says Cowell. "I'd be disappointed if we didn't make reasonable gains. Everybody has had ideas, based on our journey to that first race, and they are being put together ready for next year. I can't put a number on it, of course..." 



achievement F1 2014 represents, and neither the promoter nor the governing body have troubled themselves to push the message.

"We should take it as a compliment," says Cowell. "When things change, there are always a few people who are resistant. The rules, the timeframe and the opportunity have been the same for us all. We've had the advantage, like Red Bull and Ferrari, to work closely with the chassis designers to develop a car that fits like a glove around the power unit. I think we as a

sport need to focus on the good things that are coming out of the technologies we're developing.

"From our perspective, the road-car world is now all about hybrids, about efficient use of the fuel energy that's available and recycling the waste energy that would normally go to a braking system or down the tailpipe. We embraced it and are seeing results on track. For a group of engineers that's hugely motivating."

Mercedes are the only manufacturer to split the turbocharger's turbine and compressor so



In conversation with

Steve Nielsen

Toro Rosso's sporting director started as a truck driver and worked his way up. After he attended his 500th GP in Spain last month, we caught up with the F1 stalwart to discuss his work in Faenza

INTERVIEW JAMES ROBERTS **PORTRAIT** GLENN DUNBAR/LAT

What exactly does a sporting director do?

It's a role broadly similar to that of team manager: you're in charge of the workforce that comes to the racetrack. A race team takes 60-80 people to each GP, while there are another 300 or so back at the factory in Faenza. My job is to ensure the garage side of the workforce is operating and building the car to deadline, and that we stay within the regulations.

Have you memorised the new regulations?

Some you have to know as during a pitstop or restart you don't have time to read through them all – so you need instant recall in certain areas. But then there is stuff about the podium ceremony I don't know, but I'll have time to read up on it by the time I need to know. At other times you can use the regulations to try to get an advantage over a competitor – Safety Car periods often throw up rules you can exploit to your advantage. I also test our drivers at the beginning of each year to make sure they know the regulations.

Have you ever been to see the FIA stewards with a driver after an incident and known he was at fault?

Yes, many times. Sometimes you're there with a driver you know is innocent and it's straightforward. At other times, you go in knowing he's the guilty one and you'd be a fool to think you can turn guilty into innocent. Then it's all about mitigating the penalty.

At Renault in 2010, I went to see the stewards with Vitaly Petrov after the Japanese GP. He'd had an accident at the start and was clearly at fault. If there was a gap big enough for a bike he'd try to put his car in it. He was very upset, saying they only wanted to see him because he'd had a penalty at the previous race. I tried to explain they wanted to see him because of *this* incident. He felt very hard done by, but you do get drivers who believe they're right beyond all reason.

Is the introduction of penalty points on a driver's superlicence a good idea?

We used to have a series of reprimands whereby if the driver had three reprimands for driving offences, he would be suspended or banned for a race. So while the penalty-points system has garnered headlines, it's only really an extension of what we already had. Drivers aren't intentionally reckless, but sometimes the red mist might descend at the start of a race, or they might make a move they regret afterwards.

FACTFILE

Date of birth 2 July 1964

Place of birth Cotswolds, UK

Team Toro Rosso

Role Sporting director

2013-present Sporting director at Toro Rosso

2012 Sporting director at Caterham

2010-2011 Sporting director at Renault (later Lotus)

2001-2009 Team manager at Benetton (later Renault)

2000 Team manager at Arrows

1995-1999 Team manager at Tyrrell

1995 Assistant team manager at Benetton

1991-1994 Assistant team manager at Tyrrell

1987-1991 Spares coordinator at Lotus

1986 Truck driver at MSL, an F1 catering company. Later Lotus's test-team truck driver

When drivers like Romain Grosjean or Sergio Pérez have been in trouble in the past, the problem is that other drivers lean on them at the start, knowing they will be timid about having an accident. You have to take that into account. I personally think the penalty points system is a good thing, particularly as it's cumulative over 12 months and not just confined to a racing season. So those with nine points on their licence will conduct themselves differently.

You've previously worked for Tyrrell and Renault.

How do Toro Rosso differ from the British teams?


At lunchtime in Britain everyone has a sandwich at their desk, and after about 30 minutes they carry on with their work as they'd rather go home at 5.30pm. In Italy, lunchtime is sacred. It's an hour and a half, no one works during that time and a lot of people go home. The flipside is that they have no problem working late into the evening. So it's not about being work-shy, it's about cultural differences. When I first joined I didn't think I could work this way, but you embrace it, head off for pizza then stay late in the evenings. The work gets done – just in a different way.

How have you adapted to the new engine formula?

We had a tough start to 2014 in terms of reliability and didn't do as many laps as we'd wanted to do in pre-season testing. But at the opening race we were fortunate enough to get a handle on the car and started to see the strengths of our new driver, Daniil

Kvyat. Both he and Jean-Eric Vergne are very talented, and because they are closely matched, they'll motivate each other and push the team along.

Have you been surprised at how calm Kvyat is, considering he's only 19?

Yes – I have to remind myself that he's three years younger than my own son: talking to him makes me feel very old! He has a calm head on his shoulders and doesn't seem to be fazed by much. He also has a good memory; you don't need to tell him something more than once. His biggest problem was on the last few laps in Malaysia. It was physically hard for him and we could tell he was exhausted but, impressively, his lap times didn't waver. Many drivers make mistakes on the last few laps there, but you couldn't tell from his driving he was struggling at all, even though we knew he was. He'll have a good season and, I think, a decent career in F1. 

“My left leg swivelled so badly on impact it crushed the nerves. There was a stand-up argument between Prof Sid Watkins and the surgeons about whether to keep the leg or take it off”

In 1990 **Martin Donnelly's** first steps in F1 were halted by a terrible crash at Jerez. Now policing the grid as a driver steward, he's heard all the excuses...

PORTRAITS DREW GIBSON

With a burgeoning grand prix career cut short by an accident that wasn't his fault, Martin Donnelly has every right to feel aggrieved. Yet almost 24 years on, the only indication of that terrible crash is a stiff-legged walk as the Ulsterman bustles cheerfully through whatever opportunities life presents. It is the key to the demeanour of a man who knows he is lucky to be alive, even though wins in every formula up to and including F3000 ought to be the consolation prizes in a career that, by rights, would have included success in F1.

Donnelly will have none of it. His cheeky grin and machine-gun delivery demolish pointless speculation and the anticipation of finding a man who feels sorry for himself. Donnelly is, by his own chirpy definition, a 'blagger'; a match for Eddie Jordan, a key player in Donnelly's life. Martin used a streetwise ability – born of a father who worked all hours in Belfast's vegetable market and shaped by an opportunist's climb to F1 – to run his own team and now, in the latest phase of his life, to act as an F1 driver steward.

He's the perfect choice. Because when it comes to racing excuses, Martin Donnelly has



heard them all and, in some cases, invented them himself. We're meeting in Nick's Diner, a family restaurant with a motorsport theme in the remote village of Deopham in Norfolk. The *craic*, as we say in Ireland, is bound to be great.

Maurice Hamilton: I said this to Martin Brundle, and now I'm asking you: why on earth would you want to settle here when it's miles from everywhere in racing except Snetterton?

Martin Donnelly: Ralph Firman and Van Diemen. It's where you had to be when starting out – in my case, in Formula Ford 2000 in 1984. If it was good enough for Ayrton Senna, it was good enough for me! I was working for Ralph

and if we needed new parts – gearboxes, engines, whatever – I'd get in the van and head off to places like Chichester or Bath. Miles away. Only parts of the M25 had been built. It would take forever and a day. That was the works deal at the time. And I was glad to have it.

MH: This was because you were getting serious, having served your apprenticeship in club racing in Ireland. Had you always been into motorsport?

MD: It came through my dad. For him going racing was a hobby, but he had this idea that when I was old enough we'd go racing together. He raced Hillman Imps, Sunbeam Rapiers and so on. After a long week at work in the vegetable market, he'd go to Kirkistown, meet up with his mates and have a few scoops [drinks], with a bit of racing in between. He never missed a day's work in his life, so this was his excuse to let go.

I was about ten years old. While he was in the marquee drinking with the lads after the racing, I'd drive his MGB with Alan McGarrity. We would drive these cars round and round. So long as there wasn't too much tyre squealing, nobody gave a damn. But the downside came when my dad and his mates were kicked out of the marquee. They'd go off to the Mermaid pub in ➔



Kircubbin village and get ensconced in the room at the back. I was stuck in the car and they'd send me out an orange juice and a packet of crisps.

One day I got so bored, I found a head gasket and started trying to peel back the layers of aluminium but split my fingers quite badly. I thought: 'Right! I'll spread the blood up my arms and over my face and then walk in and tell my dad I'm bleeding badly and he'll have to take me home.' He took one look and said to the landlady: "Take him upstairs and get him cleaned up." Which she did. Then I'm sent back to the car with more orange juice and crisps. My escape plan didn't work at all.

MH: I remember going to Kirkistown and, on the way home, seeing all these racing cars on trailers and saloon cars with competition numbers parked outside the pub. Loads of them. Half the grid had to be in there.

MD: Those were the days when you could drink and drive. It was pretty wild when you think about it now, because a lot of them would then race each other home; a handicap race of sorts!

MH: Kirkistown was a very basic place, wasn't it? Cow shit everywhere.

MD: You'd go testing and the old guy on the gate would say: "Okay boys, just watch out for goats and cattle. They're down near Debtors Dip [the first corner]." So you'd spot them and that would be okay – until suddenly you'd notice they weren't there any more. You'd be going flat-out and wondering where they'd got to.

MH: So, as soon as you got yourself a licence, you went racing?

MD: For my first couple of races, I didn't have a road licence. We scammed that one. We'd go to scrutineering and my dad would say: "Get your competition licence out, son." And I would say: "You've got it," and he would say: "No, you've got it. I left it on the mantelpiece for you to pick up." So dad would tell the official this is what happened and he'd tell us to bring it next time. We did that twice, but obviously made sure it was a different official. I was 16 and racing a Formula Ford Crosslé 32F that dad had bought.

MH: You turned out to be good enough to catch the eye of a guy called Frank Nolan. You had his name on your crash helmet when I first met you. What's the story?

MD: Frank was a builder who lived just outside Dublin. He was sponsoring a guy called PJ Fallon in 1981. When Frank realised that PJ was not keen on racing outside Ireland, he was looking for some young kid to go to the UK and kick arse. I had been beating a lot of good people in Ireland, so he gave me a call.

The timing was a bit awkward. My family had paid for me to go to boarding school for seven years to get away from The Troubles in Belfast. Then I was accepted by Queen's University to study engineering. I had only been there for a fortnight when I got this call from Frank saying he'd like to back me in FF2000 in England.

My mum was really very unhappy about the whole situation. She said to me, "You're just like your dad. You're going off to England to piss away seven years of boarding school and now you're starting university, with all the

costs for books and so on." But I knew it was an opportunity that was unlikely to come along again. I spoke to the dean at Queens. He said: "Okay. I understand the opportunity is great, so go off, fill your boots for a year and, if it doesn't work out, come back and pick up where you left off." I never did go back.

By January 1984, I'd packed my bags and was living in England with Ralph and Angie Firman. I did that for a couple of months before finding lodgings with a lady called, would you believe it, Mrs Happybreeze. She was 80 years of age and she became a sort of surrogate mother to me. She'd cook my supper, darn my socks, screen my phone calls... she really was marvellous. I stayed with her for four years – I had a lovely comfortable bed and paid just £25 per week. Happy days!

MH: Meanwhile, Frank Nolan was as good as his word, but I seem to remember that came to a very sad and unexpected end.

MD: He had a massive coronary at his daughter's 18th birthday party on 13 April 1986. There were three people – three Irish people – who were very influential in my life when it came to getting into F1. My dad got me started; Frank Nolan took me to the UK; and then there was EJ [Eddie Jordan]. I can say, hand on heart, that if Frank hadn't died so unexpectedly, I wouldn't have got together with EJ.

MH: You were into F3, driving a Ralt with Frank paying half of the £160,000 bill. You won at Macau and, by then, the F1 teams were taking a close look at you. Where did EJ fit into this?



Left: Donnelly competing in Formula Ford in Ireland in the early days, sponsorship courtesy of his dad's fruit and veg business. Above: Racing for Frank Nolan at Thruxton in 1985 in a Van Diemen RF85



Donnelly takes his first win in F3000 at Brands Hatch in 1988, for Jordan Racing



"Hand on heart, if Frank Nolan hadn't died so unexpectedly, I wouldn't have got together with EJ"

MD: EJ had offered me a free F3 deal for '87 using his Spiess engine. I said no because the Spiess engine would never work. He gave that deal to Johnny Herbert, who then became British F3 champion. By 1988, EJ was in F3000 and one of his drivers, Thomas Danielsson, had to stand down due to an eye problem. EJ wanted £30,000 to put me in the car for the last five rounds. He thought I had the money from Frank's estate, but Frank hadn't left a will and his assets had been frozen. I signed, knowing I could never afford to pay. Underneath this contract – surprise, surprise – was another one from EJ; a management contract. He wanted 50 per cent of everything I earned, which at the time was about 50 pence. He wasn't going to get 50 per cent unless I was earning, so I signed. Job done. I thought: 'I'll drive the car and let that do the talking. I'll play EJ at his own game.'

