JLR'S SHOCK NEW CITY CAR

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FIRST PICS

Faster, lighter Civic Type R

Polestar's Model S beater

James Bond's DB5 driven

DRIVEN

AUDI E-TRON S SPORTBACK

Ingolstadt's first S-badged electric car is an SUV

PETROL VS ELECTRIC

Can Porsche EV beat AMG V8?

Radical Chevy meets family

SPEC YOUR LOTUS EVIJA • AUDI RS6 AVANT: ROAD TEST • NEW VW TOUAREG R

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COMMENT

LIFE UNUSUAL CARRIES ON AS USUAL

WE ARE NOW into the second two weeks of the MCO. Will working-at-home become the new way of Malaysian life? The impact on our lives and also the motoring industry would be huge. We could become less dependant on cars and give up less of our salary towards the cost of going out to earn it.

Some things don't change and that includes the excuses we use for not doing the things we claim we would do if only we had more time. We're happy you're spending some of that time reading Autocar (two thumbs up!).

As usual, we have great articles. The premiere of the 25th James Bond has been postponed but you can read up on the stunt Aston DB5 and what it can do. If you're feeling claustrophobic after days indoors and indulging in fantasies of going out on a long drive, what about one in Scotland in a Boxster for inspiration? For fans of the manual gearbox, find out which 10 have been voted the greatest. For Renault Sport fans, we have a comparison of three generations of the Méganes.

Take care and stay well.

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MOTORSPORT IMAGES

NEWS

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Lightweight version of the Turbo S will be shown later this year

No electric 911 before 2030

Porsche sports car boss will "fight to let the 911 keep its engine"; hybrid also a way off

An all-electric 911 won't be produced before 2030 at the earliest, according to Porsche sports car line director Frank-Steffen Walliser.

"The 911 will be the last Porsche to become electric," he told Autocar, "coming hopefully after my retirement, so I'm not responsible any more and no one can blame me... I will fight to let the 911 keep its gasoline engine."

Walliser also pulled back on suggestions that a hybrid version of the 911 is close by, despite the 992-generation platform having been designed to allow such a powertrain.

"It's really difficult to do with the 911 and the way it's packaged," he said. "We want to keep it as a 2+2, we want to keep decent trunk space and we don't want to destroy the shape of the 911.

"Also, I'm not ready to put that amount of additional weight into the car. If you wanted to make such a car, it would be easier to make a completely new car."

Given the seven-year life cycle of each 911, this implies that a hybrid version could be further away than initial estimates of 2022 or 2023.

More immediately, Walliser is intent on turning around the reputation of the just-launched flagship Turbo S as being the fastest but not the most enjoyable model in the 911 range. "We are aware of the feedback and have taken steps to address it," he said.

As a result, Porsche will later this year introduce a new lightweight version. "It will be a package the customer can choose, made up of some of our lightest parts and also looking at areas like sound insulation," said Walliser. "It's a number of small bits and pieces, but together they add up."

When asked if that included measures such as removing the rear seats and replacing glass with polycarbonate, Walliser replied: "We are going in that direction."

The lightweight package will also be available on the more affordable Carrera and Carrera S models, and this may well preclude the need for a Carrera T later in the life cycle.

Walliser insisted that the T version of the previous (991) 911 was well received but that it didn't spend sufficiently long enough in the marketplace for Porsche to know for sure whether it should become a permanent fixture of the range.

He also ended speculation that the new 911 GT3, likely to be unveiled this time next year, will use a more highly tuned version of the 4.0-litre engine created for the 718 Cayman GT4 and 718 Boxster Spyder.

"The answer is no," he said. "We stick with the race engine. It's expensive, but we develop it on the track and learn more with every passing race. That's the way we will continue."

Nor can Walliser see a role for this engine in other versions of the current 911 – including the GTS, which won't be dramatically differentiated from lesser variants, as has now been done in the 718 range by using the 4.0-litre six-cylinder engine rather than the four-pot in the new GTS cars.

"There has to be a business case to do it, and sadly we can't see what that is at present," said Walliser.

ANDREW FRANKEL

PORSCHE WON'T JOIN ELECTRIC HYPERCAR ARMS RACE

Porsche has no immediate desire to contribute to the emerging array of electric hypercars with four-figure power outputs, according to the company's design chief.

Talking to Autocar, Michael Mauer expressed that he has other ideas about what is important for enthusiasts.

He said: "I think now it's so challenging, with the weight of batteries, to find the best compromise of performance, drivability and lower weight.

"These hypercars are not only heavy, but they're also very much driven by aerodynamics, so they end up looking very similar. There's also the fact that the engine [power and character] isn't a big deal any more [with EVs], and therefore I would love to do something different.

"What I personally find very challenging is not to have another hypercar with 2000bhp, but for the Porsche brand to look into something smaller, something lighter, with more of a drivability focus."

The comments reinforce an Autocar report (6 November) that Porsche's plan to launch an electric successor to the 918 Spyder plug-in hybrid of 2013 has been wound back because solid-state battery technology hasn't progressed as quickly as had been hoped.

It's believed that Porsche is instead pursuing a plug-in hybrid powertrain that was originally developed by its motorsport division for an aborted return to Formula 1 as an engine supplier.

Replacement for 918 would rival the Mercedes-AMG One and Aston Martin Valkyrie

First four-seat Koenigsegg is 1700bhp plug-in hybrid

Enormous doors mean no B-pillars, aiding rear access

OFFICIAL PICTURES

Front and rear passengers are cared for equally

Gemera is longer than BMW 5 Series, at 4975mm

THE GEMERA IS Koenigsegg's first grand tourer, offering new-to-the-brand levels of practicality and an innovative plug-in hybrid powertrain that makes 1700bhp and 2580lb ft.

Claimed to seat four adults in comfort with ample room for luggage, courtesy of a 3m-long wheelbase, the new 'mega GT' promises new-found refinement but also, thanks to features including four-wheel torque vectoring and four-wheel steering, rewarding dynamics.

The Gemera's front axle is powered by a twin-turbcharged 2.0-litre three-cylinder petrol engine that puts out 600bhp. Nicknamed the Tiny Friendly Giant, it uses Koenigsegg's new free-valve technology, which replaces a camshaft with computer-controlled actuators for the valves. It combines with a 400bhp electric motor mounted on the crankshaft and a 500bhp motor for each rear wheel.

Like its Regera hypercar relation, the Gemera uses Koenigsegg's direct drive and torque-converting Hydracoup set-up rather than a gearbox.

All this means a 0-62mph time of 1.9sec and a 250mph top speed. And with a 15kWh battery, it can do 31 miles and 186mph on electricity alone.

Koenigsegg says the car can be at least as CO_2-neutral as an electric car when its engine is running on ethanol or methanol.

Designed to meet all global regulations and safety standards, the Gemera will cost more than £1 million. Just 300 examples will be produced.

Koenigsegg has also shown what it says will be the fastest car it ever makes, the Jesko Absolut. With at least 1600bhp and a lower-drag body, this less-track-focused Jesko could hit 310mph, simulations predict.

Pur Sport is just the latest special version of the 1479bhp Chiron

OFFICIAL PICTURES

New Chiron focuses on handling

BUGATTI HAS REVEALED a new handling-focused special version of the Chiron. Called the Pur Sport, it features visual as well as mechanical revisions and is described by boss Stephan Winkelmann as "geared even more towards agility and dynamic cornering" in response to customer demand.

A redesigned body brings a large splitter, a new diffuser and a 1.9m-wide fixed rear spoiler to boost downforce.

The removal of the usual hydraulic wing system, plus the fitment of a 3D-printed titanium exhaust and new magnesium wheels (wrapped in even stickier bespoke Michelin tyres), contribute to a total weight saving of 50kg.

A notably stiffer chassis and adaptive damper set-up is claimed to retain the same levels of comfort, while a new Sport+ driving mode slackens the stability control for "more skilled cornering experts".

A raised redline and 15% closer gears make for faster acceleration at low speed but reduce top speed to 217mph.

The 60 planned Pur Sports cost £2.6 million before taxes.

Springs are stiffer by 65% at front and 33% at rear

Rakish Hyundai to rival Model 3

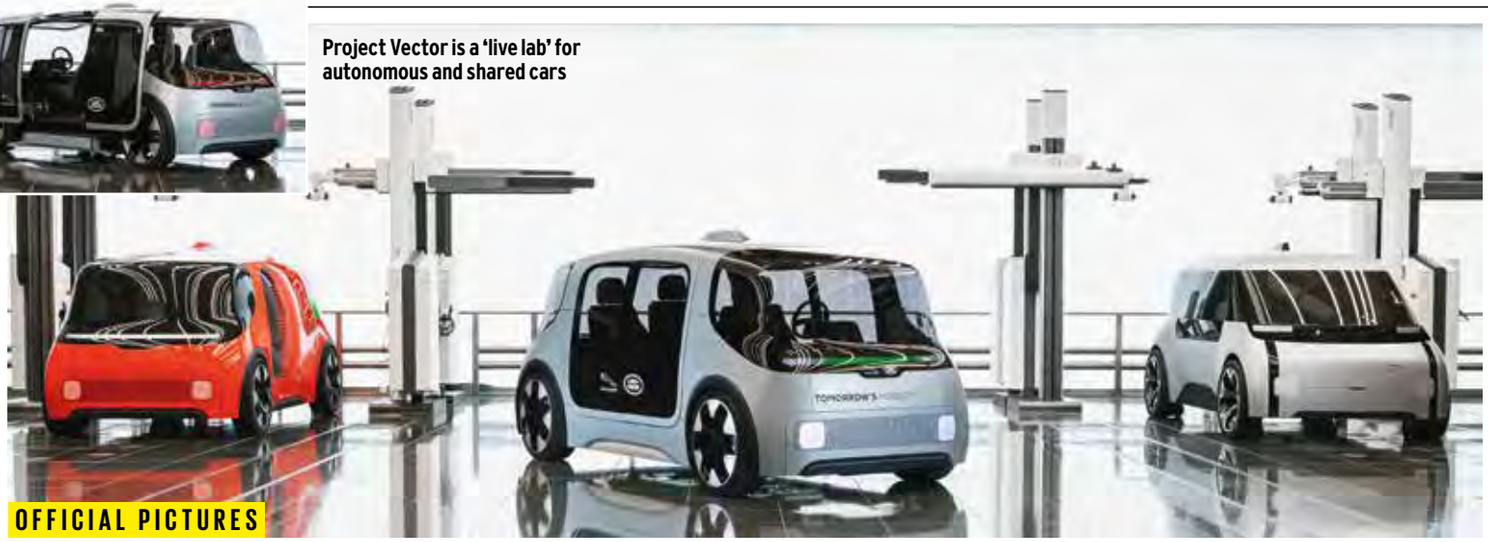
Prophecy will make production

THE HYUNDAI PROPHECY concept will be followed by an electric production car that maintains the same dramatic styling, the firm's design chief has promised.

The concept, based on a new EV skateboard architecture, features a low-slung coupé roofline to maximise aerodynamic efficiency. It will be used as the basis for a Tesla Model 3 rival that's likely to arrive in 2022, after the production version of the 45 SUV concept shown last year.

"We didn't do this car as a concept," said design boss Luc Donckerwolke. "We don't want to show something as a concept and then disappoint people. [The production version] will have the same form and architecture, with a long wheelbase and sloping design. It will have the same silhouette.

"We took the flat skateboard architecture used for an electric car and looked at how to use that for a flowing design concept. With the silent propulsion of electric cars, we wanted a design that looked smooth, fluid and silent."



Project Vector is a 'live lab' for autonomous and shared cars

OFFICIAL PICTURES

JLR zeroes in on new EV trials

Project Vector to help propel British car maker towards its 'Destination Zero' target

Jaguar Land Rover (JLR) has catapulted itself into the future by unveiling an entirely new, fully engineered, all-electric car platform that's capable of supporting a wide variety of autonomous, shared and private vehicle configurations.

Work on the project, which is entirely separate from JLR's near-future production car range, is already so far advanced that a multi-use autonomous-ready vehicle, claimed to offer unparalleled interior space and flexibility, will begin road trials in Coventry in late 2021. City and West Midlands authorities have already agreed to cooperate, viewing the project as "a living laboratory for future mobility".

Called Project Vector, the vehicle's all-new 'skateboard' platform has been launched at Warwick University's National Automotive Innovation Centre (NAIC) by JLR CEO Sir Ralf Speth, who revealed that it had been in secret development there for years. He cited Vector as the latest and biggest move yet towards 'Destination Zero', JLR's ambition to achieve a future of zero emissions, zero accidents and zero congestion.

"Jaguar Land Rover understands the trends shaping modern societies," said Speth. "Through this project, we are collaborating with the brightest minds in academia, our supply chain and digital services to create connected, integrated mobility systems, the fundamental building blocks for Destination Zero. Vector is precisely the brave and innovative leap forward needed to deliver on our mission."

The vehicle being readied for the Coventry trials is four metres long and designed for a life in the city, with its battery and drivetrain components packed into a flat floor, allowing maximum design flexibility for the body. The experimental car's cabin space allows seating configurations for private or shared use, or for commercial use such as last-mile deliveries.

Project Vector is being developed at NAIC, Speth explained, to give it the advantages of a start-up, especially agility and easy collaboration with academic and outside partners.

The project's director is Dr Tim Leverton, an eminent engineer and researcher who was previously chief engineer at Tata Motors and has worked on projects as diverse as the JCB Dieselmax record car and BMW's original Rolls-Royce Phantom.

"The mega-trends of urbanisation make connected urban mobility systems necessary and inevitable," said Leverton. "Shared and private vehicles will share spaces with and be connected to public transit networks, so you can travel on-demand and autonomously. Future urban travel will be a composite of owned and shared vehicles, as well as public transport."

STEVE CROPLEY

MYSTERY MODEL TEASE LEAVES US WONDERING...

Has JLR given us a sneak peak of the new Road Rover? A mystery model under a cover was spotted behind this Project Vector shot. Bulges show wing mirrors and a broad shoulder line, and it appears to be an SUV, but the shape is unlike anything in Jaguar's or Land Rover's current range.

Q&A DR TIM LEVERTON, PROJECT VECTOR CEO

How long has Project Vector been going?
"I joined it about a year ago, but it's been running for a couple of years. The availability of hardware through the I-Pace programme was a big enabler, but there has been an ambition to do something like this for a long time."

Is it correct that much of the Vector vehicles have already been engineered and built?
"We have an advanced 'skateboard' chassis and a choice of body designs. Clearly there's much more to do, but we're well enough advanced to be able to schedule a live testing programme beginning towards the end of next year."

How will the testing work?
"At first we'll be using driven vehicles that stay on one fairly short route, but the ambition is later to have them go much further afield [the university covers quite a big area] and to get much closer to full autonomy."

What exactly is Vector's connection with JLR?
"Vector is currently financed with a big loan from JLR, but we're basing it at NAIC to give it the agility and relative independence of a start-up business. But our ambition is to seek outside partners to help both with financing and with key technical aspects."

What will be the nature of next year's tests?
"We'll be carrying university students and staff on realistic journeys, collecting them and dropping them at places they really need to go. Routes will get bigger and more complex as our knowledge and confidence increase."

IT'S OUR BEST-KEPT SECRET

STEVE CROPLEY

In this era of routine photo scoops and leaks, it seems extraordinary that for three years JLR has been able to keep the cloak of secrecy around Project Vector.

In the middle of a busy university, the UK's biggest car maker has created a future transport ecosystem entirely in secrecy. Seeing Vector's vehicles for the first time is be given an awesome snapshot of the future. It serves as powerful reassurance that an electric car society really can work, and that well designed future vehicles can be desirable as well as functional.

The Vector team is an elite group; it's hard to imagine any start-up company having a better combination of top management skills than the far-sighted ambition of Sir Ralf Speth and the can-do technical capability of Dr Tim Leverton. In recent years, there has been a lot of poorly focused talk about Britain leading the world in the connected and autonomous car businesses, but now that outcome suddenly looks distinctly possible.


Stroll (left) and design boss Marek Reichman unveil V12 Speedster

Aston to be 'British Ferrari'

Refreshed firm pins hopes on new Ferrari-style business model

Aston Martin put new investor and executive chairman Lawrence Stroll front and centre of the reveal of the V12 Speedster. We sit down with CEO Andy Palmer to see how Stroll's expertise (and money) will help revive Aston's fortunes.

Lawrence Stroll talks about reducing inventories and rebalancing the company. What will the practical effects be?
"Lawrence has been the Canadian Ferrari importer a long time so he understands the Ferrari model very well. We expect in future to make materially fewer sports cars, but to make every one of them solidly profitable. We built 5800 sports cars for wholesale last year. We'll do fewer in 2020."

Can you be more specific about numbers?
"Not possible, I'm afraid. There will be a delay while we get stock out of the system. We'll have to swallow hard. And change what we do. It's time for us to make good and try to become the British Ferrari, asking customers to spec their cars individually and wait for them to be built. The DBX is already showing how we mean to go on. We're building those cars only for retail and our order book for 2020 is full."

What will your relationship with Red Bull be like in future?
"Red Bull's contribution has been invaluable. Those guys have been great friends to our brand and we'll continue as their title sponsor in F1 this year. Red Bull Technologies takes responsibility for the Valkyrie and that will continue after we launch it at the back end of the year. Beyond that, we will have a new relationship with the [F1] team currently known as Racing Point. It's up to us to make proper use of that relationship."

Your electrification plans for the Rapide E and Lagonda have been shelved. Is that a poor signal to send to the market?
"Our plans have gone back, but they're far from dead. We've finished the Rapide E engineering, learned a ton of stuff from it and its IP remains with us. But we've taken the opportunity to write down the capital expenditure of the electrification work. We've had some difficult years. We have to decide what our new priorities are."


Valkyrie (left) will arrive this year, Valhalla in 2022


Aston Martin's Andy Palmer

What are your priorities?
"We have to get to the mid-engined model bloodline – Valkyrie this year, Valhalla in 2022 and Vanquish in 2023 – and we have to bring our 3.0-litre V6 hybrid and plug-in powertrains into the whole model range as soon as possible, as a way of staying on the right side of clean air regulations. These powertrains need to be right across our range by the mid-2020s. But we're not walking away from the Lagonda project. I'd hope that would regain its place in our priority list post-2024."

The Vantage has had a slow start. Why is this and what can you do about it?
"Actually, we've grown our market share with this model. But though our slice got bigger, the cake got smaller. Also, we were missing the Roadster, which will account for about 40% of potential volume. There was a demand for a manual gearbox, which we're now meeting, and some buyers prefer a more traditional grille, which we're now providing. And we're now offering the leasing deals many people want."

What are your immediate priorities this year?
"We have to balance demand and supply to remove extra stock out of the system and get back to building cars to order. Then we have to ensure that DBX's quality is perfect from the very first deliveries."

How do these changes affect your own position as president and CEO?
"That's a difficult question because you never really know. I've got plenty to prove. But Lawrence Stroll is more than interested in cars and he isn't a passive guy – which I like. He's made it clear that the CEO's role won't change. I'd like to be here to see the DBX and the mid-engined models through their launches, and the Lagonda too."

So you're fundamentally optimistic about the future?
"We had four good years from the back end of 2014, when I arrived, but 2019 was very difficult and we now have plenty to prove. We need a bit of luck with the market, but we're cutting our cloth to suit the new priorities and conditions. If I wasn't optimistic, I wouldn't be the right guy for this job."
STEVE CROPLEY

CONFIDENTIAL

THE UK'S AVERAGE CO_2 output for new cars sold this year will still count towards the overall EU figure targeted at 95g/km, but it won't from 2021. Last year, the average CO_2 emissions of a new car sold in the UK rose for a third straight year to 127.9g/km, leaving car manufacturers with a huge challenge to quickly cut emissions or face fines. No softening of this target is expected by the Government, either.

LEXUS SOLD 87,000 cars in 2019 across 10 different model lines – yet more than 60,000 came from just three cars: the UX, NX and RX SUVs. Despite that, Lexus Europe boss Pascal Ruch believes the big range of cars is important for building the brand and its image and that absolute volume isn't an issue for the models, because each contributes the sales it should do to be justified.

NO TALKS HAVE taken place between Daimler and Volvo on technical partnerships, despite the two sharing a common shareholder in Geely. Volvo boss Håkan Samuelsson said his firm was "interested in talking to anyone to agree in our interests" but added there was "nothing to comment on nor any discussions" with Daimler.

KIA HAS NO plans to push online sales in the UK, according to boss Paul Philpott. "The complexity of products is increasing not decreasing," he said. There's more need than ever to speak to someone face-to-face." He added that he's seen no proof of success from other car makers that have pursued an online-focused sales strategy.

R division boss Jost Capito says his latest creation "will have to do everything"

Touareg R is 456bhp hot hybrid

New plug-in hybrid performance SUV matches 2.9-litre petrol V6 with electric motor

Volkswagen has pulled the wraps off its new fast flagship, the Touareg R.

In keeping with the high-performance R sub-brand's recent commitment to electrification, the new SUV uses a plug-in hybrid drivetrain to deliver 456bhp and can travel for up to 30 miles in electric-only mode. Performance figures have yet to be confirmed, but expect the 0-62mph sprint to take around 5.0sec and an electronically limited top speed of 155mph.

Autocar was shown around the Touareg R by the head of R division, Jost Capito, who revealed why Volkswagen had opted to make the model a plug-in hybrid rather than use the more powerful mild-hybrid V8 from sibling brand Audi's recently launched RS Q8.

"The Touareg is the perfect car for the step into electrification," explained Capito. "The engines from these other cars were never considered, as the Touareg is designed as a comfortable fast cruiser that needs to go from comfortable to sporty, but not extreme sporty. This is a car for enthusiasts but also for people with active lifestyles."

The petrol-electric set-up is essentially the same one that has already been seen in the latest Porsche Cayenne and Panamera. It comprises a 335bhp turbocharged 2.9-litre V6 mated to a 134bhp electric motor that sits between the engine and the eight-speed Tiptronic automatic gearbox and is powered by a 14.1kWh battery mounted beneath the boot floor. Combined power output is 456bhp, while total torque is a muscular 516lb ft.

"Using this drivetrain was a bit opportunistic," explained Capito. "With the relatively low volumes that R achieves, we can't develop a standalone hybrid system, so we have to look around for what's already available in the [Volkswagen] Group. If we do a car that can't be built on the existing line, the price goes way up. This is why I love working for R, because I can deliver cars that are for people who love driving yet are also affordable."

As you would expect, there are numerous hybrid-related settings. Among them is E-Mode, which allows electric-only driving at speeds of up to 87mph before the V6 kicks in. It also fires up when you request kickdown by fully opening the throttle.

When the battery is running low, it's possible to set the level of charge that you desire, which the system then achieves by using the V6 as a generator and increasing the level of regenerative braking.

Torsen-equipped 4WD system can send 70% of torque rearward

To enable the Touareg to maintain its off-road prowess and 3.5-tonne towing weight (around 80% of customers tow with their Touaregs), the R model retains the Torsen-equipped four-wheel drive transmission with various on- and off-road driving modes. Unlike the Golf R and T-Roc R, however, it has no Race mode.

In normal running, up to 80% of the engine's torque can be sent to the front axle and up to 70% to the rear axle.

As with the regular Touareg, customers will be able to order an Off-Road Package complete with improved underbody protection and extra traction control settings for driving on gravel, mud and sand.

The regular Touareg's air springs and adaptive dampers are also retained, unusually with no alterations made to either hardware or software.

