



AUTO

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HOW FILM DIRECTOR LUC BESSON JOINED THE GLOBAL FIGHT FOR ROAD SAFETY



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#12

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THE FIA

The Fédération Internationale de l'Automobile is the governing body of world motor sport and the federation of the world's leading motoring organisations. Founded in 1904, it brings together 236 national motoring and sporting organisations from over 135 countries, representing millions of motorists worldwide. In motor sport, it administers the rules and regulations for all international four-wheel sport, including the FIA Formula One World Championship and FIA World Rally Championship.

THE FIA FOUNDATION

The FIA Foundation is an independent UK-registered charity that supports an international programme of activities promoting road safety, the environment and sustainable mobility. It was established in 2001 with a donation of \$300 million from the FIA and is governed by a Board of Trustees. Among its activities, the Foundation participates in various UN road safety and environment related partnerships and is a member of the UN Global Road Safety Collaboration.

THE FIA INSTITUTE

The FIA Institute is an international not-for-profit organisation that develops and improves motor sport safety and sustainability. It leads projects that encourage the rapid development of new and improved safety technologies; that facilitate higher standards of education and training; and that raise awareness of safety and sustainability issues. The Institute was established in October 2004 and funds its activities through annual grants from the FIA Foundation.

HARD FOCUS

While the quest to improve road safety is being constantly pursued through high-level diplomacy, it's equally critical to focus on educating those involved in the battle every day - road users themselves.

To my mind there is nobody better qualified to bring that focus to bear than Luc Besson - one of the world's foremost filmmakers. It is my privilege to count Luc as a friend and I was delighted when he agreed to join in our quest by collaborating with the FIA on a road safety film. The results, detailed in our cover story, are uncompromising but will, I believe, help to reduce a death toll that sees 500 children lose their lives on the world's roads every day. The FIA's safety mission of course extends to the race track and in this issue we also take an in-depth look at the crucial work of the Formula One medical team. I hope you enjoy this latest edition of AUTO.



Jean Todt,
FIA President

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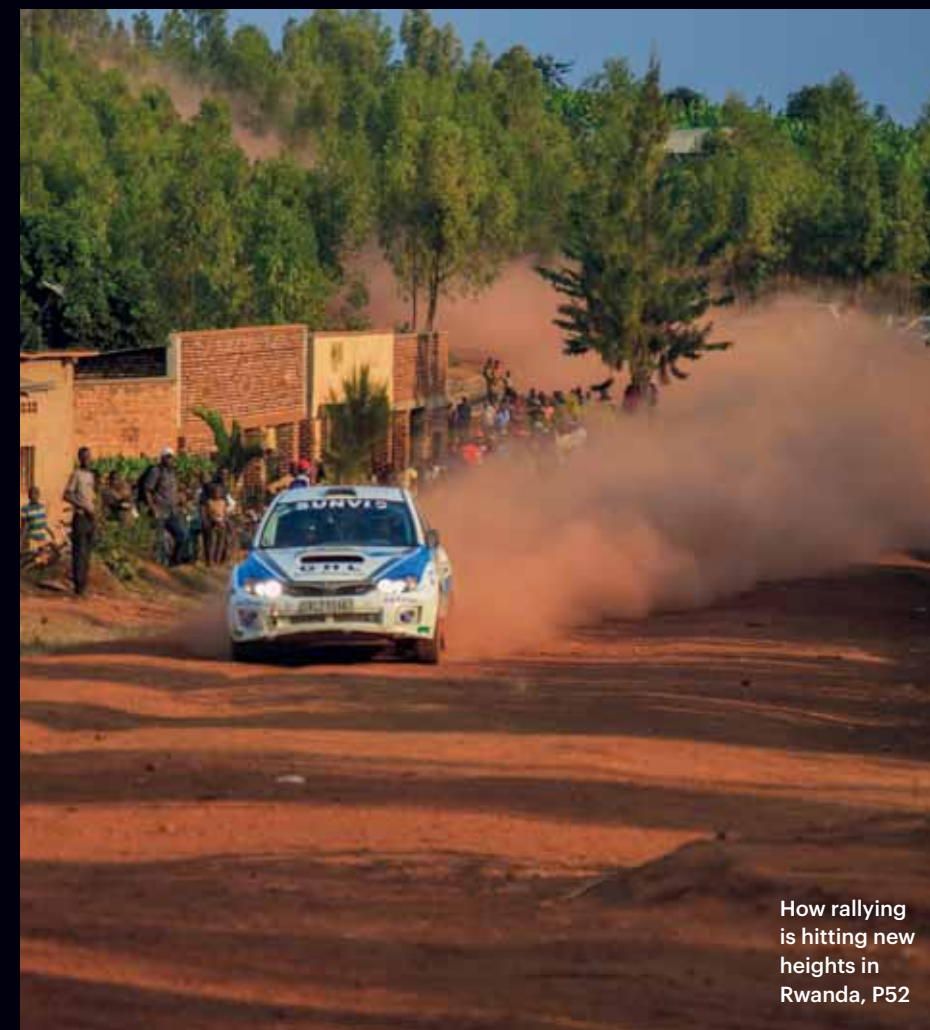
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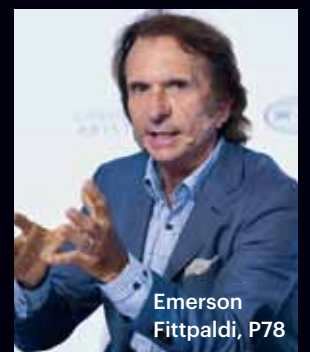


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P78 FOCUS ON DRIVING STANDARDS
Emerson Fittipaldi, President of the FIA Drivers' Commission, on improving young driver conduct



ROCKET RACER

Duncan Micallef prepares to fire his Top Fuel racer down the Rico Anthes Quartermile at the Hockenheimring. The Maltese driver was sixth in the FIA European Drag Racing Championship points following his fourth-place finish in Germany.

UP FRONT

FIA European Drag Racing Championship
RING OF POWER

Drag racing has always been one of motor sport's most visceral thrills and the most punishingly quick of all drag racers are the Top Fuel machines, with cars hitting 160km/h in less than a second and reaching top speeds of over 450km/h.

In July, Germany's Hockenheimring played host to round four of the hotly-contested six-round FIA European Drag Racing Championship, where the Top Fuel racers headed the pro-class bill at the circuit's annual festival of extreme power – Nitrolympx. And at the end of an epic series of head-to-head battles at the Rico Anthes Quartermile, it was reigning champion Mikael Kågered from Sweden who claimed victory.

The first round of eliminations saw number two qualifier Stig Neergaard beaten by number seven qualifier Urs Erbacher when Neergaard had an oil leak at the start. On the next run, 2013 title runner-up Anita Mäkelä suffered a blown engine and was defeated by Duncan Micallef (pictured right).

Micallef's win earned him a semi-final berth against Kågered but the defending champion, who had earned a bye to later rounds, posted an excellent 4.18 seconds to defeat the Maltese racer. In the other semi-final Erbacher was too fast for Top Fuel rookie Liam Jones. Kågered then took the overall win with a time of 4.178s.

The win means Kågered has extended his lead in the FIA European championship standings with the Swede now on 307 points, 66 clear of Mäkelä, with third-placed Neergaard 10 points further back.



Driverless cars

TEST PILOTING

Audi has taken to the Sonoma Raceway in California to test its latest generation driverless car concept and claims to have outperformed sports car drivers on the US track.

"In Sonoma, we took the Audi RS 7 piloted driving concept to its physical limits lap after lap, and it handled the task with uniform precision," says Thomas Müller, who is responsible for the development of brake, steering and driver assistance systems at Audi. "The car turned in lap times that were better than those of sports car drivers."

The RS 7 took just 2m01.01s to complete the 4.05km circuit. It is the latest milestone in a series of tests. In October 2014, Audi completed a driverless lap on the Hockenheimring in Germany at speeds of up to 240km/h. Earlier this year, an Audi A7 piloted driving concept drove on public highways from Silicon Valley to Las Vegas for the Consumer Electronics Show (CES). This car also drove autonomously on German autobahns at speeds of up to 130km/h.

Audi believes that piloted driving technologies can improve safety, efficiency and convenience. It says that the systems can make a valuable contribution to safety, especially when the driver is overwhelmed or underwhelmed by driving tasks. When used to temporarily assume driving tasks, the predictive technology also makes driving more efficient and reduces stress.

Piloted driving will make its production debut in the next generation of the Audi A8, a luxury-class sedan. The systems can assume control of the car during parking or in stop-and-go traffic on highways at speeds of up to 60km/h.



AUDI ON TRACK

The Audi RS 7 piloted driving concept took another step forward when it lapped Sonoma Raceway in California in 2m01.01s, with the car maker claiming the time to be quicker than that of some sports car drivers at the circuit.

UP FRONT

UP
FRONT

AUTO NEWS

In this issue, Tommi Mäkinen to spearhead Toyota's 2017 WRC challenge, FIA launches National Karting Schools worldwide, road safety targets included in UN's development goals for the first time, and Paris to host first European race in 2015/16 Formula E series.

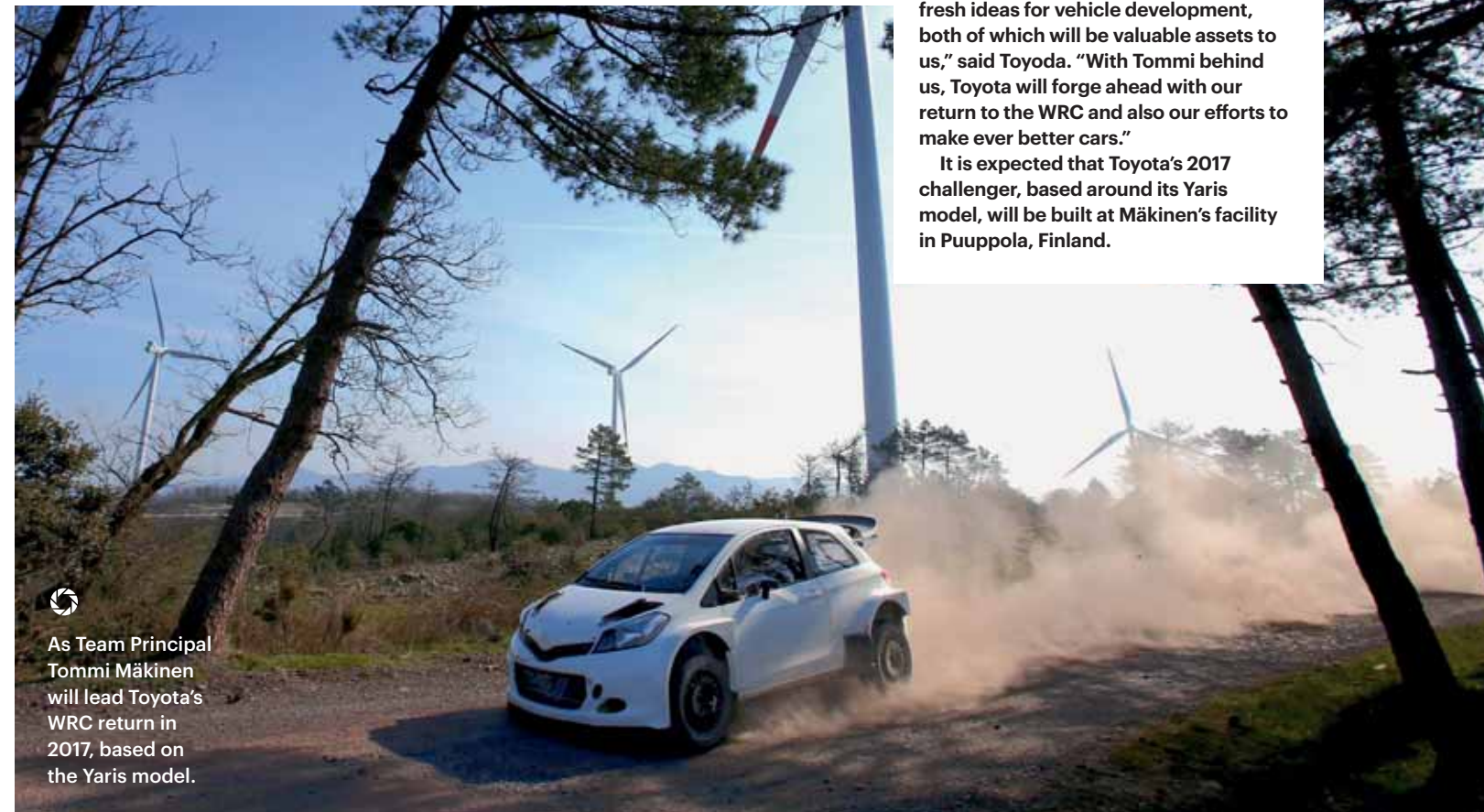
RALLY LEGEND MÄKINEN TO LEAD TOYOTA WRC CHALLENGE

Toyota has chosen four-time World Rally Champion Tommi Mäkinen to spearhead its return to the FIA World Rally Championship in 2017, with the Finn being appointed Team Principal of the company's programme.

The winner of 24 rallies across an 18-year driving career, Mäkinen achieved his four consecutive titles, starting in 1996, at the wheel of Mitsubishi rally cars and helped the marque to the 1998 world constructors' title. However, in recent years the 51-year-old has successfully run Tommi Mäkinen Racing, building and selling Group N Subarus. During that time he has built up strong links with Toyota Motor Corporation President and CEO Akio Toyoda, who will serve as team chairman.

"Tommi has abundant experience and fresh ideas for vehicle development, both of which will be valuable assets to us," said Toyoda. "With Tommi behind us, Toyota will forge ahead with our return to the WRC and also our efforts to make ever better cars."

It is expected that Toyota's 2017 challenger, based around its Yaris model, will be built at Mäkinen's facility in Puuppola, Finland.



As Team Principal Tommi Mäkinen will lead Toyota's WRC return in 2017, based on the Yaris model.



DYNAMIC NEW WORLD RALLY CAR SET FOR 2017

World Rally Cars will become more dynamic, distinctive and powerful from 2017 following the agreement of new regulations for the world championship.

The new regulations, approved by the World Motor Sport Council, are an evolution of the current 2014-2016 rules but will deliver more of what the fans want to see: an increase in power under a dramatic, competitive body.

"Defining the principles has been an extensive but very rewarding process," said Jarmo Mahonen, FIA Rally Director. "All of the sport's stakeholders have been involved to ensure we meet commercial, marketing and promotional objectives, while at the same time recognising what our fans want to see."

"The cars will look dramatic and have more character; such are the freedoms we hope to see defined in the final technical regulations. Seeing one of these cars in action will really set the heart racing and that's exactly what was intended."

The 2017 regulations will see enhancements to the engine and the visual impact created by an all-new aerodynamic package. The 1.6-litre turbo engine is retained but the power will be increased up to the level of World Touring Car Championship racers. Greater freedom will also be afforded with the aerodynamics, setting this World Rally Car aside from many of its recent predecessors.

"I think that the ideas for the look and performance of the 2017 car are great news," said Volkswagen Motorsport's double FIA World Rally Champion Sébastien Ogier. "As a racing driver you are always looking for more performance. I think the larger wing and new aerodynamics will give the car a bit more downforce, more grip and more speed going into the corners. This is also good for the show, because the extra power will definitely make the driving more spectacular for the fans. And it will also make the car look a bit more aggressive with a wider body."



The concept drawing for the new World Rally Car shows the dramatic looks that will arrive for the 2017 season.



HANKOOK'S AIRLESS TYRE PASSES TEST

South Korean manufacturer Hankook has completed initial testing on a revolutionary non-pneumatic tyre.

Hankook, which first unveiled a concept in 2013 combining the tyre and rim in one part, has reported good results from testing of its fifth-generation airless tyre, called the iFlex.

Instead of relying on air pressure, the iFlex is constructed from an eco-friendly material built into geometric shapes (below) to mirror the bounce and springiness normally provided by air pressure. This latest version of the iFlex is designed to mount onto a traditional wheel rim, making it compatible with current vehicles.

Hankook has said the most recent tests compared the iFlex to conventional tyres by measuring durability, hardness, stability, slalom and speed at up to 80mph. It reported that the airless tyre matched the traditional version in terms of performance.

The company has not indicated when the iFlex might become available to consumers or what it would cost. Japanese rival Bridgestone, meanwhile, is working on its own version of a non-pneumatic tyre and a company called Resilient Technologies is developing a prototype for military vehicles.

FIA LAUNCHES KARTING SCHOOLS

The FIA has launched an initiative that will enable children around the world to discover karting and receive structured training through approved National Karting Schools.

The concept behind the scheme is to build a worldwide network of schools that make use of standardised guidelines and accreditations. They will provide a programme through which young people can take their first steps into karting and increase the number of racing licence-holders around the world.

Introduced during the recent FIA Sport Conference in Mexico, the platform gives National Sporting Authorities (ASNs) the opportunity to create approved schools that will utilise a set of global parameters to tutor children aged six to 11 in the fundamentals of racing.

ASNs, in conjunction with their nominated circuits, will have to prove that they can meet criteria laid out by the FIA,

including having qualified instructors, adequate facilities and homologated circuits and equipment that satisfy safety standards.

In return, the FIA will certify the ASN and the circuit to establish a school and provide them with the guidelines and support necessary to do so.

Once established, the schools will provide structured tutoring to students, who will be able to progress through three levels of accreditation as they learn about safety on the track and on public roads, driving skills and the mechanical aspects of the sport. Instructors will be provided with criteria to evaluate the development of each driver, with bronze, silver and gold 'laurels' attainable.

For each level attained, the driver will receive a diploma as well as a badge that can be sewn onto their overalls.

Morgan Caron, FIA Head of Transverse Motor Sport Projects and Manager of the

Drivers' Commission, said: "The main objective is to provide a platform that will allow children in different countries to discover karting and provide them with practical skills."

Caron, who spent 15 years working for the Fédération Française du Sport Automobile, France's ASN, points to the example of a similar programme he was a part of there: "We had set up this kind of project in France and that has been a great success. That is why we are thinking this kind of project can develop in countries around the world."

Young French stars Esteban Ocon and Pierre Gasly both came through the French programme. With the launch of its new karting school, the FIA is hoping to provide similar opportunities to youngsters worldwide.

Caron said: "We are now fully open to receiving applications from countries that are interested in running a karting school."



The FIA has launched a global scheme to set up National Karting Schools, providing tuition to youngsters.



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The FIA Foundation and partners have campaigned to highlight road safety issues with the UN.

ROAD SAFETY INCLUDED IN UN DEVELOPMENT GOALS

Road safety targets have been included in the final text of the new Sustainable Development Goals (SDGs) adopted by UN member states.

A specific stand-alone target in the Health Goal to reduce road traffic fatalities by 50 per cent by 2020 and a target on sustainable urban transport in the Cities Goal have been approved, in a landmark achievement for the global road safety community. For the FIA and FIA Foundation it marks a successful culmination to more than three years of advocacy and coordination of a campaign, in partnership

with a wide coalition, to secure inclusion of road safety in the global development agenda for the first time.

FIA Foundation representatives took part in the final two-week session of inter-governmental negotiations, as they have done in every relevant session for the past 18 months, talking to government missions and UN agencies to ensure that the targets retained support. The SDGs will guide all global development efforts over the next 15 years, to 'stimulate action in areas of critical importance for humanity and the planet'.

FIA Foundation Director General Saul

Billingsley, said: "This is an historic advance for road safety. For the first time this issue is recognised and included as part of the mainstream global priorities. UN member states have committed to a specific, time-based, numerical global target for road fatality reduction."

"By setting a 2020 health target, and demanding early results, the international community is recognising the urgency of the road traffic fatality epidemic and making this a priority issue within the SDGs. Governments, donors and the road safety community must rise to this challenge."

FORD TESTS 'CLEVER' HEADLIGHTS

Ford is developing new headlight technology that can recall details of roads previously travelled as well as using an infrared camera to detect people and animals in a vehicle's path.