MH: And the message came through loud and clear; you were quick. You got on the podium a few times then Johnny had an accident in the other Jordan at Brands Hatch and you took your first F3000 win. Did EJ ever get his £30,000?



In 1988, Donnelly signed an F3000 contract, entitling EJ to 50 per cent of his earnings

MD: He stopped asking because he realised that it wasn't coming. But he had me completely tied up in a management contract. It was like he was my pimp. He had me driving sportscars in Japan and all over the place – anywhere he could make money. But I was getting results, and it launched my name on the international scene; Martin Donnelly was hot property. And then, of course, Lotus came calling.

MH: How did that work with EJ when you got a contract as reserve for Lotus in 1989?

MD: It all started to happen when Derek Warwick hurt himself in a charity kart race. EJ was on the phone like a shot to Jackie Oliver of Arrows, offering me as a replacement based on some quick times I'd done in the Lotus during testing. I made my F1 debut in the 1989 French GP. There was a big shunt at the first corner and I must have hit some debris; a wishbone was →

bent. I took over the spare Arrows for the restart but it was set up for Eddie Cheever; very difficult to drive with massive oversteer. I finished 12th.

MH: And you got a Lotus contract for 1990. You were starting to make progress by the time you got to the Spanish GP at Jerez in September. I've got your lap times from that qualifying session and you were absolutely on it when the front suspension broke. The lap until that point had been an absolute blinder, hadn't it?

MD: A stonker, yeah. The first two sectors were quick; they said it was going to be P5.

MH: Which, for that Lotus-Lamborghini, would have been like a Caterham being in the top ten.

MD: The tub was from the previous year. When they got the Lamborghini V12 for 1990, all they did was redesign the back end of the car. It was a heavy engine, so they made the tub lighter to save weight. When the car struck the barrier, it just disintegrated.

MH: Ironic, isn't it, that the chassis disintegrating actually saved your life. You were thrown out of the car with the seat still attached to your back. Not that you knew any of that at the time. I'm sure you've been filled in since on the extraordinary work Professor Sid Watkins had to do, just to get you stabilised.

MD: My left leg swivelled so badly on impact, it actually crushed the nerves. The surgeons in the hospital in Seville wanted to amputate because they couldn't control the blood; the arteries had

been damaged badly at the top of my thigh. But Sid had grabbed a young guy from the circuit and asked if he spoke English. When he said yes, Sid dragged him to the hospital, right into the operating theatre, to translate what they were saying. The surgeons wanted this guy thrown out and there was major aggro; a stand-up argument between Sid and the surgeons about whether to keep the leg or take it off.

MH: And Sid had to fight all over again when you got to the London Hospital and the artery burst.

MD: That's right. His colleagues wanted to amputate. Then there were the jump starts he had to deal with when my heart stopped twice. Your body only has a certain amount of elasticity to it. Your neck will go so far and your innards will go so far. I hit the barrier at 42G but, according to Sid, I went with the inertia when I came out of the car.

Sid knew that bones heal. But he said with a body going through that amount of G-force, all the internals go into shock and fail. He gave me one of those injections that paralysed every muscle in my body for the flight back to his hospital in Whitechapel. The very next day, what he predicted happened. All my internal organs just shut down. My kidneys, my lungs; everything stopped. I was on a respirator for six weeks and kidney dialysis for a month.

MH: I went to see you in ICU. It was hot; there was a lot of ticking and whirring and clanking,

tubes going in all directions. You were lying there, one eye shut, the other open. Your mouth was open; I could see the fillings in your teeth. You were a translucent grey. Your fiancée, Diane, having been through it with other people coming to visit, was looking for the signs. At one point, she grabbed me by the arm and said: "I think you'd probably like to leave now." I was on the point of passing out.

MD: Derek Warwick is a hard man, as you know. Diane had primed Derek before he came in, telling him he was about to see someone he knew but might not recognise, so to be prepared. He took one look at me – and collapsed.

MH: You weren't a pretty sight, Martin. But you were absolutely determined to walk down the aisle for your wedding. It was quite an emotional moment. That was the first time I'd been to a wedding where the congregation applauded as the couple walked by. But you were still in a very wobbly state, weren't you?

MD: My weight was down to about 58 or 59 kilos. I'd badgered Sid. I had these pins in my leg; four at the top, four at the bottom. I had them taken out because I was going to Willi Dungl's place in Austria. I had it in my mind that Willi had got Niki Lauda driving again after six weeks in 1976; he'd got Gerhard Berger back again after his burns at Imola in 1989. He was the guru at the time. I thought I'd go to Willi's, he'd wave his magic wand and, in two or three months' time, I'd be back behind the wheel. That's what I honestly believed. I didn't appreciate the extent of my injuries.

There were two plastic casts on my leg with a hinge at the kneecap. If you moved the leg even 4mm, I was in absolute agony; it was horrendous. For the journey out there, I had to be carried up the steps to the plane in a wheelchair, down the aisle, onto the seat, and people would bang into the leg. I don't know how many times I was in tears going to Willi Dungl's.

They took the wheelchair away when I got there and I was given crutches. I was so weak, I could hardly move an inch. All the muscle had gone. The first couple of weeks, I was learning to walk again. Then we realised the muscle was stuck to the femur. Willi was saying there was nothing more he could do unless I went back to England and had an operation.

We took the cast off the leg and, obviously, your skin dies when it's been under a cast for some time. They ran me this hot bath with special chemicals to soak in and just to freshen



Making his F1 debut with Arrows at the 1989 French GP, where he finished 12th in the spare car



The remains of Donnelly's written-off Lotus 102 are removed from the track at Jerez after his horrifying 140mph crash

"I stood up and put some weight on the left leg and, from the knee down, it just bent like an S-bend"

up. As I stood up in the bath to dry myself, I put some weight on the left leg and, from the knee down, it just bent like an S-bend. It wasn't hurting because I'd no nerve down there. The guy at Dungl's said, "Oh God, that's not right!" The doctor arrived and said: "That's still not fixed. Back to hospital."

I told everyone I was getting married and that I had to walk down the aisle. We made a plastic splint, starting under the foot, over the back of the leg with four Velcro straps. I wore that under my trousers to give the leg the support I needed to walk. I'd made a promise. Job done!

MH: And the problem remains with that muscle fused to the thigh. Is it difficult getting yourself mobile in the morning?

MD: I guess it is, but I don't notice any more. It's not that I don't think about it. I'm reminded when it comes to slopes because I can't bend the leg. If there are banisters either side, I can be as quick as anybody going up or down because my biceps are strong. The kids [from his second marriage to Julie] can't get over it; I'm down the stairs like a ferret. The nervous system feeds your muscle. If the nerves don't operate the muscles, the toes retract. The sole of your foot is basically



PHOTOS: LAT ARCHIVE

Professor Sid Watkins was on the scene at Jerez and fought to preserve Donnelly's damaged leg

one big muscle but, because it's not been fed, it wastes away. So, over time, the bone in your foot becomes more and more exposed on the surface. You end up walking on bone and because my foot got mangled, the heel is now underneath the foot. So you go to the hospital and they →

flatten off the bone so you can walk. My left shoe is built up by an inch and five-eighths because of the amount of bone I lost.

MH: Do you have to have an automatic car?

MD: No, I drive with a manual gearbox but, instead of being able to flex my foot and stretch the left leg, I have to push from the hip. I've developed a technique – which I refer to as 'River Dance'. If my left foot is off the clutch pedal for some time on a motorway, I haven't got the mobility or the flexibility to get it back onto the clutch pedal. So, I take my foot off the throttle, dip the clutch pedal with the right foot then flick the left foot onto the clutch. I don't even notice it now. Anyone sitting in the back seat would have no idea what's going on. It's very smooth.

MH: You always were! The one major handicap from a racing point of view was that the leg stopped you from evacuating the cockpit in five seconds. Without that, could you have driven a Formula 1 car again? Could you left-foot brake? You've got to hit the pedal really hard these days.

MD: I probably couldn't manage that. When I walk, I can't feel the pressure on my left foot or leg. So if I stood up now, I couldn't tell you if it was 100 per cent or 10 per cent.

MH: I could forgive you for feeling bitter about a car failure taking away a bright future, but you seem incredibly stoical about it all...

MD: Maurice, driving F1 cars is a former life. And that's it. I'm lucky to be alive. Listen, the only grief I have in life is that I wish I was more financially secure. On the day of my accident, I had contracts on the table from Jordan, Tyrrell and Lotus. I had signed a £1.2 million deal with Lotus; £200,000 for 1990, £400,000 for 1991 and £600,000 for 1992.

MH: So was that null and void after the accident?

MD: All null and void. They paid me £200,000 and £200,000 medical costs. The insurance paid out, thankfully, but by the time we got to the last couple of operations, the money was spent; it was all gone. The BRDC paid for the last two operations. That was good of them; wonderful.

MH: With driving no longer possible, you ran Martin Donnelly Racing and were quite successful. Why don't you do that now?

MD: We won races in every class we raced in. The big result for us was the British Grand Prix F3 support race. Back in those days, there were five teams in British F3 that could offer drivers cheap deals. So, anybody left in the market either had money but no results, or talent but no money. It was becoming more and more →



"Before my accident, I signed a £1.2 million deal with Lotus. Afterwards it was null and void"



After his accident, Donnelly set up Martin Donnelly Racing, which enjoyed success in different classes

INSET: LAT ARCHIVE

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Donnelly with Johnny Herbert (centre) and son Stefan (left). Father and son will race together in the Lotus Elise S1 this year

difficult. Then Johnny Lewis approached me. He was setting up his new World Series by Renault team in 2006 and he asked me to work for him. He was offering three times what I was paying myself, and it was basically a role as operations manager and driver coach. It wasn't rocket science, so I wrapped up my company and worked there until 2009. Sometimes it was seven days a week. So you work during the week, travel, race the weekends, then you're back in again. I'd got a young family, and I thought: 'Well, they don't stay young very long.' I'd been pulled in by the Lotus Academy to run their thing and give private tuition, which meant I could spend my weekdays at home, and work weekends as and when I wanted to. I am now the chief driving instructor for the Lotus Drivers' Academy, FIA driver steward and I do some personal coaching as well.

I was very fortuitous in meeting Paul Golding, a good guy and a very good friend. He runs four championships, all of them oversubscribed two months before the first race. They had a Lotus Elise S1. I asked if I could use their car as a marketing tool; Paul wasn't bothered at all. I approached ID systems, a bi-fold door specialist in Norwich. With their support, my son Stefan and I are racing together this year.

MH: You talked about being a race steward; do you enjoy that?

MD: I do. You go there basically to make yourself unpopular, a bit like it was when I was doing F3 and F3000. If you win, you're unpopular, and if you're going to do a steward's job and make a few

calls, you're unpopular. So it's nothing new to me. Obviously there's more technology involved than before, but it beats working. I do enjoy it.

MH: Do you enjoy listening to the drivers coming up with their stories? It must make you smile because you've been there.

MD: They try to be so clever, I think: 'Well you must believe I'm some muppet.' It's great *craic*!

MH: Although you're younger than me, I'd describe you as being more old school than new school. When you see the start of a grand prix and the guy on pole is slightly slow to get away, he immediately pulls across to block the driver on the outside of the front row and almost has him against the pitwall. I know you're allowed to defend but, to my way of thinking, that's not right. What do you think? What worries me is the youngsters watching that sort of thing.

MD: Maurice, we've all done it. You make a bad start then try to defend as best you can. If someone has more momentum, they'll be in there and they'll get past, but you won't give up that position until the last moment. That's racing.

MH: What's the difference between what Rosberg did from pole in Bahrain when he tried to squeeze out Hamilton, and when Schumacher had Barrichello almost into the wall during the race in Hungary in 2010?

MD: One's the start when everybody is pumped up and psyched, and some guys get a good launch and some get bad launches. But what Michael did to Rubens was really stupid. It was at quite high speed. Michael pushed his luck; he wasn't giving Rubens the width of a fag packet.

MH: Are we talking about the difference between what's permissible and what's dangerous?

MD: Yes, that was dangerous. What Nico did to Lewis is racing. These guys have a sixth sense when it comes to how much space to give. Johnny Herbert and I had a moment at Snetterton in '87. He was driving EJ's F3 Reynard and I was following through Russell, when it was flat.

Johnny got a twitch on as we went into the pit straight and I went inside. The mechanics were yanking back their pit boards! But Johnny didn't put me into the wall; there was just enough room and no more. You make it as hard as possible but know how much space you can leave.

MH: It's all about opportunities, isn't it? You had yours and grabbed them.

MD: I never had any money to pay for drives, but where there were opportunities I got results. And now I get you paying for dinner! Life goes on. Thanks, Maurice.

MH: Not at all. It's been a pleasure to have dinner with an old blagger! 