"We didn't feel we needed to make any changes," Capito explained. "The standard set-up is good and we wanted to retain the car's everyday usability. This is a car that will have to do everything".

The need to package a

R SAYS YES TO TIGUAN BUT NO TO POLO

The next R could be another SUV, believes Jost Capito. "I can see a place for a Tiguan R," he said. "We've seen the good things that can be achieved with the T-Roc, but this would be a different kind of car – more of an everyday model, like the Touareg."

However, although R is looking to grow in the coming years, a Polo R is unlikely.

"The Golf R will remain the entry point for now," Capito said. "A Polo R just doesn't make sense. For starters, there's no four-wheel drive option, so we'd have to look at a way of engineering the existing car to take the increase in power. When you do that, the cost rises, and that means it would cost the same to buy as a Golf GTI."

On the subject of the new Golf, Capito said: "The Golf R won't be hybrid. We can take systems that already exist in the platform, and the mainstream hybrid systems currently available wouldn't allow us to make a credible R with the power and four-wheel drive we need."


Touareg R gets subtle R-specific interior detailing


14.1kWh battery is charged with a Type 2 plug

bulky battery above the rear axle means the Touareg R isn't available with neither the 48V active anti-roll bars that are optional on other models nor the four-wheel steering system. However, Capito revealed that these systems would likely be incorporated into a future facelifted model.

What has been included is the latest version of Volkswagen's Travel Assist adaptive cruise control system, which can steer, accelerate and brake the Touareg at speeds of up to 155mph – 15mph more than the original iteration.

Visually, the new car is every inch an R model, in particular thanks to the Lapiz Blue paint of the pre-production example we saw. In addition to R badges, there's a subtle bodykit and gloss black inserts, plus 20in Braga alloy wheels or optional 22in Estoril rims (pictured).

Inside, R logos are embossed on grey-piped leather seats and there's piano black trim for the dashboard, centre console and doors.

The Touareg R is expected to go on sale late this year. Pricing is yet to be revealed.

JAMES DISDALE

UNDER THE SKIN
JESSE CROSSE

HOW MODERN CARS ARE BUILT TO ABSORB THE IMPACT OF A CRASH

Cars are now a complex mix of sacrificial structures and impenetrable cells to protect their occupants.

LAST YEAR, 92% of new cars sold in Europe were Euro NCAP-rated, and 75% of those tested carried a five-star rating. Euro NCAP safety ratings are largely responsible for the remarkable progress that has been made in occupant safety and now the safety of vulnerable road users, such as cyclists and pedestrians, too. Hop into any car from the 1970s or earlier and it becomes clear just how much things have improved.

Flimsy structures did little to prevent intrusion into the passenger space in the event of a crash and restraints were fairly rudimentary. When someone at the site of a road traffic incident today says "it's a miracle they survived," it isn't. It's down to the extraordinary science and engineering that goes into making modern cars safer.

As well as active safety aids such as pyrotechnic seatbelt pre-tensioning and airbags, modern cars use deformable crash structures, crumple zones and passenger safety cells to protect their occupants. It's these that probably continue to evolve most as the software simulation and analysis tools used by manufacturers get better and crash tests get tougher.

How does a car's structure protect us in a crash, exactly? One important factor is absorbing the energy of the impact and preventing it from transferring to the occupant. Crumple zones at the front and rear are designed to do just that, crumple, while absorbing energy at the same time. 'Controlled failure' is the technical term, and the structures themselves become mechanisms to absorb impact, while resisting penetration of objects from outside the car that may threaten those inside. Structures within those zones may also be used to direct the force of an impact into another area of the overall structure to spread the load.

Rather than just a random space within a tin box, occupants now sit in safety cells that, although not visible, exist under the skin of the car. While the front of a car might be wiped off or flattened in an impact, the safety cell is designed to ensure that's as far as it goes.

According to Euro NCAP, the increased stiffness of body structures, which manufacturers are keen to impress upon us at every new car launch, do more than help the chassis do a better job and improve handling. They have also helped to reduce head and leg injuries, because the passenger compartment is less likely to collapse.

Look at any classic car from the side and it's striking how close front seat occupants sit to the front of the car and the windscreen. In today's cars, even the smaller ones, front seat occupants sit more or less in the centre of the car. Far more space is devoted to crumple zones and space at the front. Cars are bigger and heavier because of these safety advances, but both have become necessary evils. In the bad old days, it used to be said that safety features never helped sell a car. Now manufacturers couldn't sell a car without them.

THERE ARE NO GEARS IN JAZZ

Honda's Intelligent Multi Mode Drive, (i-MMD), now downsized from a 2.0-litre engine in the CR-V to a 1.5-litre engine for the new Jazz, is a series hybrid system. The engine drives one of two motor-generators inside the drive unit to charge the battery and the second motor-generator drives the wheels through a single-speed reduction gear. When the Jazz is going fast enough, its engine connects directly to its wheels via a small clutch; there's no multi-ratio gearbox or CVT.

Distinctive fin is needed for lidar sensors to work

EXCLUSIVE PICTURES

UK firm unveils EV supercar

Apex AP-0 is driver's car with focus on comfort and 320-mile range

The new Apex AP-0 is an electric supercar engineered and built in the UK and designed by Guy Colborne, the Brit behind the Elemental RP1.

The AP-0 is described as race-inspired and road legal. While the car revealed here is a concept, the model is due to make production in late 2022, with prices starting from around £150,000.

The AP-0 is just the latest in a list of electric supercars being revealed worldwide from a variety of start-up companies and established players, including the Dendrobium D-1, Pininfarina Battista, Rimac C_Two and Lotus Evija.

The ethos behind the AP-0 is more in line with the RP1 or KTM X-Bow, but Apex intends to offer more on-road comfort than those track-day specials, given that the AP-0 isn't an open-top.

Apex claims the AP-0 is capable of a 0-62mph sprint of 2.3sec, thanks to rear-wheel drive, 650bhp and 428lb ft of torque. Top speed is 190mph.

Despite the figures, though, it's not intended as a hypercar.

"This is reflected in price, power output and vehicle weight," said Apex. "Instead, this is a sports car that was designed to be light, fast and a statement of intent for Apex to create the world's finest zero-emissions sports cars, which are usable and comfortable on the road but transform into pure driver's cars on a track."

The AP-0 will get an official WLTP range of 320 miles from its lithium ion battery and can be charged to 80% in less than 15 minutes from a 350kW CCS rapid-charger.

It's also capable of level three autonomy, including automatic emergency braking and lane-keeping assistance. However, Apex says its system is advanced enough for level four (self-driving in all but the trickiest scenarios) once this becomes "safely achievable".

Apex claims the AP-0 weighs 1200kg – significantly less than the majority of electric sports cars – thanks to the use of a carbonfibre tub at its core.

This structure uses modular spaceframes and a centre spine that links the front and the rear. The bodyshell is wrapped around the tub and spine but still exposes the carbonfibre chassis. Batteries are mounted in the floor at the front and rear in a bid to achieve the lowest possible centre of gravity.

The AP-0 uses a pushrod suspension system, as seen in Formula 1, and has automatic ride height adjustment using adjustable coilovers.

Highlights of the dramatic design include the fin (which gives the lidar sensors the height they need to work effectively) and the cross-shaped lights that feed into it.

Inside, there are bucket seats and a racing-like feet-up driving position. The lidar generates detailed maps of the car's surroundings, creating a 3D image. Apex says the technology enhances its driver assistance systems by more accurately identifying potential hazards, pedestrians, cyclists and other vehicles.

There's also a holographic augmented-reality display and a race instructor that helps the driver learn new tracks.

Apex is headed by Hong Kong-based brothers Jason and Gary Leung, but the firm will operate its engineering, design and manufacturing from a site near Woking in Surrey.

Once up and running, the facility will be able to build 500 examples of the AP-0 per year.

Apex previously launched the 620kg, 400bhp 2.3-litre Ford Ecoboost-powered AP-1, of which more than 10 have been sold so far. The Leung brothers say the AP-1 continues to serve as a testbed for improving the production AP-0.

RACHEL BURGESS

Two-seat interior contains an array of digital displays

Q&A GUY COLBORNE, AP-0 DESIGNER

You designed the Elemental RP1. How different is the AP-0?

"The RP1 was designed with race engineering in mind. With the AP-0, we were able to get into a deeper level of technology. The RP1 was about stripping weight out; this is also about being more refined and luxury."

What will change from this concept to the production car?

"We're going to work on ingress and egress, push the tub down a bit. And then practicality aspects: whether we can package in a 'frunk' for luggage."

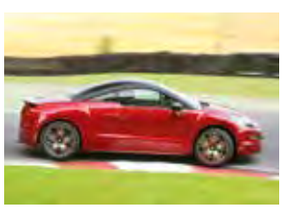
Is this the craziest car you've yet designed?

"Probably not. That was the Daewoo Mirae concept, a five-seat sports car. But we've pushed the boundaries with the AP-0, and it's the car I'm most proud of."

CONFIDENTIAL

CAR COMPANY BOSSES have expressed that the 2021 Geneva motor show might not be needed to unveil new models, since makers held their own events after the cancellation of this year's show. Bentley boss Adrian Hallmark said it could be "not absolutely necessary to attend" in future if feedback is positive and Aston Martin CEO Andy Palmer has echoed that sentiment.

COUPÉS AND convertibles are dying off in mainstream brands' line-ups because there simply isn't the spare investment capital needed to develop them, according to Peugeot boss Jean-Philippe Imparato. Electric cars, 5G connectivity and autonomous cars are huge, sequential investments that will dominate resources for a decade or more. "I love these cars," said Imparato, "but today there are three other topics first."



VIETNAM'S ONLY global car company, Vinfast, could rescue Holden workers and facilities after the Australian brand was killed by General Motors. Reports from the region claim Vinfast is setting up an engineering hub that is currently being staffed by a number of ex-Holden employees and is interested in Holden's proving ground.

GOOD NEWS FOR manual gearbox fans: not only does the new Volkswagen Golf GTI get one as standard, but its maker is committed to offering stick-shifts in the long term. VW tech chief Matthias Rabe said: "Some people enjoy going back to their roots and changing gear manually, and so long as there is a demand, we will continue to offer them."

Share prices hit by coronavirus

THE VALUE OF numerous car companies fell sharply last week as market uncertainty caused by the coronavirus shook the industry.

On 12 February, Aston Martin's shares were selling for just under £4.60 each, but their value had more than halved by 12 March, falling below £2 for parts of the day.

This meant that the ailing company was worth less than £500 million as Autocar went to press – a dramatic fall from the £4.3 billion it was valued at when it was initially floated in London on 3 October 2018.

Aston Martin's 'Geneva' press conference (held at its Gaydon HQ after the motor show was cancelled) failed to make much impact, despite the introduction of billionaire Lawrence Stroll as executive chairman alongside the new V12 Speedster.

Many car brands have seen their value drop substantially as a result of the disruption caused by the pandemic.

Nissan reported its sales in China fell 80% in February, while the value Renault was down 25% at one point last week and Volkswagen Group shares plummeted 22%.

Other industries are similarly affected, but the complexity of automotive supply chains mean that the impact is being felt more acutely.

OFFICIAL PICTURE

HOT i20 N MOVES A STEP CLOSER

A video showing the outline of what appears to be a long-awaited i20 N hot hatch has been released by Hyundai. A prominent rear wing, large wheels and a bodykit create all the hallmarks of a Ford Fiesta ST rival, but such a car has yet to be confirmed officially.

UNDER THE SKIN
JESSE CROSSE

HOW WHEAT (AND OTHER PLANTS) CAN FUEL A CO_2 CUT FOR YOUR CAR

TALK TO JUST about any emissions expert in the car industry and they'll all agree on one thing. The quickest way to reduce CO_2 emissions across a national or even global fleet of vehicles is to switch to a 'cleaner' fuel such as petrol blended with ethanol (ethyl alcohol). Because the plant material used to make the ethanol absorbed CO_2 when it was growing, the combustion of ethanol is carbon neutral. At least, that's the theory. To be fully carbon neutral, so must the entire life cycle of the ethanol, including the growing of crops as a feedstock, harvesting, production and delivery.

The UK is to switch from E5 (5% ethanol in petrol) to E10 (10%) and that may have an impact on drivers of old bangers. Higher concentrations of ethanol have been used in Europe and elsewhere since 2011, and in the UK new cars since 2011 have been compatible with it. The rule-of-thumb advice given by motoring organisations is that if a car was made in 2002 or earlier, steer clear of E10.

Ethanol is hygroscopic (absorbs water from the atmosphere) and that can cause corrosion in the fuel system if fuel is left for long periods. But then, so is hydraulic brake fluid and we manage with that. Ethanol also has a corrosive effect on seals made of natural, neoprene or silicone rubber, but there are usually ethanol-proof alternatives available. In a 2009 study, classic car insurers Hagerty in the US found the effects of E10 on classic car fuel systems to be minimal.

Like most other more sustainable fuels, including hydrogen, E10 hasn't caught on in the UK until now. But according to the RAC, 17% of German drivers, 32% of French drivers and a whopping 63% of Finnish drivers fill up with it. E25 has been mandatory in Brazil since 2007, while E10 and E15 are available in other parts of the world. In the US, E85 is also on sale for flex-fuel vehicles with engines configured for the high concentration of ethanol.

The use of food crops like wheat to make ethanol is controversial and, in global volumes, may not be feasible. But these are labelled 'first-generation' biofuels and the future is expected to lie with second-generation advanced 'cellulosic' biofuel made from plant and wood waste and pretty much anything that grows.

Other alternatives to improving the emissions from liquid fuels include synthetic fuels. Audi has been collaborating with partners for several years on a research project to make e-benzin, which is said to be almost CO_2 neutral. A synthetic e-diesel project has yielded production volumes of around 400,000 litres per year using sustainable hydroelectric power as the only energy source.

Blending ethanol with petrol doesn't make engines free of toxic emissions or help with air quality in urban areas in the same way as electric vehicles can. But it can help reduce CO_2 emissions, so long as producing the stuff doesn't emit almost as much greenhouse gas as it saves.

A SUPER-SUB FOR COBALT

Cobalt, the scarce and controversial ingredient of lithium ion batteries, is also used in engines for things like turbocharger wastegates. Component supplier Tenneco has come up with a substitute: a new type of sintered steel that, it says, makes it possible to reduce the cobalt content of components significantly. Battery and EV manufacturers are also pushing to reduce the amount of cobalt used in cathodes to improve battery life and safety.

An extended glass roof and side-mounted video cameras substitute for a rear window

OFFICIAL PICTURES

Polestar plots course for future

New concept is electric luxury saloon that showcases design direction and new tech

The Polestar Precept is an electric, four-door grand tourer that previews the design of future Polestar models as well as highlighting the Swedish company's plans for sustainable materials and advanced digital technology.

To be revealed at the Geneva motor show, the Precept is said to signify an important milestone for Polestar as a standalone brand (away from parent company Volvo) and reflect its values of "pure, progressive and performance".

Composite seats save weight and are coated in recycled material

The Polestar 1, a limited-run plug-in hybrid coupé (see p38), and the Polestar 2, an electric fastback for the mass market, will shortly be followed by an electric SUV, the Polestar 3.

The Precept, however, gives a broader hint at Polestar's future design direction. The 1 and 2 were heavily guided by Volvo design, while the Precept is intended to demonstrate a move away from its parent firm's styling influence – and potentially a future Tesla Model S rival.

The low, sleek silhouette has a lengthy wheelbase of 3.1 metres – some 150mm longer than that of the Model S – to allow for a large battery and "an emphasis" on rear head and leg room, Polestar claims.

In place of a front grille, the Precept has a so-called Smartzone that houses sensors, cameras and driver assistance functions behind a transparent panel. A lidar pod is placed on the glass roof for best visibility and is intended to be "a next step towards increased driving assistance".

Following in the footsteps of the Audi E-tron and Honda E, the Precept has video cameras in place of conventional side mirrors. Also, the glass roof extends backward, so there's no conventional rear window and the tailgate has a larger opening and higher-mounted hinges for better access.

Inside, the Precept uses flax-based composites for its panels and seatbacks, achieving a saving in weight of up to 50% and a reduction in plastic weight of up to 80% over conventional materials.

The seat upholstery is 3D-knitted from recycled PET bottles; bolsters and headrests are made from recycled cork vinyl; and carpets are made from reclaimed fishing nets.

The next-gen infotainment system, powered by Android and building on Polestar's partnership with Google, uses a 15in portrait-orientated central touchscreen and a 12.5in digital instrument display. The two are linked by an illuminated blade that surrounds the cabin, while a holographic Polestar logo floats inside Swedish crystal between the rear headrests.

The instrument display

FIRST NEW MASERATI IN FOUR YEARS

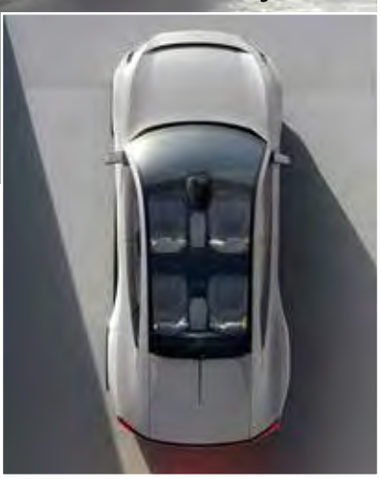
Maserati has confirmed that its long-awaited new sports car will be called the MC20 and called it a "natural evolution" of the iconic MC12 from 2004. To launch in May, it's the first new Maserati since the Levante and is set to spawn a racing variant.

MC20

FIESTA GETS 35BHP MOUNTUNE BOOST

Mountune has announced an upgrade pack for the Ford Fiesta ST that raises output from 197bhp to 232bhp. Also bringing quicker gearshifts, styling tweaks and the tuning firm's signature enhanced exhaust overrun function, the m235 kit is £575.

Precept is the first Polestar to cast off Volvo design influence



uses smart sensors, including eye tracking, to monitor the driver's gaze and adjust what the screens show accordingly.

Polestar CEO Thomas Ingenlath said: "The Precept is a declaration, a vision of what Polestar stands for and what makes the brand relevant. The car is a response to the clear challenges our society and industry face.

"This isn't a dream of a distant future: the Precept previews future vehicles and shows how we will apply innovation to minimise our environmental impact."

RACHEL BURGESS

AMG makes GLA most powerful crossover

AMG HAS GIVEN the new Mercedes-Benz GLA compact crossover 416bhp in its most powerful form.

The second-generation GLA is the third model to use Affalterbach's 'M139' 2.0-litre turbocharged engine, the most potent four-cylinder unit in series production, after the A-Class and CLA.

Like its MFA2-underpinned relations, the new GLA 45 makes 382bhp in its standard form, while the top-rung 45 S gets an extra 33bhp, making it the most powerful compact crossover on sale. The sprint from 0-62mph takes 4.4sec, with the S shaving 0.1sec off that time. The S also loses the speed limiter, raising top speed from 155 to 168mph.

All of this is put to the road using the same variable four-wheel drive system and eight-speed dual-clutch automatic gearbox as the GLA's siblings.

The AMG models can be told apart from standard GLAs by performance-focused bodywork additions, including powerdomes in the bonnet, flared wheel arches and prominent air intakes.

The hot crossover also gains a bespoke suspension set-up that's said to provide better rolling refinement than the old model while allowing "easy vehicle control at the limits". Further improvements are said to include less torque steer under acceleration and more responsive steering.

A range of driving modes allow the car to be set up for its intended use. A Race-Start function is said to provide "a highly emotional experience" by maximising off-the-line acceleration and pausing ignition between gears for more noticeable shifts, while Eco Mode makes maximum use of the engine's stop-start and coasting functionalities.

Only the S will come to the UK; it's expected this summer, priced from around £52,000.

AMG installs a more imposing front end, quad tailpipes and a rear wing

CADDY GETS NEW UNDERPINNINGS, ENGINES AND TECHNOLOGY

The Volkswagen Caddy has entered its fifth generation, with more space than its forebear and a raft of new technology.

Sitting atop the same MQB platform as the new Golf, the Caddy will be available in panel van, MPV and camper van guises and can be specified with one of three diesel engines or a turbocharged petrol.

The new-look small van also gains an overhauled infotainment system with a permanent internet connection and 19 driver assistance functions as standard.

New look is intended to be more 'charismatic'

SPORTIEST DIESEL 3 SERIES YET MAKES 335BHP

BMW will unveil its most potent diesel-powered 3 Series yet at the Geneva show. The M340d xDrive packs a 3.0-litre straight six that sends 335bhp and 516lb ft to all four wheels and is equipped with mild hybrid technology that allows for engine-off coasting.

Like the petrol-powered M340i, the new addition will be available in both saloon and Touring estate forms. It gains the suspension, brakes and bodywork upgrades of M Sport.

It will be shown alongside the new estate version of the 330e petrol-electric plug-in hybrid, which is also available with xDrive.

DEFENDER 90 PRICED FROM £40,290

Land Rover has opened order books for the two-door 90 variant of its new Defender. Prices start at £40,290 and deliveries will begin this summer. A commercial version will come later this year, around the same time as a plug-in hybrid option.

LE MANS ASTON VALKYRIE CANCELLED

Aston Martin will "pause and reconsider" after withdrawing its entry into the WEC's new hypercar class, citing uncertainty over the regulations. It had planned to take on Peugeot and Toyota with a racing version of its 1160bhp V12 hybrid Valkyrie.

Mercedes boss sets out stall

Ola Källenius talks EV strategy, F1, Smart, CO_2 targets, autonomy and AMG hypercar

In the absence of the Geneva motor show, Steve Cropley got on the phone to Mercedes-Benz boss Ola Källenius for an update on what will be a testing couple of years for the brand.

One of your rivals has said that profitable electric vehicles will start with electric SUVs. Is that how you see it?
"We have made a very clear decision that modern luxury is going to be all electric. So we're really just talking about how fast we can get there. We are ramping up our electrified ranges very quickly. The cost structures of these cars are higher than we've been used to, so many of our early models will focus on the upper segments. But as the numbers move from the tens of thousands to the hundreds of thousands, we will reap the benefits of scale."

Are you on target to reach your CO_2 targets next year?
"We are within striking range of our targets, but we can't yet be sure of meeting them because we can't steer consumer demand. We can influence it, but it is clear that 2020 and 2021 are going to be challenging."

SUV demand keeps rising, but these models tend to generate more CO_2. Should you re-educate the public about which cars to buy?
"SUV sales have been increasing for 20 years around the world. People love them. The latest SUVs are getting closer to sedans in their CO_2 footprint. In any case, I don't think it's fruitful to discuss the shape of the cars people buy. Our role is to provide the products our customers prefer, and to electrify them."

Will there be an electric G-Class?
"The G-Wagen seems to transcend all segments. It's its own company, almost. But yes, the G-Wagen will go electric in a few years."

Will you keep your connection with Formula 1?
"As you know, negotiations are proceeding right now over the framework of a new F1 agreement for the future. It is important to us that any deal should be ecologically satisfactory as well as financially sound. But F1 remains a very, very attractive arena for us."

You've been tight-lipped about the progress of your AMG One hypercar. Why is that?
"I wouldn't say we've been quiet. In fact, the whole project is quite loud, as you'd expect of a car powered by an F1 engine. Development of the car is proceeding and we are excited about it. When we reach the right stage, we will say more."

We have seen General Motors quit right-hand-drive markets

Källenius: "Modern luxury is going to be all electric"

Electric Fiat 500 to inspire new Panda and other EVs

FIAT BOSS OLIVIER François has said the electric platform developed for the new 500 will be used for multiple future models across Fiat Chrysler Automobiles (FCA) brands.