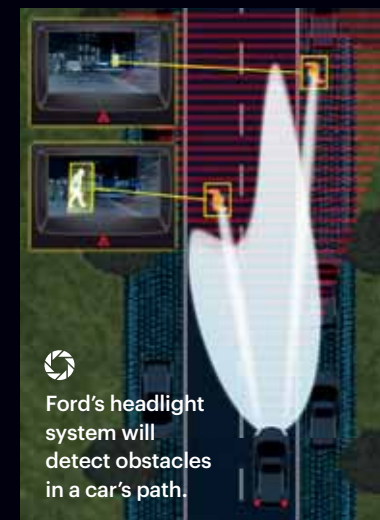
The Ford Motor Company is one of several groups working to bring automotive lighting into the 21st century. Its camera-based Advanced Front Lighting System will harness an infrared camera, GPS signals and special traffic sign recognition technology to make it easier for drivers to navigate roads in the dark.

As well as alerting drivers to pedestrians, cyclists and animals in their

path, the system will be able to store information on previously travelled roads and adjust the headlights accordingly to allow drivers to better see upcoming corners and potential hazards. The system can track eight risk factors at a time, prioritising the top two.

Ford isn't the first automotive manufacturer to make advances in this area, with Audi offering some of the same functions in its Matrix LED system.

And General Motors Company-owned Opel is working on headlights that can track a driver's eye movements and then shine light in the direction they are looking at.



Ford's headlight system will detect obstacles in a car's path.



EDF AND ITS SUBSIDIARIES ARE DESIGNING THE FORTHCOMING VEHICLE RECHARGING NETWORK

We're developing a system of recharge terminals and designing more efficient batteries, providing you with another way to drive. By 2015, five thousand electric recharge terminals will have been installed throughout France. Working hand in hand with automobile manufacturers, we're bringing electric vehicles to the city.

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ALTERNATIVE FUEL VEHICLE REGISTRATIONS RISE ACROSS EU

In the second quarter of 2015, total alternative fuel vehicle registrations in the EU increased by some 174 per cent.

According to the European Automobile Manufacturers' Association a total of 143,595 alternative fuel vehicles were registered across EU countries in the three months from April.

Of these, electric vehicle (EV) registrations grew fastest with an increase of 53 per cent, rising from 18,024 units in the same period of 2014 to 27,575 units this year. Demand for hybrid vehicles (HEV) also rose (up 22.6 per cent) totalling 53,443 units. Some 62,577 new passenger cars (up three per cent) were powered by propane and natural gas. Combining Q1 and Q2 figures, alternative fuel vehicle registrations are currently up by 24.6 per cent on the first six months of 2014.

In the second quarter of 2015, the UK saw the largest rise in registrations with an increase of 62.4 per cent, followed by France (59.7 per cent) and Spain (58 per cent). Among the European Free Trade Agreement countries, demand was primarily driven by Norway (up 74.1 per cent) with 11,614 vehicles registered, 77 per cent of which were electric.



TOYOTA MIRAI SETS RANGE RECORD

Toyota has set a new range record for zero emissions vehicles, with its new Mirai hydrogen fuel cell car (above) travelling 502km (312 miles) on a single tank of fuel.

The Mirai (which in Japanese means 'the future') is the world's first mass-produced hydrogen fuel cell electric vehicle and runs on electricity created on demand by hydrogen fuel and oxygen. The only emission produced by this process is water vapour.

The car achieved a figure of 108km (67 miles) per gallon in official US combined city/highway driving calculations, and an estimated driving range of 312 miles on a single tank, a distance the Japanese manufacturer says beats any other zero-emissions car.

Jim Lentz, Toyota North America CEO, announced the Environmental Protection Agency's (EPA) fuel economy rating at the Aspen Ideas Festival in Colorado in August.

He said: "Toyota realised in the early '90s that electrification was key to the future of the automobile. Just as Prius introduced hybrid-electric vehicles to millions of customers nearly 20 years ago, Mirai is now poised to usher in a new era of efficient, hydrogen transportation."

Toyota has already introduced the Mirai to the Japanese market and in California, and is about to launch the car in Europe. Initial European sales of the car, which is priced at €66,000 plus VAT, will be limited to the UK, Germany, and Denmark.

NEW TECHNOLOGY TO STOP DRINK-DRIVERS

New technology that could detect whether a driver has been drinking alcohol and therefore prevent their car from starting is being developed in the United States.

Auto safety officials from the Department of Transportation (DoT) recently demonstrated a test vehicle equipped with special touch pads that can instantly measure whether a driver has been drinking. If the driver is found to be over the legal limit with blood alcohol concentration of 0.08 per cent or more then the vehicle will not start.

The technology, which could exist on the steering wheel or the starter button of keyless ignitions, could become a reality for consumers as soon as the end of the decade. It works by shining an infrared light on a driver's skin, which is then reflected back and collected by the touch pad. This light contains information on the skin's unique chemical properties,

including the concentration of alcohol.

An alternative system also under development captures a driver's breath and analyses it for alcohol content. The National Highway Traffic Safety Administration, with financial backing from a consortium of auto manufacturers, is researching both systems as part of a Driver Alcohol Detection System for Safety programme.

The goal is for one of the two options, or both working in conjunction (below), to become available as optional equipment on vehicles sold in the US by 2020.



PARIS JOINS FORMULA E LINE-UP

The city of Paris will host the first European round of the 2015/16 Formula E season. The Paris ePrix will take place on 23 April on a temporary track built around the architectural complex of Les Invalides.

The French city therefore joins other world capitals such as Beijing, London, Buenos Aires, Berlin and Moscow on the calendar for the second season.

Formula E CEO Alejandro Agag said: "Staging a Formula E race in the heart of Paris is a landmark in the development of our series. I am particularly pleased that a city that is so involved in energy transition and sustainable development will organise a round of the championship."

Supporting energy transition, with the move to electrically-powered mobility being a vital component, is a priority for the Mayor of Paris, Anne Hidalgo: "Paris supports this championship for Formula E cars, because it is a fantastic accelerator for innovation in the field of electric mobility and its promotion in our towns." This innovation will be demonstrated

by the eight manufacturers approved by the FIA. For the 2015/2016 season, which begins in Beijing on 17 October, the series will become an open championship allowing manufacturers to pursue their own in-house innovations, starting with the development of bespoke powertrains.

In order to limit costs and promote investment and innovation in key areas, the manufacturers' scope is initially limited to the powertrain – the e-motor, inverter, gearbox and cooling system. All other parts will remain the same, with the aim being to prevent costly aerodynamic developments.

2015/16 FIA FORMULA E CHAMPIONSHIP CALENDAR

ROUND	DATE	COUNTRY	EPRIX
1	17 October 2015	China	Beijing
2	7 November 2015	Malaysia	Putrajaya
3	19 December 2015	Uruguay**	Punta del Este**
4	6 February 2016	Argentina**	Buenos Aires**
5	19 March 2016	TBC	TBC
6	2 April 2016	USA	Long Beach
7	23 April 2016	France	Paris
8	21 May 2016	Germany	Berlin
9	4 June 2016	Russia	Moscow
10	Date TBC	United Kingdom	London
11	Date TBC	United Kingdom	London

* All events remain subject to FIA track homologation ** TBC



CONSTRUCTORS CHOSEN FOR LMP2 CARS

Four constructors have been chosen to supply chassis for cars in the Le Mans Prototypes 2 category in ACO- and FIA-governed series and the Prototype class of the IMSA-sanctioned TUDOR United SportsCar Championship beginning in 2017, when the category's new regulations come into force.

Selected by the Automobile Club de l'Ouest (ACO), the International Motor Sports Association (IMSA) and the Fédération Internationale de l'Automobile (FIA), the four constructors are: Dallara (Italy-United States), Onroak Automotive (France), Oreca (France-USA) and the joint-venture Riley Tech/Multimatic (USA, Canada and the United Kingdom).

The aim of the new rules is to ensure long-term success for this category with a reduction in costs, the guarantee of

stability in the regulations and the intention to bring the cars' performance closer to those of the current LMP1s. They will be applicable in the Le Mans 24 Hours, the FIA World Endurance Championship (WEC), the Asian Le Mans Series (Asian LMS), the European Le Mans Series (ELMS) and in the TUDOR United SportsCar Championship.

FIA President Jean Todt said: "The FIA, ACO and IMSA have agreed to the unification of sports cars so that the same cars and teams can race on both sides of the Atlantic.

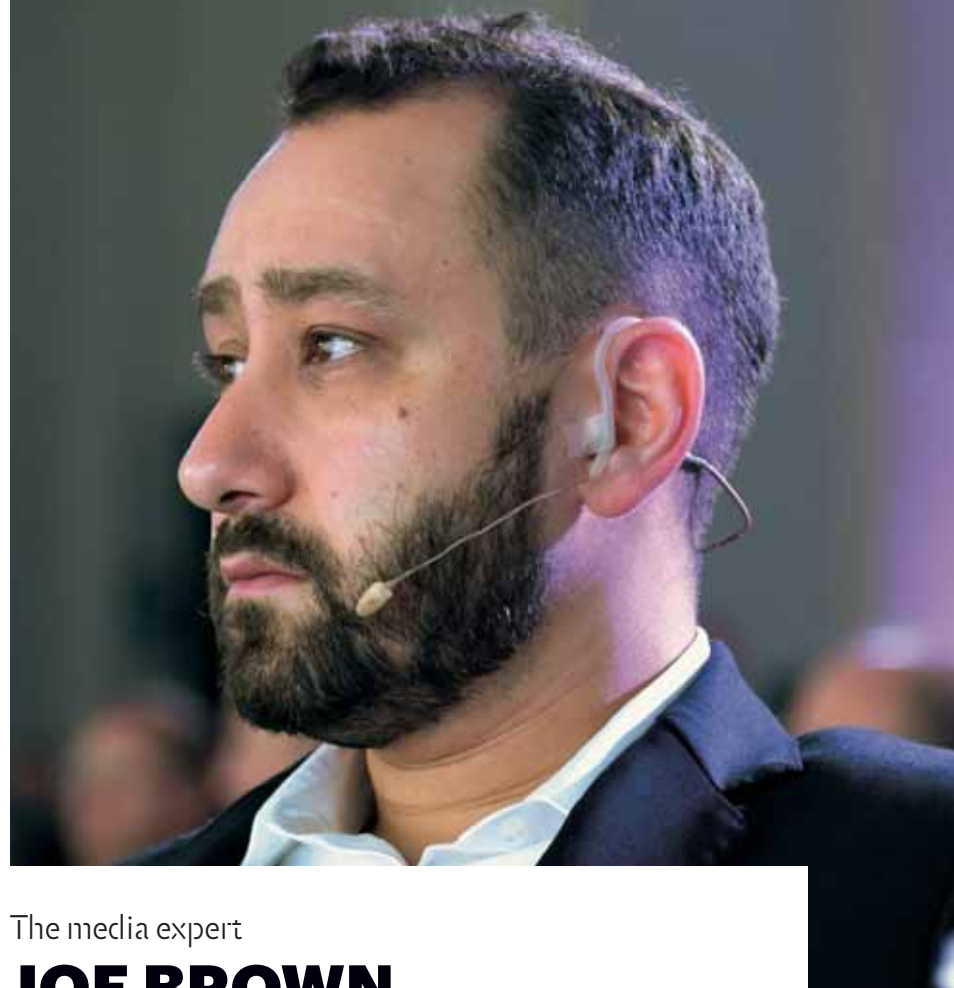
"Safety has also been at the core of these new LMP2 rules; they will integrate all the knowledge we have developed through current LMP1 regulations, with new requirements such as utilising a closed cockpit, rear crash test and wheel tethers."

**AUTO
ASKS**

QUESTION:

WHAT IS THE BEST WAY TO BRING MOTOR SPORT AUDIENCES CLOSER TO THE ACTION?

With the variety of different media platforms now available, audiences have more options than ever to consume motor sport. Speaking at the FIA Sport Conference in Mexico, three experts shared their views on what the future holds for fan engagement



The media expert

JOE BROWN

EXECUTIVE EDITOR, WIRED

To engage with the fans, I think motor sport can do a better job of using this huge buffet of different platforms to push their brand out to people who don't want the entire race. It used to be that the brand was showcased through television, but that isn't the case now as there are a variety of platforms which are available.

Repackaging information is something that we are doing in magazines at the moment and the reason for that is because some people aren't interested in the long-form articles, so it's about finding which ways you can slice up your product and push it out among the various channels.

Maybe it doesn't matter who won, maybe your viewer is interested in who made the best overtake, or maybe you are a strategic person and all you care about is when that moment was when it started raining and it was the right time to move to 'inters'.

If you're looking at the big platforms at the moment – Twitter, Facebook, Snapchat and Pinterest – I think people are consuming motor sport on all of them but it's about what sort of content it is. Fans are pulling the content through all platforms and it may seem like they are being spoiled, but actually they like to be part of the conversation.

It's amazing that Daytona [circuit] provides in-car video and audio footage for fans via a device they can hire at the track. I would pay for that when I go to the event, but I would also pay for that as an app all the way from California if I were watching the race because it's the kind of thing you want, to be behind the scenes. It comes back to the access.

People are going to get their content somehow and if you are trying to control the way they get it, without giving them something unique, then you're going to lose.

The industry insider

JOIE CHITWOOD

PRESIDENT, DAYTONA INTERNATIONAL SPEEDWAY AND NASCAR BOARD MEMBER

If I were to break it down as to how we in NASCAR try to engage more with fans, then I would have to look at three areas. The first is infrastructure: you've got to make sure you have a venue that can provide the right experience. At Daytona, we are spending \$400 million to rebuild our entire property and if you are renovating you need to be innovating. If you're not doing one or the other then you aren't going to make it happen.

Content at an event is also very important; we want to be able to ensure the live experience beats that of sitting at home and watching it. The United States is the most cluttered sports market and there is so much competition for the 'entertainment dollar'.

Whether it's the in-car video, in-car audio, timing and scoring data, having vendors and partners who offer products that allow you to listen live to the interaction between the driver and crew chief is key to really making that live experience better than if you were sitting at home.

Access is the third area where we are trying to engage with fans. If you can't get close to something, there's a good chance you aren't going to be a fan. We're coming up with more ways of getting fans onto the grid, into the garage area; places they would never normally be allowed. If you can let them in close, you're letting them be a fan, and then they can be an ambassador for your brand.

Social media allows you the opportunity to engage with the entire industry. You have to rely on your team partners and they have to be a strong ambassador for your brand, but I've found that our drivers can be the best representation for us. Giving a fan that chance to meet the athlete is invaluable, but it can be difficult as there are a lot of appearances and sponsor commitments to be met.

If we can provide the infrastructure, content and access then we can engage the product with the fans.



The race series boss

ALEJANDRO AGAG

CEO, FORMULA E CHAMPIONSHIP

It was a risk introducing fanboost, where fans vote online for certain drivers to receive an extra energy boost in their cars during a Formula E race, but it brings that aspect of interaction between the fan and the result of a sport closer. In this case it influences the result of a race to a certain extent.

We've found that the fans love it – especially the younger ones – and we will begin talking to the FIA about doing more stuff with fanboost, like bringing the voting into the race itself.

I think social media is also a very good way of engaging with fans and a great way of giving information. However, while I know we have to listen to fans, we have more information than them and we know better at times. People write all sorts of weird stuff on social media – we have a follower who wants all the cars to be pink and that's not going to happen.

For me, I think it is great to communicate on social media and look through the comments, but we have to approach it with caution. It's not always the best representation of the fans because some will write strange things and others will be staying active with what's going on all the time.

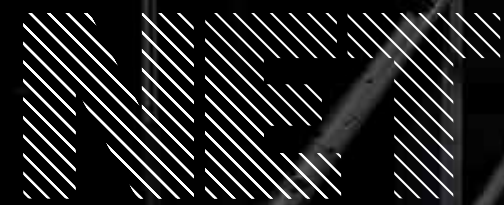
With Formula E we have also tried to target non-racing fans and give them their first experience of motor sport. We think we've done that, as when you look at the people who come to our races, many are not motor sport fans.

Going forward, we think that Formula E has a chance because it is different and hasn't tried to compete with the heritage of F1. It is electric, has different technology and we race in different locations. We wanted to bring the show to the people and we've done that as we have gone into the heart of the cities and always race in an urban environment.



TECH
REPORT

Driver protection



PROFITS

Racing nets that go around drivers' seats are set to provide new levels of protection in closed cars during side impacts

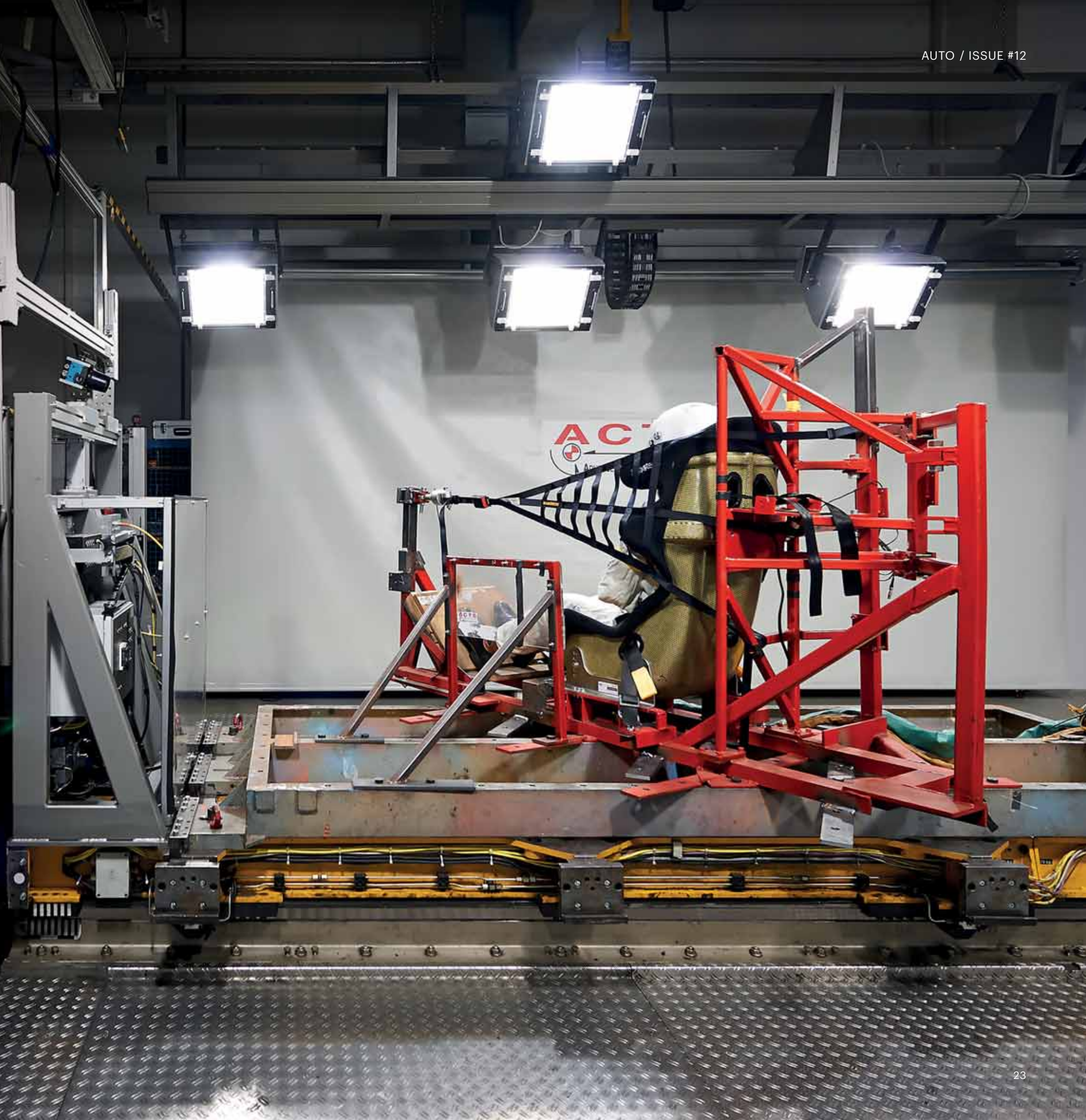
TEXT: MARC CUTLER PHOTOGRAPHY: ALEX BECKER

One of the most important safety innovations in motor sport in recent years has been the Frontal Head Restraint or HANS device, which is mandatory in all FIA championships. This equipment has made crashes survivable that were previously fatal, by preventing violent forward movement of the head and neck during frontal impacts.

Now researchers have been working on ways to improve this vital protection area in lateral and angled-side impacts.