As an FIA driver steward, Donnelly now makes decisions on whether manoeuvres are permissible or dangerous. He dismisses the tussle between Rosberg and Hamilton in Bahrain as just "racing"

PHOTOS: STEVEN TEE/LAT

Swiss movement, English heart



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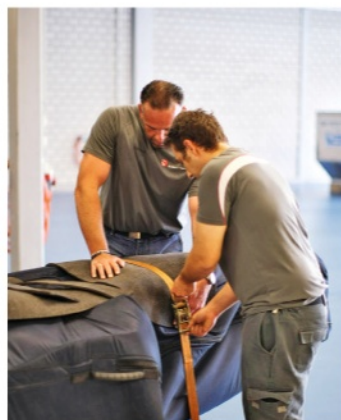
Shuttling an F1 team's gear around Europe is a major logistical challenge – especially when the destination is Monaco. We follow Sauber's fleet of five trucks from Hinwil in Switzerland to the shores of the Mediterranean

PICTURES DUSTIN SCHABER



BEFORE YOU SET OFF, YOU HAVE TO MAKE SURE NOTHING GETS LEFT BEHIND

Teams have a standard loading list for each truck, and sometimes there will be a special list – a different number of gearboxes, engines or other spares. One person is responsible for loading each truck, and checking off every item against the list.



MOVING CARS AROUND MEANS... PAPERWORK

Crossing borders requires a *carnet*, an internationally recognised customs document that enables the contents of the truck to be 'temporarily used' outside the country of origin without becoming liable for taxes; everything in the truck has to be listed on the *carnet* or customs may impound it.



REST TIME HAS TO BE BUILT IN TO THE SCHEDULE

The European Working Time Directive limits the number of hours professional drivers can spend behind the wheel before taking a break. After four-and-a-half hours, they have to stop and rest for 45 minutes. Three of Sauber's trucks have two drivers, so they only have to make a brief halt in order to swap over. Two of the trucks depart with just one driver, and most of the time depart a day earlier than the others, beginning the setup on arrival. The day of departure depends on the ultimate destination. When travelling to Silverstone, for instance, the first trucks leave the Friday before the race weekend, stay overnight in France, then take the ferry to England. Those with two drivers can leave on Monday morning and travel nonstop.



EXPERIENCED DRIVERS DON'T USE SAT-NAV

Sauber's trucks are equipped with mod-cons such as sat-nav, but the drivers readily admit that they prefer not to use it. With years of experience, they usually know the way better than the computer. It's a six-hour drive from Hinwil to Monaco via the Alps, Italy and the Mediterranean coast. →





MONACO WAS BUILT FOR MILLIONAIRES, NOT TRUCKS

Even if you're driving a car or riding a scooter, it's unbelievably hard to manoeuvre through Monaco. By day there are motorcycles and cars everywhere, and nobody wants to give you space – even if you work for an F1 team. So the truckies aim to arrive late at night, or early in the morning.

NO TIME FOR THE VIEW

Sauber's truckies readily admit they barely register the glorious vista as they descend from the A8 via the *Route de la Moyenne Corniche* to their temporary HQ near Monaco's harbour. Most of the time they're focusing on the road ahead and checking their mirrors so as not to hit anything...

Monaco is tight in every dimension – not only are the roads narrow, the steeper ones are peppered with hairpin bends. And, once in town, there are overpasses and other street furniture that a truck could get stuck in. The F1 parking spot is an area usually reserved for buses.

To reverse a truck, you have to steer the tractor unit in the opposite way to the direction you want the trailer to move in. It's a specialist skill that takes many years to acquire.



TURNING A PILE OF PACKING CRATES INTO THE TEAM'S HOME FROM HOME

The truck drivers do the unpacking as well as the driving, and they also build the complete garage for the race weekend. One truck – the most important one – carries both race cars on its upper level as well as the spare chassis. On the bottom level are the toolboxes, fuelling rigs, composites, spare parts – everything that's needed to run the car.

Two of the trailers expand to create a working space within, and these are the ones you see parked behind the garages at races. The big one has the engineers' office on the top deck with the spare parts store below. The other one has a composites area, containing the brakes, clutches and composite spares, and drivers' equipment, such as crash helmets.



THE SECOND JOB STARTS

During a race weekend, two truckies are in charge of refuelling between track sessions, while another two liaise with Pirelli's tyre fitters to deliver and collect the wheels, supervise tyre temperatures and pressures during storage, and mark which sets are to be used. Others will run the parts store.



APPEARANCE IS EVERYTHING


Normally the trucks will be cleaned just once during the weekend, after arrival – unless the weather changes. If it rains, then there is more cleaning up to do. And you have to make sure they're parked exactly in line, lest Bernie Ecclestone or lieutenant Pasquale Lattuneddu come along and spot that something's awry.

SPACE EXPLORATION

The steepness of the terrain and pervading lack of elbow room in Monaco means the team's equipment has to be stored on two separate levels (Red Bull, creatively, have a floating hospitality unit to keep guests separate from team operations). That means plenty of shuttling around in the fork-lift.



GETTING READY FOR THE GREAT ESCAPE

The truck drivers de-rig the garage and pack up, following a procedure so that all the equipment ends up in the right place. When races run back-to-back, de-rigging begins before the chequered flag. For flyaway races, they must arrive at the airport in time or the cargo plane will leave without their kit. 



TO



May is a classic month, bringing both the Monaco GP and the Indy 500. And these two jewel-in-the-crown races were once even more closely related, as two events on the Formula 1 calendar

WORDS PAUL FEARNLEY PICTURES IMS ARCHIVE

Indianapolis Motor Speedway hosted the opening round of the first world championship. In 1925. Twenty-five years later, it began an 11-race stint as part of a revived championship – for drivers rather than manufacturers. Not that many of those involved were aware of it. Or cared. But, for a fleeting decade, rumbling Indy roadsters were *de facto* grand prix cars as the Indy 500 constituted a round of the world drivers' championship.

Motor racing in booming 1950s America was wealthily self-sufficient. There was a burgeoning, European-inspired road-racing scene, but it was a square peg in an oval hole. Indy turned left, Continental motorsport ran clockwise, and never the twain shall meet. Not even the sport's richest purse could bring them together. That was the reality. But ideas cost nothing and, for a time, idealists held the theoretical high ground.

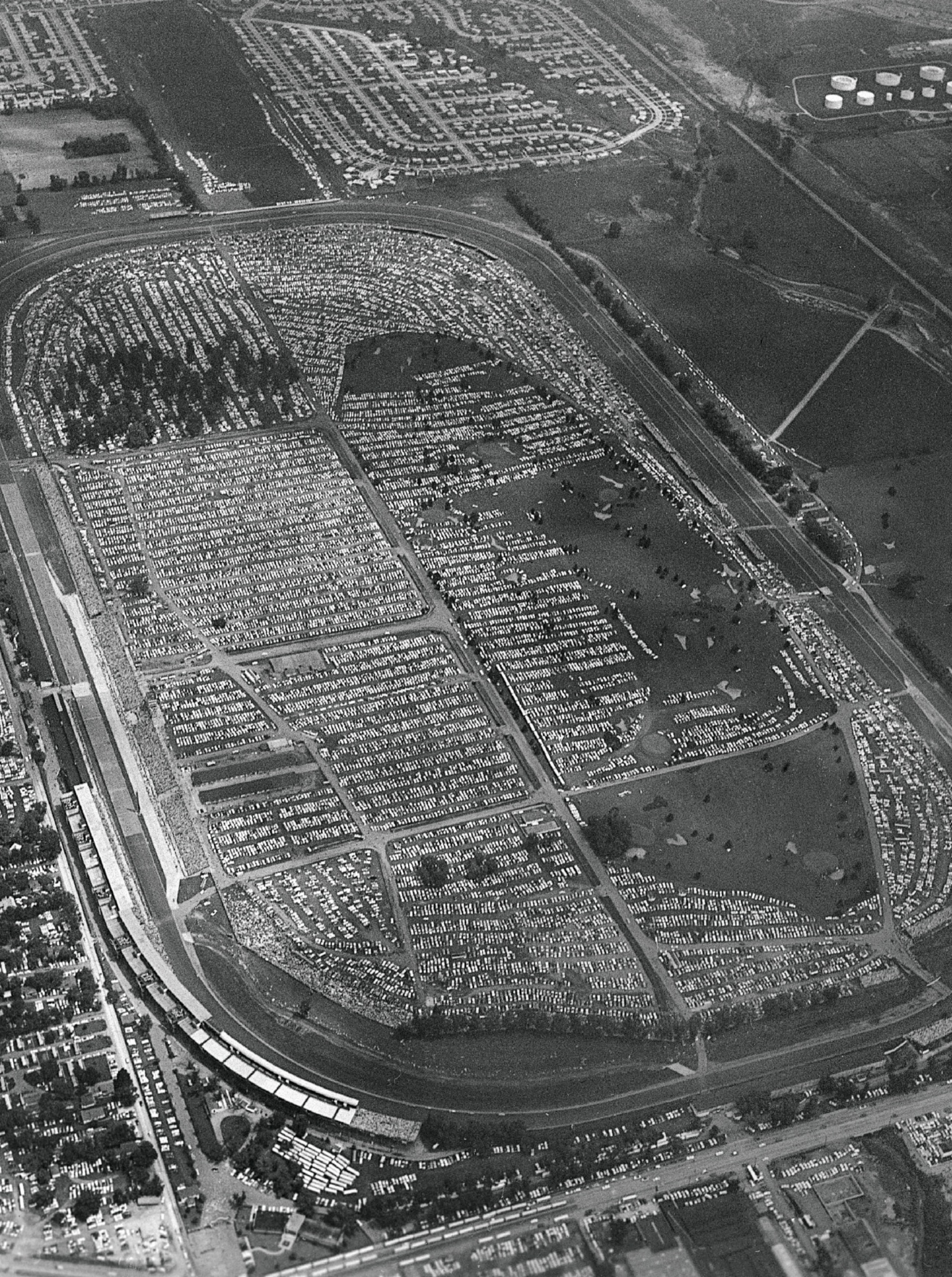
When the FIA World Championship for Drivers was mooted in 1946, the idea was to agglomerate each member country's most

prestigious race, ie its *grande épreuve*. And America's *grande épreuve* was the Indianapolis 500.

America had, in 1908, become the second country after France to host a national grand prix. Held on road courses, this 'Grand Prize' was dominated by foreign machinery – with six wins from seven – until the title fell into disuse upon the United States' entry into the First World War.

From 1929, it was decided to award the dormant nomenclature to the Indy 500. This was no hollow honour. While its 2.5-mile circuit had been built 20 years before as an aid to the American car industry, founding father Carl Fisher was keen to promote international competition. Indeed, overseas drivers in overseas cars won every 500 from 1913-16 and the race kept in step with changes to the International Formula throughout the 1920s.

That hands-across-the-sea link snapped in the economic depression triggered by the Wall Street Crash, but was restored in →





In 1952, Italian Alberto Ascari (left) became the first European to contest the Indy 500



1938 when the American Automobile Association and Europe's sporting body, the Commission Sportive Internationale, adopted the same formula: a 3000cc maximum for engines with forced induction; a 4500cc maximum for those normally aspirated; and a sliding weight scale according to engine capacity.

This 'New Deal' held good throughout the 1950s – even though regulations diverged in the immediate post-war period when Europe reduced its forced-induction limit to 1500cc and America refused to budge. What helped was that organisers were under no obligation to run *grandes épreuves* to the new Formula 1 – or Formula A as it was in 1948 – and that the prestige Indy brought a fledgling championship was more important than technical details.

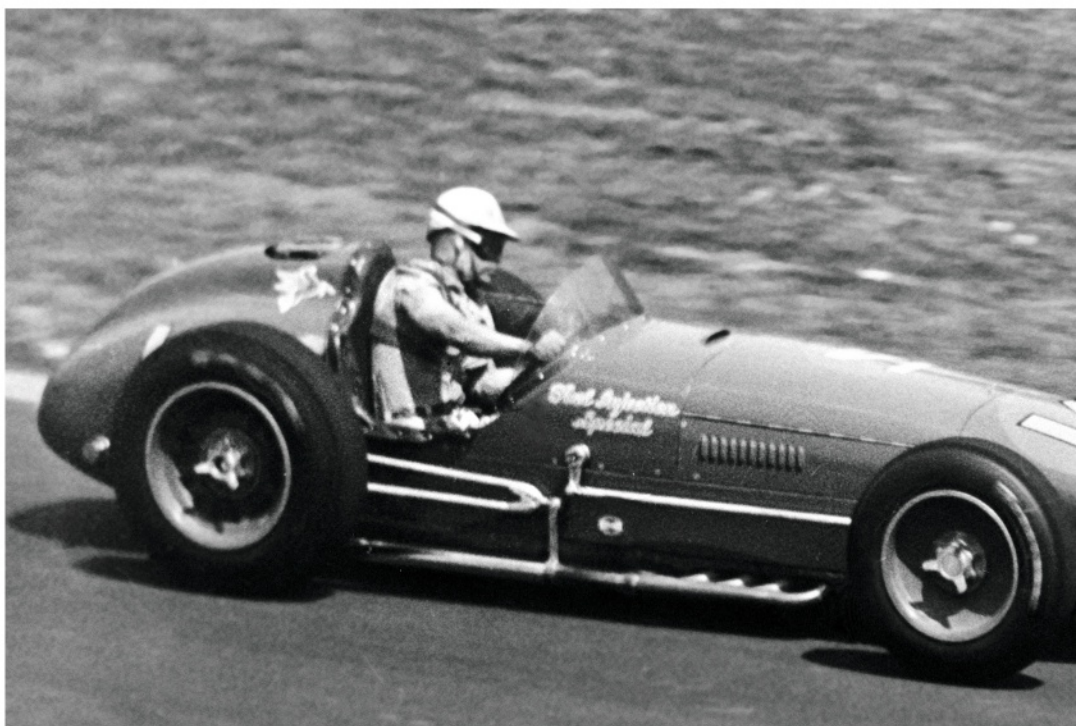
Theirs remained, however, a cool and distant relationship that not even the Latin warmth of Alberto Ascari could thaw. The portly Italian was not yet world champion when he became, in 1952, the first – and only – major European star to contest the 500 during this period.