The new-generation 500 is built on an all-electric architecture and is a key part of FCA's plan for Fiat to focus on the city and family car markets.

Fiat is working on a production version of last year's Centoventi concept – likely to take the Panda name – that will use the same platform. That model is due in 2021, and François hinted that more cars could follow.

"When you invest in a new platform – and this is an all-new platform developed for electric cars and only electric cars – you don't do it for just one car," he said. "With one platform, you always promise to see other products... There's potential to use this EV architecture across different nameplates and segments."

FCA hasn't disclosed full details of the architecture, but it's understood to be designed for small cars, so Lancia could be its next destination. FCA is currently merging with the PSA Group, so it's also possible it could be used for future city cars from Peugeot and Citroën.

François said that while the electric 500 will be targeted at a premium audience to justify its price, the production version of the Centoventi will be more affordable. The 500 La Prima launch edition costs £29,000, but there will be cheaper versions.

Calling the new 500 a "Tesla in a pocket size", François said: "The strategy of an all-electric 500 is because the nameplate is so good it can command a higher price. The business case for EVs only works at a higher price, since you need to embed the cost of the batteries."


Electric 500's platform will underpin new EVs

LOTUS EVIJA SOLD OUT UNTIL 2021

The 1973bhp Lotus Evija electric hypercar is now sold out for 2020's production run. The first hand-built cars will roll off the line this summer. Just 130 Evijas will be made, but Lotus hasn't said how many it can deliver this year. It costs £2.04 million.

MERCEDES GLA PRICED FROM £32,640

Mercedes' second-generation GLA crossover is priced from £32,640 in entry-level Sport trim. That variant is powered by a 161bhp 1.3-litre turbo petrol motor. More powerful diesels and petrols are also available alongside higher-end trim lines.


G-Class "will go electric in a few years"

around the world. Are these markets as important to Mercedes-Benz as ever?
"Absolutely. Right-hand-drive markets are extremely important to us. The UK is our second-biggest market in Europe, Japan is another vital area and we believe we still have good growth potential in Australia. Right-hand drive will continue as a cornerstone of our business."

Why do you need a partnership with Geely to make the Smart marque work?
"We looked at the options for Smart and it's clear the financial performance has never been satisfactory. We decided that the best option for fixing this was to move it to China, where a joint venture with Geely is more attractive and the technology and cost structures are right. This year will be our first producing all-electric Smarts and we have some really great new vehicles coming from the second half of 2022."

Given the decline of motor shows and the special problems with Geneva this year, how do you view the future of motor shows?
"In general, we believe motor shows can still be very effective for us. We started the year at CES in Las Vegas, which has transformed itself into a kind of technology and motor show. For the future, we think motor shows will continue to have an important role, but we will be selective in how we use them. We are discussing developments to the format of the IAA, the [old] Frankfurt motor show. There is a plan to give it a more open format, to benefit consumers more."

You've switched your priority for autonomous driving from cars to trucks. Why is that?
"Because the business case for trucks looks more attractive. Autonomy requires very, very sophisticated engineering, but we're not giving up on cars. We're just being careful how we deploy our resources."

Mercedes to streamline range

MERCEDES IS SET to dramatically reduce its model line-up and platform and powertrain options as it seeks to reduce complexity and optimise profit.

Markus Schäfer, the firm's R&D boss, said the drive came as a result of its focus on electric vehicles and will result in cutting everything from car lines to single components used in its products.

"We are reviewing our product portfolio, especially as we announced so many pure EVs," he said. "Knowing the complexity after the growth in the last couple of years means we are definitely reviewing our current line-up. The idea is to streamline – taking car variants out, but also platforms, powertrains and components."

Mercedes currently has 45 models, but Schäfer didn't say how many it would axe.

He referenced models such as the G-Class, SL, GT and S-Class that each have their own platform currently. "There are many single platforms right now and the idea is to reduce this. In the future, we will have the same underpinnings with various cars and you'll see the results pretty soon," he said.

Talking about the future of more traditional powertrains such as the AMG V8 engine, Schäfer said: "The plan is not to kick out the V8 and V12, for example, so long as there is customer demand."

However, he said the incoming Euro 7 legislation will force the maker to reflect on which powertrains will be worth putting through the process.

"Probably, yes, [powertrain] variants will reduce. Of course, four-cylinder engines will make more sense than a V12. Let's see what Euro 7 requirements are and go from there," he said.

Mercedes has completed the introduction of four variants of its 2.0-litre unit, in four-cylinder and six-cylinder guises and in petrol and diesel forms. They are built on the same line and Schäfer said: "This family of four engines can respond to any market change immediately. We planned this protection a couple of years ago in order to protect us in terms of different demands and regulations."


S-Class Cabriolet is tipped to be one of the axed models

End of the road for Bristol Cars

IDIOSYNCRATIC BRITISH company Bristol Cars has officially been wound up, with a court-ordered liquidation process now under way. Bristol owners Kamkorp lost a high-court appeal in late February and a liquidator has now been appointed to sell off assets to pay creditors.

However, the Bristol Owners' Club claims it is "actively engaged" with the liquidators in order to "preserve what we can of the heritage and associated spares", including a historic archive that dates back to the car manufacturer's formation in 1945.

Based in Windlesham, Surrey, with a now-dormant showroom in Kensington, London, Bristol Cars had planned to launch its first all-new model in decades, the £250k Bullet speedster, in 2016. However, it never materialised.


Bullet speedster of 2016 was stillborn

TOYOTA GR YARIS OFFERS 257BHP FOR £30K

The 257bhp Toyota GR Yaris will be priced from £29,995 when it goes on sale in the UK later this year. It will be offered in two specifications, including a £33,495 Circuit Pack model that has two Torsen limited-slip differentials. Unlike cheaper rivals, such as the Ford Fiesta ST, the GR Yaris features a great deal of bespoke engineering and a different bodystyle from the regular Yaris. Full UK specs will be announced later this year and customer deliveries are planned for November.

STOP VAT ON EVs, SAYS INDUSTRY BODY

The Society of Motor Manufacturers and Traders (SMMT) has called for the chancellor to remove VAT from the sale of EVs, to give them a boost, in his budget. Zero-emissions-capable cars made up just 5.8% of the market last month.

METHANOL-HYDROGEN GUMPERT ON SALE

Gumpert's methanol fuel-cell sports EV, the Nathalie, is on sale now, priced at £353,520 in First Edition guise. It can do 0-62mph in 2.5sec and generates electricity by converting methanol to hydrogen. Refuelling takes three minutes.

OFFICIAL PICTURES

Honda adds two new Type Rs

Subtler Sport Line is more refined; Limited Edition loses 47kg and gets set-up tweaks

Honda has used the mid-life update of its Civic Type R hot hatchback to introduce two new variants: a low-volume, lighter track special and a more subtle version of the existing model.

Available to order in the coming months alongside the updated Type R, the new Sport Line variant offers "more discreet styling and a more refined ride" for those who find the standard model too lairy.

The most significant external alteration is the removal of the big rear wing in favour of a lower, more subtle one, but there's also an exclusive design of 19in alloy wheels wrapped in softer-sidewall Michelin Pilot Sport 4S tyres, plus additional soundproofing in the boot and tailgate to reduce noise, vibration and harshness.

The visual drama is dialled down inside, too, courtesy of black – rather than red – seat upholstery with red stitching.

At the other end of the range is the new Limited Edition. As the name suggests, Europe will receive just 100 examples, of which 20 have been allocated to the UK. Honda says this model has been "designed and engineered to be the most dynamic front-wheel-drive hatchback available" and is the most extreme Civic Type R yet.

Key to the Limited Edition's appeal is a weight-saving regime that puts paid to the infotainment touchscreen, air conditioning and some soundproofing in the name of 47kg. Unlike with the similarly conceived Renault Mégane RS 300 Trophy-R, however, the rear seats are retained.

Further additions include lightweight, forged 20in alloy wheels from BBS shod in sticky Michelin Cup 2 rubber. Honda claims it has modified the dampers and recalibrated the steering to suit the new wheel-and-tyre combination as well as to improve feedback.

Exclusive Sunlight Yellow paint and a gloss black finish for the roof, door mirrors and bonnet air intake are intended to increase visual clout, while each example will feature a build plaque on its dashboard.

The facelifted standard Type R was first previewed last month. Minor visual changes include reprofiled bumpers and lights, but the focus is again on engineering improvements.

For example, a larger air intake combines with a new radiator core to decrease coolant temperature by up to 10deg C in high-demand situations, Honda claims.

Similar improvements have been achieved with a new braking system, which brings two-piece floating front discs to reduce unsprung weight by 2.5kg. Thermal efficiency is improved, too, and brake pedal travel is reduced.

Meanwhile, uprated suspension bushings and ball joints are claimed to sharpen the handling, while the parameters of the adaptive dampers have been widened.

Interior additions, alongside a revised infotainment system with physical shortcut buttons, include an Alcantara steering wheel and a new teardrop-shape gearknob. This contains a 90g counterweight that's said to improve shift accuracy.

Further new technology includes an Active Sound Control system that uses the stereo's speakers to enhance engine sound in Sport and R+ driving modes and mask it in Comfort. Also introduced is a performance datalogger, dubbed LogR, that allows the driver to see real-time component temperatures and pressures and uses GPS and g-meters to help them achieve the best possible lap time.

LAWRENCE ALLAN

Q&A HIDEKI KAKINUMA, CIVIC TYPE R PROJECT LEADER

Is the handling of the new Sport Line model affected by the smaller wing?
"The rear wing isn't really that big of an influence; the Type R's high-speed stability comes from the base platform layout and suspension specification. The functionality has been largely maintained for both wing designs."

Will you take the Limited Edition to the Nürburgring to see how much faster it is than the standard model?
"The Nürburgring lap time is one of our development criteria to be able to verify the actual result as an overall vehicle performance. This is something we're going to perform, regardless of whether it's a record or not: that's not our motivation."

Could the Civic Type R go hybrid, and does the Type R brand have a place on electric cars?
"There are no restrictions in the technology to apply for Type R. If it can provide the excitement, the dynamic performance and all the core fundamentals worth calling it a Type R, it can be a Type R. If that can be realised through either an electric motor or a hybrid system, that's fine. But we mustn't forget the initial idea and the fundamental concept of the Type R, which is a sports car with extremely high performance and an affordable price."

Have you reached the limit of what you can achieve with front-wheel drive?
"We don't believe we've reached the limit. I believe

there's still performance to achieve with front-wheel drive. Four-wheel drive isn't really matching to Honda's development principle of 'man maximum, machine minimum'. We don't want to increase the engine power and the weight of the car by applying four-wheel drive."

Is the Type R badge specific to the Civic now, or will you use it in other models again?
"It can still be applied to other models as well; it doesn't have to be limited to the Civic."


New pair will be sold alongside the updated standard Civic Type R


Divisive spoiler is replaced by low wing on Sport Line


Limited Edition bins off the touchscreen and air-con


Sunlight Yellow finish is exclusive to hardcore model

UNDER THE SKIN
JESSE CROSSE

FUEL-SAVING PREDICTIVE TECH PAVES THE WAY TO AUTONOMY

Predictive driving systems using artificial intelligence take us one step closer to full autonomy.

IT'S BEEN SAID that we've been on the road to autonomous cars for several years now, because what we know as advanced driver assistance systems, such as autonomous emergency braking, lane keeping, traffic sign recognition and adaptive cruise control with stop-start, are all building blocks of the autonomous car.

Hyundai-Kia's new ICT (Information and Communication Technology) Connected Shift System is another example of that, although the group isn't the first to the party with this kind of technology. The idea of CSS, as we'll call it, is that it's predictive, selecting gears to suit traffic conditions up ahead. In effect it does pretty much what an efficient driving course would teach a human driver to do, looking and thinking ahead to control speed, be in the right gear and avoid unnecessary use of the brakes.

In the Hyundai-Kia system, the Transmission Control Unit (TCU) interprets data from 3D navigation to analyse gradients, elevation, curvature of bends in the road and road events while the cruise control radar does its normal job of monitoring the speed and distance of vehicles in front, with a camera keeping an eye on the lane ahead. Artificial intelligence software decides on the gear selection and de-clutches the transmission for coasting when conditions allow.

Hyundai-Kia says the number of shifts made on a twisty road is almost halved compared with a conventional transmission and braking (a real fuel economy killer) reduced by just over a tenth. The system also switches to Sport mode when it decides harder acceleration is likely, such as when joining a motorway. Still at the development stage, ICT will be tailored to take advantage of 5G-based traffic signalling and integrate with individual driving styles in future cars.

BMW showed something similar back in 2012, and the system initially saw production on the 7 Series. Predictive Power Management enabled the transmission to in effect see the road ahead and account for bends in the road. Foresight Assistant in Eco Pro mode prompted the driver to decelerate when it predicted an imminent need to slow down, in turn avoiding using the brakes so much.

Route-Ahead Assistant calculated the most efficient route to take and enabled coasting when the road is clear. As part of its Efficient Dynamics approach, BMW also introduced smart stop-start, which doesn't shut down the engine if it isn't necessary and, when it does, restarts the engine when it's time to go using radar and camera data rather than relying on the driver's operation of the car's controls.

The ICT and CSS isn't available yet but the companies say they will roll it out on future cars. The evolution of assistance features like these do more than give efficiency gains; if drivers are aware of them, they can make day-to-day driving from A to B less of a chore (congested roads aren't going away any time soon). Just occasionally, like one-pedal driving in a BEV with driver-adjustable regenerative braking set to high, they can make it more fun and engaging, too.

TECHRULES' TURBINE TECH

Techrules, maker of the Ren supercar concept, with its gas turbine range-extender, plans to start production of a 45kW stationary power generator this year, with a 15kW range extender version to be used in EVs set to follow next year. The turbines can run on biofuels and, according to the manufacturer, produce much lower NOx emissions than piston engines due to lower peak combustion temperatures.

MARKUS PENTIKÄINEN, TEKNIIKAN MAAILMA

> “People expect the same noise from an electric vehicle, but that makes no sense”

EVs spark a noise revolution

New regulation on AVAS has defined a sonic spectrum for car makers to explore

Noise, or specifically the lack of it, is one of the most notable differences between combustion-engined and electric vehicles (EVs). And while many claim that silent electric cars will make roads and cities quieter and calmer, you can easily find sensational headlines warning that ‘dangerously quiet’ EVs are ‘silent killers’ that pose a risk to inattentive pedestrians.

Predictably, neither extreme is entirely accurate. Not least because, contrary to the hopes of some and the fears of others, EVs aren’t silent. They’re not allowed to be. But they do give manufacturers the chance to decide exactly what they want their cars to sound like.

Following research that showed silent EVs could pose a risk to pedestrians, cyclists and other vulnerable road users, especially those with visual impairments, most major markets are introducing Acoustic Vehicle Alerting Systems (AVAS). In the EU and, as things currently stand, the UK, AVAS has been compulsory on all new types of electric and hybrid vehicles since 1 July 2019, and it will be required on all hybrid or electric vehicles sold from 1 July 2021 onwards.

That doesn’t mean EVs will be emitting all manner of strange noises in the future, though, because they have to comply with various bits of legislation. The EU uses United Nations Regulation 138, which requires AVAS to operate at speeds of 0-20kmh (12.5mph) and project a noise of between 40 and 60 dB(a) in a two-metre radius. This must fall between certain frequencies and move upwards in frequency as the car accelerates to 20kmh.

Despite those limitations, manufacturers have still been given considerable freedom to determine what their cars should sound like.

Most are clear about ruling out simply creating an artificial combustion engine sound. As Volkswagen Group design chief Klaus Bischoff put it on developing the noise for the electric ID 3: “Everyone should immediately think ‘wow, that can only be an electric car’. And their second thought should be ‘yes, that’s a Volkswagen’.”

BMW Group sound designer Renzo Vitale said: “We’re defining a new paradigm. There’s a shift in how the energy [for car propulsion] is created. With an internal combustion engine, there’s a pitch change when you’re accelerating, and it’s an intensifying sound. With an internal combustion car, people are used to that sound, and they’re expecting it. In an EV they’re expecting the same, but that makes no sense.”

Instead, Vitale says BMW wanted a sound that showcases how EVs offer “a new world that didn’t exist.” “It’s about communicating an emotion,” he explained.

Hybrid and electric cars must emit synthesised noise below 12.5mph

Of course, people have perceptions of what electric cars should sound like, which prompted some companies to trial systems that met those expectations. For example, when developing the I-Pace, Jaguar tested a noise inspired by a science-fiction spacecraft. However, it abandoned that idea when pedestrians looked up at the skies rather than at the road when they heard it.

Fredrik Hagman, Volvo’s interactive sound designer, said the Swedish firm quickly ruled out any “novelty” sound concepts, commenting: “This is a sound that’s always on, and we’re going to be stuck with it for 30 years.”

Another challenge he mentioned is that “we don’t want to create noise that will be disruptive; we need to keep the advantages of electric cars”.

Hagman continued: “We realised that just because there’s no combustion engine, it doesn’t mean an electric

Anechoic chambers allow noises to be heard in isolation

HOW INTERIOR NOISE WILL CHANGE TOO

Electric cars don't just sound different on the outside; the lack of a combustion engine makes their cabins far quieter, too, and this has prompted car sound designers to rethink the noises featured inside.

"Cars in the electric age are quiet," said Indra-Lena Kögler, who is in charge of developing the interior noise of Volkswagen's EVs. "And quiet surroundings make it easier for every tone to have an effect." Quiet, but not silent. "We don't want silence," she said. "What we're after is calm."

That has led to the redesigning of several of the noises produced by the ID 3, such as the indicator. "Originally, this sound had to overcome engine noise, which is why it is so striking," said VW Group design boss Klaus Bischoff. "But that's not necessary in an electric car." The indicator noise has therefore been made quieter and 'more digital' – which Bischoff believes also makes it sound more modern.

Hans Zimmer shaping sounds for the BMW Group

car is silent. It still makes lots of noises, such as the noise of tyres on the road. So our approach was to keep it natural and enhance those sounds, rather than add a new sound."

Volvo's research found that such a sound is recognisable to other road users, easy for them to locate and "non-intrusive and non-polluting", according to Hagman. It also has the benefit of becoming hard to notice when the car reaches 20kmh and the noise stops.

Volvo's artificial noise is essentially a low hum; the very basic sound was taken from a recording of ocean waves. While clearly heard in an echo-masking anechoic chamber, it's virtually indistinguishable from road noise if a car goes past under electric power.

"We wanted to raise awareness without making people look," said Hagman. "We didn't want a head-turner."

BMW is taking a slightly different approach. Vitale has been working with Hollywood composer Hans Zimmer to develop a sound for its EVs. "We want to go for something unexpected," said Zimmer. "Technical is not our approach now; we want new possibilities. We use relationships that can be related to chords, but it's not musical."

The duo produced a trial noise for BMW that Vitale described as "very musical, and triggered by the driver, who is a performer". "The driver expresses himself," he said.

The Italian also composed the sound for the forthcoming Mini Electric, taking a slightly different, "human" approach. He described it as "friendly, with a hint of go-kart".

Another challenge with AVAS is to determine where the noise actually comes from. Jaguar put a speaker behind the I-Pace's front grille, for example, while Volvo uses an underbody speaker that bounces the noise off the road.

AVAS are also required when cars are reversing, because it's particularly important to warn people when the car is moving in an unexpected direction.

Hagman said Volvo was initially keen to avoid a beeping noise similar to those used by commercial and construction vehicles but that "after some trials, we found this was a very logical sound". This prompted Volvo to use a "synthetic" beeping that was softened to "make it sound less trucky."

While the use of AVAS is the result of legislation, sound designers are using them as an opportunity to craft an identity for their firms' cars. With a strange twist, though, they want you to notice the AVAS working – so you won't miss the car producing the noise – but at the same time don't want you to notice there's an artificial noise at all. "That's the life of a sound designer," said Hagman.

JAMES ATTWOOD

MOTORSPORT IMAGES

TESTED 19.2.20, NEUBERG, GERMANY **ON SALE** SPRING

AUDI E-TRON S SPORTBACK

New tri-motor layout gives electric SUV amazing torque vectoring capability

Engineers including Sir Alec Issigonis, who once reinvented the Mini Moke as an Arctic exploration device using dual 848cc engines with interconnected throttle cabling, have discovered that two combustion engines in one car is rarely worth the trouble.

Electric motors are proving to be much better suited to this approach, though. They're easier to package, control and maintain than oily powerplants and offer crushing performance potential when teamed up, which is why spec-sheet headliners such as the Tesla Model S and Porsche Taycan have one dedicated motor for each axle.

Independent drive units can also maximise traction or divide their efforts so that neither strays too often from its window of efficiency and therefore saps precious range. And as manufacturers are rapidly learning, control of individual axles can, if your engineers are clever enough, give even the most battery-bloated chassis an intravenous hit of agility.

At Audi, they're cleverer than most, and so the E-tron S Sportback, seen here as a prototype in light camouflage but due to arrive in the spring, uses no fewer than three electric drive motors. The fastback SUV will be the first S-badged electric car to leave Ingolstadt, with the traditional increases in performance and handling.

Compared with the existing E-tron 55 quattro, whose MEB Evo platform has been carried over, the wheel-and-tyre package has been beefed up, as have the by-wire brakes and the cooling, while the air suspension has been tuned for even closer body control. Expect prices to start at around £80,000, compared with £59,900 for the E-tron 55.

The biggest difference, however, is the additional electric motor. Instead of one motor driving the rear axle, as found in the E-tron 55, there are two in the E-tron S: one for each wheel, à la Polestar 1, and each with its own single-speed gearbox.

This paves the way for ultra-precise torque-vectoring with, in Audi's words, a high level of transverse dynamics. Or, in our words, improbably big skids if the car is in Dynamic driving mode with the stability control system set to Sport or, better still, entirely off.

Coupé version of the E-tron will become the first electric S model

Audi claims this system can distribute torque in a quarter of the time needed by any mechanical counterpart, such as the Sport differential in the new RS6 Avant, and during cornering can feed up to 162lb ft more torque to the outside wheel than the inside – far more than the 10% difference possible with the clutched Sport differential.

Furthermore, the electric torque vectoring system isn't finally spurred into action only at the very limit of grip, and then with no true control over which direction torque is sent, as is the case with a regular limited-slip differential. In theory, the satisfying sensations of apportioning torque to the outside rear wheel can therefore be felt by the driver at any time.

The front axle is more conventional, with nothing more complicated than brake-based torque

The steering is accurate but not exactly confidence-inspiring

A strong 718lb ft of torque means this 2.5-tonne lump can really launch itself

TESTER'S NOTE
The front drive unit weighs around 125kg and the dual-motor rear unit around 150kg. So, as with many electric cars, the E-tron S is left with almost perfect 50:50 weight distribution when everything is taken into account – and you can tell. **RL**

> "It will essentially oversteer on demand as the outside rear wheel is overloaded with torque"

vectoring, but the long and short of it is that this tri-motor set-up, combined with Audi's central control unit, can replicate the functions of the Sport, limited-slip and Torsen differentials, only faster-acting and all of the time. Issigonis would no doubt be impressed.

Meanwhile, total power for the E-tron S is up from 403bhp to 496bhp, with the larger front motor (the same as can be found in the tail of the E-tron 55) accounting for 201bhp and the two shorter rear motors, which are cradled back to back within the subframe, together making 354bhp. Total torque is an outstanding 718lb ft, with 456lb ft of that reserved for the rear axle.