The late Dr John Melvin, a founding fellow of the FIA Institute, conducted extensive research into this issue in partnership with NASCAR Safety Director Thomas Gideon. They conceptualised the idea of a net that surrounds the driver on either side to catch the head before it can make a violent motion sideways.

Andy Mellor, consultant for the Global Institute for Motor Sport Safety (GIMSS), the FIA Institute's safety research partner, has been investigating this concept further. He has recently completed a series of tests, with funding from the FIA Foundation to validate the use of racing nets in FIA championships. ▶



“The idea is that this net complements the protection provided by the other safety features,” says Mellor. “Frontal Head Restraints (FHRs) are designed to work in frontal and angle-frontal impacts, where if you’re in a severe crash and your body is rapidly stopped by the harness your head moves forward unrestrained until the tensile loads in the neck and at the base of the skull become excessive. These devices are designed to provide a restraining load-path for the helmet and head to limit the load on the neck and avoid neck injury. The seat itself is designed to protect the neck in rear impacts.”

The new racing nets are the final element in offering full 360-degree protection. This protection is already implemented in single-seater cars from Formula One to lower categories such as Formula 4, which, during side impacts, utilise the cockpit sides to support the shoulder and the headrest to support the head. In frontal impacts the head restraint takes over.

“This system works very well in single-seaters and the racing net basically aims to reproduce this same level of protection in touring and GT cars,” says Mellor.

MILESTONE TESTS

Side impact accidents in closed cars can have tragic consequences. During the 2013 Le Mans 24 Hours, Allan Simonsen’s Aston Martin slammed sideways into the retaining wall of the Tertre Rouge corner, killing the 34-year-old. The angle of impact meant that the Dane’s FHR device and seat offered limited protection. Mellor believes that racing nets could offer improve protection in this type of accident.

“During an angled impact, the driver’s upper torso moves sideways relative to the seat and the head can move, unrestrained, forward and around the seat-side head support. This can result in a devastating motion of the neck stretching and bending around the side of the seat,” he explains. “The racing net is designed to prevent this injurious motion.”

The latest tests, at the ACTS laboratory near Frankfurt, were designed to replicate this type of accident. The test simulated a very severe angled crash at 150 kilometres per hour with a lateral impact acceleration of 70G on the dummy, which is similar to the crash that Simonsen suffered.

“We had an Accident Data Recorder on his car, so we know what the impact conditions were,” says Mellor. “In terms of an accident, the sled test simulates a car impacting a barrier at 150kph and an angle of 30 degrees.”

It is this type of oblique-angle accident that is so dangerous for a driver.

“If the car sustains a pure side impact, the FIA8862 seat does a very good job of containing and restraining the driver,” says Mellor. “But the racing net extends this protection during angled impacts as well.”

To replicate these forces in a laboratory, ACTS uses an ingenious system called Hyge, which very accurately simulates the deceleration pulse of an actual impact but in reverse. Rather than moving then stopping, the test sled starts in a stationary position before experiencing rapid acceleration, which produces the response measured during a crash event.

“The sled actually starts stationary and then the pulse takes it from zero to 70kph in a very short distance of approximately 400 millimetres. And then it gradually comes to rest along the track. It’s a sophisticated system with a very accurate computer controller over the crash pulse.”

Mellor has already tested the strength of the racing nets, which, for this work, were supplied by safety manufacturer Schroth.

During these tests, the main aim was to evaluate the installation and geometry. ▶

The new racing net is designed to work in conjunction with the Frontal Head Restraint to provide all-round protection for a driver’s neck.



“THE NET NEEDS TO BE CLOSE TO THE HEAD’S CENTRE OF GRAVITY TO GIVE OPTIMUM PROTECTION, BUT OBVIOUSLY THE DRIVER HAS TO BE ABLE TO SEE OVER IT”

ANDY MELLOR, GIMSS CONSULTANT

“The critical adjustment was the vertical position of the racing net relative to the centre of gravity of the head. We know that if the upper strap of the net is vertically positioned close to the head’s centre of gravity then it works well, but we need to determine safe limits around this position: too high and it could cause neck compression but too low and the head could over-ride, missing the racing net altogether.

“So the main purpose of these tests was to validate those vertical positions. For each test we kept the seat in exactly the same position and we moved the net relative to the seat.”

This racing net, not to be confused with a window net (which is designed to keep a driver’s limbs in and debris out of a car), is secured to the roll cage around the back of the seat and attached to the front of the chassis at a single point. Two racing nets are fitted to each seat, one on the left and one on the right.

“They run longitudinally from the front of the car, down the side and then wrap around the seat and attach to the cage at three points,” says Mellor. “Each racing net has an upper, middle and a lower strap that attaches to appropriate points on the cage to ensure the right geometry.”

FINE-TUNING

Mellor and his team have had to consider other important safety aspects of the concept, such as the ability of the drivers to extricate quickly and to avoid obscuring driver vision.

“The racing nets need to release quickly after an accident so that a driver can get out of the car. To achieve this, they have a

mechanical attachment at the front that gives a single point release. The driver pulls the release and the net drops away.”

Creating a safe installation that does not obscure vision has been ensured.

“The net needs to be close to the head’s centre of gravity to give optimum protection, but obviously the driver needs to be able to see over the net for lateral vision and also to see the mirrors,” says Mellor. “The solution we’ve ended up with is to define a line from the driver’s eye towards the side mirror and run the top edge of the net along that line. If the racing net is significantly above this it potentially obscures the vision but if it is too low the protection it offers may be compromised.”

Numerous tests were run over four days at the ACTS facility. They were extremely successful from Mellor’s point of view and have enabled the GIMSS to confirm the installation guidelines for teams to use when installing the nets. The installation aspect of this research has been aided by Aston Martin, which, since Simonsen’s tragic death, has been fitting racing nets in its race cars.

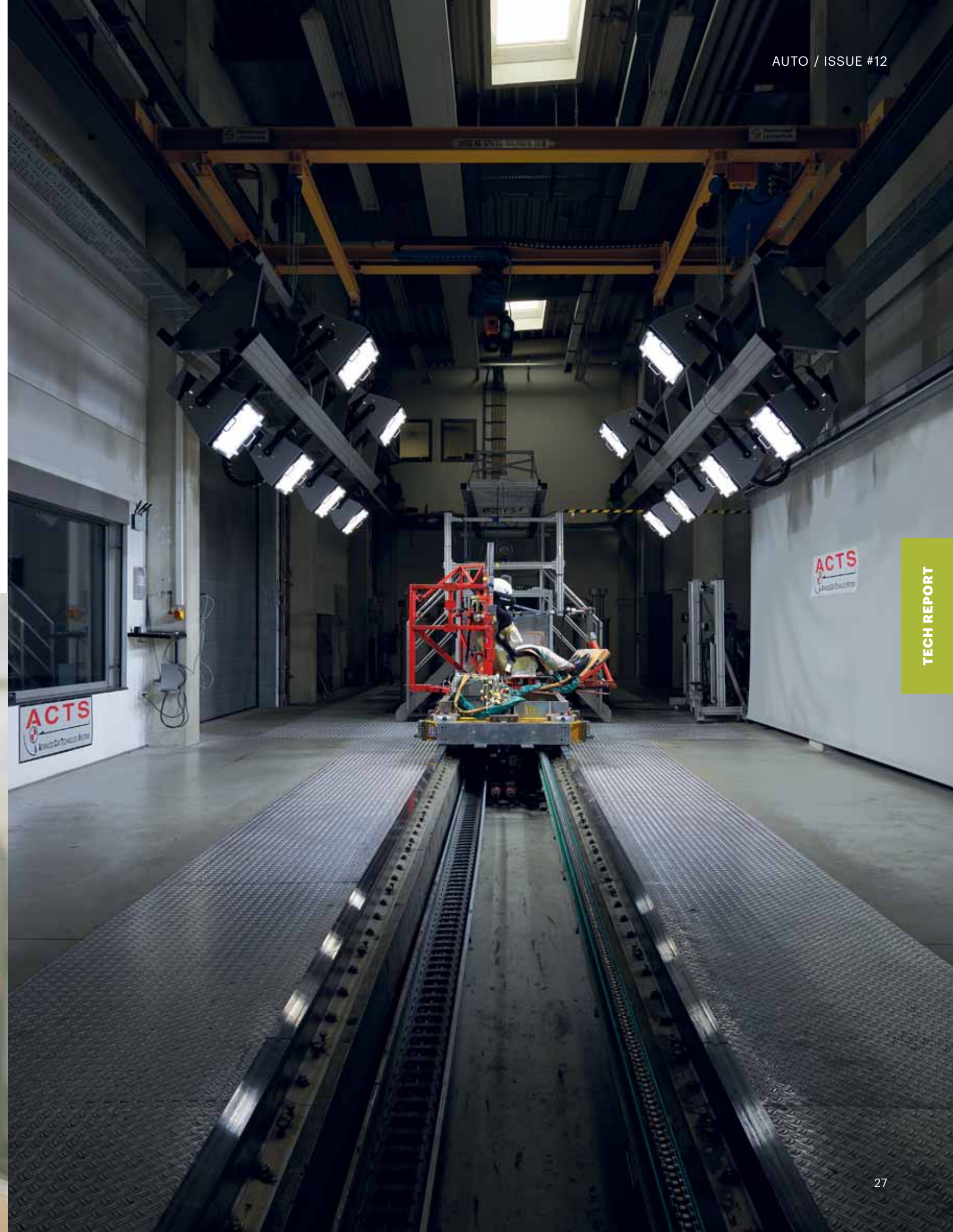
“The new guidelines will enable all teams to fit the racing nets in a safe manner.”

As for when we will begin to see them in widespread use, the FIA is planning to mandate their use from the 2016 season onwards.

“Having shown that they provide so much additional safety and are low cost and easy to fit, the FIA is confident they can be mandatory for the FIA World Touring Car Championship for next year. After that we want to cascade it down as quickly as possible so that every single club car around the world should be using them.” ■



Racetech, whose seats are FIA-approved and used in various championships, provided five seats for the tests. Right: the Hyge angled-side impact test cleverly simulates the deceleration conditions of an impact in reverse.



COVER STORY

Road safety film

MOVING



PICTURES

Hollywood director Luc Besson is the talent behind a hard-hitting new film from the FIA designed to highlight the plight of children from both poor and privileged backgrounds as they negotiate busy roads on their daily walk to school

TEXT: RORY MULHOLLAND

It's clear that this is going to end in tears. Something bad is going to happen to these innocent children making their way to school. Luc Besson's camera flicks back and forth between two groups of kids, one in the streets of a posh Paris neighbourhood, the other in a sprawling suburb of a town in South Africa.

The French children chat and laugh as they stroll, apparently safe on the clearly defined pavements and zebra crossings that ease their path to the other side of the road. The South African children have no such luck. They have to walk along dusty tracks and are then faced with a busy highway where vehicles hurtle past them in both directions.

"It was the perfect road for our purposes," says Fanny Besson, Luc Besson's sister and the producer of the three-minute film he was commissioned to make by the FIA as part of its ongoing road safety campaign.

By 'perfect' she means that there are neither zebra crossings nor traffic lights, and the South African children have no choice but to risk sprinting across whenever they spot a break in the traffic.

Therefore it was 'perfect' to illustrate the risks that millions of children across the world face on their daily trek to school.

Yet, in this film, it is in Paris that tragedy strikes. One of the children kicks a ball into the road, runs after it and is hit by a car.

The message, delivered by the following text interspersed with the images, is simple:

Every Day
Children Walk to School
Every Day
500 of them will not make it.
Save Kids Lives.

The theme of the film supports this year's United Nations Global Road Safety Week, which took place in May. Its message was #SaveKidsLives to highlight the appallingly high number of children who become victims of road accidents.

The statistics are shocking. An estimated 1.3 million people are killed each year on the roads worldwide and 50 million more are injured. That means that 3,000 people die every day in car accidents of some sort. And 500 of them are children.

For children aged 15-17, there is no greater threat to their lives

than a road traffic accident. And children's chances of dying on a road are far higher if they live in a less well-off part of the world - 95 per cent of road traffic fatalities among children occur in low- and middle-income countries.

However, as Besson reminds us in his film for the FIA's Action for Road Safety campaign, cars can be deadly even in supposedly safe cities.

Of the two countries featured in the short film, France suffered 3,992 road deaths and South Africa 15,995 according to a comparative chart compiled by the World Health Organization for the year 2010.

But those figures pale when compared to the death toll in China, which topped the list with an astonishing 275,983 road deaths that year. India was in second place with 231,027 fatalities, followed by Nigeria at 53,399 and Brazil at 43,869. The United States, where 35,490 road deaths were reported in 2010, was the only developed Western nation to appear in the top 10 countries with the worst road accident records.

GETTING THE MESSAGE ACROSS

The carnage on the world's roads represents an unacceptable - and eminently avoidable - human, economic and social cost for societies, and the FIA has associated itself with the United Nations in the world body's fight against it.

In 2011 the UN launched what it called the Decade of Action for Road Safety. Its aim was to save five million lives and reduce road-related injuries by 50 million worldwide over the next 10 years. The initiative calls on governments to embrace what the UN calls the Safe System Approach, which encourages both road users and the authorities who design and maintain the road transport system to share responsibility for safety.

Governments are urged to crack down on speeding and drinking and driving, to ensure that seat-belts are worn in cars, to build roads that are safe for both drivers and pedestrians, and to oblige car manufacturers to produce vehicles with appropriate safety features.

Yet in many countries these goals remain far off, as roads are packed with unsafe vehicles and drivers often get away with



"THE SOUTH AFRICAN CHILDREN HAVE TO SPRINT ACROSS THE ROAD WHEN THEY SPOT A BREAK IN THE TRAFFIC"

speeding or other dangerous practices because they can bribe police officers to turn a blind eye.

That is what the UN's Decade of Action for Road Safety is aiming to change. To support the world body's initiative, the FIA created its own Action for Road Safety campaign. Through its global network of motoring and touring clubs, which have become leading voices for road safety in their respective countries, the FIA encourages governments to make road safety a national priority.

FIA-sponsored road safety initiatives have been started in more than 60 countries: awareness campaigns, educational programmes and training, vulnerable road users' protection, conferences, events and workshops, road infrastructure safety information and vehicle inspection programmes.

The FIA has also produced a series of short films aimed at increasing road safety awareness. But with the commissioning of Luc Besson, this is the first time that the federation has turned to an A-list movie director.

Besson has for many years been a friend and collaborator of

FIA president Jean Todt, whom United Nations Secretary General Ban Ki-moon in April this year nominated as his Special Envoy for Road Safety.

Several years ago, Besson and Todt helped found a brain and spine research centre in a Paris hospital, the Institut du Cerveau et de la Moelle Epinière. It has become one of the leading institutes for brain and spinal research in the world.

The French director of box-office hits such as *The Big Blue*, *The Fifth Element*, *The Lady and Taken*, made a specially-commissioned short film in 2013 for the FIA's annual Prize-Giving Gala. Titled *The Heist of the Century*, it featured some of motor sport's most celebrated drivers - such as Sebastian Vettel, Michael Schumacher and Alain Prost - playing bandits involved in an audacious robbery. For his latest collaboration with the FIA, he has produced a much more sombre video.

It aims to grab public attention worldwide in September when the UN General Assembly will vote in New York for the post-2015 Sustainable Development Goals and in November at the second Global Road Safety Ministerial Conference, held in Brasilia.

The film was shot over four days - two in the chic 7th *arrondissement* of Paris and two in the town of Wellington in South Africa, which lies about 70 kilometres inland from Cape Town - and involved a professional crew helped by around 30 students from the film school set up by Besson in the Paris suburbs.

Maxime and Charline were two of the nine-year-old children acting in the Paris episode that was shot over a couple of sunny spring days earlier this year. They were having a lot of fun being stars for the day - and were thrilled to get some time off school. But they both said they knew the message of the short movie was a very serious one. "I think the film will work because Luc Besson is a really famous director, so people will definitely talk about this video," said Charline. ■

Luc Besson's film will be available later this month. See FIA.com for further details.



**AUTO
FOCUS**

FIA medical team

MEDICS IN MOTION

In the AMG Mercedes C-Class estate, F1's medical team members know they have a car they can rely on to get the job done - and it even has the thumbs up from a former world champion...

TEXT: TONY THOMAS PHOTOGRAPHY: MALCOLM GRIFFITHS



It's Saturday at the 2015 British Grand Prix at Silverstone, and former F1 World Champion Nigel Mansell is squatting low in the bucket driving seat of a highly specialised and finely tuned AMG Mercedes C-Class estate that's one of the best-kept secrets of a Formula One weekend. A smile is traced across his face, no longer hidden by a bristling moustache, and there's a glint in his eye. On this hallowed circuit, scene of some of his most fabled glory days, he's off to lap the track in the FIA Medical Car.

The low exhaust rumble that follows seconds later, as he blips the throttle and flexes his fingers around the wheel, announces that he's about to leave the garage – and he's off, accompanied by a sharp 'chirrup' from the Mercedes' rear Pirellis. He's about to enjoy a perk of his role this weekend as FIA driver steward by completing his requisite circuit inspection laps, accompanied by, among others, Tony Scott-Andrews, a senior FIA race steward and member of its international court of appeal. It just so happens that Mansell has a rather nice machine in which to perform his duties. He returns 10 minutes later with a wide, wide grin. His passengers are smiling, too.

Mansell parks up in the FIA's dedicated garage area alongside the identical sister Medical Car and a pair of Mercedes GT S Safety Cars.

He springs out, still frisky and nimble, and exchanges racing driver chat with the car's regular driver, Alan Van der Merwe. "It's quick isn't it," Mansell declares, bushy eyebrows raised in appreciation of the Mercedes estate's turn of speed.



Medical Car driver Alan Van der Merwe has British F3 title-winning credentials. He shares the Merc with Dr Ian Roberts (above), the FIA's senior on-track medical man.



champion, that can still sometimes be a close-run thing. "At Spa or Suzuka," says Van der Merwe, a clean-cut, super-fit 35, "over the last third of the lap, the field gets close enough that you have to get a move on. We don't want the race leader to even see us, or to have to lift-and-coast for a couple of seconds."

Because more than anything, the Medical Car and those within seek nothing more than anonymity. If they're suddenly visible, apart from during those final pre-race seconds of a grand prix when the C63 is stationed on the grid at the back of the pack, it means something has gone wrong – be that a serious accident for the F1 pack or, even, an incident involving Medical Car and crew.

"It's an extremely anonymous job," says Alan, who no longer races, despite his championship-winning credentials. "Most of the time we want to stay out of trouble – we don't want to be on the track any more than we need to be – but every now and again, when we have to do something, it can become quite high-profile. Everybody is scrutinising how quickly you got there and what you did when you got there. So most of the time it's a quiet, subdued job, but with an occasional burst of action."

Together with Dr Ian Roberts, the FIA's F1 medical rescue coordinator, Van der Merwe is 'on alert' through every grand prix weekend. That means being stationed in the pitlane and ready to respond to any accident throughout practice and qualifying, as well as taking the start of the race itself and then remaining 'ready to go'. In addition, the Medical Car team covers the GP2 and GP3 support races, taking the start of each. "That's useful," says Van der Merwe, "as it keeps you sharp."

The packed track schedule of a grand prix weekend, particularly those in Europe, means a lot of 'car time' for Van der Merwe and Roberts, and by the end of Saturday, he admits, both are ready to stretch their legs and listen to something other than their partner's breathing, audible over the in-car intercom. "It's quite an intimate job," he notes.

But during the emergency response moments, those quiet passages are forgotten. "We can be called to go out on to the circuit at five seconds' notice and you just have to spring into action," says Alan. "We might have to overtake the safety car, which is holding back the pack, drive faster than it and get Ian to the scene of an accident as quickly and safely as possible."

"There's a lot of banter between me and Alan in the car," Roberts adds, "to help pass the time. We can be sat in it for up to two hours without much to do, but at the start, or when the call comes, it's full concentration. Of course it's exciting at the start, seeing the grid form up, then the lights coming on and we're on full alert. The pack pulls away from us quickly, but we're in constant communication with race control and we're looking for debris or dust into the corners."

It's not the role of the Medical Car, Roberts insists, to "chase" the single-seaters; rather, it must follow extremely rapidly, but at sufficient distance to stop safely in the event of an incident ahead.