That stemmed partly from the fact that of the overseas manufacturers, only Ferrari had a 4.5-litre single-seater capable of being competitive at Indy. And even that was relative. Its V12 lacked the torque of the American four-cylinders and Ascari had to change down for Turns 1 and 3, whereas local aces remained in the tallest of their (two) gears. He qualified 19th, but fared better in the race and was holding eighth place when a Borrani wire wheel, a proven item in European racing, collapsed after 40 laps.

Though Indy *looked easy*, it made different and very particular demands of a car and its driver – a blend of strength and subtlety – and gave up its secrets grudgingly. Its Month of May practice/qualifying/race rigmarole was a necessity that few from Europe could afford the time for. Indeed, although there were 12 days between them, Ascari had chosen to skip the Swiss GP, round one of the world championship, to contest Indy. Not that this did him any harm. He proceeded to win nine GPs on the bounce – unless you count the 1953 Indy 500, which he did not contest – to become a back-to-back world champion.

May was a busy time in the Continental racing calendar, too, and so drivers and teams understandably stuck with what they knew.

Though this lack of cross-pollination ultimately caused the American oval scene to become complacent and stagnate, leaving it vulnerable to



"ALTHOUGH INDY LOOKED EASY, IT MADE PARTICULAR DEMANDS OF CAR AND DRIVER... STRENGTH AND SUBTLETY"

invasion, it was arguably the more go-ahead of the factions in this period. It came to be dominated by *garagistes* building kit cars – Offenhauser engine, Hilborn fuel injection, Halibrand running gear, Firestone tyres – long before F1, and having 33 very similar cars on its grid made the Indy 500 more competitive than the grands prix of the period.

Also, whereas Europeans visited Indy in dribs and drabs, the Americans, now overseen by the United States Automobile Club, a professional body created in 1956 purely for this purpose,

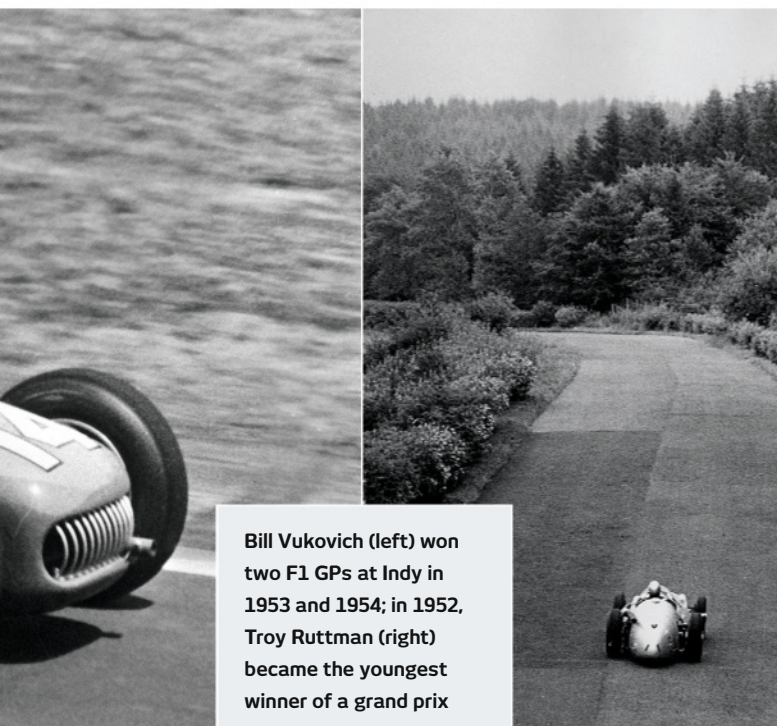
came over lock, stock and barrel-crankcases when invited to Europe.

The Race of Two Worlds on Monza's new banked oval was a final throw of the unifying dice. The home talent all but ignored the first in 1957, however, and though Maserati and Ferrari built cars for the second, only the latter's Luigi Musso, who drove with the ferocity of a man in debt, was competitive. Stirling Moss tried to put one across the visitors by practising in the wet – rather than be impressed, they thought him crazy – but ultimately received an unnerving insight into an unfamiliar world when his Maserati's steering failed during a heat and, for once, he was a passenger.

Neither side of the equation knew enough of the other to reach meaningful conclusions, although those Americans who stayed on and watched Fangio win the 1957 French GP at Rouen in a Maserati 250F,



At the Race of Two Worlds in 1958, Stirling Moss (left) unnerved spectators by practising in the rain. He retired from the race when his Maserati's steering failed



Bill Vukovich (left) won two F1 GPs at Indy in 1953 and 1954; in 1952, Troy Ruttman (right) became the youngest winner of a grand prix

the epitome of a front-engined F1 car, came away with the overwhelming impression that, "This fella really motor races".

Ex-hot rodder Troy Ruttman, an Indy prodigy – he was 22 when he won the 500 of 1952 – was sufficiently intrigued to hire a 250F for the '58 French GP at Reims. The only Triple-A/USAC racer to contest a world championship GP in Europe throughout the decade, he finished five laps behind in 10th. Phil Hill and Carroll Shelby, keynote names of American motorsport, also made their F1 GP debuts in hired 250Fs that day. That neither would include the Indy 500 in their storied driving careers further illustrates the starkness of the schism. That's a shame because Bill Vukovich, 'The Fresno Flash', who came within a few laps of scoring Indy's only hat trick, and who memorably qualified on the leading edge of a rainstorm in 1953, possessed a freakish talent that would have shone in GP racing. The same was said of Bob Sweikert, who succeeded 'Vuky' in tragic circumstances in '55, only to suffer a fatal accident the following year.

Johnnie Parsons, the 1950 Indy winner, travelled to Europe to meet Enzo Ferrari but was unable to agree terms. He did, however, enter a Ferrari for the 500 of '52 – but chose not to race it. Ferrari, in turn, would take delivery of a Kurtis-Kraft Indy roadster – and drop a 4.4-litre straight-six into it. Its half-hearted Indy programme was delayed by a year and dumped on the Maserati brothers for '56. Running on gasoline and Weber carburettors – locals espoused injection and methanol, but the Europeans 'knew better' – the car was uncompetitive and failed to qualify despite the efforts of the first world champion Giuseppe Farina. →

JOINT HONOURS

The winners of the world championship races at the Indianapolis Motor Speedway



1950 Johnnie Parsons

Parsons was leading as the race was halted on lap 138 due to rain. Back in 20th, the amusingly named Spider Webb completed 126 laps.



1951 Lee Wallard

Wallard shed 15lb to become the first to complete 200 laps in under four hours. He led 159 of them in a car Tony Bettenhausen turned down.



1952 Troy Ruttman

Fred Agabashian was on pole, but Bill Vukovich dominated until his steering failed with nine laps to go. Ruttman, 22, remains the youngest winner.



1953 Bill Vukovich

'Vuky' got his revenge by starting from pole and leading all but five laps of a murderously hot race that claimed the life of Carl Scarborough.



1954 Bill Vukovich

He worked harder for this win, having qualified 19th. Humid conditions took a toll and it required five drivers to bring home the 11th-placed car.



1955 Bob Sweikert

Vukovich was going for win three in a row, but crashed fatally after tangling with backmarkers. Winner Sweikert's crew chief was AJ Watson.



1956 Pat Flaherty

AJ Watson scored his first win as a constructor of roadsters thanks to a virtuoso win by 'Buffer Red', who qualified on pole and led from lap 76.



1957 Sam Hanks

In the smallest car in the field, Hanks won on his 13th attempt and announced his retirement after pocketing the first \$100k prize pot.



1958 Jimmy Bryan

Five-time champion Fangio lapped at 142mph in practice but didn't start. The race was marred by a first-lap crash that eliminated eight cars.



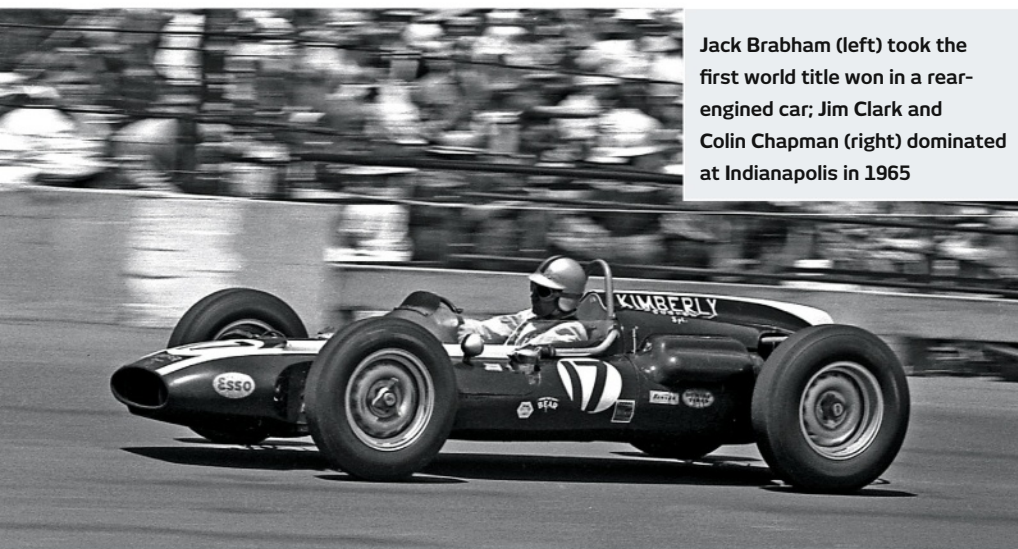
1959 Rodger Ward

Ward led for 130 laps after fending off early challenges from pole man Johnny Thompson, Pat Flaherty and Jim Rathmann.

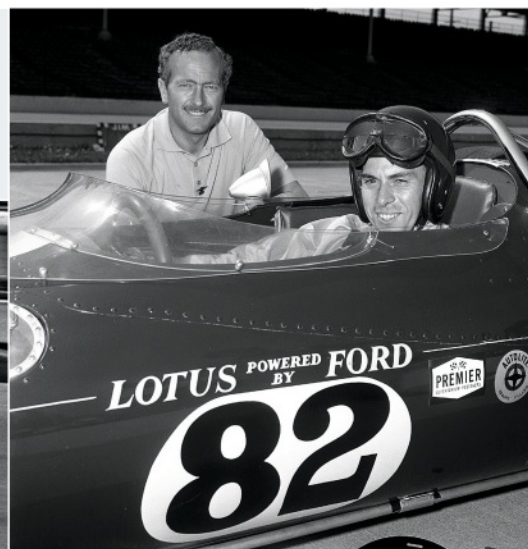


1960 Jim Rathmann

The best roadster 500 involved 29 changes of lap-leader. Three-time runner-up Rathmann, in an AJ Watson car, won from Rodger Ward.



Jack Brabham (left) took the first world title won in a rear-engined car; Jim Clark and Colin Chapman (right) dominated at Indianapolis in 1965



Farina's successor, Fangio, who held a long fascination with Indy's screaming supercharged Novi V8 – Offenhauser's powerful but unreliable rival – also failed to take the start. Enticed to Indy in 1958, he was unimpressed by the machinery on offer – even the Novi that he briefly switched to – made his excuses and left. Moss didn't even get that far and regrets today that he found neither the time nor motivation to race at Indy.


This barrier – psychological as well as geographical – was broken in odd circumstances. For some unfathomable reason, reformed hell-raiser Rodger Ward, winner of the 1959 Indy 500, later that year entered an Offy-powered Midget at the revival of a road-based American GP. The car, designed to run on quarter-mile ovals, was laughably outclassed at Sebring and, to be fair, its driver saw the joke.

But Ward also took the opportunity to befriend Jack Brabham – who had literally pushed his way to the first world title won in a rear-engined car. Ward insisted that Brabham's light, compact and nimble Cooper would be competitive at Indy. Having earned his spurs on Australian dirt tracks, the latter was more open-minded than most and accepted the challenge.

When it arrived at Indy in 1961, the Cooper was dismissively labelled a 'funny car'. That stopped when Brabham qualified 13th and finished ninth. Four years on, Jim Clark and Colin Chapman's Lotus completed a dominant victory. Indy would never be the same again.