Our chance to test this driveline came at Audi's facility in Neuburg, near Munich. This is where its racing machines – including the R8 LMS GT3 and previous LMP1 cars – are shaken down for the first time, hence the generous grass and asphalt run-off (although this could equally be for the benefit of visiting journalists).

Unsurprisingly, even the colossal torque of three electric motors meets its match with a car that weighs more than 2500kg before you've even factored in passengers. So while the E-tron S gets off the mark briskly, from then on it feels no more than Volkswagen Golf R quick. However, what you do genuinely notice is the subtle rear torque bias during lightly committed driving, because from the moment you turn the wheel, the front axle mainly devotes itself to brake vectoring rather than propulsion and the rear axle's torque vectoring simultaneously comes into play.

The real surprise comes when you attack a corner. Neither the brakes nor the slick but soulless steering inspire too much confidence, but once the nose has securely taken your chosen line, the E-tron S will essentially oversteer on demand as the outside rear wheel is overloaded with torque. More surprising still is how neatly and predictably this happens, and one can't help but imagine what this technology might one day do for, say, a TT-sized coupé with friendlier proportions and less weight to cart around.

Another striking characteristic of the system is that there's almost no initial understeer to push through before the rear axle starts to swing, as is almost always the case with combustion engines, needing a moment to coalesce their efforts. In this respect, the E-tron S feels a little unnatural – binary, frankly – but massively effective and enjoyable all the same. Too much angle and the rollover electronics grip the chassis in a protective vice, killing the slide.

But the cat is out of the bag: if Audi can make a tank of a car like the E-tron S Sportback handle this sweetly, an electric Porsche Boxster suddenly seems an immeasurably more enticing prospect.

RICHARD LANE
@_rlane_

AUDI E-TRON S SPORTBACK PROTOTYPE

Clever driveline tech is used by the E-tron S to impressive effect, but its promise lies in smaller, lighter cars.

Price	£80,000 (est)
Engine	Three asynchronous electric motors
Power	496bhp (combined)
Torque	718lb ft (combined)
Gearbox	Single-speed
Kerb weight	More than 2500kg
0-62mph	4.5sec
Top speed	131mph (governed)
Range	230 miles (est)
CO_2, tax band	0g/km, 0%
RIVALS	Jaguar I-Pace EV400, Porsche Taycan 4S

TESTED 16.2.20, SURREY **ON SALE** NOW

VOLVO XC40 T5 TWIN ENGINE

Plug-in hybrid compact SUV arrives with 28-mile claimed electric range

Plug-in hybrids such as this new Volvo XC40 are a curious breed, but you can see why car makers keep churning them out.

The EU's strict new CO_2 targets come into effect this year, and PHEVs are a sure-fire way of reining in manufacturers' fleet average emissions figures. And, of course, they make for a good stepping stone between regular internal combustion-engined cars and pure EVs. But if we're to believe that every new car sold from 2035 (or perhaps 2032) will have to be emissions-free, it's tricky to ignore the feeling that they're being developed and promoted at great expense in the knowledge they'll soon be obsolete.

Anyway, you can see why the concept might appeal in the here and now. With its 81bhp electric motor and 10.7kWh battery, this XC40 T5 Twin Engine can travel as far as 28 electric-only miles before its 178bhp three-cylinder engine fires up and takes over the task of driving the front wheels. So if you charge it regularly and use it mainly for short hops, it should theoretically cost very little to run – despite the fact that it's actually a 1.75-tonne SUV.

This ability to run on electricity alone for short distances is also why PHEVs are currently so inexpensive on the company car tax front. As long as you get your spec right, this XC40's WLTP-certified CO_2 rating drops as low as 47g/km, equating to a massive benefit-in-kind tax saving when compared with a standard diesel or petrol XC40. This applies even if the owner then treats it as a regular car and runs it almost exclusively on petrol power, which doesn't seem entirely sensible. But like it or not, it's where we're currently at in the world of new cars.

A 28-mile electric range is claimed; we saw only 21 miles offered on the trip meter

Past the points of potentially lower running costs and a cheaper company car tax rate, the XC40 PHEV still carries plenty of appeal as an ownership proposition. For starters, it looks as great as it always has, with the only real change to its suitably swish exterior being the addition of a charging port just over the front wheel arch.

The cabin continues to exude all of the lounge-like class that we so liked about the XC40 when it first arrived a few years ago. Even in the darker colour palette of our test car there's an impressive sense of space in both the first and second rows, and an elevated level of material quality lends it plenty of upmarket appeal.

That said, the front seats err on the firm side, and their short squabs could provide a bit more in the way of under-leg support. But there's plenty of adjustability to be found both here and in the steering column, the net result of which is that the XC40 is afforded an appealingly commanding and comfortable

R-Design trim's firmer set-up keeps body roll in check, but the ride comfort suffers


Classy cabin feels spacious and is nicely finished in quality materials

TESTER'S NOTE
Volvo offers a Type 2/ Mode 3 fast-charge cable as a £50 option. With it, a home wallbox can top up the XC40's battery in as little as two and a half hours. **SD**

> There's a delay as the transmission rifles for a gear, but progress is swift once it's found

driving position with excellent visibility out of the cabin.

With its battery fully charged, the XC40's crisp, clear digital dashboard informed us we had 21 miles of electric-only range rather than the 28 that Volvo claims. Nonetheless, driving the XC40 on battery power alone is a relaxing undertaking – if not a particularly rapid one. With only 118lb ft and all of that kerb weight to cart about, the electric motor isn't the last word in accelerative potency but is responsive enough to your inputs and still capable of getting the Volvo up to speed in a timely enough fashion.

Brake pedal feel is as good as non-existent, however, and the transition from electric to petrol power isn't quite as smooth as you'd ideally like, particularly in those instances where you need to suddenly summon all of the car's available shove at the drop of a hat. Hit the kickdown switch and there's an extended delay as the petrol engine sparks up and the seven-speed transmission rifles around for a suitable gear, but progress is swift once it's found. The 1.5-litre three-cylinder petrol engine doesn't sound too bad, either, and emits an intriguingly sporty warble under load.

Ride comfort could be better, though. Our R-Design test car rode on firmer sports suspension, so there was a brittle, slightly agitated edge to its ride in the low-speed environments you'd expect to use it most frequently. Of course, its vertical body movements felt well-checked when travelling at speed, but we'd be likely to sacrifice some of that control for an additional level of pliancy around town.

Still, its steering is nicely weighted and pleasingly direct, allowing you to guide the car through bends with reassuring levels of confidence. It's hardly the sort of car that eggs you on to drive it hard and fast, but the accuracy of its steering remains easy to appreciate when you're simply moseying around town.

And it's in town where the Volvo most feels in its element. Here you can take advantage of its limited electric-only range to bring running costs down, and probably improve greatly on the 45-50mpg average economy figure we saw during our time with the car.

It operates at its best within a fairly narrow window, then. But if it fits your usage patterns, there's a lot going for this plug-in XC40. We'd just avoid the sports suspension.

SIMON DAVIS
@simondavisnz

VOLVO XC40 T5 TWIN ENGINE R-DESIGN

Limited electric range makes XC40 PHEV a more city-friendly SUV, provided you use it correctly

★★★½☆

Price	£40,905
Engine	3 cyls in line, 1477cc, turbo, petrol, plus electric motor
Power	259bhp (combined output)
Torque	314lb ft (combined output)
Gearbox	7-spd automatic
Kerb weight	1741kg
0-62mph	7.3sec
Top speed	127mph
Economy	119.1-139.4mpg
CO_2, tax band	47-55g/km, 16-19%
RIVALS	Lexus UX, DS 7 Crossback E-Tense

TESTER'S NOTE
I'd like to try Mountune's M400r, which doesn't go so far as the new engine internals of the M520 but is still quick enough and costs less. Despite the appalling turning circle it brings, I'd also take the firmer, lowered KW suspension. The car's weight demands it and the rear axle is more planted – and playful – than with the standard hardware. **RL**

TESTED 5.3.20, ESSEX **ON SALE** NOW

MOUNTUNE FORD FOCUS RS

Adrenaline-charged fun awaits in this ferocious 513bhp mega-hatch

Mountune's M520 belongs back in time, when no-name electric cars with 2000bhp didn't show up out of nowhere and we thought supercars making barely one-third of that were pushing the boundaries of what normal humans could handle. If you want a date, try March 2000, which was the month Porsche showed a concept version of the Carrera GT in Geneva.

This is the era you need to mentally revisit to fully appreciate such an extreme take on the Ford Focus RS. We've become worryingly immune to big numbers, so let's be clear: 513bhp is an unhinged degree of power for a C-segment hatchback and it has been achieved by the company that, while Porsche was formulating its V10 supercar, was supplying four-cylinder turbo engines for the works Focus WRC cars of Sainz and McRae.

The M520 also uses a four-cylinder turbo engine, although one based on the 2.3-litre Ecoboost that serves in the latest Focus ST. Mountune fits a new BorgWarner turbocharger with low-friction ceramic bearings and a low-inertia turbine. Then there are upgraded camshafts and valvetrains, a more powerful fuel pump and a host of new gaskets, hoses, studs and nuts. Any car due for conversion also needs, as a prerequisite, to use Mountune's own intercooler and air intake, big-bore exhaust and forged engine internals, to take the strain.

Elsewhere, the front driveshafts have been beefed up and there's a Quaife torque-biasing differential to replace Ford's open diff. The rear axle, which in the standard Focus RS is never asked to cope with more than 240bhp of the engine's 345bhp total, has been left untouched.

From scratch, it all costs around £15,000, but the promise of Nissan GTR-troubling performance with Mountune's trademark drivability has meant no shortage of orders.

In truth, the car feels experimental and illicit, which will scare many people away but should also secure it massive appeal among the hardy few. Ominously little happens below 2600rpm, when the car is mild mannered but for some driveline shunt if you don't finesse gearshifts.

On Michelin Cup 2 tyres and with lightly revised suspension geometries, it also steers genuinely well: still slightly too elastic in its action but responsive, feelsome and with an authentic heft missing from the set-up in the latest Focus ST. Our car's optional two-way KW adjustable dampers are also worth having and give the M520 the same solid but supple brand of body control found in the BMW M2 Competition, even if the front axle needs a very firm hand on cambered or rutted roads.

Fuel economy varies between 30mpg cruising off boost and as little as 8mpg for cross-country blasts.

But what blasts they are. At around 2800rpm, the torque curve spikes violently as the turbo wakes up and piles on 250lb ft in the space of 1000rpm. The acute torque steer that follows is a candid reminder that the throttle pedal goes both ways, although if you keep your cool, you'll find the M520 never drags you screaming into a hedge. Even on a perfectly smooth, straight and dry road, you can spin up all four wheels if you give it everything in fourth gear, and frankly the car seems as though it'd be happiest with all the electronic aids switched off, wheels constantly over-rotating a touch and McRae himself at the helm. Do get it properly hooked up, though, and you'll accumulate speed in a way that makes a Volkswagen Golf R feel completely pedestrian.

And once you have become accustomed to the explosive torque delivery, and you trust the chassis to just about cope with the onslaught, you can start to savour the experience. After all, here we have a four-wheel-drive car with a manual 'box and a heavily boosted engine that doesn't suffer from obvious lag. It's a car that needs to be learned and respected, one more often thrilling to drive fast than enjoyable, and one that can slide neatly but misbehaves often. It's flawed, but for the fast Ford diehards who've been waiting for a spiritual successor to the Escort Cosworth, this is probably that car.

RICHARD LANE
@_rlane_

It's a thrilling car to drive, once you learn to trust it, and the rear axle is happy to become involved in your progress

MOUNTUNE FORD FOCUS RS M520

Truly unruly at times but massively exciting, not least because of its motorsport-grade personality

★★★½☆

Price	£15,000 (est – upgrade)
Engine	4 cyls, 2261cc, turbocharged, petrol
Power	513bhp at 5550rpm
Torque	516lb ft at 4000-4700rpm
Gearbox	6-spd manual
Kerb weight	1599kg
0-62mph	4.0sec (est)
Top speed	175mph (est)
Economy	WLTP figures na
CO_2, tax band	WLTP figures na
RIVALS	BMW M2 Competition, Mercedes-AMG A45 S

TESTED 12.3.20, MIDDLESEX **ON SALE** NOW

AUDI RS Q8

Flagship SUV weighs 2.3 tonnes and packs a 592bhp V8

When you first drive the Audi RS Q8 down a busy, potholed high street, you find you need a good imagination.

The five-metre, 2.3-tonne, 592bhp, £101k behemoth purring under your backside may feel like an ordinary, £67k Q8, but it's actually a genuine Nürburgring record-holder, 12 seconds faster around the famous 16-mile circuit than the Lamborghini Urus and Porsche Cayenne Turbo Coupé that are simultaneously its relatives and its rivals.

The fact that this mighty machine's low-speed ride and refinement are so impressive will come almost as a disappointment to some. Same goes for the classy interior and enveloping leather seats: they say luxury rather than top-end performance. But few cars demonstrate as starkly as this Audi how sophisticated electronics allow a car as unlikely as this to be a storming performance flagship.

Such a tall and heavy SUV really shouldn't be agile or fast around a circuit. But give it 592bhp at 6000rpm, eight quick-shifting gear ratios and the kind of low-end torque that we've come to expect of a twin-turbocharged V8 and it will erupt off the mark – with almost no wheelspin – to 62mph in just 3.8sec. It will also manage 190mph flat out (but is limited here to 155mph).

Give this self-same SUV a four-wheel drive system that directs up to 80% of torque to the rear wheels and it will have an unexpectedly sophisticated throttle-steering capability. Give it a torque-vectoring rear differential, plus four-wheel steering and the option of a Porsche-Lamborghini-Bentley 48V adaptive roll control system and it will turn in to corners brilliantly and keep gripping and turning with near-perfect stability no matter how long and fast they turn out to be.

Also give it adaptive air suspension and it will prove comfortable over potholes yet also planted at 120mph.

And off road, it will even lift itself 50mm to do some mud-plugging.

Here in overcrowded, speed-restricted Britain, the RS Q8 will hardly ever get the chance to demonstrate the extent of its capabilities. But if you still fancy one of these – and the fact that it undercuts its British, German and Italian relatives makes three decent reasons – you can rest assured that it will cope beautifully at all the speeds and in all conditions that are allowable.

STEVE CROPLEY
@stvcr

Interior is a luxurious tech-fest with subtle sporting touches

AUDI RS Q8 TFSI QUATTRO

Audi's top-spec SUV offers huge performance yet copes perfectly well with the daily driver role too

★★★★☆

Price	£100,900
Engine	V8, 3996cc, twin-turbocharged, petrol
Power	592bhp at 6000rpm
Torque	590lb ft at 2200-4500rpm
Gearbox	8-spd automatic
Kerb weight	2315kg
0-62mph	3.8sec
Top speed	155mph (governed)
Economy	20.2mpg (combined)
CO_2, tax band	277g/km, 37%
RIVALS	Lamborghini Urus, Porsche Cayenne Turbo Coupé, BMW X6 M Competition

JAGUAR F-TYPE R P575 AWD

Price £97,280 **On sale** Now
What's new? Top-of-the-range sports car is given more power, revised suspension, refreshed styling and four-wheel drive

WE'VE DRIVEN THE range-topping R version of the facelifted Jaguar F-Type abroad already, and on UK roads its reappraised suspension tuning makes it feel pretty familiar: like the burly, firm and slightly unruly hot rod it always was, even with four-wheel drive. It's not a subtle driver's car, but it is a compelling one.

That 567bhp V8 lays on mid-range torque in especially spectacular supply, and the way it snarls to 5000rpm, then crackles as you finally lift your right foot, is something else.

Overall, this car probably has more power and go-faster purpose than it really needs. But if you like wildness and excess in your daily-driven sports car, you'll love it. **MS**
★★★★☆

BMW M235i GRAN COUPE xDRIVE M PERFORMANCE

Price £37,255 **On sale** Now
What's new? Hottest version of new five-door packs a 302bhp four-pot and four-wheel drive

THE NEW BMW M235i Gran Coupé isn't a particularly good-looking car. But be that as it may, it's impressively effective at tackling challenging B-roads at pace. Its petrol engine lacks character but pulls hard and is paired with an eight-speed automatic gearbox that's slick and decisive.

Four-wheel drive and intuitively paced steering let it corner neutrally and with impressive grip, but it's hard to shake the sense that this is a more derivative device than the rear-driven six-cylinder M235i two-door.

Still, even on passive dampers, the Gran Coupé rides cracked British back roads in a tidier fashion than its Mercedes-AMG CLA 35 rival. It's a pity it doesn't look as good, then. **SD**
★★★½☆

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TESTER'S NOTE
The Captur offers three instrumentation packs. Annoyingly, the mid-range one (a 7.0in digital screen) shows only a tacho in some driving modes, yet there's also a fuel gauge you could read from the hard shoulder. Renault evidently hasn't had every last bit of its old quirkiness knocked out of it just yet. **MS**

TESTED 18.2.20, GLOUCESTERSHIRE **ON SALE** NOW

RENAULT CAPTUR

Second-generation compact crossover uses a turbo triple in its cheapest form

Renault has done well out of the modern love affair with the compact crossover. It got in early, in 2013, with the Captur, and has made plenty of hay since.

Would you believe that car outsold the Nissan Juke in Europe by almost five to one in 2019? It has been the continent's class favourite for several years, proving that smart looks and good value are more than half the battle concerning sales success.

The second-generation Captur has just landed in the UK and, echoing the theme of its supermini sibling, the Clio, it's a slightly larger and classier reinterpretation of what went before. And so Renault's blend of curvaceous good looks with straightforwardly labelled value for money will likely continue to be its chief lure.

Yet there's more than that to like about the new Captur if you look more closely. Having grown 110mm longer, it now offers very respectable second-row passenger space, which only taller adults will probe the limits of (and more likely for head than leg or knee room). The Captur retains a useful sliding rear bench seat, and boot space swells to a very roomy 536 litres with it moved forwards. There's a split-level boot floor, too.

Much of the cabin architecture and componentry is shared with the new Clio, but that's no criticism. You have to climb all the way to the uppermost of Renault's three-tier trim hierarchy to experience the interior at its plushest, where soft-touch mouldings cover parts of the centre console and doors as well as the upper dashboard. But even in mid-level Iconic trim, in which we spent the most time, the cockpit looks and feels quite tactile and consistently classy, with flashes of ambience-enlivening colour to be had if you want them.

Onboard technology should be more of a strong suit. Fully loaded Capturs combine a portrait-oriented 9.3in touchscreen infotainment system with a 10.0in digital dial display, the latter conveying sat-nav instructions and more.

They will also come with all the driver assistance systems that Renault can muster, among them automatic emergency braking, lane-keeping assistance, adaptive cruise control and parking assistance, not to mention a 'Level Two autonomous' traffic jam assistance system that effectively guides and drives the car for you through heavy congestion.

Plenty of choice on engines means you're more likely to find a motor to suit your particular needs than with rivals. There are three petrols and two diesels from launch, plus a range-topping plug-in hybrid, called the E-Tech, will come later this year.

Having tested the mid-range petrol (the 1.3-litre four-cylinder TCe 130) in Europe last year, we opted to try the 1.0-litre turbo triple TCe 100 on British roads. It's pleasant and willing enough, with creditable refinement and drivability, and that's not to be sniffed at, considering it's the cheapest option in the range.

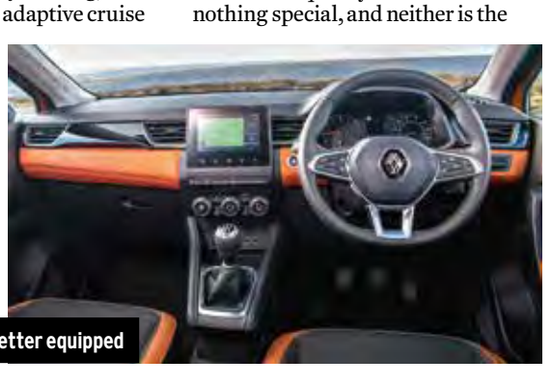
A decently gutsy, boosty-feeling delivery of mid-range torque provides plenty of usable performance in the lower gears, even if the longish higher intermediate ratios of the five-speed manual gearbox make it seem a bit sluggish elsewhere at times.

The shift quality of that unit is nothing special, and neither is the Captur's ride, which feels slightly wooden and over-firm around town.

Ideally paced and intuitive-feeling steering does make it fairly enjoyable to thread along at cross-country pace, although the easy long-wave fluency of the original Captur seems, rather regrettably, to have been disposed of.

While you can clearly add power and performance at greater cost, then, or even a dual-clutch gearbox or a plug-in hybrid powertrain, it's encouraging to discover that you can keep your Captur simple and cheap and not end up with a second-rate drive. That's not a quality every rival offers. So it may not be the biggest, comfiest or best-handling crossover, but the compromise of qualities it does offer should serve it very well.

MATT SAUNDERS
@TheDarkStormy1



Ride has regressed slightly; interior is now more appealing and better equipped

RENAULT CAPTUR 1.0 TCE 100 ICONIC

Roomier and more pleasant inside while still offering respectable ride and handling and good drivability.

★★★★☆

Price	£19,095
Engine	3 cyls in line, 999cc, turbocharged, petrol
Power	99bhp at 5000rpm
Torque	118lb ft at 2750rpm
Gearbox	5-spd manual
Kerb weight	1190kg
0-62mph	13.3sec
Top speed	107mph
Economy	45.6-47.1mpg
CO_2, tax band	136-141g/km, 30-31%
RIVALS	Peugeot 2008 Puretech 100, Ford Puma 1.0 Ecoboost 125

TESTED 19.2.20, ARIZONA, US **ON SALE** NOW

BMW X5 M COMPETITION

Range-topping SUV arrives with a 616bhp petrol V8

The BMW X5 M50i is perhaps all the car you and I are ever likely to need. It's roomy, well equipped, rapid enough to outrun all but the most focused of sports cars and compliant enough to be used every day. And if its CO_2 credentials are a concern, there's always the X5 M50d.

Still, there remain those with the necessary financial means who will always seek even greater exclusivity. It is this small group of customers that M division is aiming at with this, the new, third-generation X5 M.

As with the latest X6 M, featured last week, the 2020 X5 M is available in two distinct forms. Both run the same twin-turbo 4.4-litre petrol V8 from the M5. But while the standard model sold in other countries has 592bhp and 552lb ft, the range-topping Competition model that will underpin UK sales gets 616bhp plus the same 552lb ft. That's 89bhp more than the twin-turbo 4.4-litre V8 used by the X5 M50i, which again produces the same 552lb ft.

The X5 M sends its reserves through an upgraded version of the X5 M50i's eight-speed torque converter-equipped gearbox and multi-plate clutch four-wheel drive system with torque vectoring function at the rear wheels, delivering effortless part-throttle traits in town and rabid acceleration on the open road. It's all accompanied by a compelling baritone exhaust note, which is played through the speakers for added effect.

A wide range of chassis tweaks, including a brace across the front suspension towers to add rigidity and a mix of 21in front and 22in rear wheels, shod with 295/35 ZR21 and 315/30 ZR22 tyres respectively, bring a more sporting feel in comparison with the X5 M50i in any one of the driving modes. It's quite direct in character by SUV standards and feels more agile than its 2300kg kerb weight suggests. However, the speed-sensitive steering wants for real feel and the ride is way too firm, even in its most relaxed mode, to be classed as comfortable on all but the smoothest roads.

The interior, with its own unique digital instruments and sports seats, is superb. It's also a good deal more practical than the sloping-roofed X6 M, with the boot offering 650 litres of luggage space.