And it's here that the 'medical' aspect of 'medical car' comes to the fore. Roberts, in addition to the senior FIA medical role he has held since 2013, remains a consultant anaesthetist at the UK's George Eliot Hospital and has decades of experience in dealing with trauma injury victims. There's very little, he reckons, that he has not encountered in terms of human injury and little, therefore, that will faze him.

Those years of experience are invaluable in making 'on the ground' assessments of whatever drama may be encountered on lap one of a grand prix, for a split-second call may be required on whether to attend a situation immediately ahead, or decide that a post-crash driver looks unharmed, despite extensive damage to his car. "If we see an incident," says Roberts, "Alan will draw up at a safe point and we have to make a rapid assessment of what's going

"MOST OF THE TIME IT'S A QUIET JOB, BUT WITH AN OCCASIONAL BURST OF ACTION"

ALAN VAN DER MERWE

"Yep, it's not too bad," agrees Van der Merwe, pleased, though not surprised, to receive this seal of approval for his machine from a world champion who built his reputation in the massively powerful – and often dangerous – '80s-generation turbo F1 cars.

VITAL WORK

Indeed, the Mercedes-AMG C 63 S estate, to give the car its full title, is quick, because it has to be: it takes the start of every grand prix, lining up behind the last row of the grid, and follows the pack away around the first lap, prepared to deal with any serious incident. That means it has to be able to propel its near-two-tonnes of body mass, driver, up to three passengers (usually doctors) and extensive emergency kit around every F1 circuit fast enough to be well out of the way of race leaders gaining rapidly from behind as they approach the start/finish for lap two. In other words, it mustn't be lapped during its single tour when the race is 'live'.

And despite an engine that pushes out 510bhp and 700Nm of torque and the driving skills of the 2003 British Formula 3

Q&A

JEAN-CHARLES PIETTE

FIA PERMANENT F1 MEDICAL DELEGATE

on and of what we see. The question for us is: 'Does it require immediate involvement?' And if it doesn't, then we carry on. Aches and pains can be dealt with in the medical centre later."

REACTION TIMES

It's a crucial call, because if the Medical Car does stop and Dr Roberts steps out to attend an injury, race director Charlie Whiting is obliged to deploy the Safety Car to round up the pack and red-flag the race.

"We don't make these judgements entirely alone," Roberts adds. "For example, we have a system in the car that allows us to listen in to what a driver is saying and that can help us tell whether or not he's okay. But the worst times are when you hear nothing. Is the intercom broken? Is the driver just fed up because his race is over? Or is it something much worse? Unfortunately, right there and then, we don't know."

The most serious incident attended by Roberts and Van der Merwe was the accident involving the late Jules Bianchi in the rain at the 2014 Japanese Grand Prix. Even for a hardened medical professional, the scene they encountered at Turn Seven - Dunlop Corner - on a stormy, brooding 5 October, was disturbing.

Bianchi suffered serious head injuries in the accident and after a period in care at the Mie Prefectural General Medical Center in Yokkaichi, Japan he was eventually moved to Le Centre Hospitalier Universitaire de Nice. After nine months in a coma, he finally succumbed to his injuries in July.

The FIA's investigation into the accident noted: "Bianchi's helmet struck the sloping underside of the crane. The magnitude of the blow and the glancing nature of it caused massive head deceleration and angular acceleration, leading to his severe injuries. All rescue and medical procedures were followed, and their expediency are considered to have contributed significantly to the saving of Bianchi's life."

"Sometimes," Roberts reflects, "you look at the damage to a car and you wonder 'how could anybody survive that?'"

He insists, however, that he is able to detach himself from any emotions that might arise in dealing with serious injury. "I can just do whatever I have to do, to save a person's life."

Roberts will work at an incident with another senior medic travelling in the rear seat of the Medical Car - most often the head of the local circuit's medical team - and they'll be supported by the extensive medical network assembled around the circuit for every race. Van der Merwe, meanwhile, although not a medical professional, has a key role to play in relaying information about any incident to race control, and carrying medical kit from the C63's boot to Roberts and co (see Inside the Car, p38).

"It can be a difficult job," he says, "in one aspect because of what you sometimes see and in another because of the level of consistency that you have to bring. You just can't make a mistake."

At least he knows he's been given a great tool for the job: "This is the sort of car a lot of people will be expecting to carry a Labrador. But anyone who gets in it for the first time is always pretty amazed at what it can do." ■

Q How would you describe what you do for the FIA?

The most important aspects of my role are not on the circuit, even though I attend all the GPs. I am more closely involved in regulatory work, training, inspections of new tracks and so on.

Q What do you do during a grand prix?

During events I am in Race Control - one of four FIA people. We are connected via radio to the Medical Car, to Dr Ian Roberts and Alan Van der Merwe, and to the Safety Car. If there is an accident, we must decide how to react. This decision is taken mainly by Charlie Whiting, the FIA Race Director, who is in Race Control. Is it necessary to secure the track? Red Flag or Safety Car? Do we need to send the Medical Car?

It's not the only medical vehicle at circuits. There are also national medical cars - between three and five depending on where we are. These would be ambulances and two or three extraction vehicles. But the Medical Car is supposed to give support whatever the track location and be first on the scene.

Medical Car personnel are there to act directly and coordinate the national people. Depending on the circuit and country our role as doctors may be discreet, for example at Silverstone or Monaco - races with a long history and great experience. It's the opposite for new circuits, where our role is really important for countries with limited experience of the race and perhaps a limited culture of pre-hospital medicine. It's a specialised medicine, with a rapid response time of between 30 seconds and no longer than one to two minutes. You see the driver as soon as possible, still under safety conditions, assess the medical situation and organise the next steps.

A heavy accident can require additional resources - extraction, for example. In more severe cases such as Jules Bianchi's accident, there should be good co-ordination with a national medical team. There might be as many as 150 medical personnel to coordinate, depending on the incident and circuit.

Q You must have to do a lot of preparation before each season and event?

For every circuit a medical questionnaire is sent in January to the Chief Medical Officer and we have to get it back not later than two months before the event. It describes in detail the organisation and equipment we want to find. There's a separate medical questionnaire for FIA circuit world championship events, which runs to 16 pages, and this is also completed by the CMO. There's a lot of detail in this document: the positioning of medical personnel, how local hospitals are prepared, the position of track cameras, maps of medical facilities...

I collect as much information as we can in advance. For example, compiling a summary of all the drivers in F1, GP2 and GP3, with all their allergies, their medical histories etc, and to ensure their tetanus vaccination has been done in the past year.



"THE MEDICAL TEAM MIGHT SEEM LIKE A BIG AND COSTLY OPERATION - UNTIL THE DAY YOU NEED IT"

JEAN-CHARLES PIETTE

Q Your job must vary between relative calm and moments of extreme intensity?

Yes - I come to a race and things can be quite quiet, but if an accident happens you go from 0-100 like *that* [clicks fingers]. Fortunately we have few accidents in F1, but we also have GP2 and GP3 to take care of. Typically, there are between zero and two big accidents per year.

The medical team is there for those moments. It might seem like a big and costly operation - until the day you need it. And the moment you have an accident is not the time to start a discussion about 'oh, perhaps we could do this, or that...' It's the moment to act.

Everything should be ready - all the appropriate equipment, all the people involved, needing to know what they have to do in terms of organisation and good practice. They have to be well trained, because we cannot anticipate everything. Perhaps there will be an accident involving two or three drivers, or two accidents at the same time at different parts of the track. All of this has to be anticipated and planned for as far as you can.

Q Do you enjoy your work?

I enjoy it very much. It's a very special form of medicine. There are few patients, but it has to be done according to the same rules.

Q After an accident like Bianchi's, how do you feel and react?

Initially you react in a professional mode to ensure that everything is done properly. It was anticipated that we might not be able to use the medical helicopter because of the hurricane approaching that day, so Ian went with Jules in the ambulance to the hospital. I went later.

After his operation I spoke with the neurosurgeon and there were many more phone calls - for example to FIA President Jean Todt and Jules' father. These were, if you like, the professional aspects.

After that come the personal and emotional aspects. I'd known Jules since he was 16, when I met him at the Grand Prix de France in '06. For the emotional aspects... I do not have words to describe this.

Q Is there still room for improvement with circuit safety?

Clearly, in many areas, some of the most important things have been done. At some of the historic circuits we go to now, you can see places where 30 to 40 years ago there was no protection. In the 1960s and '70s, as we know, a quarter of the drivers were dying.

I can't say we will never see these accidents again but certainly the cockpit survival cell was the most important thing for protecting drivers. After that, the HANS device. There have been many step-by-step improvements, such as having wheels attached with a double tether. These meant we were not supposed to see flying wheels, but in 2009 Henry Surtees died in a Formula Two accident after his helmet was struck by a flying wheel. So it is impossible to get 100 per cent safety - it's important for the public to be aware of this.

Q Do technological gains help with safety improvements?

Yes: an area for improvement is perhaps to have more direct transmission of medical data from a driver to the medical team. For example, his heart rate, blood pressure, oximetry transmitted directly to the Medical Car, so that Ian and his team would be able to start organising their minds even before arriving at the accident.

This might be of even greater importance in rallying, where accidents can be hard to access. But why not for F1, also?

INSIDE THE CAR

The FIA Medical Car is designed to carry a boot-load of emergency medical kit to the scene of an F1 accident as fast as possible. Dr Ian Roberts, FIA F1 medical rescue coordinator, explains the essentials...

LARGE MEDICAL BAG ▼

The large medical bag, produced by MDD Europe, has a fold-out design and contains a wealth of equipment that I consider essential to have immediately to hand. On one side we keep all the airway equipment, from airway adjuncts and tubes to a video laryngoscope (to view inside a patient's throat). We have a small portable automatic ventilator and a kit to form a tracheotomy in the event of a compromised airway. In the other side of the bag we keep all the circulation equipment. We have intravenous equipment along with fluids and dressings. In case of difficulty gaining access to a vein, we have an intraosseous kit to place fluid directly into the cavity of the sternum (breastbone). Also included in this section is a pelvic splint, a neck collar and a selection of burns dressings.



DASHBOARD ▲

This is where we control the lights on the car - the buttons all correspond to the colours they display. Yellow and white are warning lights, located on the top of the vehicle and at the front and rear. The green button illuminates the medical car sign in the rear of the car. Finally, the blue button operates the siren, which we use when entering the pitlane at speed, usually after the opening lap.

SMALL MEDICAL BAG ►

I carry a small bag that has immediate airway equipment, tools to gain intravenous access and a tourniquet if there is any bleeding from a limb. Essentially there's everything you want in the first couple of minutes following an accident.



PHILIPS DEFIBRILLATOR ▼

This is used when a cardiac arrest is caused by a severe disturbance of the heart's electrical activity to reset its normal rhythm. The FIA technical staff have been trained to use it in case of a cardiac arrest in the scrutineering bay or pitlane, which may have been caused by an electric shock from the hybrid engine systems.



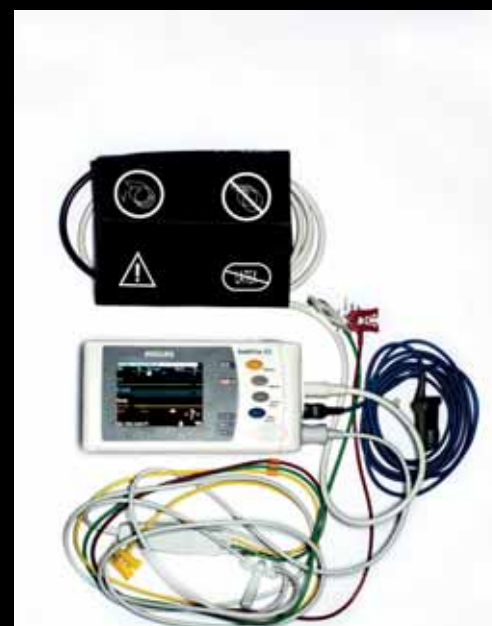
SUCTION MACHINE ▼

If the casualty has any secretion, blood etc in their airway or mouth, then we use this suction machine to clear it. It's quite large but creates a high vacuum for effective suction.



PHILLIPS x2 VITAL SIGNS MONITOR ►

We can monitor the casualty's electrocardiogram, oxygen saturation, pulse and blood pressure with this light and compact unit. The colour display is readily visible outside on even the brightest day.



◀ VISUAL SCREENS

We have three screens in the car. The top one gives us information about the car's dynamics and other useful technical data. Below that is a mini iPad built into the console displaying timing information for all the cars on track, and it shows a live race feed so we're aware of any incidents. Finally, the iPad in front of me acts as a GPS monitor showing the drivers' location. It also highlights yellow flag sectors, red flags, Safety Car periods and even displays the g-force a car has encountered in an accident. I get Race Control messages too. We keep all the documents in the car including timetables, and the car has its own email address so we can be sent any additional information.



Vehicle connectivity

BLURRED LINES

The future of motoring is inextricably linked to the internet, but as the automotive world rushes to log on, just how connections will be made and who will own the data generated by vehicles remains unclear

TEXT: JUSTIN HYNES

It's a technology story as old as technology itself: new areas of innovation open up a landscape of huge profit possibility, which in turn leads to a flood of competing systems all attempting to stake territorial claims aimed at securing a dominant position. Vinyl versus CD, VHS versus Betamax, HD DVD pitted against Blu Ray; the shake-up to be recognised as the platform of choice for consumers has been going on since the dawn of the electric age.

The latest and most fiercely fought over battleground is within the automotive world, where advances in technology over the past 20 years have within the last half decade sparked a gold rush of gargantuan proportions as motor manufacturers, technology giants and mobile communications conglomerates pursue a new manifest destiny in which the land up for grabs has been branded as 'the connected car'.

Just what constitutes a connected car is similarly up for grabs. The phrase has come to encompass a multiplicity of technologies, from autonomous safety systems to infotainment, to smartphone applications that allow users' cars to do anything from simple unlocking actions to searching for Korean restaurants in the middle of Ohio.

One thing is certain - the battle to own a slice of the connected pie is hotting up and leaving motorists unsure of just which platform to put their money on or which technology will be compatible with the cars they will drive in the future.

This territorial battle extends to all major areas of connected activity, with the most high profile being the platforms upon which the connectivity rests. In short, does connectivity in your car rest with the car itself or with your smartphone.

So far, that contest is far from being resolved, with car makers and the tech world's major players vying for space. Lately it has been the smartphone and software giants winning out.

Traditionally car makers have strenuously resisted ceding

access to vehicle systems by outside developers and have chosen instead to build their own connectivity systems, with Ford, for example, continuing to champion its own in-car Sync infotainment system.

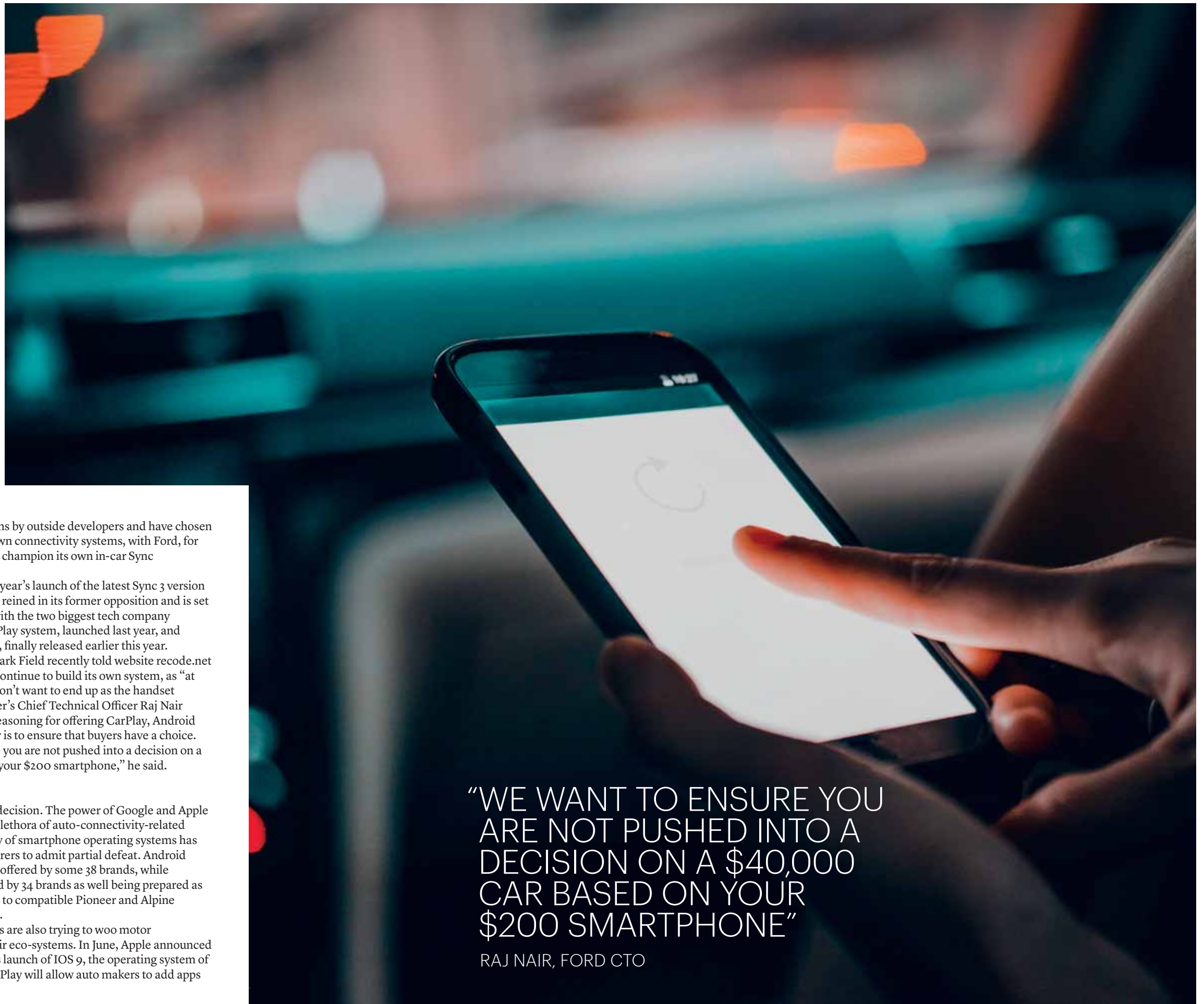
However, with this year's launch of the latest Sync 3 version of the system, Ford has reined in its former opposition and is set to offer compatibility with the two biggest tech company offerings - Apple's CarPlay system, launched last year, and Google's Android Auto, finally released earlier this year.

While Ford CEO Mark Field recently told website recode.net that the company will continue to build its own system, as "at the end of the day we don't want to end up as the handset business", the car maker's Chief Technical Officer Raj Nair explained that Ford's reasoning for offering CarPlay, Android Auto and Sync together is to ensure that buyers have a choice. "We want to make sure you are not pushed into a decision on a \$40,000 car based on your \$200 smartphone," he said.

POWER STRUGGLE

Ford is not alone in its decision. The power of Google and Apple as the native host of a plethora of auto-connectivity-related apps and the familiarity of smartphone operating systems has forced motor manufacturers to admit partial defeat. Android Auto is being or will be offered by some 38 brands, while CarPlay is being offered by 34 brands as well being prepared as an after market add-on to compatible Pioneer and Alpine entertainment systems.

The tech companies are also trying to woo motor manufacturers into their eco-systems. In June, Apple announced that with this Autumn's launch of IOS 9, the operating system of iPhones and iPads, CarPlay will allow auto makers to add apps into the system. ►



"WE WANT TO ENSURE YOU ARE NOT PUSHED INTO A DECISION ON A \$40,000 CAR BASED ON YOUR \$200 SMARTPHONE"

RAJ NAIR, FORD CTO

Does it mean an inevitable migration to the smartphone becoming the brains behind a series of ‘dumb’ terminals in your car? It’s not clear, but car makers are unlikely to cede that much territory to companies that could become their bitter rivals in the manufacture of the driverless cars of the future.

Indeed, Toyota, the world’s second largest car maker, recently distanced itself from CarPlay and Android Auto by announcing that while it will introduce smartphone integration in some models it will do so through a platform called Scout GPS Link. This is a feature that channels map route and destination information between the dashboard and a version of Telenav’s Scout app for phones, thus retaining control of the car’s display systems rather than mirroring a phone’s operating system.