British designs and designers ruled its roost for the next 30 years: Lola, McLaren, Penske, March and Reynard; Eric Broadley, Gordon Coppuck, Geoff Ferris, John Barnard, Robin Herd, Nigel Bennett and Adrian Newey; plus Cosworth and Ilmor engines.

This transformation occurred after the Indy 500 had been dropped from the world championship. F1 had switched in 1961 to a 1.5-litre formula, whereas 4.2-litres and supercharged 2.8s – there had been a small reduction in 1957 – were still roaming Indy. The gap had become too wide to bridge. Nobody cried when it collapsed. Indy had never needed F1's blessing to flourish, and F1 had by now found its American spiritual home at Watkins Glen.

The relationship between Indy and F1 didn't end there, of course, as from 2000-2007 the US GP was held on a road course en-looped by the mighty oval. But that F1 adventure is a whole different story... 

World championship points at Indianapolis 500

	Points	Points finishes	Fastest laps
1 Jim Rathmann	29	5	1
2 Sam Hanks	22	4	
3 Bill Vukovich	19	2	3
4 Jimmy Bryan	18	3	
5 Rodger Ward	14	2	
6 Tony Bettenhausen	13	3	1
7 Johnnie Parsons	12	2	1
8 Troy Ruttman	11	2	
= Jack McGrath	11	3	1
10 Johnny Thomson	10	3	1

NB Awarded 8-6-4-3-2, plus 1 for fastest lap, from 1950-'59; and 8-6-4-3-2-1 in '60

STARS AND GRIPES

Why F1's return to Indy wasn't all that successful

The Indianapolis Motor Speedway and Formula 1 have never been comfortable bedfellows, particularly at the circuit's second run of world championship races between 2000-2007.

Rather than hosting GPs on the fabled oval, Indy bosses built a fiddly infield track that took in the banked Turn 1, but ran in the opposite direction. It did little to stir passion, but there was huge support when F1 defiantly continued to race in September 2001, just weeks after 9/11.

The affair came to a swift end with two moments that left the US paying public feeling swindled. The first was in 2002 when Michael Schumacher slowed his Ferrari approaching the finish line in an ill-judged attempt to try to create a dead heat between himself and team-mate Rubens Barrichello.

The second was in 2005 when the Michelin runners pulled out on the formation lap, following concerns their tyres wouldn't last, leaving just the six Bridgestone runners racing. After this, there was no desire for the race to continue at the Speedway beyond the final year of its contract in 2007.

James Roberts



INSET: STEVE ETHERINGTON/LAT

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ABOUT PAT SYMONDS

In his 30-year career, Pat has achieved success with the sport's top teams including Toleman, Benetton and Renault.

His partnerships with Michael Schumacher and Fernando Alonso produced 32 race wins, four drivers' and three constructors' titles.



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FINISHING STRAIGHT

Reports Previews Analysis Opinion Stats

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Lewis continues reign in Spain

Hamilton wins his fourth GP of 2014 in Barcelona, edging ahead of team-mate Rosberg in the standings. But their intense intra-team battle will rage on...

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Hamilton collects his first hat trick and equals Lauda's record of 25 GP wins



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Murray takes a trip down memory lane as he remembers the magic of Monaco in years gone by



RACE DEBRIEF

by James Roberts

Chinese Grand Prix

20.04.2014 / Shanghai



Three in a row for Lewis

Hamilton scores his first-ever hat trick and reduces team-mate Rosberg's lead to just four points

This was another masterly performance from Lewis Hamilton. For the first time, he's scored a hat trick of wins, and in doing so has equalled the achievements of both Jim Clark and Niki Lauda by scoring 25 grand prix victories.

Likewise, this was Nico Rosberg's third defeat in a row by his Mercedes team-mate. From a relatively lowly fourth on the grid – thanks to an error in the wet qualifying – he made a superb job of damage limitation, particularly since his team lost all car-to-pit telemetry during the race.

During the weekend there were clear signs of irritation in Rosberg's usually calm demeanour during press debriefs at the heart of the maze-like Shanghai paddock. A few times he snapped at journalists, seemingly rattled by a line of questioning about his team-mate gaining the upper hand. He was somewhat abrupt, too, on the radio during the race on account of having to continually relay his fuel usage to his pitwall.

After dropping to sixth on the opening lap (with no telemetry, the team were unable to

calibrate his clutch effectively for the start), he made steady progress, passing Vettel for third on lap 22 and Alonso on lap 42 – to claw his way back to second place. The finish itself took place after 54 of the scheduled 56 laps, thanks to a moment of overenthusiasm on the part of the delegated waver of the chequered flag.

Rosberg's second was enough to minimise Hamilton's net gain, leaving Rosberg with a slim four-point lead in the standings.

Further down the field there was frustration for another German competitor. On Thursday afternoon, a bank of TV cameramen and journalists crammed into Sebastian Vettel's press briefing in the Red Bull hospitality unit. In fact the room was so busy that Vettel joked when he came in: "I thought Multi-21 was last year!"

He was soon asked whether the speed of his team-mate Daniel Ricciardo had surprised him this year. "Not surprised," replied Vettel. "But he's doing a good job. I'm not yet where I want to be with how I feel inside the car. There has

been a lot of new stuff to adapt to and it's been a challenge, so perhaps I'm not where people were expecting me to be in terms of results."

Ricciardo's form continued in Shanghai: he was second on the grid on Saturday and fourth on race day, 20 seconds further up the road than Vettel. There is speculation he could even have challenged third-placed Alonso, if he hadn't been held up by his Red Bull team-mate.

For the second race running, Vettel's engineer Guillaume 'Rocky' Rocquelin asked him to move over for Ricciardo. In Bahrain, Vettel had cooperated, but here there were shades of last year's 'Multi-21-gate' as he declined to obey.

On lap 23, battling for fourth with Ricciardo, Vettel asked over the radio: "What tyre is he on?"

"Primes, but they are newer than yours," replied the ever-professional Rocky. Three laps newer as it happened: "Tough luck" was Vettel's response. But within a few laps, trying to hold Ricciardo back was futile. He didn't have the pace and ran wide at Turn 1. Ricciardo was through.

Post-race Christian Horner denied that the delay had cost Ricciardo third place. "I don't think so," said Horner, showing none of the tension he'd clearly experienced on the pitwall during the key engineer-to-driver radio chit-chat.

"What Sebastian didn't realise is at that stage we were looking at putting him on a different strategy [three stops, not two] because he was going through the tyre phase quicker. When he understood that, he let him through."

After a gloomy week in Shanghai, the warmer temperatures on race day reduced graining on the tyres, pushing every team's strategy towards a two, rather than three-stop race. But it's not often another driver finishes 20 seconds further up the road in the same car as Seb Vettel, is it?


"It was a massively impressive performance by Dan, as it has been all weekend," agreed Horner. "In all four races he's done a tremendous job. His confidence is growing, he's very calm in the car, and his feedback is exceptional. When he talks on the radio, it's like he's talking in a coffee shop up the road – particularly with the lack of noise – and he's enjoying what he's doing."

"Sebastian is having a tough time because he's not getting the feeling from the car that he is looking for. He's tremendously sensitive to certain aspects of the setup and without that feedback the compound effect is that he's damaging the tyre more. It's unusual for him to go through the tyre life quicker since the Pirelli was introduced to F1, but once he's worked those issues out, I'm sure he'll be back with a bang."

In the distance, you could make out the cheers as the whole Mercedes team posed with their trophies for the obligatory post-race team photo. Then Horner was asked if he thought the gap to Mercedes had reduced since Bahrain. "In the corners, yes," came the wry reply.

Over at Ferrari, new team principal Marco Mattiacci made an impact on his first morning in F1 by conspicuously keeping his sunglasses on, even in the garage on the gloomiest day so far this year. His arrival coincided with a better result, but it was Fernando Alonso who elevated Ferrari to podium contention. Kimi Räikkönen could manage no better than eighth on race day.

And what of McLaren? Despite an impressive driver combination of young hotshoe Kevin Magnussen and wise veteran Jenson Button, they've gone from a podium finish in race one to beyond the top ten in race four. Behind the scenes, they're on a recruitment drive and are currently at loggerheads with Red Bull over aero man Dan Fallows (see 'F1 Insider', page 22).

Christian Horner, earlier seen talking to Ron Dennis, who had threatened to take Red Bull to the High Court over the future of Fallows, summed it up: "It's obvious why they're looking for aerodynamicists..." 

The story of the race

V Massa makes another strong start in his Williams, but bangs wheels with Alonso's Ferrari

SHANGHAI



> Bottas's Williams collides with Rosberg's Mercedes and both drop down the field



< Massa pits but a tyre mix-up means Williams try to fit rear wheels to the wrong side, losing him time



< Alonso makes a first stop two laps before Vettel, ensuring P2 when Vettel stops for fresh rubber

> Vettel concedes to team-mate Ricciardo after a disagreement about the order on the pit-to-car radio



> Hamilton makes his second and final pitstop of the race



^ Rosberg gets past Alonso to secure second place

> The chequered flag is shown to Hamilton a lap early, so the rules declare a result from the previous lap (54)



MAIN PHOTO: STEVEN TEE/LAT; ILLUSTRATION: ALAN ELDREDGE
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Chinese Grand Prix stats

The lowdown on everything you need to know from the weekend at Shanghai...



1. HAMILTON
MERCEDES
1min 53.860secs Q3



3. VETTEL
RED BULL
1min 54.960secs Q3



5. ALONSO
FERRARI
1min 55.637secs Q3



7. BOTTAS
WILLIAMS
1min 56.282secs Q3



9. VERGNE
TORO ROSSO
1min 56.773secs Q3



11. RÄIKKÖNEN
FERRARI
1min 56.860secs Q2



13. KVIAT
TORO ROSSO
1min 57.289secs Q2



15. MAGNUSSEN
MCLAREN
1min 57.675secs Q2



17. GUTIÉRREZ
SAUBER
1min 58.988secs Q1



19. BIANCHI
MARUSSIA
1min 59.326secs Q1



21. CHILTON
MARUSSIA
2min 00.865secs Q1

THE GRID



2. RICCIARDO
RED BULL
1min 54.455secs Q3



4. ROSBERG
MERCEDES
1min 55.143secs Q3



6. MASSA
WILLIAMS
1min 56.147secs Q3



8. HÜLKENBERG
FORCE INDIA
1min 56.366secs Q3



10. GROSJEAN
LOTUS
1min 57.079secs Q3



12. BUTTON
MCLAREN
1min 56.963secs Q2



14. SUTIL
SAUBER
1min 57.393secs Q2



16. PÉREZ
FORCE INDIA
1min 58.264secs Q2



18. KOBAYASHI
CATERHAM
1min 59.260secs Q1



20. ERICSSON
CATERHAM
2min 00.646secs Q1



22. MALDONADO*
LOTUS
NO TIME IN Q1

THE RACE



THE RESULTS (54 LAPS)

1st	Lewis Hamilton Mercedes	1h33m 28.338s
2nd	Nico Rosberg Mercedes	+18.063s
3rd	Fernando Alonso Ferrari	+23.604s
4th	Daniel Ricciardo Red Bull	+27.136s
5th	Sebastian Vettel Red Bull	+47.778s
6th	Nico Hülkenberg Force India	+54.295s
7th	Valtteri Bottas Williams	+55.697s
8th	Kimi Räikkönen Ferrari	+76.335s
9th	Sergio Pérez Force India	+82.647s
10th	Daniil Kvyat Toro Rosso	+1 lap
11th	Jenson Button McLaren	+1 lap
12th	Jean-Éric Vergne Toro Rosso	+1 lap
13th	Kevin Magnussen McLaren	+1 lap
14th	Pastor Maldonado Lotus	+1 lap
15th	Felipe Massa Williams	+1 lap
16th	Esteban Gutiérrez Sauber	+1 lap
17th	Jules Bianchi Marussia	+1 lap
18th	Kamui Kobayashi Caterham	+1 lap
19th	Max Chilton Marussia	+2 laps
20th	Marcus Ericsson Caterham	+2 laps

Result declared after 54 laps, after chequered flag shown incorrectly after 55 laps

Retirements

Romain Grosjean Lotus	28 laps – gearbox
Adrian Sutil Sauber	5 laps – engine

THROUGH SPEED TRAP



Fastest: Nico Rosberg,
209.27mph



Slowest: Adrian Sutil,
159.56mph

TYRE COMPOUNDS USED



Soft



Medium



Intermediate



Wet

CLIMATE

Overcast 16°C

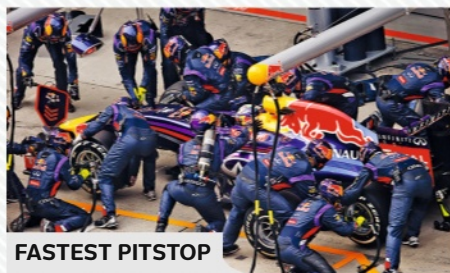
TRACK TEMP

24°C



FASTEST LAP

Nico Rosberg, lap 39, 1min 40.402secs



FASTEST PITSTOP

Sebastian Vettel, 22.246secs (entry to exit)