The X5 M should be commended for its explosive performance and outstanding road holding. But at £110,610, you pay handsomely for the privilege. At £74,620, the X5 M50i offers almost as much performance but with more relaxed driving traits and the sort of comfort that makes it more suitable as an everyday car. It's the one I'd have.

GREG KABLE

Sports seats and bespoke digital dials are the high points of a superb cabin

BMW X5 M COMPETITION

Powerful and engaging but pricey and short of ride comfort next to the arguably better-balanced X5 M50i

★★★½☆

Price	£110,610
Engine	V8, 4395cc, twin-turbocharged, petrol
Power	616bhp at 6000rpm
Torque	552lb ft at 1800rpm
Gearbox	8-spd automatic
Kerb weight	2295kg
0-62mph	3.8sec
Top speed	180mph
Economy	22.1mpg
CO_2, tax band	291g/km, 37%
RIVALS	Mercedes-AMG GLE 63, Porsche Cayenne Turbo

MERCEDES-AMG GLS 63 4MATIC+

Price £105,000 (est) **On sale** June
What's new? New GLS gets the AMG treatment, with greater reserves and a luxurious cabin

MERCEDES-AMG HAS wasted little time in launching a go-faster version of the new GLS, and it runs the same twin-turbo 4.0-litre V8 petrol engine as its GLE 63 4Matic+ sibling.

With 603bhp and 627lb ft along with a nine-speed automatic gearbox and fully variable 4Matic+ four-wheel drive system, it delivers huge urge when the conditions allow, propelling the GLS 63 to 62mph in just 4.2sec on the way to an optional 174mph top speed. It's the imbibing effortlessness and surprisingly direct response from the steering at more moderate speeds that really appeals, though.

The luxurious cabin, with its own unique digital graphics, makes good on Mercedes-AMG's claims that this new GLS is its best yet. **YK**

★★★★☆

PORSCHE CAYENNE TURBO S E-HYBRID

Price £123,349 **On sale** Now
What's new? Plug-in hybrid bruiser arrives with up to 19 miles of electric range

TIME WAS WHEN the wildest Porsche, in spec-sheet terms at least, would be some form of 911. But today Porsche is an SUV maker that builds sports cars to protect its pedigree, and the wildest model it now makes is the Cayenne Turbo S E-Hybrid, whose plug-in hybrid V8 powertrain makes 671bhp and 664lb ft.

Despite weighing more than 2.5 tonnes, this car will match even the Audi RS6 in a straight line, but it's a bit of a one-trick pony in this respect and not so satisfying to drive as lesser Cayennes. That BMW's X5 45e costs half the price, goes more than twice as far in EV mode and isn't exactly short on performance further consigns this wild Porsche to curiosity status. **RL**

★★★½☆

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Audi RS6 Avant

Will the raft of clever tech improve the driving experience or make it feel more remote?

MODEL TESTED **CARBON BLACK**

Price £100,650 ● **Power** 591bhp ● **Torque** 590lb ft ● **0-60mph** 3.3sec ● **30-70mph in fourth** 4.6sec ● **Fuel economy** 19.5mpg ● **CO_2 emissions** 268g/km ● **70-0mph** 43.9m

PHOTOGRAPHY LUC LACEY

We like

- Suitably monumental outright performance
- Genuine any-weather, any-trip usability
- Cabin mixes luxury with restrained performance purpose like no other

We don't like

- Character is more restrained than you may prefer
- Not quite as agile or entertaining as rivals

Still nobody does the uncompromisingly large, uncompromisingly fast and supremely usable performance estate car quite like Audi. Even now, with the concept so familiar that we're at risk of taking its continued existence entirely for granted, with imitators closing in by degrees, and with almost as much in-house competition for the subject of this week's road test to contend with as exists outside of the showroom.

It's funny to think, then, that the biggest, quickest and most desirable of all of the wickedly purposeful but deliciously understated wagons to which Audi puts its name – the RS6 Avant – has yet to reach its 20th birthday. The very first came along in 2002; and yet the car has quickly taken on the inscrutable persona of one that has been around forever and must likewise survive that way not least because to lose it would be to lose one of the performance car ether's true archetypes.

With this fourth-generation version, the RS6 will tear into its roaring 20s. Having dallied briefly but memorably with turbocharged V10 power a decade ago, the new version retains the turbocharged V8 engine type that has helped to define its character for so long. It also retains the permanent quattro all-paw driveline that has had equal influence in the casting of its character and place in the world.

And yet the list of new technology that's ready to reinvent the dynamic abilities of this new version is long. From mild hybridisation adopted to boost the car's socially responsible fuel efficiency to four-wheel steering adopted to keep pace with a set of increasingly purposeful rivals, there is plenty that promises to make this Audi 'bahn stormer even better than its predecessors. Stand by to find out exactly what it all amounts to.

DESIGN AND ENGINEERING

★★★★★

There are quite plainly some notions of wider Volkswagen Group performance car hierarchy to which the new RS6 is wonderfully immune. The car's 3996cc V8 replaces the 3993cc unit that was co-developed with Bentley and first used in 2011. It's the same mill you'll find in a current Bentley Continental GT, Bentayga V8, Porsche Panamera GTS and Porsche Cayenne Turbo.

In the RS6, however, the twin-turbocharged lump (now with a perfectly 'square' cylinder bore/stroke ratio; the last version's V8 was slightly long-stroke) is allowed to develop more power and torque than in any of those other applications: fully 591bhp, and 590lb ft over a near-2500rpm spread of mid-range revs. The related RS7 Sportback is no more potent and neither is the new RS Q8 super-SUV. Within wider VW Group circles, only the madcap Lamborghini Urus uses the same motor to more spectacular effect, along with Porsche's Turbo S E-Hybrid models (in which outputs are, of course, electrically assisted).

Ironically enough, the motor does have some hybridisation here as well. A 48V electrical architecture and starter/generator allow the engine to 'harvest' power at up to 12kW under regenerative braking and also mean the RS6 can coast at cruising speed in an 'ignition-off' state for periods of up to 40 seconds. It retains cylinder deactivation technology as well and all of that means the car tops 30mpg on the extra-urban test cycle of the outgoing 'NEDC equivalent' fuel economy lab test.

Like the last RS6, the new one has full-time mechanical four-wheel drive with a passively locking Torsen centre differential that splits 60% of drive to the rear axle by default, varying it by as much as 85% as traction deteriorates up front. Rearward torque is then split actively and asymmetrically by Audi Sport's locking rear differential, which can overdrive the outside wheel using a system of electrically controlled clutches. The car also uses brake-based electronic torque vectoring.

For suspension, the A6's multi-link front and rear axles have been specially redeveloped by Audi Sport, with tracks that are 40mm wider than a regular A6's and a ride height that cradles the RS6's body 20mm closer to the road – and 'actively' lower still at high speed if you stick →

Range at a glance

ENGINES	POWER	FROM
45 TFSI	242bhp	£42,720
55 TFSI	335bhp	£50,205
40 TDI	201bhp	£39,695
50 TDI	286bhp	£48,605
S6 TDI	344bhp	£61,180
RS6	591bhp	£92,750

TRANSMISSIONS

7-spd automatic
8-spd automatic ■

Although the RS6 is available exclusively as an Avant estate, the cooking versions of the A6 and slightly quicker diesel S6 can be had as either a saloon or an Avant. The entry-level 40 TDI and 45 TFSI make use of four-pot diesel and petrol motors, while the mid-range cars come with larger, six-cylinder units. The RS6 is available in different trim levels, with the standard car priced from £92,750. Our Carbon Black model starts at £100,650 and range-topping Vorsprung from £109,250.

Past RS6s were also offered as saloons

● Rather than the same units as lesser A6s, the RS6 adopts the slimmer matrix LED headlights of the A7 for a meaner stare. Adaptive laser light functionality is standard.

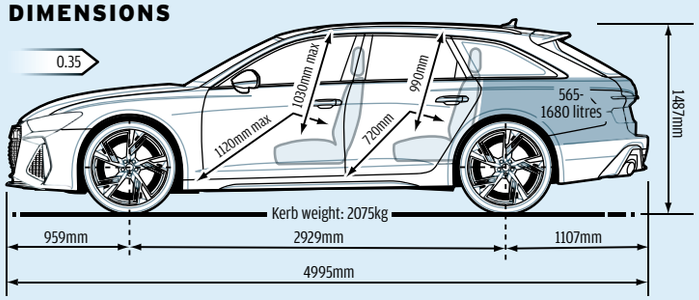
● Audi's designers have achieved something special with the RS6's wheel-to-body height ratio, a key reference where design proportions are concerned. Anything close to 2:1 makes for a very purposeful stance. The RS6's might even be less than that.

● Audi Sport has junked the frame of Audi's familiar hexagonal 'single-frame' grille to make for a more impactful look, very effectively achieved. Gloss black plastic hides the driver assistance sensors quite well, too.

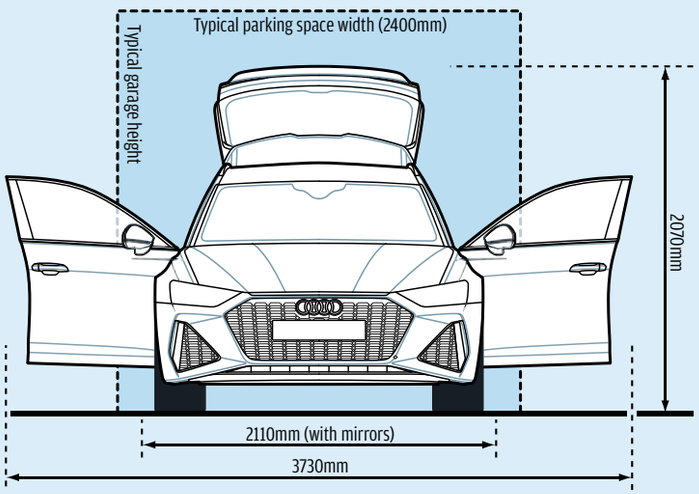
● Our car was a bit of a mule but closest to Carbon Black trim. The carbonfibre look of the diffuser styling comes with Carbon Black trim (it's gloss black on Vorsprung). Black tailpipes mark out the optional active exhaust.

Weights and measures

DIMENSIONS

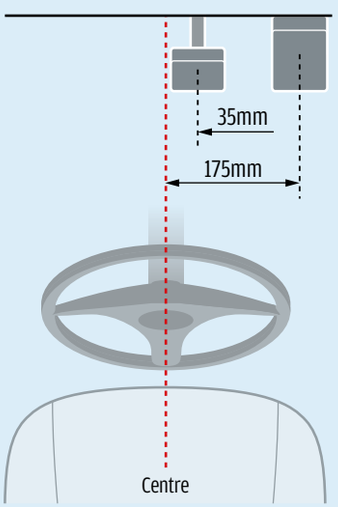


PARKING



WHEEL AND PEDAL ALIGNMENT

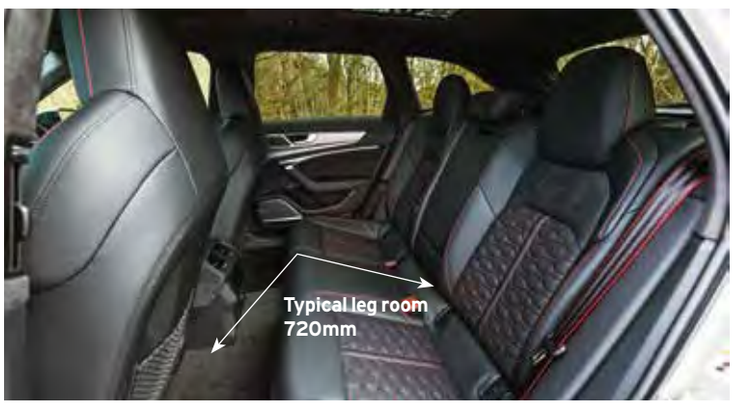
No problems with pedal alignment. Positioning of both brake and accelerator makes for comfortable motoring over distance. There's excellent adjustability in the steering column and seat base, too.



HEADLIGHTS

Adaptive matrix LEDs are standard. We didn't have the opportunity to test them this time, but the same units have shown excellent range on other occasions and are quick to prevent dazzling.

● Quilted leather seats afford plenty of support and adjustability and enhance the RS6's impressive credentials as a genuinely comfortable long-distance tourer.



● There's loads of space in the second row for adult passengers or younger family members. Panoramic sunroof is standard on Vorsprung models, or a £1950 option.

● RS6's 565-litre boot isn't quite a match for the E63's 640-litre hold. Boxes, mats, trays and partitions are all available as accessories to help you to secure loads.

←with the car's now-standard air suspension set-up. Steel coil springs with diagonally interlinked dampers – Audi Sport's time-honoured RS6 suspension set-up labelled Dynamic Ride Control – come as standard if you opt for top-of-the-line Vorsprung trim, or as an option elsewhere.

This is the first RS6 to adopt four-wheel steering in addition to torque-vectored four-wheel drive – and it's standard on all UK cars. Carbon-ceramic brakes are available but remain among the options for most RS6 trim levels.

INTERIOR

★★★★½

It's a tribute to Audi's interior designers that the brand's big-car cabin architecture hangs together equally well for a luxury, high-quality feel in a £50,000 A6 as it does in a £130,000 (as tested) RS6. This cabin is as tech laden and electronically sophisticated as you'd expect a flagship Audi to be, thanks to its sharp display screens and well-judged combination of cool metal and glossy black surface treatments.

The usual tasteful yet typically restrained sporting details do help to differentiate this performance model from its lower-order A6 siblings, though. Contrasting red stitching stands out on the black leather upholstery of our test car and the Alcantara steering wheel and gear selector feel suitably motorsport derived. There's an impressive sense of space in the front half of the cabin, too, afforded in part by the optional panoramic glass sunroof but also by the Audi's sheer girth.

This airiness extends to the second row, where our tape measure recorded typical leg room of 720mm. Although that's 20mm less than in a BMW M5, the Audi has more head room (990mm versus 920mm). In any case, there's more than enough room for two adults to sit comfortably and enough overall width for three children to fit across the back seats without too much complicated tessellation of booster seats.

The boot, meanwhile, has a seats-up capacity of 565 litres, extending to 1680 litres with the rear seats folded flat. The aperture itself is usefully wide; the boot floor is close to flush with the opening, which makes loading heavy stuff easy; and for stowing cargo, you'll find rails, nets, hooks and a handy elastic strap in the RS6's boot, all of which help to prevent what you're carrying from smashing itself to pieces while you're enjoying what we're coming to next.

PERFORMANCE

★★★★½

We'll start with the negatives. If the RS6's immensely powerful 4.0-litre V8 disappoints in any aspect, it's in the way it sounds. There's a richness and an aggression to its deep, growling timbre that's eminently appealing when you can hear it, but compared with the more expressive V8 of the Mercedes-AMG E63 and, to a lesser extent, the M5's, the Audi's engine just sounds a bit restrained. Even with the optional RS sports →

● RS button on the steering wheel allows for quick access to your own customisable drive modes. Only the RS2 mode lets you deactivate the ESC.

● Select RS mode and the instrument binnacle throws up a unique, race-style display with large rev counter and g-force meter. Cool, if a little contrived.

● Chunky shifter is carried over from standard A6 models but, in the RS6, this is upholstered in Alcantara. It looks good – and feels even better.

Multimedia system ★★★★☆

Audi's flagship MMI Navigation Plus infotainment system and 12.3in Virtual Cockpit come as standard on all versions of the RS6 Avant.

The quality of the graphics and the rate of response to your inputs are, as we've experienced in the past, impressively crisp, but it remains a slightly awkward system to use on the move. The need to apply a fair bit of pressure to garner a response is one drawback, but the need to avert your eyes from the road for longer than you'd like is its greatest issue.

Still, the Virtual Cockpit is impressively configurable and the addition of an RS mode will no doubt appeal to some – even if some testers thought it looked a bit naff.

A £6300 Bang & Olufsen sound system was fitted to our test car as well. It's pricey, certainly, but when set up correctly, it's one of the best car stereos that we've come across.

> “The RS6 Avant lunges off the line with incredible ferocity”

exhaust fitted, the way in which its soundtrack swells into the cabin is akin to listening to a favourite music album from another room. In this sort of car, you'd just prefer to be able to hear it in more detail and at apparently closer range.

The other slight sticking point is that we averaged just 19.5mpg during our time with the car – a figure that dropped to 9.8mpg during performance testing. Allowing for the fact that this engine develops 591bhp and the car weighed 2.2 tonnes on our scales, fairly extreme fuel consumption isn't exactly a surprise. However, it does erode the car's everyday ownership appeal a bit and reveals that Audi's economy-boosting measures will have a rather limited effect should you choose to stretch the car's legs.

And you will – because on summer tyres and a dry track, the Audi's appetite for speed is even more voracious than its need for fuel. The RS6 lunges off the line with incredible ferocity, although it takes a couple of runs and a bit of heat in the tyres to launch it completely cleanly. Initially, the rearward weight transfer as the car springs forward can make the front wheels momentarily scrabble for purchase, but from there on out, the rate at which the Audi accrues pace is nothing short of incredible for a car of its size. Excessive? Probably. Unnecessary? Without question. But, above all else, utterly spectacular.

Our test car hit 60mph from a standstill in an average time of 3.3sec. The run to 100mph, meanwhile, was dispatched in 7.8sec. So it's a match for the M5 up to 60mph, although the lighter BMW pips it by 0.3sec to 100mph. And while the Audi's in-gear performance is certainly strong (30-70mph in fourth took 4.6sec), it's still not quite as quick as the M5's 4.0sec effort. Either way, you'd have a very hard time convincing anyone that the RS6 needed more grunt.

The eight-speed gearbox is well mannered. Aside from a slight tendency to shunt a bit at step-off, it changes gears swiftly and smoothly when up and running. The carbon-ceramic brakes, meanwhile, can be a bit grabby at low speed, but their power and robustness when you really need them is unquestionable, as our braking test results clearly show.

HANDLING AND STABILITY

★★★★☆

Those used to fast front-engined Audis of old might be in for a surprise the first time they steer an RS6 towards a corner. At least, they might if the RS6 is fitted with the coil springs of our test car, which, even with optional winter tyres and standard four-wheel steering, was responsive. (We tested the car on both 'summer' and winter tyres but performance tested it solely on 'summer' ones.)

In the past, the way to make an Audi estate feel really agile would have been to buy an RS4 instead, but at last here's a big Audi wagon with a keenness that takes it from its traditional positioning of being 'fast if a bit inert and uninvolving' to something you really can compare to an M5 or E63 S – although few people would claim that it handles quite as incisively as those rivals.

Unlike either of those competitors, the RS6 can't be placed into rear-wheel-drive mode, nor is its four-wheel drive system as rear biased as those of its major rivals.

It doesn't do precisely what big fast Audis always used to do, which is to understeer a bit on the way in to a corner and then a lot on the way out. Instead, it grips very well on the way in and now can be cornered very neutrally on the way out, thanks to its RS-tuned active rear differential. We're not talking about daft speeds to feel this, either. This is the kind of

● Plentiful grip quells any understeer on the entry to a corner and the car typically remains neutral thereafter, aided by well-tuned four-wheel steering and a clever driveline

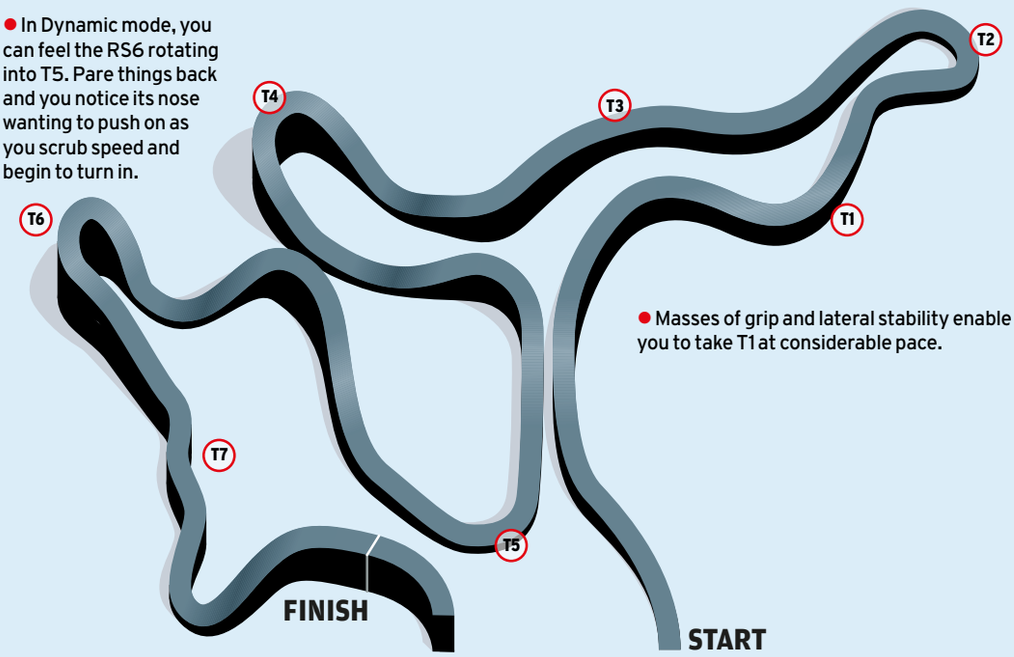
Track notes

One of the first things you appreciate on track in the RS6 is the reduced need to consider its width compared with fast road driving. But even without oncoming traffic to contend with, the Audi still feels really quite large on Millbrook's Hill Route.

That said, its four-wheel steering gives it surprising agility through tighter corners such as T2, but this doesn't come at the expense of perceived stability. Grip levels are tremendous and, although you're aware of its mass during quick, twistier sections of track, body control remains steadfast. This affords the car the ability to carry impressive speed through corners, although you never really shake the feeling that it's more precise, grippy and assured than out-and-out fun.

The RS6's steering is mute but predictable and makes you comfortable quickly, its relatively sedate on-centre response sharpening up naturally as you wind on lock.

● In Dynamic mode, you can feel the RS6 rotating into T5. Pare things back and you notice its nose wanting to push on as you scrub speed and begin to turn in.



● Masses of grip and lateral stability enable you to take T1 at considerable pace.

demeanour you can sense in everyday brisk driving, not track lunacy.

Here, the active rear steer is really nicely judged, too. It's rare that a manufacturer tunes these systems to feel as natural and predictable as Audi has done. You don't end up cornering as if navigating the rim of a 50 pence coin. Rather, you just turn the moderately weighted, slightly soft yet accurate steering and feel the RS6 want to point towards a corner.

Unless, that is, you're on the open road, in which case the rear wheels assist high-speed stability – which, even on winter rubber with some squidge in its tread blocks, is as good as you'd hope for a car with a top speed as high as the Audi's. On proper 'summer' performance rubber, it's very good indeed.

COMFORT AND ISOLATION

★★★★☆

Another trait of previous fast Audis was a certain brittleness to the ride, especially if you screwed up when choosing from the myriad suspension and wheel options.

Well, even on a lowered, steel-sprung chassis with Dynamic Ride Control adaptive dampers and 22in wheels with 30-profile tyres, that's not a criticism that we'd level at the latest RS6, which absorbs most bumps and surface lumps with admirable efficiency.

And because this particular car wasn't air sprung, it also rode without the occasional hollow, echoey 'sproing' that can afflict cars that have a bag for a spring on each corner.