There are signs that car companies will continue to pursue their own connectivity routes. With mapping being a key consideration in the future of connected cars and driverless cars in particular, a consortium of manufacturers – comprising Audi, BMW and Daimler – last month spent \$3 billion acquiring Nokia’s mapping arm HERE, a company with 30 years experience in GPS mapping. The purchase is aimed at inuring the companies against the march of Google and Apple mapping as the tech giants eye the driverless car market.

DATA DILEMMA

Beyond the hardware used, there is the thorny topic of how information is carried and who provides the cellular connection.

In the United States, as part of its second-quarter figures announcement, telecoms provider AT&T recently revealed that it had gained 2.1 million new customers of which 1m were connected car subscriptions through its status as the operator chosen by General Motors for its OnStar service.

The service, provided since the late 1990s, has traditionally involved call centre access to motoring-related help. But the deal with AT&T also provides for the roll out of 4G LTE, the fastest kind of wireless internet connectivity available, a move that GM believes will allow it to provide expanded offerings such as custom apps, streaming entertainment and enhanced diagnostic links to dealers.

The sticking point remains the cost of the cellular connection, with customers reckoned to be resistant to paying an additional cellular subscription beyond the fee they usually pay for internet, phone and cable. The solution being hinted at by GM is to fold the OnStar subscription into a customer’s existing cell phone package.

That means tying car customers to particular cell phone providers and once again there is a battleground developing as mobile providers jockey for position.

There remains one further area of contention – ownership of the vast amounts of data that connected cars will generate. And as yet it’s far from clear just who will take ownership of information that has huge value to a broad range of interested parties, including car manufacturers, insurance providers, advertising concerns, content provider and motoring organisations.

In the US, the National Highway Transportation Authority (NHTSA) has stated that it “considers the owner of the vehicle to be the owner of data collected from an EDR (Electronic Data Recorder). NHTSA will always ask permission from the vehicle owner before downloading any information for use in government databases”.

However, it also added that “ownership of the EDR and EDR data is a matter of state law, and such provisions vary considerably”.

That suggests that there is a legal battle to be had and it’s one that some car companies seem willing to fight, with Audi CEO Rupert Stadler quoted by Bloomberg last December as saying, “The data we collect is our data and not Google’s data. When it gets close to our operating system, it’s hands off.”

This sentiment has been echoed in comments from Volkswagen CEO Martin Winterkorn and Daimler CEO Dieter Zetsche.

“IT’S NOT CLEAR WHETHER DRIVERS, OWNERS OR VEHICLE MANUFACTURERS WOULD OWN DATA GENERATED BY THEM”

STEPHAN APPT, TECH LAW EXPERT

However, despite the sizeable obstacles that still need to be overcome in the development of a somewhat unified world of connected systems, convergence is firmly on the agenda at the grander level of infrastructure, with car makers calling for concerted efforts at state level to implement infrastructural digitalisation.

Speaking at a recent economic conference in Berlin, Stadler called for digitalisation to top the political and economic agenda.

“Economics and politics must together shape the digital revolution,” he said. “Seventy-five per cent of the infrastructure of the year 2050 has not yet been built. That’s a great opportunity for uniform standards in the operating system of the city of the future.”

As an example, Stadler cited online traffic-light prediction technology, developed by Audi as an aid in the reduction of pollution: “If all the stop-lights in Germany were connected, we could reduce fuel consumption by 900 million litres a year, which means CO2 emissions would be reduced by more than a million tons.”

“We need a shared social understanding of how we want to use technology for safety, efficiency, sustainability and quality of life.”

The Audi chief’s statements have been echoed by Volvo Vice-President and Group CIO Klas Bendrik: “Imagine a world where

road status data collected by cars is shared with other road users and with local authorities through a connected car cloud: a world where the benefits of anonymised data-sharing supports convenience and life-saving services while helping to contribute to a better society.”

Like other manufacturers the Swedish brand is also investigating Cloud-based services aimed at integrating connected cars with infrastructure in order to create so-called ‘smart cities’, where traffic flow management could be improved through the optimisation of traffic lights and speed limits and by offering re-routing suggestions based on real-time traffic jam alerts.

In the future, the company says, smart cities could even use connected street lights to illuminate slippery road sections in another colour when detected by a connected car to alert other road users to dangerous conditions.

Bendrik says such integrated services could mitigate against road traffic accidents. “If a Volvo car detects that it is slippery on a certain stretch of road, for example, it can make other connected cars aware of this via the Volvo Cloud so they are forewarned. Such connected car services could deliver both personal and societal benefits by reducing the potential for accidents and lowering the cost of road maintenance by making winter road maintenance more efficient.”

“Car makers have the potential to deliver real benefits to society by democratizing anonymised car data.”

QUESTION OF LIABILITY

The trick is to choose which are the right connections to make. The fundamental question of whether data generated by connected cars can legally be owned, and who acquires ownership in such data at the time it is generated, must be answered before the extent to which companies can make use of it can be determined, argues one expert.

Munich-based technology law expert Stephan Appt of Pinsent Masons, the law firm behind Out-Law.com, says it is unclear whether the owners of connected cars, or those that manufacture them, would be the owners of data generated by such vehicles.

“It is not clear, certainly under German law, whether the drivers, owners or manufacturers of vehicles can be said to own the data generated by them,” says Appt. “For either standpoint there is some effort necessary to make the case that data belongs to drivers or owners rather than manufacturers and vice-versa, and either case would be arguable until a definitive statement is made on the issue by a court or in new laws.”

The question of who owns data generated by cars is important because of the “gold mine of connectivity” that the age of connected cars promises to bring, he adds.

‘Connected cars’ is a term used to refer to vehicles that are fitted with SIM cards which allow real-time information to be transmitted between information providers powering infotainment and driver assistance features and those vehicles, or even between vehicles themselves over communication networks.

Most of the current discussion around connected cars is based on the health and safety benefits that such connectivity could offer. The European Commission, which has just announced the finalising of standards by the European Telecoms Standards Institute (ETSI) and European Committee for Standardisation (CEN) for vehicle-to-vehicle connections, says connected cars could allow drivers to be notified about accidents, traffic problems and other road conditions.

However, Appt says there is potential for information providers to offer services to people in connected cars, from details about available parking spaces nearby to personalised advertising and entertainment and social networking services.

Car makers are increasingly expressing an interest in tapping into the potential offered by connected cars, but Appt says there is uncertainty about data ownership. ▶



Audi CEO Rupert Stadler says economics and politics should play a role in car digitalisation. Above: Ford’s Sync 3 infotainment system. Right: Apple’s CarPlay system is becoming more prevalent; a group of car makers now owns Nokia’s HERE mapping system.



AUTO FOCUS

“The SIM cards in such cars can transmit data generated from the use of the various systems connected. Manufacturers technically can collect the data as it is their IT infrastructure that is linked to the SIM card. However, it is not clear whether vehicle owners would themselves have ownership of the data. Even if manufacturers could be said to own the data, those companies would generally be required to obtain the consent of car owners and other drivers of the vehicle before sharing personally identifiable data with third parties, such as insurance companies, due to privacy laws.”

Appt says that manufacturers as well as insurance companies may have an interest in some of the “technical data” generated in connected cars, concerning speed, driving habits, use of brakes and all sorts of other telematics data that sensors in the car collect. But he believes there is an ongoing debate about whether even some technical data could be said to constitute personal data, therefore becoming subject to rules set out under data protection laws.

“The unique identification number given to vehicles can be associated with the individuals who are registered as owners of those vehicles,” says Appt. “The technical data generated by vehicles and associated with the unique vehicle identifier could, therefore, be linked to individual drivers and relay information about their driving habits, for example.

“Although there is a debate to be had about whether data generated in connected cars can be attributed to individuals where a number of drivers use those vehicles, there is potential for data to be linked to individuals. The situation is to some degree analogous to the debate over whether IP addresses can be linked to individuals.

“Where technical data is also personal data, manufacturers are

likely to need the consent of individuals before they transfer such data to third parties, like insurance companies. Consent would almost certainly be needed from individuals before companies could collect and use other personal data generated in connected cars, such as geolocation data or a log about those individuals’ use of entertainment services.”

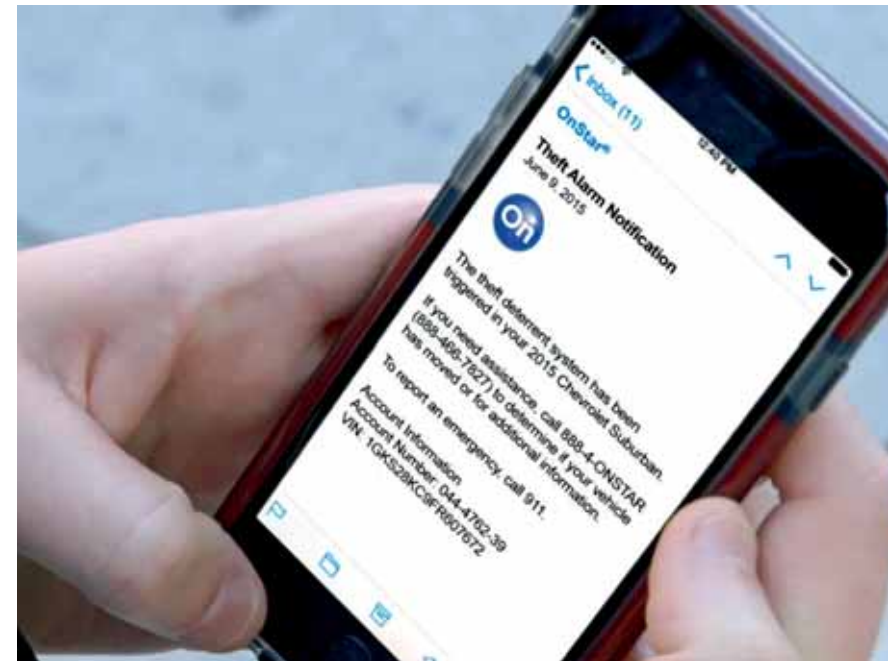
Appt says many connected car makers also run websites where users can configure infotainment and driver assistance services. Those websites require users to register and set up an account, meaning manufacturers may not need the vehicle identification number to link technical data to the car user.

He adds that manufacturers could adopt ‘privacy by design’ to overcome privacy law concerns. They should consider whether they need to be able to link data generated through certain services to individuals and, for those services that do not, could deploy anonymisation techniques and other privacy by design measures to allow them to make use of the data generated without having to obtain individuals’ consent to do so or comply with the other requirements of data protection law.

Where it is essential to use personal data, manufacturers and providers should consult with individuals and obtain consent for making use of the data where that use goes beyond merely providing the services those individuals have requested or paid for together with the car. This may cover personalised advertisements or other marketing proposals, says Appt.

He also warns about the challenges that could arise in attributing liability for accidents involving connected cars.

“The law is currently quite clear in that registered car owners



AT&T customer numbers soared after GM decided to use the US telecoms provider to run its OnStar service.

are, in the first instance, liable for accidents caused by their vehicle and are required to be insured against such an eventuality,” he says. “Car owners then might have the opportunity to pursue recourse against the manufacturer if it can be established that the accident occurred due to a defect for which it is responsible.

“However, if an accident involves a connected car and is down to defective connectivity, it may be difficult to establish whether it was a software or a connection problem. This causes issues with determining where fault lies and who is liable for any damages.

“For example, who would be liable for accidents caused by defects in software that lie in the interface between two connected cars? Is the defect with the software in the connected car involved in the accident, or the car or information provider connected to it which was sending incorrect signals about road conditions but was not involved in the incident? If there was a connectivity problem caused with network issues, can the network provider be held liable?”

In Germany there is a €5m cap on damages that can be claimed for death or injury, and a €1m cap on damages that can be claimed for property. However, German law states that telecom providers can only be held liable for up to €12,500 of damages per party. Appt says that uncertainty in determining the cause of accidents and the potential difficulties in recovering damages from those at fault may cause insurance companies to reconsider the terms of their policies.

“Even if accident liability can be attributed to telecoms companies for interruptions in connections, for example, drivers or their insurance companies could be left footing the bill for serious amounts of damages owed,” says Appt. “Law makers need to address such anomalies before the connected car phenomenon takes off.” ■

DRIVING SMART

Car connectivity is about more than access to the latest maps and listening to your favourite internet radio station. From sampling road conditions to locating the nearest and cheapest parking lot and booking a service, your next car will be an always-on co-driver

1 ENGINE
Ford’s S-Max people carrier has an intelligent speed limiter that uses a camera mounted on the windscreen to scan traffic signs. It enables automatic adjustment of maximum vehicle speed to remain within legal driving limits.



2 HEADLIGHTS
Automotive supplier Valeo’s fully automatic matrix beam technology uses cameras to locate other vehicles and adjusts the high beams so the entire road is lit, except for a shadowy area around the vehicle that is approaching.

Thus a driver has access to constant full beams without dazzling oncoming drivers. Audi has also successfully used matrix beam technology in its Le Mans programme and developed comparable systems for its A8 road model.

3 BRAKES
Used in conjunction with pedestrian-detection and collision-avoidance systems – often based on front-mounted lasers – auto braking will bring stop a car without the driver’s intervention. Alternative systems see brake systems primed for panic stops, with seatbelts also being pre-tensioned. Mercedes’ Pre-Safe system harnesses the sensor technology already fitted for ESP or BAS. These sensors detect a potentially hazardous driving situation – for example, heavy oversteer or understeer – and relay information to the system, which triggers appropriate safety measures to help prevent injuries

should a collision occur. The system also triggers almost complete closure of side windows to protect occupants from any objects or debris entering the vehicle.

4 TYRES
In systems such as Pirelli’s Cyber Tyre (see AUTO #11) and also developed by Dunlop, sensors embedded within tyres detect air pressure and temperature. The information is routed to the car’s computers, which would use it to improve stopping distances when braking with ABS to optimise its operation. This device would also allow the car to optimise other systems such as ESP. The car could sense if you have a puncture and, linking in with the navigation system, call a breakdown service or guide you to a garage.

5 ROAD MONITORING
Developed by Jaguar Land Rover on its Evoque model, this technology

will allow a vehicle to gather data about the location and severity of potholes, broken drains and manhole covers via a suite of sensors and cameras on the windscreen and front of the car. It will also allow vehicles to send and receive warnings allowing the driver to slow down or the car to adjust its suspension settings to reduce the impact, with the aim of reducing the potential for punctures, wheel and vehicle damage.

6 TRAFFIC SIGNALS
BMW is introducing an embedded app, EnLighten, that lets drivers anticipate traffic signal changes by displaying real-time dashboard data. EnLighten combines data from a city’s traffic management systems with that of a vehicle’s location to make predictions. Using an iPhone’s GPS, it pinpoints the light a driver is approaching and checks how recently it has changed colour. This enables it to predict when traffic lights will change based on the user’s position and speed, so it can tell a driver whether to start braking or to prepare to move off if they are stationary. The system is currently active in the US cities of Portland and Eugene, Oregon and Salt Lake City in Utah. More will follow.



7 PARKING
Audi has trialled a system where a link is established between cars and car parks, enabling barriers to be raised and charges paid without driver input. A test programme involved 13,000 connected vehicles at the car maker’s Ingolstadt HQ. Software giant SAP has developed a similar platform. When approaching a car park, the car’s infotainment screen displays the hourly rate and a button graphic. Tap the button and, providing there are spaces, the barrier opens, starting the clock on your parking time. If there are no spaces, the car’s sat-nav will direct you to another car park or around the block until a space is free.

8 REFUELLING
SAP has also built a system that allows users to refuel in a cost-effective manner. It allows drivers to choose a

refuelling point and, once completed, the system automatically charges the driver’s credit card. Fuel pumps would also interact with the car to display information or advertising targeted at the driver.

9 DIAGNOSTICS
Volvo’s ‘Book service and repair’ is one of a number of manufacturer solutions that allow you to manage vehicle servicing and repair from your internet-connected car. Information is sent to your dealer, who will contact you to book an appointment. US firm Openbay has started OpenbayConnect, which leverages connected car technology to remotely diagnose vehicle problems and deliver repair quotes to consumers from mechanics.

10 COLLISION AVOIDANCE
Such technologies are not new but companies are taking the concept further. Last year Nissan introduced its Predictive Forward Collision Warning system, which can monitor movement over a distance of around 390ft using a bumper-mounted radar. The system will beep and flash dashboard alerts if it detects a problem.



**AUTO
FOCUS**

Road safety testing

CITY LIMITS

Volvo has joined forces with a pioneering proving ground in Sweden, called AstaZero, to test new active safety systems in a variety of 'real-world' environments, from 'city centres' to rural roads

TEXT: BEN BARRY PHOTOGRAPHY: THOMAS BUTLER

It looks like your classic American street, but it's not – this is in fact a pioneering proving ground where Volvo is testing its latest collision-avoidance systems in a bid to eliminate fatalities in its cars.

Sited next door to Volvo's Hallered proving ground in southern Sweden, AstaZero, an all-new facility, opened in August 2014. It is dedicated purely to active safety systems, and combines the Active Safety Testing Area acronym with a nod to the Swedish government's target of eliminating road deaths and serious injuries.

At another part of the site, 20 seconds after the crash-test countdown begins, there's a violent rush of acceleration and a Volvo XC90 hurtles into view, slamming sideways into a post. The force buckles the driver's door, triggering the airbags.

"That," says Jan Ivarsson, deputy director of safety systems, "is a very heavy impact. It's tough on the occupants and tough for the side airbags – they have to react much faster than with frontal impacts."

Volvo was founded on a bedrock of safety and continues to be a pioneer today: it has amassed data on 50,000 accidents over 45 years and supplements laboratory tests and virtual simulations with real-world recreations of accidents to understand what happens when humans make mistakes.

Now its Vision 2020 project takes things up a notch, pledging that no one will die in a new Volvo by 2020. "Our focus is now more on collision avoidance than passive safety," says Ivarsson. "We can make bigger gains with these active safety systems." ▶

Jan Ivarsson, Volvo's deputy director of safety systems, is heading the car maker's latest road safety mission.



“OUR FOCUS IS NOW MORE ON COLLISION AVOIDANCE; MAKING GAINS WITH ACTIVE SAFETY SYSTEMS”

JAN IVARSSON, VOLVO

Volvo's first collision-avoidance system, Collision Warning and Brake, debuted in 2006. Now, the systems are becoming increasingly complex and nuanced, and in 2017 Volvo will hand 100 autonomous cars to ordinary drivers as part of the DriveMe project. It's the logical next step on the active-safety road map.

The challenge is how to test such systems in a safe environment. Traditional automotive proving grounds typically prioritise dynamics, ride quality and reliability, meaning their configurations are far from ideal.

Owned by the SP Technical Research Institute of Sweden and Chalmers University of Technology, AstaZero has been financed by €55 million of funding from agencies including the EU and the local Borås region. Anyone can schedule test time at AstaZero, but Volvo is a key partner, committing to €1m of bookings annually.

Anders Axelson, attribute leader, active safety at Volvo, was instrumental in drafting AstaZero's original specification over a decade ago. He takes us on a guided tour.

Axelson explains that the 700-acre facility is divided into several different areas to replicate typical driving environments and can accommodate up to 100 test cars simultaneously. For now, the focus is purely on testing, but ultimately AstaZero and Volvo envisage a future where the test track helps to influence safety, testing and ratings standards for a more holistic approach.

We drive the two-way 5.7km perimeter road that loops around AstaZero. It's designed to replicate steady-state driving on a rural road, where most test tracks buck and weave and engage the driver's undivided attention. Small roads lurk to the side, ready to spring surprises: elk-avoidance technology will help Volvo cut the five per

cent of Swedish road accidents caused by the animals each year.

Inside the perimeter road, rural Sweden surreally morphs into downtown Harlem, New York. This 'city' area features vision-obstructing buildings that shield multiple crossroads with run-up roads of 150 metres. During testing, the active safety challenges posed by densely packed urban spaces and heavily restricted visibility can be fully explored.

Nearby, a multi-lane area uses a 700-metre straight road, 300 metres of run-up around a gentle corner and myriad road markings used worldwide. These markings are key because active safety systems fitted to globally available cars must accurately distinguish them. If not, Lane Departure Warning, Lane Keeping Assist and even fully autonomous steering systems would malfunction.