DRIVERS' STANDINGS

1st	Nico Rosberg Mercedes	79pts
2nd	Lewis Hamilton Mercedes	75pts
3rd	Fernando Alonso Ferrari	41pts
4th	Nico Hülkenberg Force India	36pts
5th	Sebastian Vettel Red Bull	33pts
6th	Daniel Ricciardo Red Bull	24pts
7th	Valtteri Bottas Williams	24pts
8th	Jenson Button McLaren	23pts
9th	Kevin Magnussen McLaren	20pts
10th	Sergio Pérez Force India	18pts
11th	Felipe Massa Williams	12pts
12th	Kimi Räikkönen Ferrari	11pts
13th	Jean-Éric Vergne Toro Rosso	4pts
14th	Daniil Kvyat Toro Rosso	4pts
15th	Romain Grosjean Lotus	0pts
16th	Adrian Sutil Sauber	0pts
17th	Esteban Gutiérrez Sauber	0pts
18th	Max Chilton Marussia	0pts
19th	Kamui Kobayashi Caterham	0pts
20th	Pastor Maldonado Lotus	0pts
21st	Marcus Ericsson Caterham	0pts
22nd	Jules Bianchi Marussia	0pts

CONSTRUCTORS' STANDINGS

1st	Mercedes	154pts	9th	Sauber	0pts
2nd	Red Bull	57pts	10th	Marussia	0pts
3rd	Force India	54pts	11th	Caterham	0pts
4th	Ferrari	52pts			
5th	McLaren	43pts			
6th	Williams	36pts			
7th	Toro Rosso	8pts			
8th	Lotus	0pts			



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*Five-place grid penalty for causing a collision in Bahrain GP.
Also permitted to start by the stewards

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RACE DEBRIEF by James Roberts

Spanish Grand Prix

11.05.2014 / Circuit de Barcelona-Catalunya



'Struggling' Lewis holds on

Another lap and Nico Rosberg might have squeezed past – instead, Lewis now leads the championship

For the first time this season, Lewis Hamilton leads the drivers' world championship following his fourth consecutive grand prix victory – coincidentally, his first ever win at the Spanish Grand Prix. After scoring another 25 points, 29-year-old Hamilton has finally been able to claw back the deficit caused by that spark-plug failure in Australia. But, as ever, his team-mate Nico Rosberg shadowed him throughout the race and finished right on his tail.

Mercedes split the strategies of their two protagonists, putting second-placed Rosberg on option-prime-option, compared with Hamilton's option-option-prime tyre sequence. This required a masterly defence from the British racer, since it put him on the slower, orange side-walled hard-compound Pirellis in the latter stages of the race.

After a quiet opening gambit, from the first corner onwards Hamilton and Rosberg were mostly driving in isolation. It made for a tense

endgame: with two laps to go, Rosberg got within a second of his team-mate and was able to use his DRS, while Hamilton was nursing the graining on his tyres (in particular the left-front). After 66 laps, Hamilton's margin of victory was just 0.636 seconds. Rosberg admitted afterwards that if the race had been just a single lap longer, he could have had a shot at passing Hamilton for the victory.

If you wanted an example of how close this intense battle was, then lap 49 made for a fascinating snapshot of the race. Both Mercedes runners had almost a half-minute advantage over Red Bull's Daniel Ricciardo, but between them their private duel was hotting up. Hamilton lit up the timing screens with a blinding 1min 29.759secs lap – at that point, the fastest of the race. Just behind him, Rosberg did his personal best lap of the grand prix, recording 1min 29.793secs. The 0.034sec deficit proved how close the fight for the race win was –

ultimately reflecting the bigger battle for world championship honours.

The differences between them are down to the finest of margins; the fractions of a second lost or gained in the pitstop or subtle variations in set-up trim. During this race, Hamilton was affected by a slow change on the front-left tyre at his first pitstop and another somewhat laboured tyre change at his second. It led to some fraught radio messages from the cockpit of the number 44 machine back to the Mercedes pitwall.

"While I am driving I am always asking how much of a gap do I need," said Lewis in the sanctuary of the Mercedes motorhome after the race, when quizzed about the final laps. "When I was in Bahrain I knew I had to have a ten-second lead, but then the Safety Car came out. Here I was asking about the gap I needed, but lost a lot of time in my pitstops.

"Nico's pitstop was three seconds, mine was 4.8 seconds – or something like that. That was

significant. On those last laps there was a huge amount of pressure and he was very, very close to taking it – and I don't like that, being in that position. I like to say it was no problem and under control – but it wasn't."

Hamilton conceded that the advantage he enjoyed over his team-mate on Friday afternoon disappeared with set-up changes made on Saturday morning. From that point, he was on the back foot. But again, as was the case in China, at a race where he wasn't comfortable with his car, he was able to extract the maximum points haul while in damage-limitation mode. As a result, you could understand the terse nature of his radio transmissions, something that Mercedes motorsport boss Toto Wolff admitted in his post-race debrief.


"You have to understand that the intensity of the battle is huge and if you are alone in the car you have to rely on the information from the engineers – you don't really know where your team-mate is," said Toto. "Lewis has a very strong personality and he's ultra-competitive, and sometimes his words might sound harsher than he actually means them. Thankfully his race engineers have known him for some time now, so there is no problem."

While there were smiles in the Mercedes camp, just next door at Ferrari it was a very sombre affair. Local hero Fernando Alonso had spent most of the race tucked up behind his team-mate Kimi Räikkönen. On his home turf, you could sense the growing frustration in Alonso's driving, and then the relief as he was able to muscle his way past, into Turn 4, in the closing laps.

After the race, much of the attention was focused on why the team had decided to bring Alonso into the pits first on lap 16 instead of Räikkönen, who was ahead on track. Both drivers tried to downplay the moment, but it was clear from Räikkönen's body language that the decision had left him fuming. Even though he is a man of few words, it was significant that he engaged with the press for less than four minutes. That in itself spoke volumes.

Alonso was much more vocal about where the team had finished. In his final stint he had to concede position to Sebastian Vettel who had driven brilliantly to finish fourth after starting the race from 15th.

"We had some chances to fight but we are still far away from where we want to be," said the unhappy Alonso. "Overall we were the fourth-quickest team, so it's disappointing."

For every team aside from Mercedes, 'disappointing' is becoming a recurring adjective this year. At this rate the Silver Arrows are likely to win every race, something that Toto Wolff was questioned about – and joked: "Yes, we will do that... and then we'll retire!" 

The story of the race

V From pole, Lewis Hamilton heads his team-mate Nico Rosberg into the first corner

BARCELONA



> Valtteri Bottas fends off Daniel Ricciardo to take third place in the opening laps



> Pastor Maldonado serves a five-second stop/go penalty for tangling with Ericsson's Caterham



> By lap 26, both Ferraris pass Grosjean to demote the Lotus driver to seventh place



> Vettel drives a brilliant race to claw his way to fourth place at the flag after starting 15th



^ After running behind for most of the race, Alonso finally passes Räikkönen with just a few laps to go

> Lewis Hamilton beats his team-mate Nico Rosberg by just over half a second to win the Spanish GP

























MAIN PHOTO: STEVE EATHERINGTON/LAT; ILLUSTRATION: ALAN ELDRIDGE; INSETS: GLEN DUNBAR/LAT; ANDY HONE/LAT; CHARLES COTES/LAT; ALASTAIR STALEY/LAT; ANDREW FERRARO/LAT; STEVEN TEE/LAT

Spanish Grand Prix stats

The lowdown on everything you need to know from the weekend at Barcelona...

THE GRID

 1. HAMILTON MERCEDES 1min 25.232secs Q3	 2. ROSBERG MERCEDES 1min 25.400secs Q3
 3. RICCIARDO RED BULL 1min 26.285secs Q3	 4. BOTTAS WILLIAMS 1min 26.632secs Q3
 5. GROSJEAN LOTUS 1min 26.960secs Q3	 6. RÄIKKÖNEN FERRARI 1min 27.104secs Q3
 7. ALONSO FERRARI 1min 27.140secs Q3	 8. BUTTON McLAREN 1min 27.335secs Q3
 9. MASSA WILLIAMS 1min 27.402secs Q3	 10. HÜLKENBERG FORCE INDIA 1min 27.685secs Q2
 11. PÉREZ FORCE INDIA 1min 28.002secs Q2	 12. KVYAT TORO ROSSO 1min 28.039secs Q2
 13. GUTIÉRREZ SAUBER 1min 28.280secs Q2	 14. MAGNUSSEN McLAREN NO TIME IN Q2
 15. VETTEL* RED BULL NO TIME IN Q3	 16. SUTIL SAUBER 1min 28.563secs Q1
 17. CHILTON MARUSSIA 1min 29.586secs Q1	 18. BIANCHI MARUSSIA 1min 30.177secs Q1
 19. ERICSSON CATERHAM 1min 30.312secs Q1	 20. KOBAYASHI CATERHAM 1min 30.375secs Q1
 21. VERGNE** TORO ROSSO NO TIME IN Q2	 22. MALDONADO*** LOTUS NO TIME IN Q1

*Five-place grid penalty for replacement gearbox **Ten-place grid penalty for unsafe release from the pits *** Permitted to start by stewards

THE RACE



THE RESULTS (66 LAPS)

1st	Lewis Hamilton Mercedes	1h41m 05.155s
2nd	Nico Rosberg Mercedes	+0.636s
3rd	Daniel Ricciardo Red Bull	+49.012s
4th	Sebastian Vettel Red Bull	+76.702s
5th	Valtteri Bottas Williams	+79.293s
6th	Fernando Alonso Ferrari	+87.743s
7th	Kimi Räikkönen Ferrari	+33.462s
8th	Romain Grosjean Lotus	+43.143s
9th	Sergio Pérez Force India	+49.014s
10th	Nico Hülkenberg Force India	+28.654s
11th	Jenson Button McLaren	+1 lap
12th	Kevin Magnussen McLaren	+1 lap
13th	Felipe Massa Williams	+1 lap
14th	Daniil Kvyat Toro Rosso	+1 lap
15th	Pastor Maldonado Lotus	+1 lap
16th	Esteban Gutiérrez Sauber	+1 lap
17th	Adrian Sutil Sauber	+1 lap
18th	Jules Bianchi Marussia	+2 laps
19th	Max Chilton Marussia	+2 laps
20th	Marcus Ericsson Caterham	+2 laps

Retirements

Kamui Kobayashi Caterham	34 laps – brakes
Jean-Éric Vergne Toro Rosso	24 laps – exhaust

THROUGH SPEED TRAP



Fastest: Felipe Massa, 212.69mph



Slowest: Kamui Kobayashi, 193.68mph

TYRE COMPOUNDS USED



Medium



Hard



Intermediate

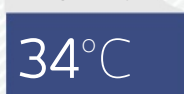


Wet

CLIMATE



TRACK TEMP



FASTEST LAP

Sebastian Vettel, lap 55, 1min28.918secs



FASTEST PITSTOP

Sebastian Vettel, 21.599secs (entry to exit)

DRIVERS' STANDINGS

1st	Lewis Hamilton Mercedes	100pts
2nd	Nico Rosberg Mercedes	97pts
3rd	Fernando Alonso Ferrari	49pts
4th	Sebastian Vettel Red Bull	45pts
5th	Daniel Ricciardo Red Bull	39pts
6th	Nico Hülkenberg Force India	37pts
7th	Valtteri Bottas Williams	34pts
8th	Jenson Button McLaren	23pts
9th	Kevin Magnussen McLaren	20pts
10th	Sergio Pérez Force India	20pts
11th	Kimi Räikkönen Ferrari	17pts
12th	Felipe Massa Williams	12pts
13th	Romain Grosjean Lotus	4pts
14th	Jean-Éric Vergne Toro Rosso	4pts
15th	Daniil Kvyat Toro Rosso	4pts
16th	Adrian Sutil Sauber	0pts
17th	Esteban Gutiérrez Sauber	0pts
18th	Max Chilton Marussia	0pts
19th	Kamui Kobayashi Caterham	0pts
20th	Pastor Maldonado Lotus	0pts
21st	Marcus Ericsson Caterham	0pts
22nd	Jules Bianchi Marussia	0pts

CONSTRUCTORS' STANDINGS

1st	Mercedes	197pts	9th	Sauber	0pts
2nd	Red Bull	84pts	10th	Marussia	0pts
3rd	Ferrari	66pts	11th	Caterham	0pts
4th	Force India	57pts			
5th	Williams	46pts			
5th	McLaren	43pts			
7th	Toro Rosso	8pts			
8th	Lotus	4pts			



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The Monaco GP preview



Round 6 / 22-25 May / Circuit de Monaco

This tight, twisting classic puts more emphasis on driver skill than any other race



THE ENGINEER'S VIEW

Pat Symonds,

Williams' chief technical officer

Of all the tracks, Monaco is considered to be the ultimate test of a driver's skill. Its tight, twisty streets pile pressure on the driver, while engine power plays a smaller role. Especially in changeable conditions, the driver is paramount: Nelson Piquet likened racing on this circuit to "riding a bicycle around your living room."