A good portion of our test took place on winter tyres, whose movement in the blocks, designed to find purchase in horrid conditions, undoubtedly gives the car a slightly softer edge than usual. Even on 'summer' performance rubber, though, the RS6 rides with surprising fluidity, dealing with more testing surfaces better than either of its performance rivals from BMW or Mercedes-AMG.

Noise isolation is also first class. It probably helps that Audi's 4.0-litre twin-turbocharged engine is naturally more muted than any comparable AMG unit or even BMW V8, but with low idle, cruising and revving noise, and with a fine-quality sound system, the RS6 is perhaps the easiest-going car in this class.

BUYING AND OWNING

★★★★☆

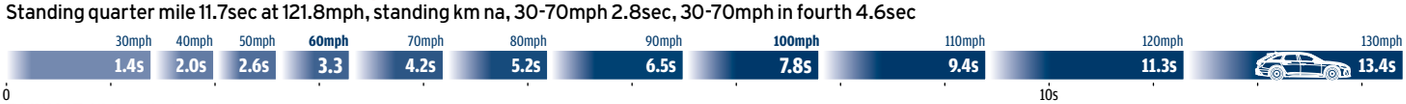
The new RS6 is available in Avant-branded wagon form only, and in four trim levels – the cheapest of which starts at £92,750. That's a lot of money, clearly, but not an exorbitant figure when viewed in the context of the Audi's current competitor set. It's also made to seem more reasonable than it otherwise might in light of the fact that it's roughly what an averagely equipped entry-level Porsche 911 sports car will cost you in 2020. With the first car costing just under £60,000 in 2004, the same comparison could have been made when the first RS6 Avant was launched in the UK.

The new car's trim levels progress upwards from stock RS6 trim, through Carbon Black and Launch Edition versions, to culminate in near fully loaded Vorsprung, for which Audi is asking just shy of £110,000. All cars get four-wheel steering, matrix LED active headlights, fully digital instruments and privacy glass as standard, while the Carbon Black version has slightly different exterior body trim from the glossier Launch Edition and Vorsprung versions. Only with Vorsprung do you get Dynamic Ride Control interlinked suspension, Audi Sport's active exhaust, a premium Bang & Olufsen stereo, a head-up display and a full suite of active driver aids for no extra cost, though. →

ACCELERATION

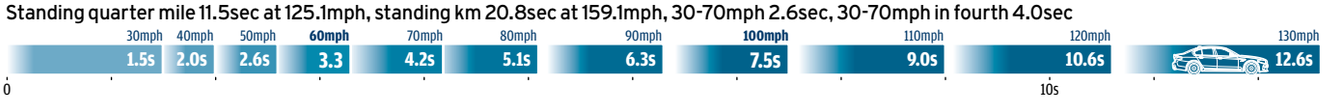
Audi RS6 Avant Carbon Black (9deg C, dry)

Standing quarter mile 11.7sec at 121.8mph, standing km na, 30-70mph 2.8sec, 30-70mph in fourth 4.6sec



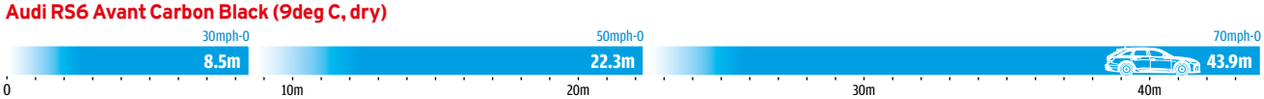
BMW M5 (8deg C, damp)

Standing quarter mile 11.5sec at 125.1mph, standing km 20.8sec at 159.1mph, 30-70mph 2.6sec, 30-70mph in fourth 4.0sec

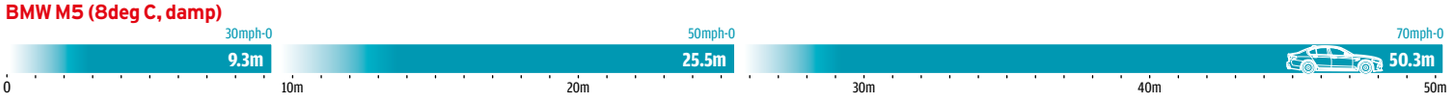


BRAKING 60-0mph: 2.73sec

Audi RS6 Avant Carbon Black (9deg C, dry)



BMW M5 (8deg C, damp)



Data log

AUDI RS6 AVANT CARBON BLACK

On-the-road price	£100,650
Price as tested	£129,815
Value after 3yrs/36k miles	£52,925
Contract hire pcm	£1214.71
Cost per mile	na
Insurance	50E/£1195

TYPICAL PCP QUOTE

Three years/36,000 miles £1297.64

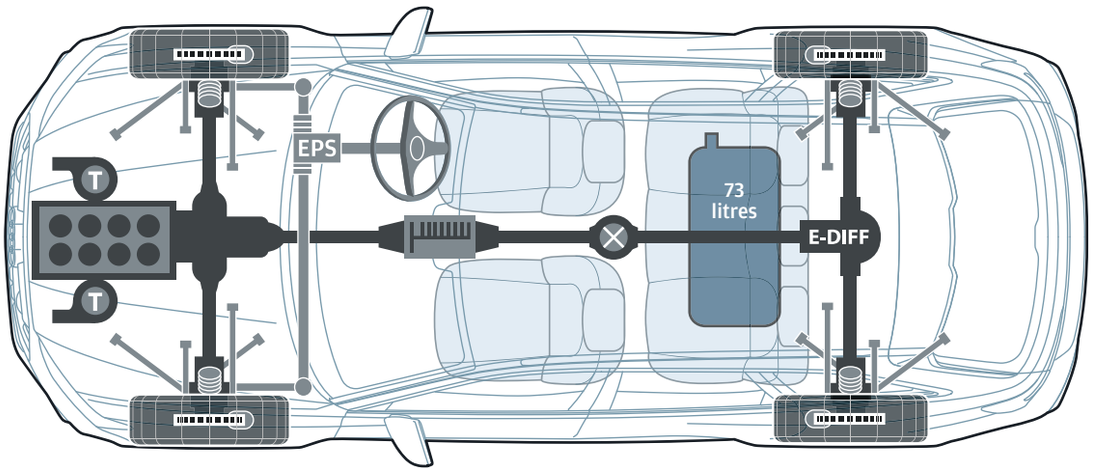
A £10,000 deposit will net you an RS6 Avant on a three-year, 36,000-mile PCP plan for just under £1300 per month. The optional final buyout comes to £49,600. Representative APR is 6.3%.

EQUIPMENT CHECKLIST

22in alloy wheels	■
Four-wheel steering	■
Sport rear differential	■
Matrix LED adaptive headlights	■
Privacy glass	■
Virtual Cockpit digital instruments	■
MMI Navigation Plus touchscreen infotainment system	■
Top speed increased to 189mph	**£1550**
Dynamic Ride Control suspension	**£1300**
Parking assistance pack	**£380**
RS ceramic brakes	**£9700**
RS styling pack, red	**£1970**
Black styling pack	**£300**
Black exterior mirror housings	**£115**
Night vision assist	**£2200**
Alcantara headlining	**£2100**
Bang & Olufsen premium audio	**£6300**
Panoramic glass sunroof	**£1950**
RS active sports exhaust	**£1450**
Head-up display	**£1450**
Power door closure	**£675**

Options in **bold** fitted to test car

■ = Standard na = not available



TECHNICAL LAYOUT

C8-gen RS6 sits on VW Group's MLB-Evo platform, which is shared with everything from the Porsche Cayenne to the Lamborghini Urus. Its 4.0-litre twin-turbo V8 sits up front, its power directed to all four wheels via an eight-speed 'box, a Torsen centre differential and an e-diff at the rear axle. Four-wheel steering is standard, as is 48V mild-hybrid tech. We weighed the RS6 at 2217kg, split 55:45 front to rear.

ENGINE

Installation	Front, longitudinal, four-wheel drive
Type	V8, 3996cc, twin-turbocharged, petrol
Made of	Aluminium block and head
Bore/stroke	86.0mm/86.0mm
Compression ratio	10.0:1
Valve gear	4 per cyl
Power	591bhp at 6000-6250rpm
Torque	590lb ft at 2050-4500rpm
Redline	6500rpm
Power to weight	285bhp per tonne
Torque to weight	284lb ft per tonne
Specific output	148bhp per litre

ECONOMY

TEST MPG	**Track**	9.8mpg
	Touring	32.8mpg
	Average	19.5mpg
CLAIMED	**Low**	13.4mpg
	Mid	21.6mpg
	High	26.2mpg
	Extra high	25.7mpg
	Combined	22.1-22.6mpg
	Tank size	73 litres
	Test range	313 miles

EMISSIONS & TAX

CO_2 emissions	268g/km (NEDC eq)
Tax at 20/40% pcm	£621/£1241

CHASSIS & BODY

Construction	Aluminium/steel monocoque
Weight/as tested	2075kg/2217kg
Drag coefficient	0.35
Wheels	10.5Jx22in
Tyres	285/30 ZR22 101Y, Pirelli P Zero
Spare	Mobility kit

TRANSMISSION

Type 8-spd automatic

Ratios/mph per 1000rpm

1st 4.71/5.7 **2nd** 3.14/8.5 **3rd** 2.11/12.7

4th 1.67/16.0 **5th** 1.29/20.8 **6th** 1.00/26.7

7th 0.84/31.9 **8th** 0.67/40.0

Final drive ratio 3.20:1

SUSPENSION

Front Multi-link, coil springs, interlinked adaptive dampers, anti-roll bar

Rear As above

BRAKES

Front 440mm carbon-ceramic discs

Rear 370mm carbon-ceramic discs

Anti-lock Standard, with brake assist

Handbrake type Electric

Handbrake location Centre console

STEERING

Type	Electromechanical, rack and pinion
Turns lock to lock	2.25
Turning circle	na

SAFETY

ABS, ESC, ACC, high-beam assist, city assist pack

Euro NCAP crash rating 5 stars (Audi A6)

Adult occupant 93% **Child occupant** 85%

Pedestrian protection 81% **Safety assist** 76%

CABIN NOISE

Idle 40dB **Max rpm in 4th gear** 72dB

30mph 58dB **50mph** 61dB **70mph** 66dB

ACCELERATION

MPH	TIME (sec)
0-30	1.4
0-40	2.0
0-50	2.6
0-60	3.3
0-70	4.2
0-80	5.2
0-90	6.5
0-100	7.8
0-110	9.4
0-120	11.3
0-130	13.4
0-140	–
0-150	–
0-160	–

ACCELERATION IN GEAR

mph	2nd	3rd	4th	5th	6th	7th	8th
20-40	1.5	2.3	–	–	–	–	–
30-50	1.3	1.8	2.5	3.6	–	–	–
40-60	–	1.7	2.2	2.8	4.6	7.4	–
50-70	–	1.8	2.2	2.7	3.7	5.6	11.3
60-80	–	1.9	2.2	2.9	3.6	4.7	8.7
70-90	–	–	2.3	3.0	3.8	4.7	7.1
80-100	–	–	2.5	3.1	4.1	5.0	6.7
90-110	–	–	–	3.3	4.3	5.4	7.2
100-120	–	–	–	3.5	4.4	5.8	8.1
120-140	–	–	–	–	–	–	–
140-160	–	–	–	–	–	–	–
160-180	–	–	–	–	–	–	–
180-200	–	–	–	–	–	–	–

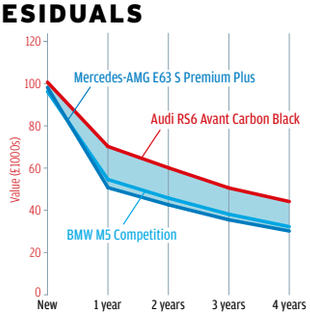
MAX SPEEDS IN GEAR

1. **37mph** 6500rpm
2. **55mph** 6500rpm
3. **82mph** 6500rpm
4. **104mph** 6500rpm
5. **135mph** 6500rpm
6. **173mph** 6500rpm
7. **189mph** 5945rpm
8. **189mph*** 4727rpm

* claimed

RPM in 8th at 70/80mph = 1751/2001

RESIDUALS



● Despite costing more than its rivals when new, the RS6 should retain a greater percentage of its original value.

AUTOCAR ROAD TEST

Read all of our road tests autocarmalaysia.com

VERDICT

★★★★☆

Bigger on luxury and usability than rawness or involvement

Audi Sport's flagship super-estate is now even more devastatingly fast, remorselessly purposeful and more incredible-looking than it ever has been. But while the RS6's altogether more hawkish appearance might hint at a heightened capacity for engaging its driver, this impression isn't fully in sync with the way it drives.

The RS6's unflappable all-weather traction leaves you in awe of its ability to cover ground, but its tight-lipped steering still doesn't do as much to really involve you in the process as rivals might. Meanwhile, the disparity between the slightly muted audible character of its V8 and the volcanic straight-line performance it affords can be puzzling.

The BMW M5 and Mercedes-AMG E63 S are both more thrilling devices for different reasons, although only the latter comes in estate form. But the Audi's luxurious, practical cabin, well-judged ride and overall refinement give it a suitability for everyday use on imperfect roads that neither of its rivals can match.

Being the most usable all-rounder in the class doesn't necessarily equate to class champion. Even so, the appeal of the RS6 remains impossible to deny.

Testers' notes

SIMON DAVIS
Audi Sport considers the RS6 to be its most illustrious model and you can see why. Sure, it suffers from some of the same pitfalls as other RS cars, but its demeanour, pace and aesthetic make it impossible to dislike.

MATT PRIOR
I'm sure there's a sound reason for the light switches to all be separate buttons, but I still prefer a single round dial – especially for dipping to sidelights momentarily to say 'thanks' for giving way.

Spec advice

As long as you like the carbonfibre styling, go for Carbon Black trim. Add an Audi Exclusive paint shade if you're feeling lavish (£3000) as well as DRC suspension (£1300), sports exhaust (£1450) and the comfort and sound pack (£1895).

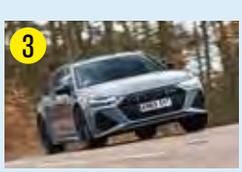
Jobs for the facelift

- Don't lose the proper centre diff: the extra ski-holiday traction on snow it affords over clutch-based 4WD is key for Audi RSs.
- Bring a bit more life and feedback to the steering.
- Although the muted refinement is welcome, it wouldn't hurt for high revs to come with more noise.

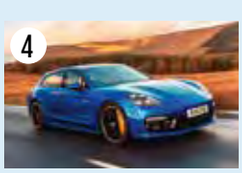
ROAD TEST RIVALS

1 ALPINA B5 BITURBO TOURING
More of a focus on luxury and comfort than inherent track capability but still a hugely entertaining and effective super-estate. Superb.
★★★★½

2 MERCEDES-AMG E63 S 4MATIC+ PREMIUM PLUS ESTATE
Harder and sharper than the Alpina – and more powerful, too. Not as easy to live with, mind.
★★★★½



3 AUDI RS6 AVANT CARBON BLACK
A phenomenal all-rounder. It doesn't engage quite like an Alpina or AMG but is still devastatingly quick.
★★★★☆



4 PORSCHE PANAMERA TURBO S E-HYBRID SPORT TURISMO
Hugely powerful, hugely expensive and, well, huge in general. Quick, but weighty. Electric mode handy in town.
★★★½☆

5 VOLVO V60 T8 TWIN ENGINE POLESTAR ENGINEERED
Nowhere near the other cars here in terms of raw pace, but still sweet to drive. Looks far cheaper in this company, too.
★★★☆☆

	1	2	3	4	5
Price	£91,000	£100,050	£100,650	£142,279	£57,205
Power, torque	599bhp, 590lb ft	604bhp, 627lb ft	591bhp, 590lb ft	671bhp, 627lb ft	400bhp, 494lb ft
0-62mph, top speed	3.7sec, 200mph	3.5sec, 186mph	3.6sec, 189mph (derestricted)	3.4sec, 192mph	4.6sec, 155mph
CO_2, economy	248g/km, 23.5mpg	246g/km, 22.6-23.3mpg	263-268g/km, 22.1-22.6mpg	76g/km, 72.4-74.3mpg	48g/km, 104.5mpg


S GO 162E

NEW AGE TRAVELLERS

Is ‘road to zero’ new car legislation about to consign the grand touring car to the history books? After a couple of days in the company of the latest ultra-modern GTs, **Matt Saunders** thinks not

PHOTOGRAPHY LUC LACEY

Polestar's plug-in hybrid powertrain straddles the technological middle ground

The news out of Whitehall earlier this month seemed very much like the death sentence for the internal combustion engine that so many of us have been dreading, didn't it? And with it there also came a numbering of days for all sorts of vehicle that it's hard to imagine being powered in any other way.

Well, maybe not. Things can change, after all, and where government policy is concerned, they usually do. But if prime minister Johnson's new car electrification plan for 2035, or perhaps 2032, sticks, it's likely to accelerate a global move towards ever more ambitious sustainability legislation, as the AK47 of public opinion gets aimed ever more squarely at the undeserving temple of the traditional piston-engined automobile.

When the shots are finally heard, we must simply hope that they mark an important beginning as well as an end. If there is to be no place at all for internal combustion in new cars sold just 15 years from now, then at least the certainty of that decree ought to give even greater impetus to the development of electric car technology than it has thus far had. It certainly needs to. From what you might call our 20th century legacy perspective, it's hard to fathom how the sheer breadth and variety of the car market as it is today might be supported entirely by batteries and electric motors and so few public charging stations. We must have faith that it won't seem like such a leap in a decade or so.

Tightening our focus in, we must also hope and trust that the classic fast grand touring car will survive the transition. It's one of the oldest automotive types of them all, and one linked inextricably with our very earliest, most formative and most romantic notions of motoring. The GT has done quite well already to survive more than a century of development, containing within that span a couple of world wars, several oil and economic crises and the rise and rise of budget airlines which, in some countries, sprang up as early as the 1970s.

Polestar is a 2+2, and then only for kids

AMG GT 4dr seats four in spacious luxury

The Taycan's rear is also accommodating

In spite of all that, with a long way to go and a short time to get there, plenty of us still choose to travel under our own steam, according to our own schedule and route and in our own company – by car. And for those who do, here's the good news: there is much heart to be found in the very latest ultra-modern fast GT cars, such that the traditions of 600-mile-a-day road trips will continue to be possible, at speed and in style, once we've reached the end of this 'road to zero' glidepath on which we now seem to be set so firmly. A couple of days like those I've just experienced, on the still magnificent and sparsely trafficked Route Napoleon and the surrounding roads of the French Prealps, with a couple of the most →

The Taycan driver sits low down but the cabin has a restrained feel

> “The traditions of 600-mile-a-day trips will continue to be possible, at speed and in style”

Polestar trumps both Porsche and Mercedes for luxury

AMG GT’s cabin is roomiest but feels the most sporting

The Taycan's performance requires a recalibration of what's possible for an EV

The Taycan's digital engine noise synthesis is the first system of its kind I've actually warmed to. It's multi-tonal and sensitive to speed throttle load – think sonorous humpback whale song meets Luke Skywalker's landspeeder.

Electric, plug-in hybrid, petrol: three different takes on the GT theme. And a Renault 4

←wanted, new-age electrified grand tourers for company – and a good combustion-engined fast GT car to provide the necessary context – is all it takes to make you feel significantly better about the future of long-distance motoring.

On our road trip was one of our favourite fast GT cars of the moment: the Mercedes-AMG GT 63 S 4-Door Coupé. A bit of a dinosaur, some might say – and possibly more oil tanker than oil painting, I grant. But as a yardstick of the sheer breadth and varied ability of the modern combustion-engined GT car, to represent everything it can do better, perhaps, than the very height of luxury and elegance it can reach, it takes some beating.

A 630bhp 4.0-litre turbocharged V8 engine mated to an active torque-vectoring four-wheel drive system makes it capable of performance you can call supercar-level without a moment's pause: 0-62mph in 3.2sec, 196mph flat out. The car feels every bit as quick on the road as those figures would imply, but it knows comfort and dynamic versatility just as well. It has a good-sized cabin with four usable doors and the same number of usable adult-sized seats, plus a boot that will swallow a long weekend's luggage for as many passengers without the slightest issue.

As we've reported many times, this car comes bristling with AMG-typical driver appeal and performance character, ready to handle as well as any bigger sports car but also to reach across long →

USED GRAND TOURERS FROM £35K TO £250K

MASERATI QUATTROPORTE SPORT GTS

Early versions got a mixed reception, but incremental improvements resulted in the fine Sport GTS. No more will we see the likes of a naturally aspirated 4.7-litre V8 and expertly judged passive chassis set-up free from electronic trickery. Expect to pay £35k.

PORSCHE PANAMERA TURBO

True, the Panamera Turbo doesn't have the instant push of the Taycan, but it's as good as it gets from a traditionally powered car. Revised models get 513bhp and 516lb ft deployed through a seven-speed PDK transmission that rattles off gearchanges like rapid fire. A bargain at £40k.

FERRARI GTC4 LUSSO

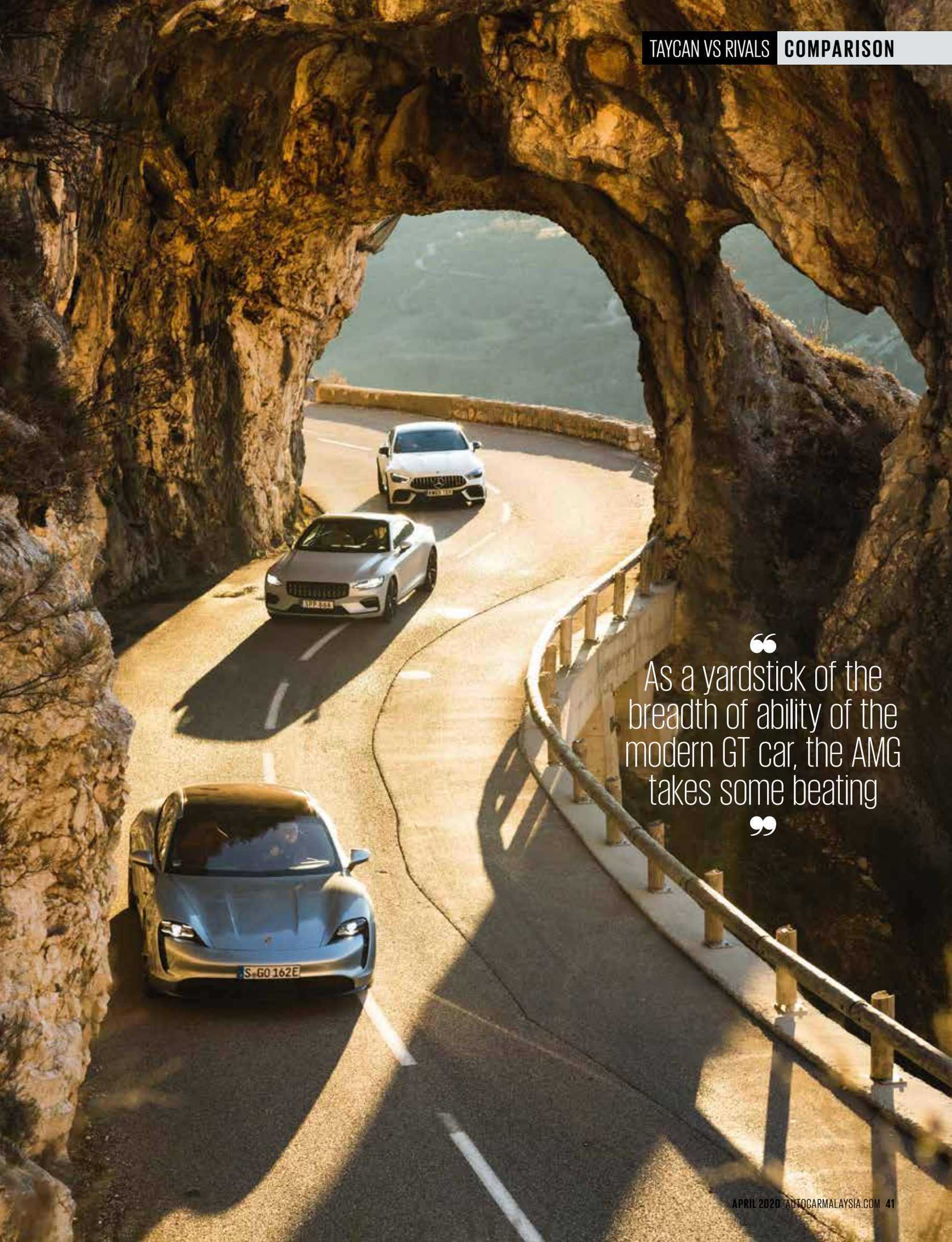
Ferraris with rear seats have always had acceptance issues, but the FF helped break the mould. In GTC4 Lusso form, it's hugely impressive: four-wheel steering, four-wheel drive (sort of), four usable seats and an 800-litre boot, as well as a 680bhp naturally aspirated 6.3-litre V12. Buy from £160k but don't just store it away...