'Low riders' form an essential part of the test process. These car-sized, remote-controlled platforms skim along the road surface on four small-diameter wheels, with 'top-hat' foam structures used to replicate relevant vehicle dimensions. Should a new vehicle detection system fail, test cars can simply be driven over the low riders at 100kph without causing damage. Existing systems cannot exceed 80kph, however, and are not suited to poor weather conditions. AstaZero is engineering its own test equipment to overcome these flaws.

It's this level of detail that AstaZero and Volvo hope will refine collision-avoidance technology still further. As Ivarsson, explains: "The systems are extremely complicated but must feel nice for all drivers to use. For instance, engineering technology that gives a driver control while turning across a busy crossroads, but is always ready to stop the car if the driver misjudges the situation. ▶

AstaZero's perimeter road tests driver concentration. Left from top: side-impact testing; recreating urban America; autonomous cars are put to the test.





Volvo's Anders Axelson helped to draft the original specification for AstaZero more than a decade ago.



A New York city area features vision-obstructing buildings and multiple crossroads. Left from top: AstaZero wreckage; the backlot of downtown America; new cyclist detection system in operation.



AUTO FOCUS



“WE’VE SEEN A HIGH REDUCTION OF IN-CAR FATALITIES, BUT NOT WITH CYCLISTS AND PEDESTRIANS”

JAN IVARSSON

Some people are very skilled and they take the decision very late; others decide very early and are very conservative.”

AstaZero’s multi-lane road feeds into a 240-metre diameter high-speed area, with an additional two access roads that create uniquely configurable opportunities for controlled car-to-car impacts. We’re here to watch a very early phase of development for a cyclist detection system. Crucially, the test does not seek to assess Volvo technology, but is instead an early validation of the testing process itself. In creating the test, AstaZero’s engineers have extrapolated data from a ‘crossing scenario with up to a million permutations’ and focused on a key cluster of 10 scenarios that are said to cover the vast majority of real-world situations.

Once this process is fully mature Volvo’s engineers can use it to sign off next-generation technology. For now, an XC90 and today’s existing pedestrian-avoidance system has been adapted for the purpose. Hence the ‘cyclist’ must adopt an upright pedestrian-like position and his speed is restricted to 10kph; faster-acting sensors are required for higher velocities.

With an engineer in the driving seat as a fail-safe, a ‘driving robot’ steers the XC90 to the end of the 240-metre area, then turns it around and drives back towards us at 25kph, its position accurate to just 2cm. As the XC90 nears our vantage point so the cyclist begins to silently move along a length of track, accelerating to 10kph in order to cross the Volvo’s path. The scenario is comparable to a vehicle failing to stop at a T-junction, potentially hitting a cyclist riding along a main road.

It’s a strangely terrifying sight with a seemingly inevitable outcome, but as the Volvo closes to within just a few metres of the cyclist so the graunch of ABS braking kicks in, the XC90’s nose dips heavily and the SUV comes to a screeching stop. The oblivious cyclist continues on his way. The test is repeated, the happy outcome the same.

Over time, with the test method verified, speeds will increase, other scenarios will be enacted and the cyclist will adopt a natural seating position. By 2018, the technology will reach production.

It promises to make a genuine contribution to road safety, helping to arrest an alarming trend. “We’ve seen a high level of reduction of in-car fatalities,” explains Ivarsson, “but you don’t get that with cyclists and pedestrians – in fact, there was an increase in Sweden last year. In young economies where you have cyclists and pedestrians and motorbikes, this is really the problem, so from a governmental perspective it will be an increasing focus.”

Pedestrian systems already feature on production cars and we’ve just witnessed the early stages of development for Volvo’s cyclist-detection system. The motorcyclists – a bigger challenge due to their vastly increased speeds – are the next logical progression, says Ivarsson.

With that, Ivarsson and Axelson make their excuses and get back to work. After all, they’ve got an awful lot to do if Vision 2020 is to become a reality in the next five years. ■



**AUTO
FOCUS**

Rallying in Rwanda

KINGS OF THE MOUNTAIN

The Rwanda Mountain Gorilla Rally, part of the FIA African Rally Championship, has come a long way since it launched 15 years ago

TEXT: USHER KOMUGISHA PHOTOGRAPHY: TIMOTHY KISAMBIRA



African Rally Championship contender Jassy Singh finished second in Rwanda in a Subaru Impreza. Right: Christian Gakwaya (on left), President of the Rwanda Automobile Club. Below: the rally is attracting increasing interest each year.



“THE LEVEL OF COMPETITION HAS IMPROVED. WE’RE NOW CLOSE TO INTERNATIONAL STANDARDS”

CHRISTIAN GAKWAYA, RAC PRESIDENT



The Rwanda Mountain Gorilla Rally was started as a reconciliation event three years after the horrific 1994 genocide against the Tutsi people that claimed almost a million lives. Originally called the Fraternity Rally, it has since grown into a fully-fledged event that is included in the FIA African Rally Championship.

With the help of neighbouring Uganda, the Rwandan motor sport fraternity first organised a cross-border event in 1997 and eventually gained enough experience to launch the inaugural Mountain Gorilla rally on their own in 2000.

“We were trying to unite people, to do something not only for sport but that can contribute to reconciliation,” explains Christian Gakwaya, President of the Rwanda Automobile Club (RAC). “At that time, however, we were not ready to organise a rally on our own. That is why we decided to do a cross-border event.”

With the realisation that the rally could become a major event, careful thought was put into a name change. “We had to find a brand that reflects the uniqueness of our country,” says Gakwaya. “Rwanda is known to be home to more than half of the remaining mountain gorillas, so we said this is unique to Rwanda.”

Four years was enough for the RAC to showcase what it had learned and, as the organisation marked 15 years of running the annual event in 2015, Gakwaya says the number of competing drivers from across the continent demonstrates the rally’s growth.

“The level of competition has improved from hosting Ugandan and Burundian drivers to seeing people come from Kenya, South Africa, Belgium and Zambia among others. I can say that progress has been slow but it is now reaching another level.”

He also points to the increasing professionalism of the organisation: “We are now close to international standards in terms of documentation, regulations, technical and other details.”

It hasn’t all been rosy for the RAC, however, with the biggest challenge in organising an event of such magnitude being the club’s financial limitations. “We are a non-profit organisation and we depend on sponsorship and partners who sometimes offer financial and logistical support,” explains Gakwaya. “Sometimes it is very hard if we do not have the support of big sponsors.”

FIA SUPPORT

In a country where sports marketing has yet to reach a high level, the challenge remains a hindrance to realising the full potential of a sport that depends on huge sponsorship deals. But there is no doubt that the event is improving in other areas and this will help in finding long-term partners.

Gakwaya says: “In the past we had unqualified officials, which is no longer a problem because now we have qualified young people who have the knowledge and keep improving and have been trained.”

This year’s rally saw up to 75 marshals involved in the event including course marshals, starters, safety workers, secretariat workers, support for results, registration, scrutineers and stewards.

Gakwaya is quick to point to the FIA’s help in developing in this area. “For the last two years we have been receiving funds to organise trainings for officials, young drivers and security to ensure the safety of the rally,” he explains. “We currently have three programmes being funded by the FIA.”

This has come in the form of grants from the FIA’s Motor Sport Safety Development Fund, which has supported projects around the world. It has helped to raise the standards of marshalling and driver training, particularly in developing motor sport regions such as Rwanda.

For this year’s rally, the FIA sent an observer, a steward and a technical delegate to officiate and also offer guidance throughout the event, especially with regards to maintaining international standards. “They guide us on what we can do to improve because normally they have more experience than us.” ▶



Every rally fan wants a good vantage point... Left: Kenyan Jaspreet Chatte boosted his African title hopes with victory in Rwanda. Top right: the top three crews.



“SOME OF THE STAGES ARE BREATHTAKING. I HAD TO STOP AND STARE AT THE BEAUTY”

DESH KANANURA, RALLY DRIVER

It is this quality of organisation that has been crucial in helping motor sport become popular in Rwanda. But it is also the unique experience of driving through the country’s undulating hills and mountainous terrain that is a major attraction of the event.

After inspecting the route the day before the rally, Ugandan driver Desh Kananura said: “I was overwhelmed by the bends and hills. I’ve always known Rwanda as the land of a thousand hills, but wow, some of the stages are breathtaking. I had to stop and stare at the beauty of Rwanda.”

Gakwaya reflects on this achievement: “Motor sport is becoming very popular. It is changing for each event. For example, last year when we had the super stage at Gahanga quarry, we had an estimated 3,000 people coming just for the spectator stage, which was an afternoon event.

“If we compare the national championships, if we have an event outside Kigali, we see people driving for two or three days to get to those places. It is really gaining in popularity and people have started liking and taking an interest in motor sport.”

This enthusiasm extends beyond the borders with continental drivers participating in the Rwanda Mountain Gorilla Rally. Hundreds of fans also endured 12-hour bus journeys from Uganda to cheer on their favourite drivers.

The increased interest has been helped by the rally’s new July date on the African Rally Championship calendar. In past years, the rally was held in September as the penultimate event in the series, but this attracted fewer participants.

“We noticed that people and even our sponsors had started doubting our rally because after six of seven events you can predict or sometimes you know who the champion will be,” says Gakwaya.

For two consecutive years, the African champions did not compete in Rwanda because the winning crew had already secured enough points to be sure of the title.

“So we asked to be repositioned to the summer, in July, so now we are straight after [the rally in] Tanzania and before Uganda,” adds Gakwaya. “It is good because at this point, people are still fighting for the championship.”

INCREASED COMPETITION

After the rally was moved forward, this year’s edition saw the top two African contenders – Kenyan Jaspreet Chatte in a Mitsubishi Lancer Evo X and Zambian Jassy Singh in a Subaru Impreza – register for the event in search of points.

At the time Chatte led the standings with 50 points from two wins in South Africa and Zambia, with Singh trailing him in second place on 36 points. Victory for either would play a key role in their tightly-contested title challenge.

Their rivalry did not deter regional drivers from entering into the competition and from chasing bragging rights in their own countries. Of the 20 cars that started the rally on day one, 10 were from Uganda.

At the end of that day’s competition Burundian Valery Bukera, in a Subaru Impreza, was leading after the super stage in Nyamata. But a dramatic day two in Rwamagana district in the eastern province would see him suffer a puncture and leave Chatte and Singh, both in more powerful cars, to fight for the victory.

Singh enjoyed a three-second lead at the end of stage seven, but Chatte came back strong to lead by 17 seconds at the end of the following test. He then had a puncture and Singh assumed the lead with a 48s advantage. Chatte worked hard to get to within 17s of Singh and, on the final stage, the Kenyan snatched a 33s victory.

“It was a very interesting rally, really good,” said Chatte. “It was tough. We fought with Jassy until the last stage. Every leg I would go in and get some time, then he would go in and get some time, so it was quite a good fight till the end.”

However, Singh thinks his chances of winning his second African title at the age of 22 are minimal. “Our chances are very slim now but rally is rally,” he surmised. “We shall push on in Uganda and Madagascar and see what happens.”

Singh, who won the 2013 African title in Madagascar, knows not to lose hope and will be going all out at the upcoming events.

Despite the duo’s enthusiasm for the Rwandan rally, Gakwaya has some concerns about the future of the championship.

“The declining number of entrants is worrying the countries organising events,” says Gakwaya, after just four drivers registered for this year’s series, down from eight in 2014.

He says new regulations mean drivers must participate in a minimum of four events from seven, attending one rally in the north of the region and another in the south. This means that drivers have to compete in Ivory Coast and choose from events in South Africa, Zambia, Tanzania, Rwanda and Uganda.

“Transporting a rally car to Ivory Coast is challenging in terms of funds and sponsorship, so we are discussing an easier formula that can revamp the championship,” says Gakwaya.

He insists, however, that despite this challenge motor sport in Africa has a bright future. “When you look at Kenya, they have 75 cars in the national championship, Uganda is hitting 30 and will soon have 40. In Rwanda, we have 15 to 20. There is an increasing number of cars, powerful new cars and more drivers.”

Rwandan Elefterios Mitraros, the only local driver to complete this year’s Mountain Gorilla event, has been rallying since 1970. “There is an increase in the number of drivers and I believe more are coming on board,” he says. “This can be attributed to good organisation by the RAC and I am willing to mentor young drivers.”

Mitraros’s offer, combined with an FIA young driver programme to provide training from 2016, should help to ensure that Rwanda’s unique countryside is enjoyed by rally drivers for years to come. ■



REAR
VIEW

Legend

MEMORIES OF MOSS

This year may be the 50th anniversary of Sir Stirling Moss' historic Mille Miglia win, but the racing legend's career encompassed so much more. From grand prix racing to sport cars, from road and rallying to speed records, AUTO invites the greatest driver to never to win the F1 world championship to delve deep into the photo archives to celebrate his ability to win at the wheel of whatever he was handed

TEXT: JUSTIN HYNES





Moss won his first RAC Tourist Trophy in a borrowed Jaguar XK120.

The First Breakthrough

16 September, 1950: RAC Tourist Trophy, Dundrod, Northern Ireland
 "I'd been driving quite a bit in the 500cc class but I wanted to get a car for the RAC Tourist Trophy. I went to all the different companies and no one would give me a car. They all thought I was going faster than I should for my level of experience. They didn't want me to crash in their car, as it would be bad publicity."
 "Now, you couldn't buy Jaguars, they were all for export, but I knew a guy called Tommy Wisdom, who was the motoring correspondent for the *Daily Herald* newspaper, and he had bought one as the press were allowed to. He said: 'Look, I'm driving a Jowett Jupiter, would you like to borrow my XK120 for the Tourist Trophy?' And of course I said 'fantastic'.
 "Dundrod, in Northern Ireland, was an incredible circuit, one of the great circuits anywhere. It rained but I happen to like the wet, so it really suited me and because of the rain, the shortcomings of the car weren't exposed. Really, the brakes weren't that good - they weren't good until we got discs - but you didn't notice in the wet, as you simply don't go that quickly.
 "I managed to win it and that night William Lyons signed me up to lead the team the following year. It was a big step forward for me. The following day was my birthday as well, so it was doubly good. I had never driven on a course as good as that. Dundrod was really a very important circuit for me."

Now a works Jaguar driver, Moss won the 1951 Tourist Trophy in a C-type.



Formula One Calling

27 May, 1951: Swiss Grand Prix, Bremgarten, Berne
 In 1950, based on his good showings in the 500cc class, Moss joined Britain's HWM team and toured a series of F2 and non-championship F1 races. Moss's Formula One World Championship debut would come at the following year's Swiss Grand Prix, the season opener in the absence of Monaco.
 "[Bremgarten] was a great circuit but the HWM was terribly outclassed. We had about 120hp, running on alcohol. I think the regulations were for 1500cc cars with a supercharger or 4.5 litres normally aspirated and we only had 2 litres.
 "I was up against guys like [Luigi] Villoresi, [Alberto] Ascari, [Giuseppe 'Nino'] Farina, those kind of guys. To me, they were gods. I was only something like 19 or 20 years old and to race on a circuit like that was very, very difficult. You had the Alfas and things like that, which were so fast we obviously couldn't get close, but it gave me an enormous amount of experience.
 "What was very good at that race was that on the first practice day it was wet and I qualified up with the really fast cars, so that did me a lot of good. It was another big stepping stone for me." ▶



Moss's F1 debut might have come in an underpowered HWM, but his talent still shone through at Bremgarten.

REAR VIEW

From Race Track to Rally

22-29 January, 1952: Monte Carlo Rally

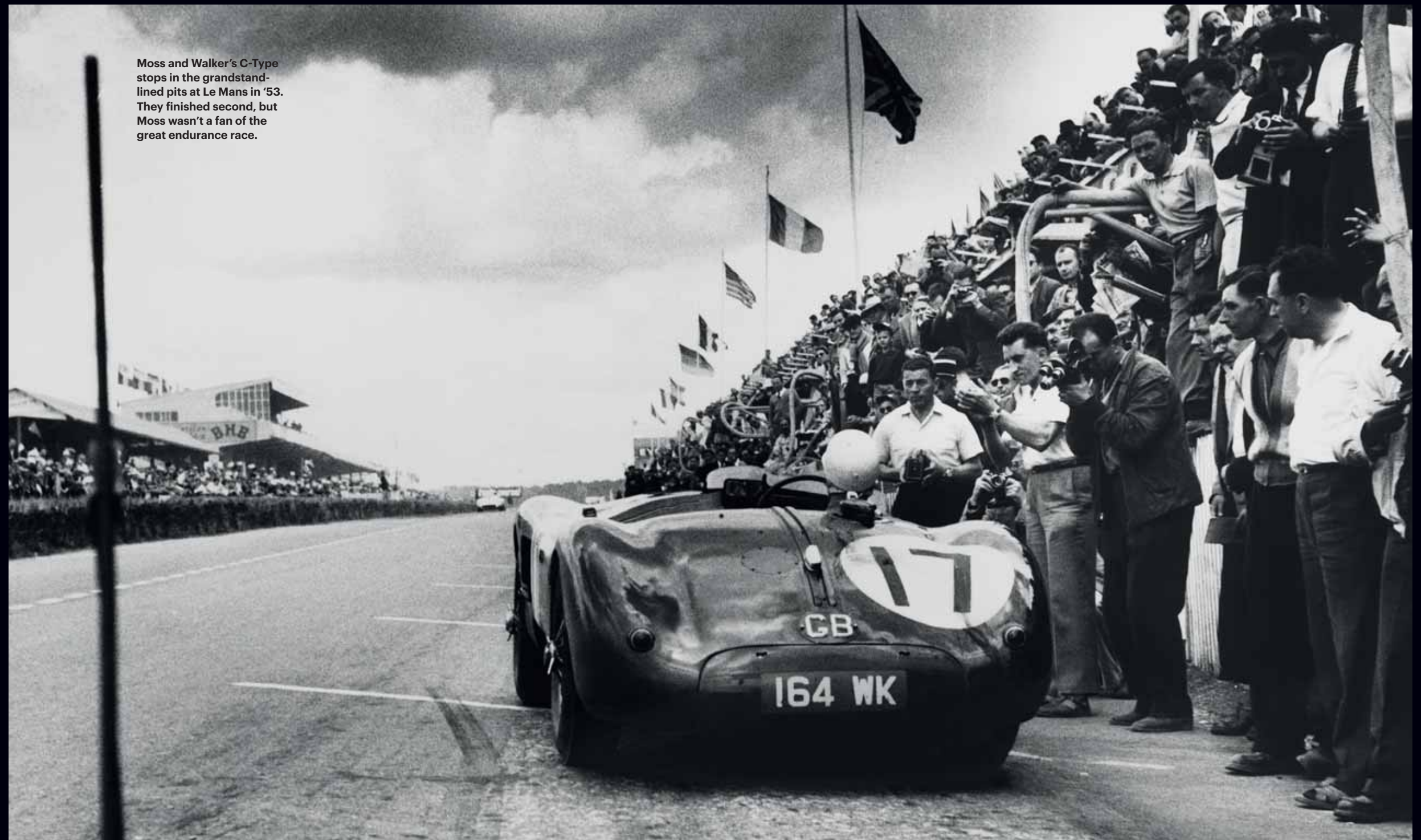
In keeping with his belief in motor sport as a broad church open to all-comers, in 1952 Moss took up the offer to compete in the Monte Carlo Rally, "simply because it was something I could do in the off-season".

And in keeping with his habit of proving competitive in any discipline, in any car, Moss and team members Desmond Scannell (Secretary of the British Racing Drivers' Club) and *Autocar* editor John Cooper finished second, marginally behind motor manufacturer Sydney Allard with Guy Warburton as co-driver and Tom Lush as navigator, in a Type P Allard saloon. Moss' second place was scored in a Sunbeam-Talbot 90, a car *Autocar* described as possessing a "comparatively high-efficiency 2,267 o.h.v. engine, with four-speed 'box and coil spring independent front suspension. It cost £845 (basic) at the time of the rally".