Monaco has one of the slowest corners in F1, the Grand Hotel hairpin, where cars crawl around as slow as 30mph. It also has one of the quickest: the kink in the tunnel under the Fairmont Hotel,

which is challenging enough without the rapid change from light to dark then back to blinding light as the drivers exit at high speed.

The circuit is bumpy and undulating and drivers will modify ideal racing lines between Casino and Mirabeau corners to avoid overly unsettling their cars. Engineers, meanwhile, must provide a 'soft' car that will let the tyres retain as much contact as possible with the asphalt, without giving up too much aerodynamic grip.

Teams typically run a special, larger-than-usual rear wing here to ensure as much downforce as possible is achieved at the lower speeds required here. Front downforce is also an issue, with most teams tending to run a lot of – if not maximum – front wing, because the circuit has an understeer-inducing characteristic.

The asphalt is very smooth, which is why Pirelli will bring the supersoft tyre here for the

first time, paired with the soft compound. The increased torque of the 2014 power units makes good traction more important than ever. We may see quite severe rear-tyre wear if the tyre management is anything less than perfect.

With the high occurrence of Safety Cars, red flags and/or changeable conditions combined with the difficulty of overtaking, Monaco presents a unique problem in terms of strategy. Although a certain number of stops might be optimal for a single car going around the circuit, teams are pushed to reduce the number of tyre changes, taking into account the actions of other cars – because track position is key. Teams often take a slower strategy (in terms of lap time) because it provides a better distribution of outcomes.

Despite the difficulty of overtaking, there is a lot of excitement here, since a single accident can drastically change the outcome of the race.



MONACO GP RACE DATA

Circuit Name Circuit de Monaco
First GP 1950
F1 races held 60
Laps 78
Circuit length 2.075 miles
Race distance 161.879 miles
Direction Clockwise
Winners from pole 27

TV TIMETABLE (UK TIME)

Thursday 22 May
Practice 1 09:00-10:30
Practice 2 13:00-14:30
Saturday 24 May
Practice 3 10:00-11:00
Qualifying 13:00
Sunday 25 May
Race 13:00
Live coverage Sky Sports F1
Highlights BBC One



WHAT HAPPENED IN LAST YEAR'S RACE...?

Winner Nico Rosberg
Margin of victory 3.888secs
Fastest lap 1m 16.577s, S Vettel
Race leaders 1
Pitstops 30
Overtakes 16



Rosberg beat Mercedes team-mate Hamilton away from pole and retained a lead throughout the race. There was drama when Maldonado collided with Chilton's Marussia at Tabac – a barrier was dislodged, forcing a red-flag stoppage. Rosberg was unfazed and held on to his lead at the restart.

MONACO TELEMETRY

2014 ■ 2013 ■

HOW A SIMULATED LAP HERE IN A NEW 2014 CAR COMPARES WITH LAST YEAR

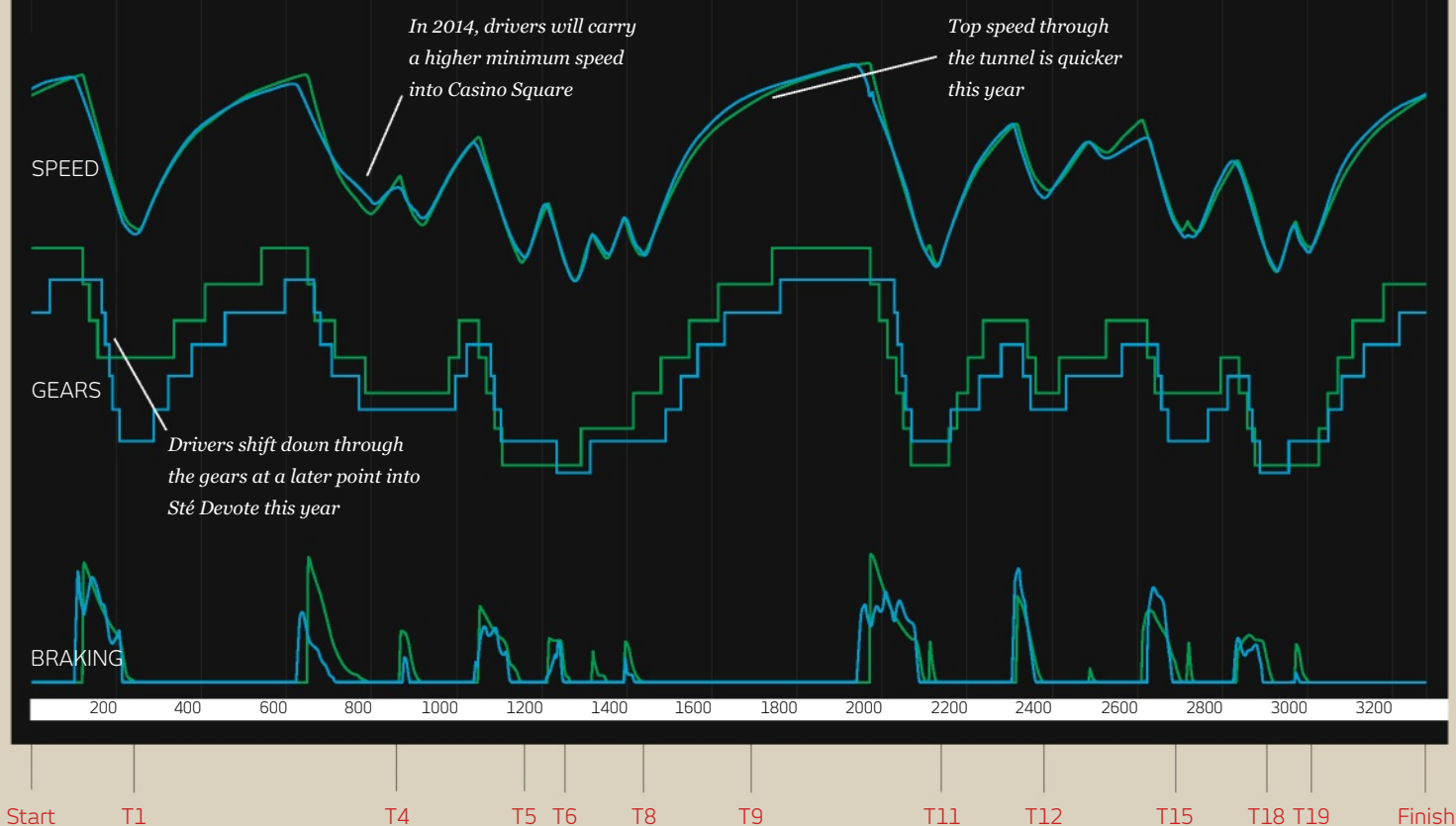


ILLUSTRATION: ALAN ELDREDGE. PHOTOS: STEVE EATHERINGTON/LAT, ANDY HONE/LAT

The Canadian GP preview



Round 7 / 6-8 June / Circuit Gilles Villeneuve

A high-pressure, stop-start race where any hesitation can put a driver in the wall



THE ENGINEER'S VIEW

Pat Symonds,

Williams' chief technical officer

The Canadian Grand Prix takes the Formula 1 teams away from Europe once more after only a couple of races close to base. This time, they're heading off to Montréal on the eastern side of Canada. Gone are the benefits of being within easy reach of the factory, which have spoiled teams at the previous two races, meaning it is much harder to bring last-minute parts and fixes to the track.

The circuit at Montréal is dominated by long straights and hard braking events, which means

its nature is very much stop-and-go. Good top speed is therefore the key to success, as well as a good car under acceleration and traction. This makes the race all about the engine and puts it under a fair amount of strain. The brakes are also placed under a lot of stress, and it's important to keep a close eye on both brake wear and temperature due to the number and severity of braking zones at this track.

Although Montréal's circuit was resurfaced only a few years ago, it remains very bumpy in parts and this can really affect drivers under braking. The entry to the hairpin at Turn 10 is one area where this is critical, because it forms one of the best areas to either overtake, or to line up an overtaking manoeuvre for the following straight.

It is a tough circuit for drivers; the ample overtaking areas mean that they cannot rest if

there is a car close to them on track and they must be especially careful about getting good exits onto the longer straights. The walls are very close to the track, and one in particular, the Wall of Champions, has gathered more than its fair share of carbon over the years. What's more, to set a good lap, it's necessary to really ride the kerbs and be very good on the sharp changes of direction, both of which are going to push drivers closer to the limits of their cars.

Despite the bumpiness, the Tarmac itself is very smooth here, and that explains Pirelli's decision to bring the same tyres to Montréal as they did to Monaco (the supersoft and soft compounds). Strategies will be very variable from team to team, and, with an almost constant threat of a Safety Car deployment, they can vary between one-stop strategies and three-stop strategies – sometimes in the same race.



CANADIAN GP RACE DATA

Circuit Name Circuit

Gilles Villeneuve

First GP 1978

F1 races held 34

Laps 70

Circuit length 2.709 miles

Race distance 189.685 miles

Direction Clockwise

Winners from pole 15

TV TIMETABLE

(UK TIME)

Friday 6 June

Practice 1 15:00-16:30

Practice 2 19:00-20:30

Saturday 7 June

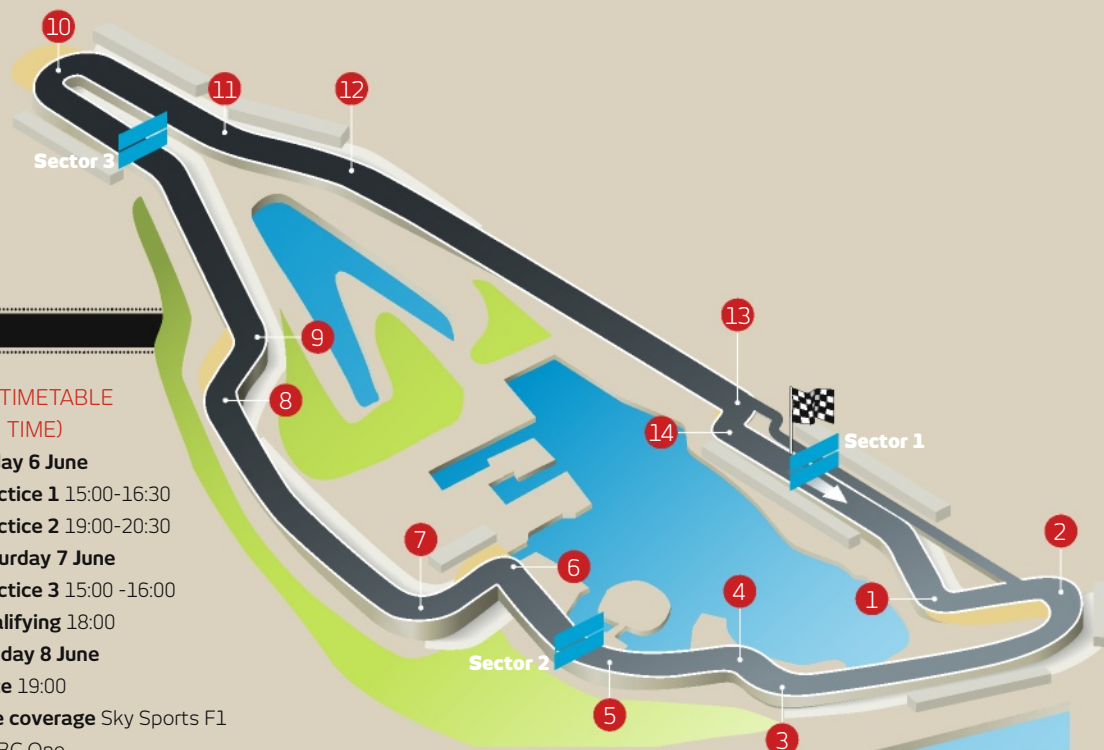
Practice 3 15:00-16:00

Qualifying 18:00

Sunday 8 June

Race 19:00

Live coverage Sky Sports F1
& BBC One



WHAT HAPPENED IN LAST YEAR'S RACE...?

Winner Sebastian Vettel

Margin of victory 14.408s

Fastest lap 1m 16.182s, M Webber

Race leaders 2

Pitstops 44

Overtakes 39



Unusually, last year's race was free from rain or Safety Cars, so Sebastian Vettel raced at the head of the field untroubled, to take his and Red Bull's first win at this track. While there was no rain on race day, there were downpours on the Saturday, when Valtteri Bottas qualified his Williams in P3.