LEXUS LFA

It took two attempts to get it right, but the Lexus LFA was a work of art when it arrived in 2010. Under the carbonfibre body lay an engine that was nothing short of a masterpiece: 4.8 litres, 10 cylinders and 552bhp produced at a redline of 9000rpm. Much like fine art, though, you'll need at least £250k to buy one.

BENTLEY CONTINENTAL GT

We weren't always sure about the W12 Conti, but this latest one has come good. As quick as an Aston and more refined than a Porsche, it enables you to revel in top-level luxury and thrilling 207mph performance. Boomers will love the rotating dash, too. Yours for £150k, or buy an older one from £13k.



> “As a yardstick of the breadth of ability of the modern GT car, the AMG takes some beating”

Taycan's charging needs mean long journeys require more planning

You can turn brake energy regeneration on and off in the Porsche, with brake pedal feel improving a little with it off – but being good either way. Leave it off, though, and you'll struggle to get more than 190 miles of range in mixed use.

←distances in real comfort. And so it is in so many ways the complete any-occasion grand tourer. It comes with a 66-litre petrol tank which, with up to 32mpg possible on a long run, allows you to cover 450 miles between stops – and it can be refilled in less time than it takes your passengers to log into the service station's free wi-fi and check Whatsapp.

That kind of usable range and recharging capability remains well beyond the all-electric GT for now, but not quite so for the plug-in hybrid. To represent the latter, enter the stunning Polestar 1. Its eye-catching design should achieve one of this debut model's intended purposes – which is to invite onlookers to wonder what on earth a Polestar is – with impact to spare.

Underneath the square-set, emphatically proportioned CFRP bodywork lies a 'twincharged' 2.0-litre four-cylinder petrol engine and a trio of electric motors that can combine to make for as much as 591bhp and 738lb ft while also offering four-wheel drive. There's enough battery capacity for a real-world 60-70 miles of zero-emissions running, and then a fuel tank with enough for about 250 miles of 'range-extended' petrol running on the top. The catch? That such a configuration makes the Polestar the heaviest and slowest car of our trio – although, with 62mph coming up from rest in a whisker over four seconds and a 155mph top speed, it's still quick enough to cover ground very nicely indeed when the occasion calls for it. This is a driver's car and no mistake – although it is by no means an ideal one.

Not compared with the remarkable Porsche Taycan Turbo S, whose driving experience we'll come to in a moment. Porsche's first electric car was always unlikely to be any half-measure, and yet wrapping your head around this car's abilities doesn't immediately get much easier after your first test drive than it is while simply attempting to digest the technical breakdown: up to 751bhp and 774lb ft of torque for full-bore launches, 0-62mph in as little as 2.8sec, more than 160mph in full flight, four usable seats and naff all emissions. Reconcile that lot, and all from the same car, if you possibly can.

The range-topping Taycan Turbo S comes with an official WLTP range of between 241 and 256 miles, depending on specification, and it has rapid-charging capability to take its 93kWh battery from 5% charge to 80%, where there is a rapid charger of sufficient power, in less than 23 minutes. As EV owners will tell you, 350kW public chargers remain pretty rare things at present, but as they proliferate on motorway networks, and just off them, around Europe over the next few years, it should be entirely possible to plan 600-mile days in a Taycan in a not-dissimilar fashion to how you plan them in any other GT car.

The question for touring in electric cars, it seems to me, is whether you're happy to be bound to a pre-ordained route and schedule, and to have your journey and experience effectively defined by the nearest rapid chargers along it. If, however, you prefer to simply nurture your adventurous spirit and to point the prow of your car in roughly the right direction – to take the road less travelled as and when you fancy, and to worry about how and where you refuel when the need arises – well, perhaps electric long-distance motoring isn't for you. Perhaps it never will be; time will tell.

Whichever way you prefer to plan your journeys, it will be a while before any electric GT can beat the GT 63 S for ease of use. For straightforward ownership appeal, though, it's the →

AMG GT 4dr marries supercar pace with comfort and agility

> “The Polestar 1 is a driver’s car and no mistake, although it is by no means an ideal one”

Wide grilles cool the petrol engines of Polestar and AMG; Taycan keeps its mouth shut

Polestar is heavy but, with 591bhp, it's far from slow

←Polestar that you'd choose out of this trio, I reckon. It's nowhere near as practical as the Mercedes, with 2+2 seating that would only ever make it a four-seater with younger kids in the second row, and even then over shorter trips only. The layout of the car's power management electronics also means boot space is limited, and there's no chance of loading longer items through into the cabin.

Even so, the Polestar's is a much richer, more pleasant and more luxurious place for two to travel in than is either the AMG's or the Porsche's. Where the Taycan's cabin is bigger on touchscreen technology but is ultimately more restrained and less ornate, and the AMG's is more spacious and more overtly sporting, the Polestar's is the bubble of sophisticated luxury that would make touring an easy pleasure. It juggles comfort, visibility, refinement, perceived quality and sense-of-occasion richness the best of the trio – and to drive, it has all the performance and handling appeal you'd expect in a biggish, expensive GT, although it doesn't reset any preconceptions.

Which is precisely what the Taycan does do, and in all sorts of ways. You wonder, to begin with, how it is that a car that seems reasonably compact on the outside – that seats you so low, that has such a low scuttle and that seems so sporting on the face of things – can possibly weigh 2.3 tonnes. It simply doesn't look like it does. It really doesn't drive like it does, either, but that's the upshot of being seated so low, in among the pouch cells that power the car's twin electric motors rather than on top of them, I suppose. Not to mention simply the result of what happens when you give designers and engineers from Porsche, rather than from any other car maker, a clean-sheet brief to come up with the very best electric driver's car imaginable.

It takes something special to comprehensively out-punch a 630bhp AMG on outright performance and handling dynamism, but the Taycan Turbo S manages to do both on the road. Holy moly, this car is quick. When picking up from low speed, it feels even more breathtaking both for response and outright power than you dare expect it might. This is a car whose throttle you squeeze – and you do so carefully at first.

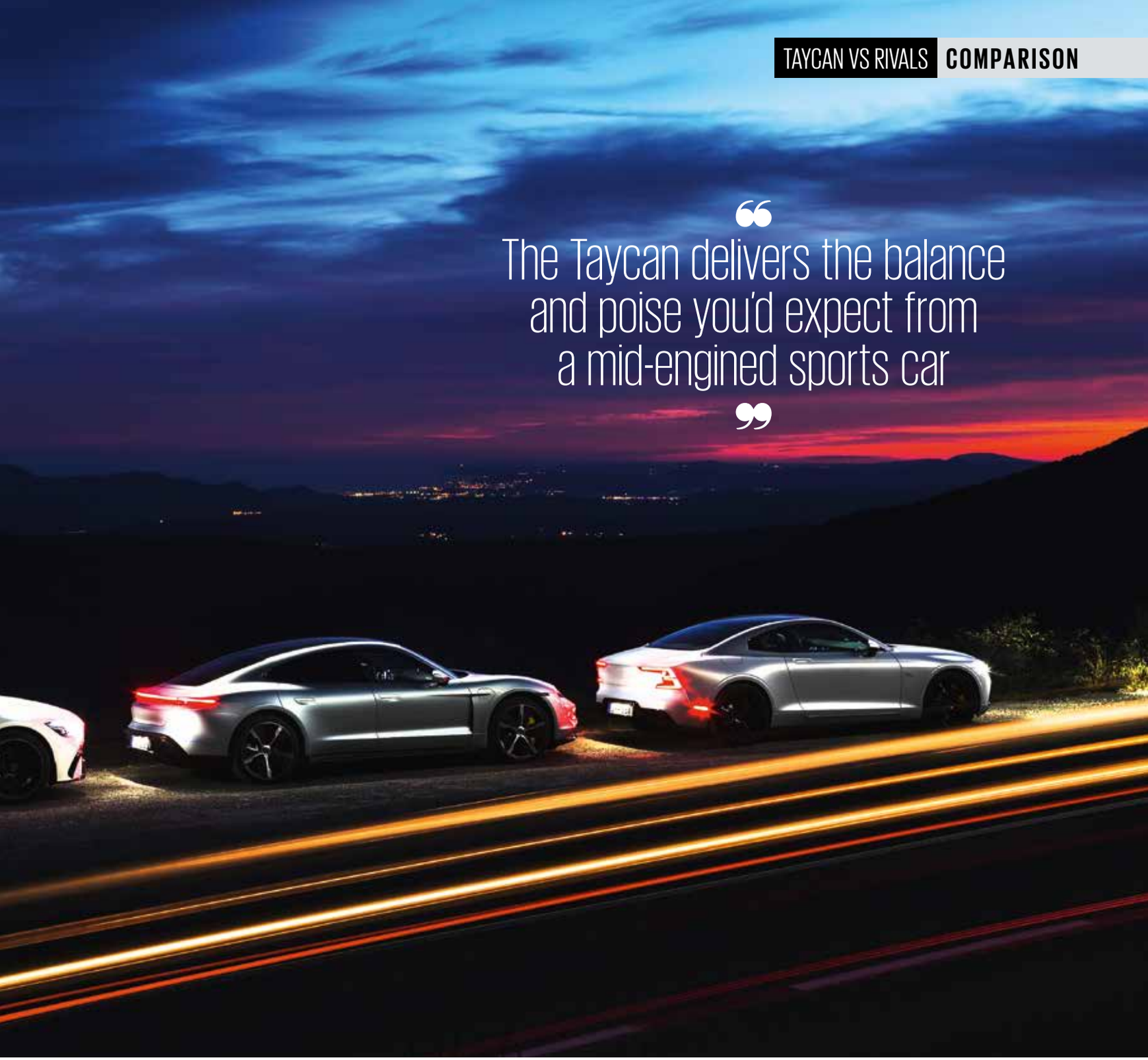
But unlike the other high-end electrically powered offerings that this embryonic market niche has seen hitherto, the Taycan handles every bit as well as it goes – and it stops very well indeed. It steers as well as any Porsche barring perhaps the best GT-department specials. It turns flat, grips hard and contains it body movements tightly, at least until you hit very high speeds. It also manages to deliver the cornering balance and handling poise you would sooner expect from a 1500kg, mid-engined sports car.

So yes, it's driver's car, and a sensational one at that when driven really hard. It's most alike to some next-generation Nissan GT-R than anything else, but with even greater handling poise, tactile feedback and sheer wallop than that would suggest. And that's why, given the option of all three cars to take for one more tilt down a testing road, it's the Taycan I'd pick here and now – and probably again and again. Trying to fathom how it does what it does – and exactly how it can make the GT 63 S, which you might imagine ought to handle better because it is, in fact, 250kg lighter, feel like it's the heavier car – is one of the most superbly bewildering tasks I've had in this job.

None of which makes it a grand tourer, of course, which brings us to the summing up of this exercise with no little complexity to negotiate. The Mercedes-AMG GT 63 S 4-Door Coupé, Polestar 1 and Porsche Taycan Turbo S may all occupy similar notional market territory, but they will appeal for very different reasons, to very different people and for quite different intended purposes.

You might imagine that, with the 'road to zero' picture looking like it does, I'd recommend that someone with the means to be in this particular market should buy the Mercedes now, while they still can, before the public mood and legislative context turns irrevocably against it; the Polestar in a few years, it being an ideal bridge and introduction to an electrified touring

Clockwise, from top right: Polestar, AMG GT and Taycan all have latest touchscreen tech



> The Taycan delivers the balance and poise you'd expect from a mid-engined sports car

future; and the Taycan in perhaps another few years more, when the world is ready to better support owning and charging it.

That sounds like a very reasonable argument. Trouble is, with the memory of all three cars and an epic couple of days now hardened but still fresh in the mind, the Porsche is all I can think about. How on earth does it perform and handle like that? How have they hidden all that weight so well? Could I possibly find a way to make it fit into my life?

Truly great cars have a habit of leaving you thus bewitched and bewildered, stuck for explanations. And GT or not, we can be sure of this much if nothing else: the Porsche Taycan deserves absolutely no less a billing than that.

	PORSCHE TAYCAN TURBO S	POLESTAR 1	MERCEDES-AMG GT 63 S 4MATIC+ PREMIUM PLUS
	The same usability challenges as other EVs but breaks new ground for handling and driver appeal for its breed. Stunning to drive.	Luxury ambience, refinement and driver appeal match stunning looks. A few dynamic limitations but impressive all the same.	Electrified GTs still can't beat petrol's usability and charm. Fast, versatile, rewarding – even if it borders on social unacceptability.
RATING	★★★★½	★★★★☆	★★★★☆
Price	£138,826	£139,000	£145,495
On sale	Now	Now	Now
Engine	2 electric motors	4 cyls in line, 1969cc; 3 electric motors	V8, 3982cc, twin-turbo, petrol
Power	751bhp (during launch control only)	591bhp (total system output)	630bhp at 5550-6500rpm
Torque	774lb ft (during launch control only)	737lb ft (total system output)	664lb ft at 2500-4500rpm
Gearbox	2-spd automatic (r), direct drive (f)	8-spd automatic (f), direct drive (r)	9-spd automatic
Kerb weight	2295kg	2350kg	2045kg
0-62mph	2.8sec	4.2sec	196mph
Top speed	161mph	155mph (governed)	3.2sec
Economy	2.46mpkWh (WLTP combined)	403.5mpg (WLTP combined)	22.1-21.4mpg (WLTP combined)
CO_2 emissions	0g/km (WLTP combined)	15g/km (WLTP combined)	288-299g/km (WLTP combined)
EV range	251 miles (WLTP combined)	78 miles (WLTP combined)	na

OKAY, BOOMER?

Typical Chevrolet Corvette buyers are Americans in their late fifties. Will the radical move to a mid-engined layout for the C8 put them off? **Colin Goodwin** shoots the breeze with an owners' club in Nevada

PHOTOGRAPHY JAMES LIPMAN

The logic in Chevrolet lifting the venerable small-block V8 out of the nose of the Corvette and dropping it behind the seats is easy to understand. The engineers had got as much out of the front-engined, rear-wheel-drive format as they could; if they wanted more performance, especially on the track and in racing, going mid-engined was the logical move.

However, there's also another reason, and a more important one at that. The front-engined sports car is old-fashioned. For those of us who grew up fantasising about owning a Jaguar E-Type, Aston Martin V8 Vantage or Ferrari Daytona, the format is still highly emotional. For younger enthusiasts, though, a sports car is mid-engined (unless it's a Porsche 911). Not so much for its dynamics but for the way it looks.

The Vanquish Vision concept shown at Geneva last year demonstrates that Aston Martin is thinking along similar lines.

It is a risky move, though. The Corvette is mostly bought by baby boomers; what if this change to a mid-engined layout for the C8 puts them off? You can't overnight change your customer base, even if your underlying theory is correct. So what do current Corvette fans think of the C8? Well, there's only one way to know, and that's to ask them.

Welcome to the car park of the Bootleg Italian Bistro in Las Vegas, Nevada. Vegas is where Chevrolet is holding the international launch of the C8 Corvette Stingray; later today, we'll be driving the cars on a road trip out to Lake Mead and the day after to the nearby Spring Mountain race circuit for some track driving. I'm beyond excited.

On this gorgeous sunny Sunday morning, we're joined by a large group of enthusiastic members of the Las Vegas Corvettes Association. Last month, I got in touch with club president Benita Klaizner and asked her if she could get together a group of owners to have a butcher's at the C8 and tell ←

← me what they thought of it.

In the interests of science and for my own enjoyment, I asked Benita if she could manage an example of each Corvette from the formative C1 onwards. Benita is a girl who gets things done, and sure enough we have seven generations of Corvette here, plus a bright yellow C8 brought by the man from Chevrolet. "Is it okay if other members come along?" Benita had asked me. "Of course," I'd answered. "The more the better." And what a fantastic collection of cars we've ended up with here.

I know from experience that the original Corvette isn't particularly dynamic on the road. It would have been unwise back in the day to take on a Porsche or Jaguar in one, but there's no doubting the fact that Dan Crochet's 1958 model is one of the most stylish sports cars ever made.

"I had a 1981 Corvette after I left college but bought this one 22 years ago," says Dan. "I wanted a C2, but my wife loves C1s and twisted my arm. The '58 is the only year that the car had this washboard bonnet and chrome boot straps. Critics at the time said the car was gaudy but, once I realised how special it was, I had to have one.

"It's powered by a 283-cubic-inch [4.6-litre] engine with twin four-barrel carburettors and pushes out 245bhp. The car was restored in 1990, and I take it out at least once a month for a drive up into the mountains."

Dan is interested in the C8, but it's pretty obvious that nothing could take the place of his '58.

Like most of the club members here, Slim Stephens has a long history of →

Boot space causes much more concern than engine location

1958 C1's interior is truly a thing of beauty

BUYING A C8 HERE

The new Corvette is expected to land on our shores, and for the first time with right-hand drive, in early 2021. Ian Allan Motors in Virginia Water, Surrey, is the UK's only official General Motors dealer and has been selling new Corvettes and Camaros for several years. Already it has taken a substantial number of orders for the car, and they're not fantasy orders, either, because I've seen the list of names.

HOW THE C8 DRIVES

Twenty years ago, I would have robbed a bank to have been able to buy myself this new Corvette. Today, though, I don't see the point of owning a very high-performance car, and so I'd be more likely to spend my money on one of these classic Corvettes.

The C8 is, however, pretty much my perfect mid-engined supercar. The small-block V8 has enormous character and is a much more emotive engine than Ford's V8, due, I suspect, to its two-valve combustion chambers. The motor not only sounds fantastic but shakes slightly at tick-over and cranks over with the torque reaction as you hit the throttle.

At the launch event, Chevrolet displayed a cutaway C8 chassis that showed the layout as well as how well the car is put together. Put an Audi or Ferrari badge on the aluminium monocoque and nobody would know.

The new Corvette has a definite Lotus feel to it in the way it both rides and handles. The Nevada roads were smooth but, even so, the C8 felt supple and compliant. On the track, there was a hint of confidence-inspiring understeer on turn-in that reminded me of the Esprit.

About the only part of the C8 that I don't like is the Allegro-style quartic steering wheel (the designers call it a 'squircle'), but I'd get used to that.

When it comes to the UK early next year, the C8 is likely to cost around £80,000 and will be fitted with the Z51 performance upgrade package that's a $5000 (£3810) option on our test car. This is an awful lot of car and performance for such money. But it's more than that: I'd rather have this more characterful car over a McLaren, regardless of price.

Clockwise from front: the C8, C1, C4, C7, C6, C5, C2 and C3

"The C8 has a definite Lotus feel to it in the way it rides and handles"


Goodwin spies the one C8 aspect he dislikes

←Corvette ownership. "I've owned this 1965 C2 Convertible for a couple of years," he explains, "but I worked on it for 10 years when it was with its previous owner. It's got a 327 [5.4-litre] engine with a new cam, a high-rise manifold that I'm about to swap for a Holley EFI system and a four-speed gearbox. I had a big-block '64 coupé in the '60s and then bought a new C3 in 1973."

Like several of the members, Slim is concerned that the C8 won't be as practical as his car, due to its lack of luggage space. Actually, as Chevrolet dealers will no doubt demonstrate to potential owners, you can transfer a C7's full luggage load straight into the C8's front and rear boots.

Originally from Canada, Benita Klaizner is a long-time Corvette owner. She's married to Jim, who slipped the bounds of communist Czechoslovakia in 1972, and the couple own this 2013 C6 Grand Sport 60th Anniversary Convertible as well as a 2015 C7 Stingray that lives at their house in the Czech Republic. They're currently having a 1972 C3 restored as well.

"We've already ordered a C8," says Benita, "and I can't wait for it to arrive. Each Corvette that we've owned has been better than the last. I love the style of the new car, and I'm sure that it's going to be a car to be reckoned with."

Scarlett and Gino Montoya (no relation to Juan Pablo) are here in their 2014 C7 Convertible. Actually, it's Scarlett's. "I was a school teacher, and this car was a retirement present to myself, bought new," she explains. "We've had a C5 and a C6 in the past."

"And I had a '57 fitted with a 409 [6.7-litre] engine that I used to drag race in the '60s," says her husband.

The Montoyas are among those concerned about the luggage space of the C8 but, as discussed, I suspect it won't take much of a salesperson to convert them. "The convertible might prove to be a temptation difficult to resist," says Gino.→


'96 C5 used an all-new V8, breaking a lineage stretching back to '53

THE PANTERA REBORN?

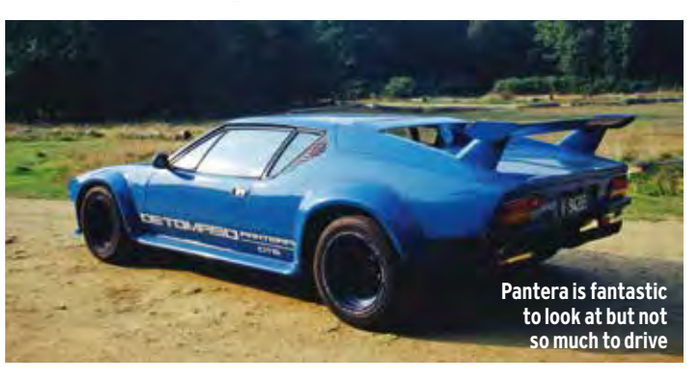
I've not heard of anyone suggesting this, but to me the new Corvette is the De Tomaso Pantera reincarnated. Think about it: an affordable, rock-solid American V8 with an abundance of horsepower that will be cheap to maintain. And even in the worst-case scenario of the engine spreading itself across the road, a replacement wouldn't break the bank.

Plenty of owners had fun with the Pantera's 351-cubic-inch [5.8-litre] Ford Cleveland V8 by fitting Weber downdraft carburettors or just giving it higher-compression pistons and a hotter cam. No doubt America's huge speed shop community will offer a vast array of goodies for the C8.

I loved the Pantera, but my passion waned slightly when I made the mistake of driving one, due to a terrible driving position, poor quality and the fact it isn't particularly fast.

Now it has a successor that follows the formula but executes it to 2020 standards.