"That car would do about 84mph if you were lucky, so we weren't exactly going very quickly, but I really enjoyed it. We lost by four seconds and that's because Col de Braus was the final test. We were going round there and I came round a corner, braked and unfortunately nudged straight into the snow. So we jump out - it was all very amateur - get it out and get going again. We said, 'How long do you reckon we lost?' because nobody had started a stopwatch or anything like that. So we said, 'Right, okay, we'll do the Boy Scout thing: how long do you think we stopped? Shall we say 82 seconds?' And I said, 'No, no, more like 52 or 53,' and then we put them together and divided by three. We took an average, figured out what we needed to do - and it was four seconds wrong! You're talking about real amateurs, you've got to realise that. I mean if you're a professional, the first thing you do is start the watch when you have a problem, but that didn't happen."



Moss, Cooper and Scannell with the Sunbeam-Talbot at the end of their Monte Carlo Rally adventure.



Moss and Walker's C-Type stops in the grandstand-lined pits at Le Mans in '53. They finished second, but Moss wasn't a fan of the great endurance race.

"I WAS VERY QUICK AT GETTING IN CARS. I COULD RUN 100 YARDS IN 10 SECONDS"

Test of Endurance

13-14 June, 1953: Stirling Moss/Peter Walker, Jaguar XK120 C, Le Mans 24 Hours, France

Moss's eclectic racing career also saw him take on the mighty Le Mans 24 Hours, principally with Jaguar. In 1951, he had retired after 92 laps, although he did set fastest lap, and in 1952 an engine issue forced him out of the race after three hours. In 1953, however, Moss and Peter Walker arrived with a C-Type Jaguar sporting the radical new racing development - disc brakes. Jaguar utilised the technology to march to victory with Tony Rolt and Duncan Hamilton, with Moss and Walker second, but despite the success Moss is still unenthusiastic about the grand endurance event.

"I'd love that race today because they go flat out the whole way, but in those days you just couldn't. The cars weren't strong enough.

The materials weren't good enough. If I'd been racing in England using 6100 revs, when you went to Le Mans they would only allow you 5500, which is boring. It really was most annoying."

Despite his reservations over the demands of endurance racing at Le Mans, he does fondly recall the start procedure, with drivers running to their cars to begin the race.

"I was very quick at getting in cars. I could run 100 yards in 10 seconds in those days. I practised a lot. I'd run across and leap in so that my foot went down onto the clutch, finger onto the button to start it... There was an enormous amount of practice and people would say, 'For a 24-hour race, why do you bother?' And I'd reply, 'Well frankly, if there's a crash either I start it or I avoid it and the quicker you're out of the way the better.'" ▶



Bill Lloyd and Moss celebrate their 1954 Sebring victory with a cup and a smoke...

The American Way

7 March, 1954: Stirling Moss/Bill Lloyd, 1st position, Sebring, Florida, USA

"This was my first time in the States. [US entrepreneur, racer and team owner] Briggs Cunningham called me up and asked if I would like to drive for him.

"I really wanted to go to America because in those days you could buy anything there. You wouldn't know the war had been on, so I could buy coloured nylons for my girlfriend, all the stuff you couldn't get in England.

"I'm with [co-driver] Bill Lloyd in this picture. We had a 1300-1400cc Osca and won the race outright in bad conditions. It was amazing how that little Osca kept going. It had very poor brakes... Brilliant, because you could drive it so well, you could put it sideways to slow it up and everything."

"The thing is in America, it was almost a dirty word to be a professional racing driver. Gentlemen had their Ferraris and it was considered slightly vulgar to race for money – these guys were racing for cups, trophies. It was completely the opposite to what you might think American racing would have been like. Americans would say, 'What do you do for a living?' and I almost didn't dare say I was a racing driver because to them it conjured up images of Sprint Car drivers.

"There actually weren't that many drivers. You had people like [Kleenex heir] Jim Kimberley and all these people who had these cars, but there weren't many of them. There were some really good ones – Phil [Hill] and Dan Gurney for example – but there weren't really many Americans up to the standard we had in Europe and it made it great fun to drive there."

Grand Prix Gold

16 July, 1955: British Grand Prix, Aintree, with Juan Manuel Fangio
Having attracted the attention of Mercedes' racing boss Alfred Neubauer with a string of good performances, Moss joined the German marque for 1955 and at Aintree, the penultimate round of the season, the Briton took his first grand prix win – though to this day he is unsure if team-mate Juan Manuel Fangio gifted him victory.

"[Fangio] had had a better start but I caught him up. We're going into the last corner of the last lap, which was a right angle, and I can remember braking as late as possible, scraping round the corner and being just in front as we came out. So I kept my foot in and waved him past, knowing he couldn't pass me because the cars were very similar. So I won it and I said, 'Did you gift it to me?' In other words, did he back off. 'No, no,' he said, 'it was your day.' I still don't know. He was the sort of man whose philosophy would be, 'Well, I've won all the other ones and it means more to Stirling than it does to me, so let him win it.' I don't know but the only thing it shows to me is he was such a gentleman that he certainly could have well done that."

Were they close friends? "Oh yes. He was a father figure really. I could beat him in sports cars, I mean, I beat him at the Targa Florio and the Mille Miglia and what have you, but in Formula One, which is the number one to me, he was unbeatable."

The End of Mercedes' Road

11-12 June, 1955: Le Mans 24 Hours. The Jaguar D-Type of Mike Hawthorn/Ivor Bueb leads the Mercedes 300SLR of Juan Manuel Fangio/Stirling Moss

Le Mans 1955 was a watershed moment, not just in Moss's career but for all of motor sport. At the end of lap 35 Pierre Levegh's Mercedes made contact with Lance Macklin's Austin-Healey and flew off the track. The car smashed into an embankment and Levegh was killed. Pieces of the car were thrown into the crowd, killing 83 people and injuring another 120. The race continued but eventually Mercedes withdrew its remaining cars, with Moss leading at the time.

"I must say the person [who wanted to stop] really was [Mercedes driver] John Fitch. He went to Neubauer and said, 'Listen, I think we should pull out of this', in deference to those people killed and I just thought really and truly that's a ridiculous thing to say because it's not going to make any difference. I mean it wasn't done on purpose, it happened because of a mistake on behalf of Lance Macklin and Mike Hawthorn and Levegh – all three together really had a small contribution – but it's not going to do any good [to quit], and so they pulled out the team and at that time we had a four-lap lead and that was an enormous amount. It affected motor racing enormously." ▶



REAR VIEW



Moss and 'Jenks' navigate their way through the crowds in the '55 Mille Miglia. Right: Moss leads third-placed Stuart Lewis-Evans, both in Vanwalls, at Oporto in '58.



Sacrificing Glory

24 August, 1958: Portuguese Grand Prix, Oporto

Moss came closest to winning the Formula One title in 1958. Going into the Portuguese Grand Prix, round nine of 11, Moss, now driving for Vanwall, trailed Ferrari's Mike Hawthorn by six points. Moss won on the streets of Oporto, taking eight points, while Hawthorn faced disqualification for allegedly driving in the wrong direction after restarting his car during the race. Having witnessed the event, Moss marched to race officials and told them Hawthorn had been on the pavement when he was spotted and so had not broken the rules. Moss's evidence swung the decision and no action was taken. Hawthorn would go on to win the title by a point.

Moss still insists that his defence of the Ferrari driver was the correct thing to do.

"I just felt [the stewards] were wrong in their decision and they reversed it. The point is you race for pride and you race for the enjoyment and pleasure, and you're trying to beat the other guy to show that you're a better driver than he is. What happens a couple of months down the road or at the end of the championship is irrelevant, really.

"It's a lot different now. Now it's a commercial business. I mean really and truly, motor racing has been ruined because of the sponsorship from these big companies. If Lewis [Hamilton] wins the British Grand Prix, he has to go over and speak to Vodafone or whoever. If I won the British GP, I'd piss off and chase the girls! I was much more suited to that scene!"

The 1000-mile Legend

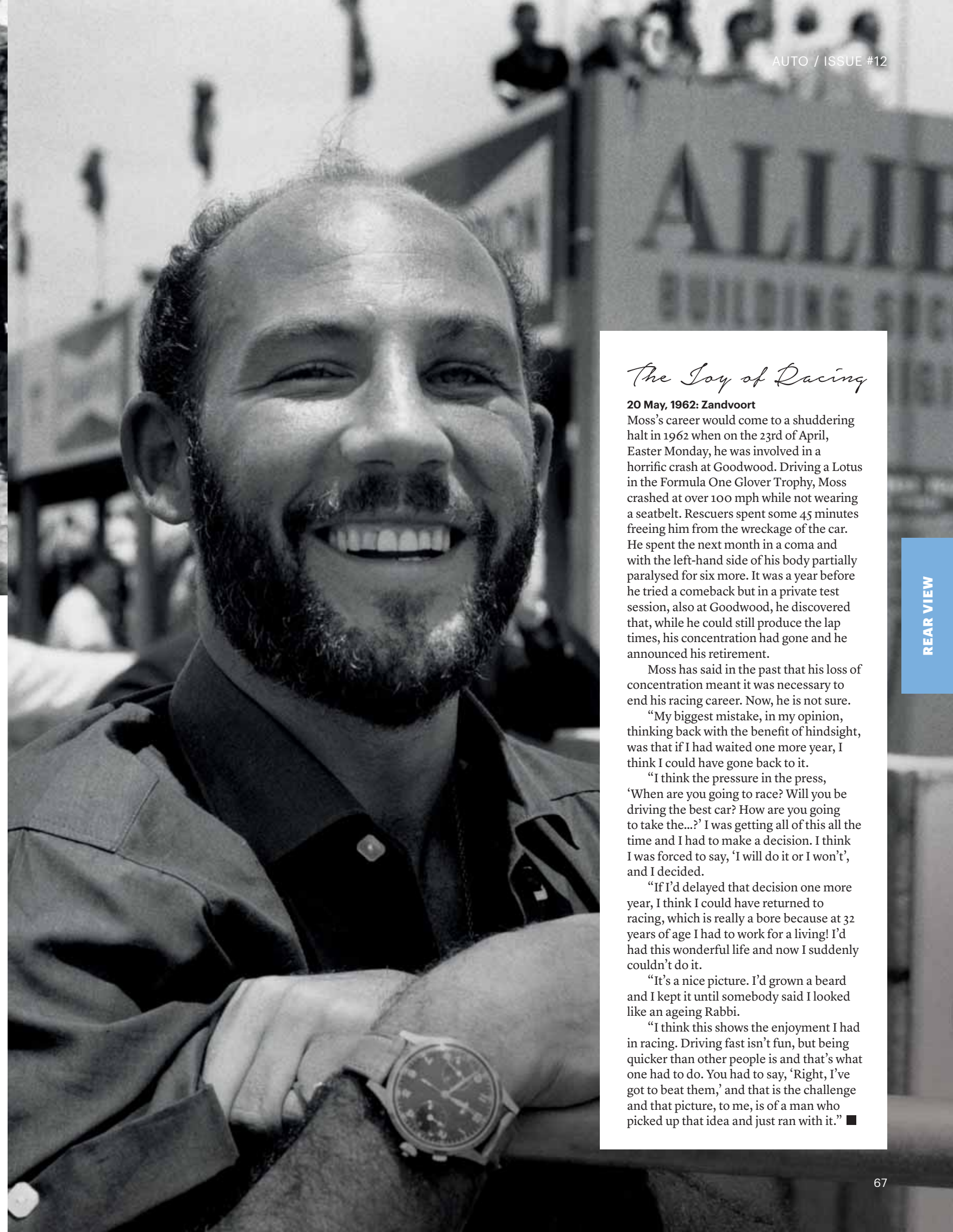
30 April-1 May, 1955: Mille Miglia, Brescia-Rome-Brescia, Italy

Perhaps Moss's greatest achievement, the 1955 Mille Miglia, saw the 25-year-old take a brand-new Mercedes, the 300SLR, a diminutive co-driving journalist, Denis Jenkinson, and a rough, ready and revolutionary set of pace notes to a stunning victory. Moss's skill and stamina, coupled with Jenkinson's guide to the route – communicated to Moss only by hand signals – meant that the pair covered the 1,000 miles at an incredible average speed of 97.9mph. The performance remains one of motor sport's greatest ever, an almost superhuman performance in a car that proved almost supernaturally fast and reliable (the duo had three minor accidents en route, but the car soaked up the impacts and only its rear tyres were changed, while its engine never missed a beat).

"I still think the performance was staggering, amazing, and you needed a car like the Merc to win it. I mean that car was so solid, so strong.

"If we hadn't had the pace notes... I mean 'Jenks' was my guide dog. He gave me everything we could see. The problem is of course that people were lining the streets nearly the whole way and so if there was anything there like milestones, you couldn't use them because people would go and sit on them. So therefore we had to find another way and he found all these... adverts and stuff, things he had drawn little pictures of and then he was interpreting those in order to say to me, 'Right, slow down a bit or slow down a lot, or right, left'.

"It had to be hand signals as we couldn't get an intercom to work. Here we were in Germany [at Mercedes] and even Bosch and all these people, no one could get an intercom that worked."



The Joy of Racing

20 May, 1962: Zandvoort

Moss's career would come to a shuddering halt in 1962 when on the 23rd of April, Easter Monday, he was involved in a horrific crash at Goodwood. Driving a Lotus in the Formula One Glover Trophy, Moss crashed at over 100 mph while not wearing a seatbelt. Rescuers spent some 45 minutes freeing him from the wreckage of the car. He spent the next month in a coma and with the left-hand side of his body partially paralysed for six more. It was a year before he tried a comeback but in a private test session, also at Goodwood, he discovered that, while he could still produce the lap times, his concentration had gone and he announced his retirement.

Moss has said in the past that his loss of concentration meant it was necessary to end his racing career. Now, he is not sure.

"My biggest mistake, in my opinion, thinking back with the benefit of hindsight, was that if I had waited one more year, I think I could have gone back to it.

"I think the pressure in the press, 'When are you going to race? Will you be driving the best car? How are you going to take the...?' I was getting all of this all the time and I had to make a decision. I think I was forced to say, 'I will do it or I won't', and I decided.

"If I'd delayed that decision one more year, I think I could have returned to racing, which is really a bore because at 32 years of age I had to work for a living! I'd had this wonderful life and now I suddenly couldn't do it.

"It's a nice picture. I'd grown a beard and I kept it until somebody said I looked like an ageing Rabbi.

"I think this shows the enjoyment I had in racing. Driving fast isn't fun, but being quicker than other people is and that's what one had to do. You had to say, 'Right, I've got to beat them,' and that is the challenge and that picture, to me, is of a man who picked up that idea and just ran with it." ■

AUTO
FOCUS

F1's newest player

THE AMERICAN'S DREAM

US industrialist and NASCAR entrant Gene Haas is fulfilling a long-held ambition to enter F1 through an international collaboration that he hopes will help his team to succeed where others have failed

TEXT: ERIC SILBERMANN



f there were to be a league order of 'big sport' investment, ventures that offer the hardest road to success and which require the grandest commitment – both financial and spiritual – then Formula One would surely rank close to the top of the list.

With annual costs running towards hundreds of millions of dollars and largely dominated by established dynasties, the world's foremost single-seater racing category has long been a graveyard for big dreams and grand ambition.

However, it is precisely the grand nature of the competition, Formula One's status as the most technologically advanced, most heroic, historic and glamorous form of motor racing that, despite the risks, continues to exact a magnetic appeal on manufacturers and moguls of every stripe.

The latest to attempt to survive in a world described by Mercedes F1 boss Toto Wolff as a "shark tank" is by US industrialist Gene Haas, whose new team will take to the grid at the start of the 2016 season. And it is precisely because of the scale of the challenge that the multi-millionaire entrepreneur is wading into F1's choppy waters.

"It's filled with peril and there [are] a million ways to fail," he said of his venture, with refreshing honesty. "For all those reasons you do it – to see if it's something you can do."

But who is Gene Haas? A 62-year-old, originally from Ohio, Haas made his fortune with Haas Automation, the biggest machine tool manufacturing business in the Western world. A lifelong motor

sports fan, Haas competed successfully in off-road truck racing and has sponsored numerous race teams in US series such as CART, IndyCar and NASCAR. In 2002, he purchased the Craftsman Truck Race Facility from Hendrick Motorsports and formed his own NASCAR team, Haas CNC Racing. Since '08 he has run the highly successful Stewart-Haas NASCAR team, which he co-owns with colourful driver Tony Stewart.

Formula One, though, is a world away from the cost-contained, less technologically voracious arena of US stock car racing, so what makes Haas believe that he can succeed where so many others have failed in the past?

"It's mostly based on a simple business plan, one I've been doing ever since I left High School," he says without a hint of the starry-eyed dilettantism that sometimes colours the perception of entrepreneurs eyeing the sport.

"I started off as a machinist making parts for race cars; I've done the shop floor, I've machined magnesium wheels and done it all," he adds. "I've actually been in racing as a mechanic since I was 16 years old, which is a long time. For me, machine tools and racing are the same thing, there are a lot of synergies between making race cars and manufacturing parts."

There's nothing flashy about Haas despite his success and he makes no claims to know it all when it comes to Formula One. With that in mind, he appointed former Jaguar F1 and Red Bull Racing technical director Guenther Steiner as team principal, leaving the Italian with the German-sounding name to manage the operation. That's quite a task given that in its early incarnation Haas F1 will have not one, not two but three bases to work from.



Haas's racing headquarters has expanded to provide room for both its F1 and NASCAR ventures.



Former Jaguar and Red Bull tech boss Guenther Steiner is Haas F1's team principal. Left: Haas with NASCAR driver Kurt Busch at Watkins Glen in August; Haas F1's US base near Kannapolis.



"I will admit it does not make it easier," says Steiner. "It is complicated, but all the technical development is done under one roof in Italy with our technical director, Ben Taylor, running a design office of around 70 people within the Dallara facility, near Parma."

FERRARI LINK

There's a lot more to Haas's Italian job as a deal has been struck with Ferrari not just for a supply of engines – also flying out the doors at Maranello will be the transmission and electronics as well as the suspension and various other components that do not feature on the FIA's list of what has to be made in-house to ensure 'constructor' status.

Currently the team has a deal to use the Ferrari wind tunnel and this has led to some mutterings about giving the Scuderia an unfair advantage, even though this is hardly the first time a team has used another one's facility. "Our scale model stays at Dallara in their model shop, which is where it goes back to after the wind tunnel sessions," stresses Steiner. "It's never left on its own at Ferrari."

This outsourcing is nothing new for Haas, which has based its NASCAR operation along similar lines. But where's the USA part of this project?

"We have created a group of around seven people at the moment to work on Computational Fluid Dynamics [CFD] in the States," continues Steiner. "We want to establish Formula One technology in the States and CFD is one of the things you don't need to have where the rest of your work takes place. It all gets done on a screen, all the calculations, and in fact our CFD computer is in the UK! We just shoot the data across the big lines of fibre optics we have dedicated to us. We bought the server from Marussia and we didn't want to move it, as that does it no good and costs a lot of money. It's just a virtual tool so it doesn't matter where it is."

"And in terms of designers we have good people in the USA, even

if they had not been working on F1 up until now," adds Steiner. "They have all the CFD technology skills. So it made sense to establish it in the US, where we also have our metal machine shop. After all, that is the Haas business. A lot of the metal model parts we make in the US and ship them over to Italy. It might take a bit of time, but the world has got much smaller than it was, say, 10 years ago, not just in terms of sending information and data but also sending actual parts. The mindset of the people is very different now. They are much more used to working from continent to continent. It is doable and for the future I think it's good for the team."

As usual, with teams supplied F1 engines by Ferrari, the package comes complete with a team of technicians and they will also be keeping an eye on the gearbox side. Everything from Dallara and Ferrari will be shipped over to the UK where Haas F1 has set up shop in the former Marussia factory at Banbury, in the heart of Britain's so-called 'Formula One Valley'.

"The race engineers and mechanics will work out of Banbury and we will ship out to all the races from there," reveals Steiner. ▶

"WE HAVE GOOD DESIGNERS IN THE USA, EVEN IF THEY HAVEN'T WORKED ON F1 BEFORE NOW"

GUENTHER STEINER

AUTO FOCUS

Heading up the design operation in this multi-national adventure is Rob Taylor, a man with around 25 years of experience in F1 with teams such as Ferrari, McLaren, Jaguar and Red Bull.

"I'm designing a racing car with a bunch of colleagues over in Italy and Gunther's trying to design a race team from scratch," he says. "It's a strange situation for me to be in and it makes me think of the famous Donald Rumsfeld quote: 'There are known knowns. These are things we know that we know. There are known unknowns. That is to say, there are things that we know we don't know. But there are also unknown unknowns. There are things we don't know we don't know.'