MONTRÉAL TELEMTRY

2014 ■ 2013 ■

HOW A SIMULATED LAP HERE IN A NEW 2014 CAR COMPARES WITH LAST YEAR

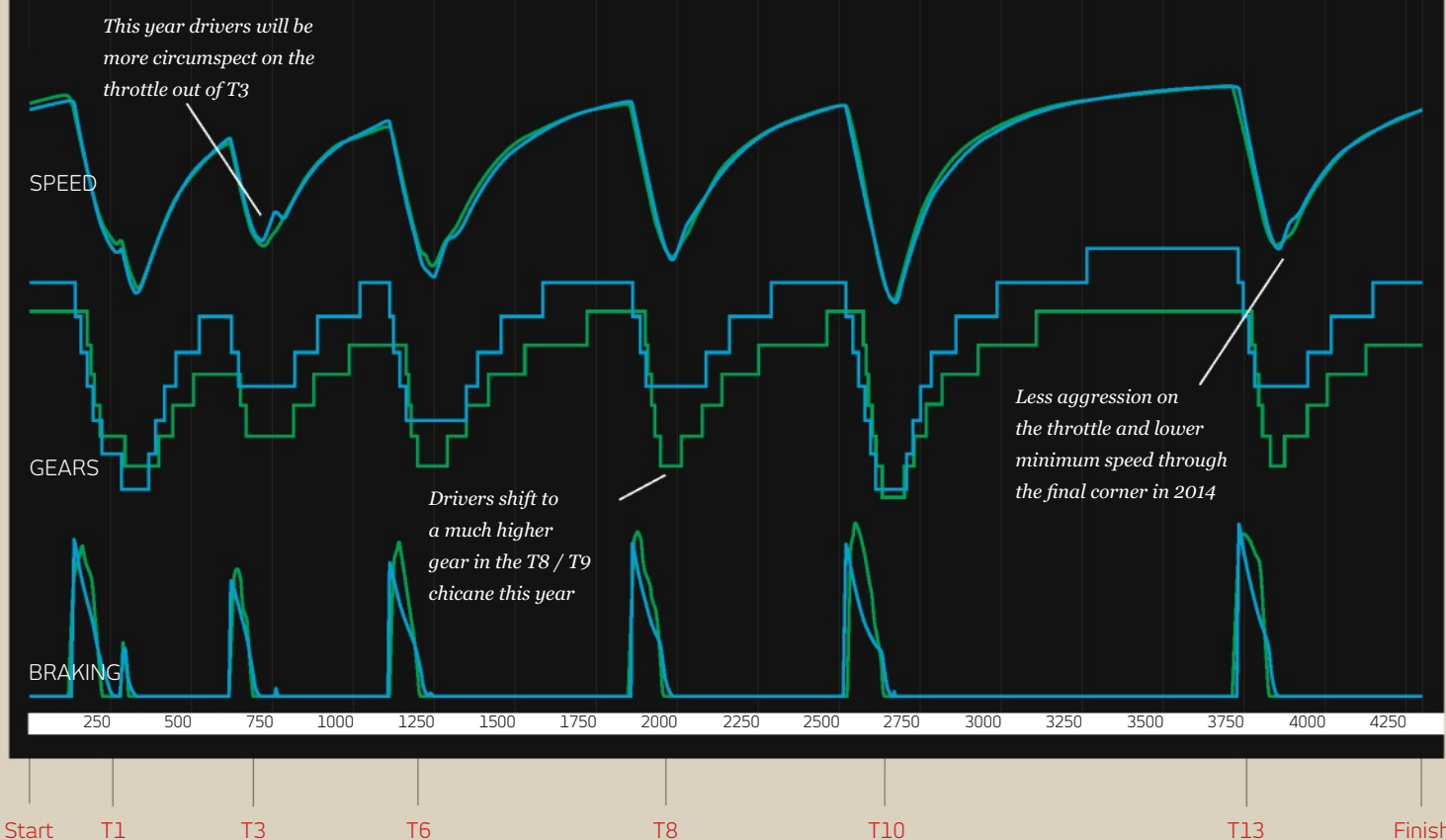


ILLUSTRATION: ALAN ELDREDGE. PHOTOS: CHARLES COATES/LAT



There was a time when the sound was beautiful but the racing was nonexistent, so is there a middle ground? Maybe, but not to the detriment of the fantastic racing in Bahrain. F1 is certainly moving with the times, and maybe certain 'fans' of the sport should as well.

Craig Curtis
Swansea, UK

★ STAR LETTER



Ricciardo: a faultless racer and an all-round nice guy

Ricciardo is the real deal

While the Chinese and Spanish Grands Prix may have provided great lessons from Lewis Hamilton on how to control a race, it was Daniel Ricciardo who stood out for me by yet again demonstrating the class and maturity rarely associated with a young driver in his position.

Not only was his driving close to faultless, his whole attitude over the team radio and when talking to the media about Vettel initially refusing to allow him to pass, proved to me what a professional racer and genuinely nice guy he really is.

I'm sure I'm not the only one finding themselves rapidly becoming a Daniel Ricciardo fan without really realising that it is happening.

Toni Attwell
By email



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"Tough luck"? Good for Vettel

The recent discussion of Sebastian Vettel's comments when asked to move aside for Ricciardo during the Chinese Grand Prix seem, in the main, critical of Vettel.

But I, for one, am pleased to see that he chooses not to meekly follow team orders. As I see it, if an F1 driver wants to get past his team mate – he should overtake him. If he can't do it, then he's not fast enough. It's called racing!

This may be a bit simplistic, but I am heartily fed up with the artifice involved in today's F1. Team orders are a farce, brought on by the way the constructors' championship apportions prize money. Maybe the system needs changing?

Paul Hayes
Devon, UK

I'll take racing over noise

Nine hundred races and still you can't please some people!

Ever since the first winter test of 2014, fans have been talking about boycotting F1 until they sort out the sound of the power units. What they fail to realise is that this 'new' sound isn't a new sound at all. Those who watched F1 during the '80s will tell you it's very similar to the old-school turbo monsters – and I don't recall anyone moaning about the sound then.

What they also fail to realise is that, more importantly, Bahrain was F1's 900th world championship race. And the evolution of the cars, the technology and the circuits since that first race in 1950 has been remarkable.

Like it or not, F1 changes its image more often than David Beckham changes his hairstyle. And it *will* change again. People may not like it, but for me the racing far outweighs the sound in 2014.

The sound and the spectacle

I just received my May issue of *F1 Racing* and noted your disbelief about the negative response to the 2014 changes.

Perhaps you are one of the few, on the small bandwagon, trying to justify the change from racing drivers and cars to technical- and rule-driven strategy

Yes, F1 needed some far-reaching technical changes to bring it up to date. Yes, Bahrain was a great race – not because of the rules changes but because team-mates were allowed to race one another. You should listen to the real fans of F1.

I've been to two of the four races so far and the fans' overwhelming response to the lack of noise is that it is a nonsense – up to the point where many say they won't attend again. Watch on TV and all you can hear is the banal commentary – the noise of the cars is virtually nonexistent.

I don't want what we had before and I'm not 'rev-addicted', I just want the sound and spectacle that has led me to follow Formula 1 for 50 years.

Les Clayton
By email

Speed versus safety

Fans want to watch a race at full speed. A Safety Car can add excitement, but we need to drop the ruling that lets cars un-lap themselves. Let's get the racing going again as soon as possible.

Secondly, the deployment of a Safety Car is not always a straightforward decision but why the delay following the Gutiérrez flip? The cars may have been off the racing line and there was little

debris, but this was a serious incident and more immediate action was appropriate to check that the driver was not injured.

Russell Lines
East Sussex, UK

An American dream

I was pleased to read that Gene Haas, of Nascar's Stewart-Haas Racing team, will be running a new team in Formula 1 from 2015.

Conquering America has so far seemed a chicane too far for the otherwise boundless expansion of Formula 1 – a sport that transcends social class and creates common ground for sports lovers the rest of the world over. Maybe now, with a home-grown boy to back, the Americans will sit up and take notice. I hope they do for the simple reason that Formula 1 deserves to be a truly global sport.

John Sheridan
By email

Give Wolff a chance

I recently read an article in a UK newspaper in which the journalist responsible described Susie Wolff's Formula 1 story as a "publicity stunt" and pointed to a lack of success in DTM as evidence of this.

I find this extremely harsh. For example, in the 2010 DTM season, Wolff finished ahead of both David Coulthard and Ralf Schumacher, two very capable drivers during their F1 careers. That proves something doesn't it?

It stands to reason then that Wolff has some potential; just

how much she has is difficult to determine, but I say give her a chance. Let her drive in practice sessions at Silverstone and Hockenheim this year and then judge her if you must.

Harry Conroy
Manchester, UK

Meeting with a legend

Your article in your May issue by Mike Gascoyne reminded me of the time I met Harvey Postlethwaite.

Many moons ago I was a member of Racing for Britain and one of their fundraising trips involved a tour of the Tyrrell factory followed by a Q&A session with Harvey Postlethwaite. At the end of the session, Mr P said: "Now you have asked all your questions, I have one – who owns the Caterham?" I raised my hand and he asked if he could have a look at it!

We trooped out to the car park, he looked at my 7 and asked if he could sit in it. I said yes and he said it brought back memories of his racing days. At this point, I dangled the keys in front of him and he politely said "no". I carried on waving them and he soon changed his mind and drove around the car park with a grin on his face.

Later I wrote an article for the 7 owners club magazine about the trip, under the headline: "I'll never wash the steering wheel again!"

I always admired his designs and that day showed me what a pleasant gentleman he was.

Mike Stamper
By email



Susie Wolff will have a chance to prove herself in F1 at the British GP in June

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NEXT MONTH...



LEWIS'S DREAM MACHINE

How Mercedes built Hamilton the perfect race car to suit his style – and claim world title number two

- > Charlie Whiting fields questions from paddock insiders
- > Analysis: Who's bossing F1 team management?
- > Maurice Hamilton grills Nigel Mansell over lunch

ISSUE ON SALE 19 JUNE*

MURRAY WALKER



UNLESS I'M VERY MUCH MISTAKEN...

"So, coming up, it's magical Monaco, which certainly lives up to its reputation as the jewel in Formula 1's crown!"

With its glorious location, long racing history, unique round-the-houses circuit and glamorous image, the Monaco Grand Prix has created so many wonderful memories for me.

At one time, Monaco limited starters to 16, but in 1974, when I was commentating for BBC Radio, 25 hopefuls took the start. Halfway up the hill to Casino Square, Denny Hulme's McLaren hit a barrier and, in the ensuing mayhem, seven were out immediately and, by lap seven, so were another four. With no TV screens and the radio lines cut, was I confused? Yes, I certainly was!

Twenty years later in 1994, at the first F1 event following the deaths of Roland Ratzenberger and Ayrton Senna at Imola, there was a minute's silence on the grid to honour their memories. Ayrton had dominated Monaco since his phenomenal first drive there in 1984. He entered ten races there and it was my privilege to commentate on every one of them.

He won six of those ten, and two of his races at Monte Carlo particularly stand out for me. In 1984, his performance was, for a newcomer, astounding. He came close to winning in


appalling conditions and in an inferior car. Then, in 1992, his resistance in the latter stages to a recovering Nigel Mansell, in a faster Williams on new rubber, gave him his fifth victory. He was truly the Master of Monaco.

In 1980, Irishman Derek Daly slammed his Tyrrell into the back of Bruno Giacomelli's Alfa Romeo in Monaco. He flew through the air and landed on top of team-mate Jean-Pierre Jarier's car. Ken Tyrrell's sponsors at the time were the Candy white-goods company and they had been complaining to Ken about the lack of publicity they were getting from their considerable expenditure. So when spectacular pictures of the two Candy-branded Tyrrells appeared on front pages worldwide, all was euphorically forgiven!

The following year, race day was gloriously sunny. But there was concern as water began to cascade onto the track inside Monaco's tunnel. It turned out that a chip-pan fire in the Loews Hotel kitchen above had set off the sprinklers! The race eventually got under way and was won by Gilles Villeneuve for Ferrari.

If 1980 and '81 had been exciting, 1982 was an all-time cliffhanger. On lap 74 of 76, Alain Prost, with a secure lead in his turbocharged Renault, hit the barrier and was out. Riccardo Patrese's Brabham then led until he spun, stalled his engine and dropped to third behind Didier Pironi's Ferrari and Andrea de Cesaris's Alfa. Lap 75 – two to go – and Pironi stopped in the tunnel but, further back, de Cesaris had run out of petrol. In the meantime, Patrese had managed to bump-start his Brabham and was back in the lead! In the commentary box James Hunt dryly remarked that here we were waiting for a winner but nobody seemed to be prepared to oblige, although Riccardo eventually did so.

It's always said that it is impossible to pass at Monaco unless the chap in front is prepared to move over – but no one told Olivier Panis that in 1996. After Michael Schumacher crashed his Ferrari on the very first lap, Panis made an inspired tyre selection and came through from 14th on the grid to win in his Ligier. There were 21 starters that year, but only three went the whole distance.

It is the one they all want to win. There's nowhere else like it and it is not difficult to see why. So expect to enjoy Monaco 2014! 



"In 1992 Senna's resistance to Mansell, in a faster Williams on new rubber, gave him his fifth win. He was the Master of Monaco"







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Official fuel consumption for the SEAT Leon Cupra in mpg (litres per 100km); urban 32.5 (8.7) – 34.4 (8.2); extra-urban 49.6 (5.7) – 52.3 (5.4); combined 42.8 (6.6) – 44.1 (6.4). CO₂ emissions 154 – 149g/km.

Standard EU test figures for comparative purposes and may not reflect real driving results. Acceleration 0–62mph in 5.7–5.9 seconds.