"You don't quite realise what you don't know until you sit down. In most race teams, there's a whole infrastructure of things and components and people that are already in place. It's very rare that this whole scenario takes place."

At the moment, the most obvious American influence in this team, apart from Gene Haas himself, is the team of CFD engineers based in Kannapolis, North Carolina.

"They bring a completely different perspective on Formula One to what I've seen before," says Taylor. "It's a mix of a breath of fresh air and complete naivety maybe, but it's good. They are a mixed group, some from open-wheel racing in the States, others from NASCAR and a couple of PhDs just out of university. So they get a completely different perspective and in lots of ways that's usually what sparks off great ideas, isn't it?"

Haas F1's chassis partner, Dallara, is best known as an 'off the shelf' race car constructor rather than a bespoke manufacturer, providing as it does all the chassis for Indy racers, GP2, GP3, Renault 3.5 and Formula E.

"It's obviously very new for them to have a car of this complexity. They are rising to the challenge and, as a manufacturing company, they bring a lot of interesting insights on how to make and manufacture components.

"Actually, the initial car will be built by our race team people in Italy due to the tight schedule. It would make no sense to ship everything to the UK and then back to Spain for the tests, as we would lose three to four days."

Haas is sanguine about coming into F1 and realistic about his team's prospects, and the current trend for criticising the sport does not faze him. "Looking back at history, Formula One has always had drama - even back in the '60s drama was part of the package," reckons the sport's newest team owner. "I don't think it's any different today to 20, 30 or 40 years ago. You are always looking for change and some controversy. In NASCAR we have the same thing. The people in front are happy, the ones behind want to change it."

Haas also reckons there's been no pressure from the folks back home to go out and do it for the good ol' USA.

"I've not had that," he says. "Americans like to compete and I'm one of them. I've been successful in other racing formulas, but I don't have any grand plans to come and dominate F1, that's for sure."



Racing veteran Haas was among the speakers at last November's NASCAR Sprint Cup Series Champions Week. Right: with his 2014 NASCAR Sprint Cup Series winner Kevin Harvick.

"I THINK THAT IF WE'RE SUCCESSFUL, OTHER TEAMS WILL ADOPT THE SAME METHOD TO COME INTO F1"

GENE HAAS

Given that an F1 cost cap remains an unlikely prospect, it might just be that Haas F1's turnkey-team approach to entering the sport could be the only workable model for aspiring entrants right now.

"I don't know if it's a unique model," says Haas. "It's just what was presented to us when we first decided to seek the licence. There were certain time constraints. If we'd got the licence a few months earlier I think we'd have been racing in 2015. But the way it worked out we were just a couple of months short of that, so we elected for 2016. We had already started talking to Ferrari on one level, but as soon as we ended up saying we were going for 2016 that changed

the dynamics quite a bit about how we approached it, and Ferrari had some ideas and we had some ideas. Our original ideas got somewhat pushed aside and we looked at a new way of doing it.

"The relationship with Ferrari was unique in that it was going to provide the more complete package of anything that was available out there, so that dictated that. Keep in mind that all the primary manufacturers build their own engines and lease them to other teams. All the teams do this; we're just going a little further with it.

"We originally looked at doing everything out of Kannapolis and, ultimately, our goal is to start with the agreement with Maranello, plus operating the mechanics and the logistics out of the UK and then, five or six years down the road, bring most of that back to Kannapolis. But we will do it the most logical, efficient way we can. I can't tell you what that will be five years from now."

Teaming up with Ferrari seems like a smart move now given the Prancing Horse's renaissance this season. However, since Haas first started talks with the legendary team, it went through its worst season for decades with not a single podium finish in 2014 and three changes of team principal. Haas was not concerned. "I've been in racing long enough to know there are periods when things don't go right, but Ferrari has been in the sport for over 60 years and I knew things would change and they are already making things better, so I had no qualms about that. For us, the Ferrari magic is the ability to use so much of their package. Without that I think we'd be suffering the same fate as the teams who were granted the four licences in 2009. That didn't work, so what's the point of doing what they did? You might as well do something different. Quite frankly, I think that if we're successful, other teams will probably adopt that method if they want to come into the sport. If you want to grow an oak tree, you have to start with a seed. We needed something and Ferrari offered a great opportunity."

AMERICAN FLAVOUR

For the moment Haas's business interests have financed the fledgling team, because promoting his machine tools operation is Gene Haas's primary purpose in throwing his hat into the F1 ring. But his marketing crew are actively chasing outside sponsors. "They tell me there's a lot of interest, but I'm a bit more sceptical," says Haas. "I don't want to sit there and tell people we're going to be one of the wonders of F1, because we are not. Like anyone else, we have to prove ourselves out on the track and we have to perform. If we don't then I don't think people will want to sponsor us. My view is that we need to get out on track and show people what we can do. That will make us more valuable and we won't have to take lesser sponsorship, we can wait for the better sponsors."

That's the business plan, but what sowed the seed of setting up a Formula One team dates back to the 1970s.

"In 1975 they had the Long Beach GP, running Formula 5000 cars, and that was the test race for F1 which came in '76 and was there for 10 years," recalls Haas. "I went to some of the practice days and back then you could walk through the pits and see the cars and equipment. I was fascinated by the difference between F1 cars and the ones we were working on - they were smaller, more dainty and revved to 18,000rpm, so they seemed faster and the noise was incredible too, something we'd never heard before: that kinda got me interested. Then there was a hiatus when I worked on my machine tool business and when I finally came back to racing, the highest level at that time was NASCAR, so I started off there."

With much of the team's efforts initially based in Italy and the UK, one could ask where the Stars and Stripes features in all this. But Haas insists that, apart from the involvement of those working at his impressive Kannapolis facility, the team will have a distinctly American style and flavour: "We're going to be having beer and ribs in the motorhome!" ■

FINAL LAP

Freeze frame

ORIGIN OF THE SPECIES

This month's Frankfurt motor show, acknowledged as the world's biggest auto exhibition, can trace its roots back to the birth of the car itself

Almost one million people will stream through the doors of this month's Frankfurt Messe for the latest biannual International Motor Show, to get a first look at upcoming models, plot their next purchase and get a taste of the future of the automobile through extravagant visions of the auto world's arch conceptualists.

While that might seem like an enormous number, it is merely in keeping with the show's history, which stretches all the way back to the birth of motoring.

The first IAA show was held at the Hotel Bristol in Berlin in 1897, with eight vehicles on display. The German capital remained the exhibition's home right up until the outbreak of the Second World War, with some 825,000 visitors in attendance at the final pre-war show in 1939.

Frankfurt made its debut as host city for the IAA in 1951 and it was there, before 575,000 visitors, that BMW launched its 501 'Barockengel' model (pictured right), the first car to be produced by the Bavarian manufacturer following the war.

Curiously for the time, occupant safety was a major consideration in the car's design, with a sturdy chassis providing above average side impact protection, the steering column shortened to prevent injury and the fuel tank placed in a carefully protected location above the rear axle in order to minimise fire risk in the event of an accident.

The luxury car made an immediate impact, even on rivals, and a message was received from the management of Auto Union stating that the "esteemed wife" of the company's chief would love to go for a drive sometime in "the beautiful BMW she has been admiring at the show".

The BMW was not the only home-grown car to make an impact at that particular event. German rival Mercedes also debuted a number of new models at the first Frankfurt show, including the beautiful, top-of-the-range 300 model and the more affordable workhorse 220.

So popular did the company's cars prove that the run on the Mercedes-Benz hall at the 1951 show (inset) was so great that mounted police had to guard the entrances.

That sort of hysteria may not accompany this year's launches from the two marques, but both should still garner headlines, with BMW set to launch new versions of its X1 SUV and its flagship 7 Series models. Mercedes, meanwhile, will debut its new C-Class Coupe and also its entrant into the small SUV market, the GLC.



AUTO GRAPH

FORMULA E IN NUMBERS

AUTO looks at some of the outstanding numbers from the inaugural season of the all-electric racing series Formula E.

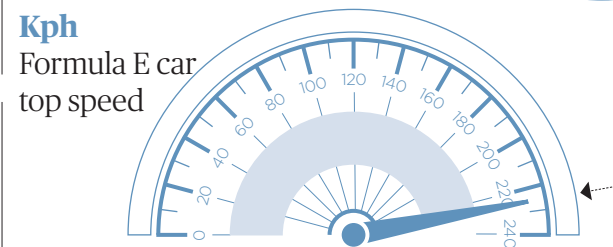
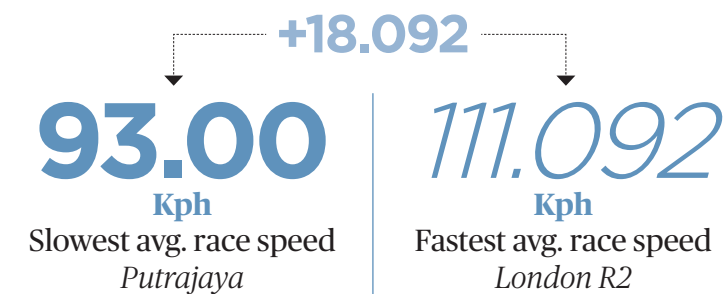
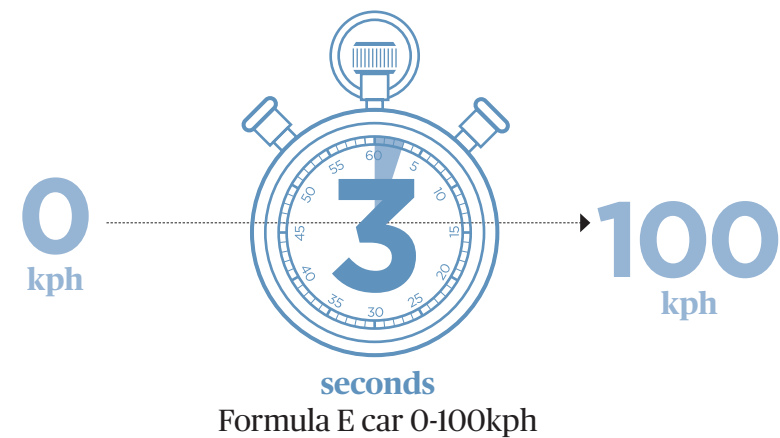
The FIA Formula E Championship hit the streets of Beijing in September 2014 and after 11 races in ten cities around the world, Brazil's Nelson Piquet Jr was crowned the first champion after a title battle with France's Sebastien Buemi that went down to the wire at the season finale in London June 2015.

E.dams-Renault claimed the team title as six squads took victories over the course of the first season. Buemi took the most wins with three triumphs, while he tied with Andretti Formula E's Jean-Eric Vergne for the most pole positions with three each.

With 5.2 billion social media interactions, the all-electric series also took communicating with fans to a new level. This included the FanBoost concept where the three most popular drivers received a temporary power boost twice per race. Piquet proved to be the most popular driver with six fanboosts, followed by France's Vergne with five and Brazil's Bruno Senna with four.

As well as getting 361,500 people watching the action trackside, Formula E was also a hit on TV with a cumulative global audience of 190.3m.

SPEED



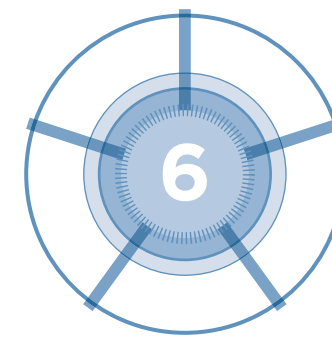
COMPETITION

Biggest winning margin
Sam Bird, London R2

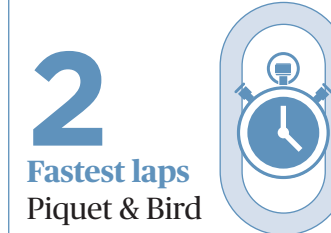
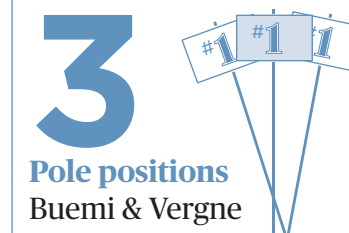
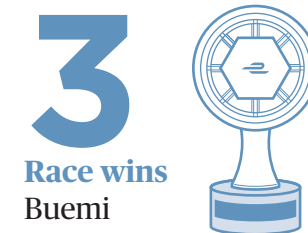


Smallest winning margin
Nico Prost, Miami

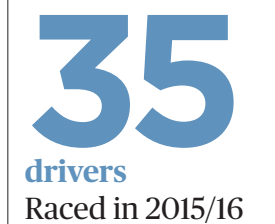
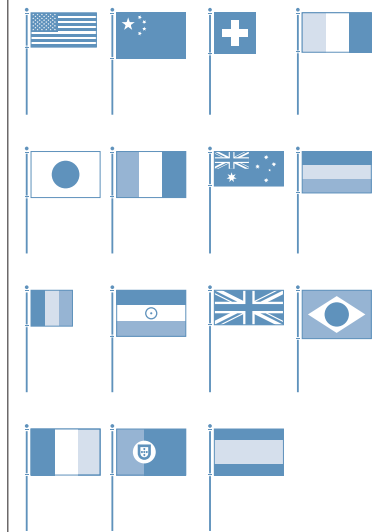
FANBOOSTS



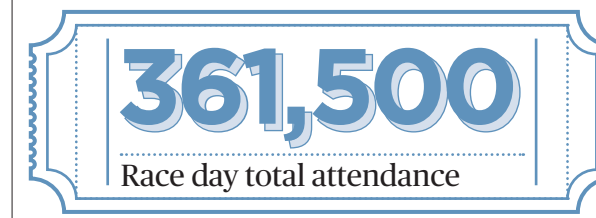
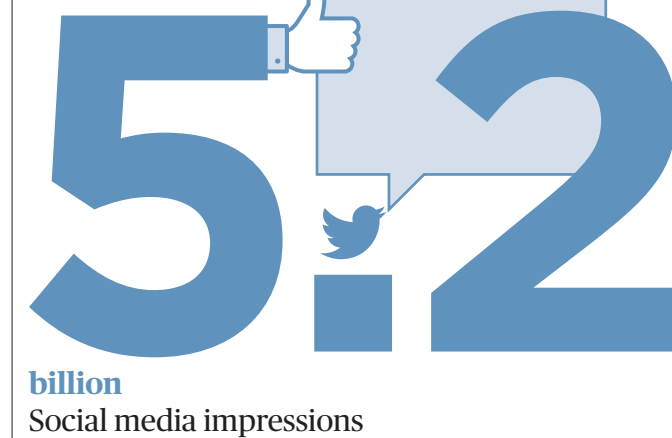
THE MOST...



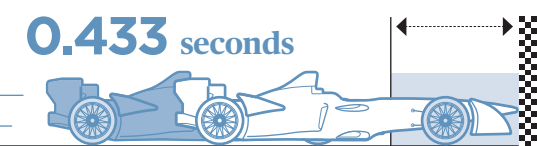
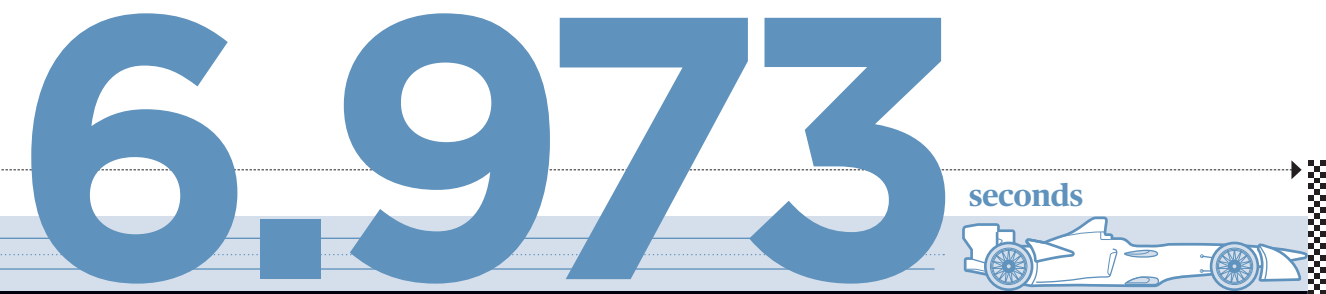
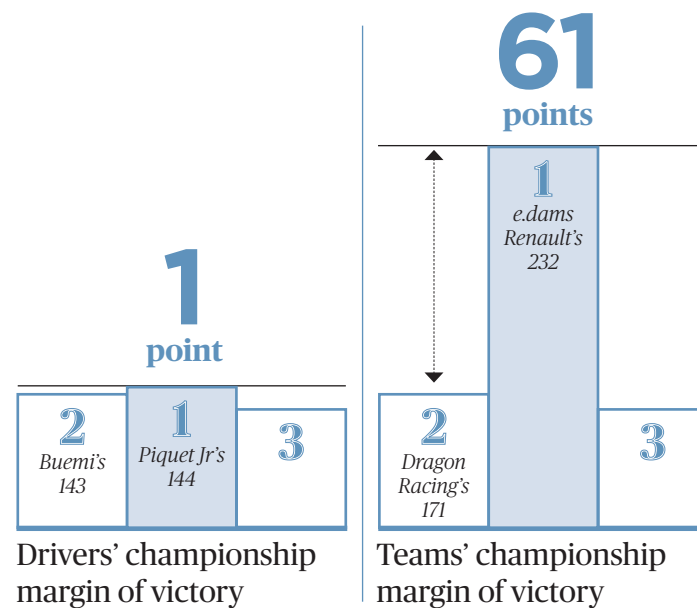
DRIVERS



AUDIENCE



CHAMPIONSHIP MARGIN





FINAL LAP

The last word

STANDARD BEARER

Emerson Fittipaldi, President of the FIA Drivers' Commission, is on a mission to improve driving standards in racing. Here, he talks to AUTO about young racers and driver conduct

Q There's been a lot of talk recently about driving standards, especially in the lower categories of motor sport. Do you think driving standards have slipped?

A I think when kids start in go-karts, they don't get the right reference of safety and respect for each other, so when they get to formula cars they think it is the same. They try to drive formula cars the same as a go-kart.

Go-kart racing is wheel-to-wheel and sometimes there is contact, and I think we need to be much stronger with the race directors in the briefing before the race even starts to create this respect.

I was in Monza before the Formula 3 race [which was cancelled due to poor driving standards]. Some of these teenagers are very talented, but they come straight from go-karts and they are now driving around Monza at 280km/h in a formula car that is much heavier than a go-kart. It does not have the same dynamics of a go-kart, when you move it takes longer and it needs a bigger space. When braking for the chicane you come from 280km/h down to 60km/h, so there is

a different dynamic and this transition they have to understand and respect.

We have to be very strong for the future. The public wants to see wheel-to-wheel racing and it's not good when you crash and one goes one way and the other goes that way and you lose the battle. It's the battle that the public want to see.

Q How can motor sport's governing bodies, whether at FIA level or national level, help young drivers to develop their skills and knowledge?

A The launch of the new FIA karting school is an important development in this aspect [see News p14] and I hope it spreads to many different countries as I think that's going to help. It will offer a new system for young drivers to get into the sport with the same opportunity as other drivers, and should help to unify the sport globally.

Q Looking at Max Verstappen in Formula One, do you think the ability of someone at his age to perform at that level is more

to do with the availability of knowledge or about the cars being easier to drive?

A The car is easier to drive fast because it has a very good set-up provided by the team for different tracks. In my time you had to give information to the engineer; now the car should be ready very fast, which makes it easier to drive. But at the same time the analytics will help the driver to develop their ability much faster. Yet at the end of the day, they do need to have talent.

Q How does the FIA Drivers' Commission play a role in the development of rules for motor sport and driver behaviour?

A One of the major objectives of the FIA Drivers' Commission is safety and that includes driver conduct. The new code that we'll establish will, hopefully, be global and will be used by National Sporting Authorities, and that's going to be the basis of a driver's conduct for any category from go-karts to Formula One. That is our job, to be very strong on these new rules, which will be implemented in all categories.

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RICHARD MILLE

A RACING MACHINE ON THE WRIST



RM 011 LOTUS F1 TEAM
ROMAIN GROSJEAN