Original Corvette was more boulevard cruiser than sports car


Pantera is fantastic to look at but not so much to drive

> It's clear the revolutionary new C8 has already been taken to their bosoms


Ken's Corvette love started at high school


Every generation has offered a convertible

←You can sign up Carl Hastings for a C8 too, but he'll be waiting for second-hand examples to fall within his reach. Meanwhile, he's enjoying his 1990 C4. "I've had this car for 20 years, but I also had an early [1986] C4 before it," he says. "I owned a 1964 327 [5.4-litre] convertible in 1967, but these C4s were the first Corvettes that could get good gas mileage."

If I were Ken Ackeret's local Chevrolet dealer, I'd have him top of my list of potential customers for the C8. Ken's here in his Targa Blue 1972 C3. "The C3 was the first Corvette that I was aware of when I was in high school," he says. "I've owned this 350 [5.7-litre] four-speed car for five years. It has been in the club for most of its life and has been really well looked after."

Ken also has a C5 that he's owned from new. "It's a 2004 model, which makes it one of the last C5s made," he explains. "I've done 216,000 miles in it, and it has been extremely reliable. My wife has a C5 too, and we've also got a 2019 Sebring Orange Grand Sport hard-top."

Of all the classic Corvettes we have here this morning, it's Ken's C3 that appeals to me the most; the one I can imagine owning. As with him, this is the first model of Corvette that I was aware of. The C1 is the most beautiful but would be out of my budget.

The last of our seven generations is Jim Gregorio's C5. Jim has spent the past 42 years working on Corvettes, both at private specialists in Connecticut and for two Chevrolet dealers in Las Vegas. There isn't much he doesn't know about these cars. His own C5 is far from stock, as they say here, with a dry-sump engine and numerous suspension modifications.

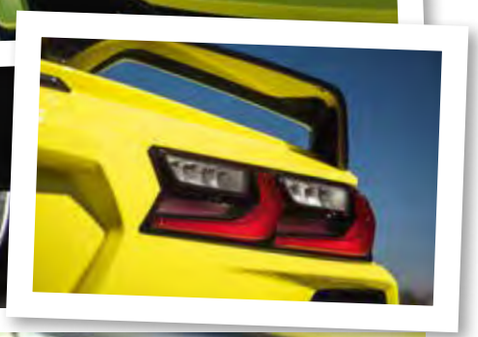
I'm rather impressed by his tyre choice: essentially a slick with one groove cut into it. "Er, yes," he says. "They do have Department of Transportation stamps on them..." I suspect that they're not entirely road legal, but then America is funny about things like that.

While clearly looking forward to getting his hands on a C8, Jim's dream Corvette is a 1967 model that has been given the restomod treatment. "That's getting really popular here," he explains. "An LS7 engine with Z06 suspension would give me the perfect combination of '60s style with modern performance, reliability and handling."

Talking with all the owners of the seven model generations, as well as the other Las Vegas Corvettes Association members, it's clear that the new and revolutionary C8 has already been taken to their bosoms. Some have already ordered theirs and

What goes better with your Burger King than talk of cubic inches?

C8 has a 12.0in digital instrument display and an 8.0in touchscreen



Odd wheel and row of buttons would take some getting used to

THANK CHEVY FOR THAT

The Corvette launch was one of the best I've attended in decades, and not just because I was so excited to drive the car. Not once during the three days did anyone mention connectivity, driver assistance or mobility. Instead, I sat at dinner next to engineers who talked about pistons, crankshaft materials and synchro rings. In a life now full of dull crossovers and lectures on future mobility, it was indescribably refreshing.

others are either waiting for the launch of the convertible or the faster and more extreme versions that are likely to follow.

I'm not at all surprised by their willingness to accept the C8, because it's not the first time that I've witnessed dedicated owners welcome in the new world. Look how readily Rolls-Royce enthusiasts ushered the BMW-produced Phantoms into their fold. Same with Bentley owners and Volkswagen-era cars and traditional Mini owners with the BMW product.

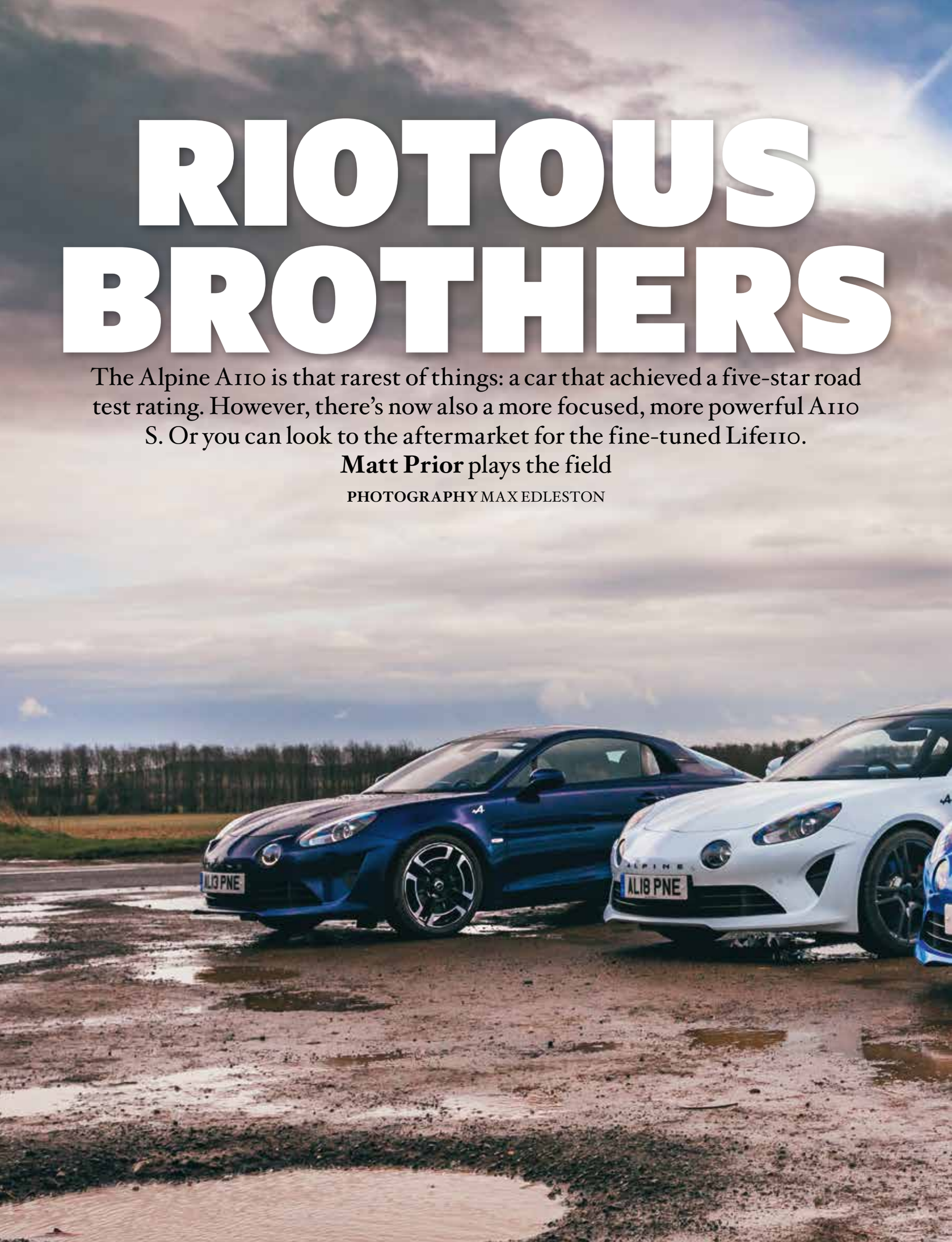
As club president Benita herself proves, the passion for America's sports car runs across many decades, and just because you own a 1972 model, it doesn't mean that you won't like a sixth-generation car or indeed the newcomer. I do suspect, however, that even these committed Corvette enthusiasts would draw the line at a four-cylinder hybrid powertrain... A

The C3 of 1967-82 is the Corvette of Goodwin's dreams

RIOTOUS BROTHERS

The Alpine A110 is that rarest of things: a car that achieved a five-star road test rating. However, there's now also a more focused, more powerful A110 S. Or you can look to the aftermarket for the fine-tuned Lifeı10. **Matt Prior** plays the field

PHOTOGRAPHY MAX EDLESTON



Yes, it's convention to test a group of cars that are differently shaped, but this isn't a normal group test. At least they're a different colour.

What we have here is a five-star car in the shape of the (dark blue) Alpine A110, a slightly flawed but brilliantly refreshing small French two-seat sports car with a bespoke aluminium platform and a Renault Sport engine in its middle to drive its back wheels.

We've said an awful lot about the A110 already but, to recap, it's a revelation. Weighing just 1103kg (in Pure form, or 1123kg as the Légende), it has agility in spades, while the ride over poor surfaces is doubly impressive. What we particularly love about it is its lack of convention; Alpine knows a great driver's car doesn't necessarily need to have incredibly stiff suspension and that not everything has to feel like it was developed on a race track.

However, the white car here is the newer Alpine A110 S, which is definitely not an A110 mark two but a different take on the original; the two are meant to do different things. The S is a more, well, trackish, tied-down, focused version of the A110. Some of the things that the standard car deliberately isn't, in fact.

To that end, it has a bit more power – a 40bhp increase to 288bhp, although torque remains the same, at 236lb ft, because that's the operating limit of the standard dual-clutch automatic gearbox.

A suspension drop puts the S 4mm closer to the ground, stiffens the springs by 50%, stiffens the anti-roll bars by 100%, retunes the dampers and adds 10mm of width to the standard 205/40 front and 235/40 rear tyres.

That said, you can spec the 215/245 rubber on the standard A110 too if you pay for the optional forged wheels (sorry, this test will get a little geekily detailed). →

Life110 changes add £3041 to the price of the standard Alpine

Racing-derived lip is meant to reduce high-speed lift; sports seats are very comfy

Those two would be sufficient on their own to make for a test of which is better in real-world Britain, but you will have also noticed the third car in the pictures: the lighter-blue one. It's owned by, and a project of, David Pook, formerly a Jaguar Land Rover dynamics specialist and now the proprietor of Life110.

Pook will take your standard A110 and can change it, he thinks for the better. And if you thought details were complex already, brace yourself.

On Pook's own car, the dampers are unchanged, but the new Eibach springs are 30% stiffer and the car sits a full 16mm lower. The wheels are 18in Evo Corse items, as used in the Alpine Cup racing series. They can run the standard or 10mm-wider rubber, ideally the latter, and are half-an-inch wider than even those forged Alpine alloys, which effectively stiffens the tyre sidewall for better response and accuracy.

There's a carbonfibre lip spoiler, too, but where it gets really detailed is in the geometry settings. The regular A110 doesn't run very much camber but has lots of range of adjustment, while Pook's investigation found it runs toe-out at the front and toe-in at the rear – a trick usually reserved for front-wheel-drive cars and one of the reasons people have reported the A110 to be borderline for stability at high speeds. Now his car runs toe-in at the front.

You can spec any of the Life110 modifications – geometry (£156), springs (£480), spoiler (£750) and wheels (£1655) – individually, but this car has them all.

But let's begin with the regular A110. The goodness is all there, you know. I've driven it down to our meeting point and had a great early morning blast, even in poor wintry conditions. From there, I head out on a short but testing driving loop that consists mainly of small, heavily cambered and poorly surfaced roads that are, in short, rubbish. And the A110 is enjoyable on those, too. It just turns so ably, smoothening and gliding over surface imperfections. There isn't much you'd pick over it.

Probably not the A110 S in these conditions. There's a reason that Alpine reckons the regular model will outsell the S by three to one (an unusual ratio when it comes to top-spec variants), and it's all about use on roads like these.

The S is a different kind of A110, not a better or worse one. Its ride is more tied-down, no doubt, and with that comes more stability. It's impossible to say precisely how much each mechanical

Standard A110 rolls more than most sports cars, but that's not a bad thing

Life110 is run by ex-JLR dynamics expert David Pook

No modern car is better suited to a British back road


Alpine offers three styles of 18in alloy rim


S gains Dinamica steering wheel sections


A110 has one of the best steering set-ups there is

> “The S has more steering feel, weight and accuracy but also more fidget and conventionality”

modification is responsible for each dynamic characteristic change, but there’s more focus and more steering feel, weight and accuracy. Also more fidget and conventionality, though.

If the regular A110 feels like it was designed with nothing else in mind, the S seems more ‘normal’. If it had come out first, you’d have sworn it had been conceived with a Porsche benchmark in mind. Quicker? Perhaps, but the extra urge is at the top end so, in these conditions and on this road, you don’t notice much of it.

Then there’s the Life110. A halfway house? Yes and no. In some ways, it’s just different again – simply another nuanced option. But in tone, it’s more ‘regular improved’ than ‘S wannabe’.

The ride is ever so slightly firmer than the standard car’s, although not by nearly as much as the S, despite it riding even lower. It’s a shame to lose some of that plushness, but the A110 has plushness to spare and there are big gains to be had elsewhere. The steering is the biggest, with more precision, self-centring and road feel than a regular A110. So the Life110 feels more responsive when you turn and is more composed, while the magic of the regular A110’s agility, plus nearly all of its waft, is retained.

There are conditions, then, in which each variant would be best. I could imagine some big cheeses being presented with all three, having to decide which they ought to sell and saying ‘er, all of them?’.

But if I had access to them all, with the kind of driving I do, I suspect I’d drive the Life110 most, the A110 next often and the A110 S the least – while wondering what Pook’s geometry and wheel but not spring changes would be like on the standard car.

DIEPPE OR STUTTGART?

Given the A110 S feels like a more conventional mid-engined sports car than the regular A110, as if it were developed with a rival in mind, lining it up alongside that rival feels the right thing to do.

Step forward the Porsche 718 Cayman T, the nicest of the turbocharged four-cylinder Caymans. It starts out life as a 2.0-litre model and then gets a load of options that you could throw at the standard car but would cost you more in individual add-on fees if you did.

There’s a limited-slip differential with torque vectoring, active suspension (PASM) with a drop in ride height, active drivetrain mounts and 20in (rather than 18in) alloy wheels. PASM on the Cayman T is 20mm lower, rather than 10mm lower as a usual option, but other than that (plus some decals, fabric door handle loops and barely relevant details), this is a regular car with options.

The Cayman T costs £52,055, which isn’t so far from the £56,810 of the A110 S, although either can come in at around £60,000 once specced up.

Both are terrific cars, especially on smoother roads, and the Alpine feels like it were specifically targeting the Porsche. Despite the extra security and stability over the regular A110, the A110 S still turns more quickly than the Cayman and gives great steering feel while it’s at it. It probably rides better than its German rival, too.

However, the Cayman has terrific reserves of ability and a cornering stance that’s more adjustable on the throttle. There’s a better driving position and a greater sense of all-round solidity, too, plus it comes with a fine manual gearbox (a dual-clutch automatic is an option).

The A110 S probably outnoises it (a slight matter of taste), so this ends up an exceptionally close contest. I would pick the A110 S, just, while remembering that, in truth, if I wanted an A110, the S isn’t the version to have anyway.


Alpine wins for ride, Porsche wins for handling


Prior asks Pook about his toes. Camber, too

DIAMOND CUT

Renault Sport's R26R went down in hot hatch history, but has it been surpassed by its successors? **Matt Prior** gathers the ultimate version of each Mégane RS to see

PHOTOGRAPHY JOHN BRADSHAW


Consensus among hot hatch fans is rare...

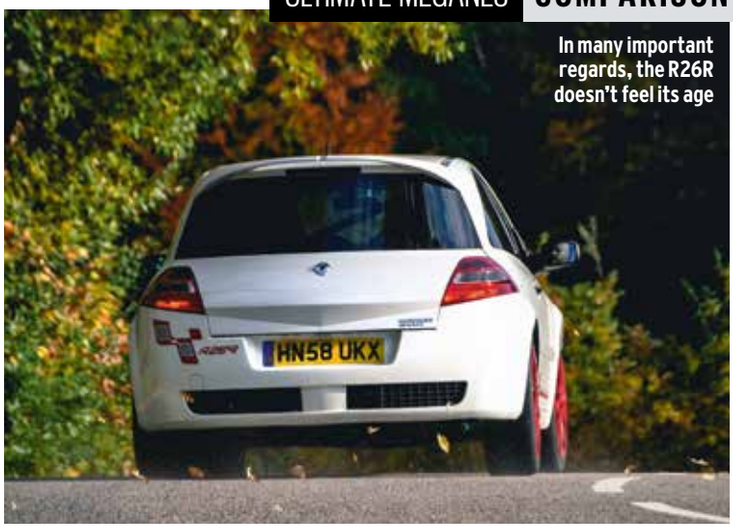
I had always imagined the 275 Trophy-R was the high point of the really hot Renault Mégane model series. I'm not sure why but I remembered it as the high watermark. With its coupé-ish appearance and rock-rigid body, it seemed as modern as today's Mégane does, but with less than 300bhp, it retained the delicacy of old hot hatchbacks.

It's also the only one I drove at the Nürburgring, the track that has made this series of special Renault Sport Méganes famous, because each of the trio set a new lap record for a front-driven production car. That's not any guarantee of greatness, of course, but it helped here, and I always felt that the 275 Trophy-R was the standout among a series of standout cars. Today, though, will tell. We have the three cars in the series together in the same place at the same time. It's a sequence that started in 2008 with a car called the R26R, or R26.R in Renault-speak of the sort that led to the Kia cee'd becoming the Ceed by the time it had passed via sensible sub-editors.

There had been hot Renaults before the R26R. The most bonkers Clio ever had a V6 installed in its middle; there's an amusing 'three-litre Clio' story involving a confused Volkswagen chief, Ferdinand Piëch, attached to that (see p90). And even before that, there were Group B rallying-homologated, mid-engined Renault 5 specials. But the R26R had a different kind of competition in mind and went about succeeding at it in a different way. Renault wanted the Mégane to become the fastest front-wheel-drive production car around the Nordschleife – a feat that, remember, doesn't necessarily make for a great driver's car – so set about throwing 123kg from an already light hatchback, including ditching the rear seats and swapping rear window and tailgate glass for plastic. Thus equipped and riding on optional Toyo track tyres, Renault's tame test driver Vincent Bayle took the R26R around the 'Ring in just 8min 17sec.

There were quite a few production examples of this car built at the old (and new) Alpine factory in Dieppe: 450, of which Renault UK was quite bullish about the prospects of selling in Britain, opting to take 230 of them.

It didn't quite pan out like that. As with the earlier, if anything more special, Ford Racing Puma, the market baulked at the £23,815 (plus another £3000 for the track tyres, roll-cage and titanium exhaust that no R26R should be without) asked for a two-seat Renault, so some of the allocation made its way onto



In many important regards, the R26R doesn't feel its age


Buckets with harnesses are a given


Carbonfibre wheels are a £12k option

Acceleration increased marginally (0-62mph fell by half a second to 6.0sec) as a result of the weight loss, but the lap time came from extra poise, grip and braking.

Some old cars, even future classics, start to feel a bit tired as their bodies fatigue and their suspension bushes soften, but this evidently well-looked-after R26R feels impeccably tight. So although the steering wheel is thin-rimmed and slow-geared by today's standards, it's still exceptionally precise and controls a chassis that generates brilliant grip and poise.

At a test track, it hangs on gamely and resists understeer, including under power, feeding back plenty of splendid road feel while it's at it. Partly that keen line is possible because it makes less power and torque (at 228lb ft) than a truly modern hot hatch. But it also has an ability to damp road lumps, owing to 10% softer springs than the standard R26 (lightness keeps on giving, as Renault recently demonstrated once again so deftly with the Alpine A110), while there's a lovely throttle adjustability that subtly and predictably brings the rear wheels into play in faster cornering. It's three generations old, this car, but it feels every inch as rigid and competent now as I remember it was at the time.

That time, though, wasn't quite so long ago, really. Renault used to launch its super-special version just as time was running out for the model that spawned it, so the R26R set its fast lap and failed to find buyers as recently as 2008 – the same year the Mk3 Mégane was launched.

It took until 2014 for the German Ring Road Special edition of that variant to find its way onto the street in the form of the 275 Trophy-R. More than 80kg was removed from the standard 275's kerb weight, but the measures weren't quite so extreme as the first time (maybe through fear →

101kg
The difference in weight between the R26R and today's 300 Trophy-R.

Renault's internal car scheme on favourable rates and other examples were sold back in France.

Used values, at one point, dropped to the low teens. Sigh. Yes, we probably should have. Now they will cost what they did when they were new, but even at that price, as when new, I think they're worth every penny. To drive one today is to still find a hugely enjoyable hot hatch. Or perhaps 'small coupé' would do it more justice.

With the R26R, Renault set out (and this is a theme it continues) to do more with less. So the 227bhp turbocharged 2.0-litre four-cylinder engine and six-speed manual gearbox came in unchanged from the standard Renault Sport Mégane, which was called the R26.


Eleven years and 69bhp separate these Méganes

The R26R allows you to easily adjust your line with your right foot

500
The total number of 300 Trophy-Rs that will be made. Compare and contrast: in the end, Renault produced more than 12,000 examples of the Clio Williams.

←that market forces would again shun it), so while there were no back seats, there were still glass windows and a strut-brace rather than a half roll-cage. And that meant you could tell your other half you were buying a small van.

The price went up to £36,430, but the UK was allocated just 30 cars. The lap time, set by Laurent Hurgon, dropped to 7min 54.3sec, beating the Seat Leon Cupra 280 by four seconds.

I remember loving it dearly at the time, and while it's no less impressive today, trying it and the R26R back to back reveals that they're not night-and-day different in class in the way I had remembered. I thought I remembered the steering of the R26R being vaguer, but while it's true that the 275 Trophy-R has a weightier, much quicker and more responsive rack, it's actually no more accurate than its predecessor's.

What it does simultaneously do is feel wider, heavier, taller of scuttle and firmer. A lot firmer. Quicker, too, in a straight line – unsurprisingly, given the 44bhp power increase that came with it. But more noteworthy still is the on-or-off nature of the handling; you turn at a corner and the 275 Trophy-R really dives to the apex. Do the same with the throttle off or, if chance allows, with the brakes trailed and the rear wheels are exceptionally but predictably and controllably mobile. While

	RENAULT MÉGANE R26R	RENAULT MÉGANE RS 275 TROPHY-R	RENAULT MÉGANE RS 300 TROPHY-R NÜRBURGRING RECORD EDITION
Price	£26,815 (in 2008, inc. options)	£36,430 (in 2014)	£72,140
Engine	4 cyls in line, 1998cc, turbocharged, petrol	4 cyls in line, 1998cc, turbocharged, petrol	4 cyls in line, 1798cc, turbocharged, petrol
Power	227bhp at 5500rpm	271bhp at 5500rpm	296bhp at 6000rpm
Torque	229 ft at 3000rpm	265 ft at 3000rpm	295 ft at 3200rpm
Gearbox	6-spd manual	6-spd manual	6-spd manual
Kerb weight	1230kg	1280kg	1381kg
Top speed	147mph	158mph	163mph
0-62mph	6.0sec	5.8sec	5.4sec
Fuel economy	27.7mpg (NEDC combined)	37.7mpg (NEDC combined)	35.3mpg (NEDC combined)
CO_2	199g/km (NEDC combined)	174g/km (NEDC combined)	180g/km (NEDC combined)

"There is a fairly natural progression: each is bigger, faster, grippier and yet more responsive to its steering"

FIVE MORE SPECIAL HOT RENAULTS

8 GORDINI
The Gordini version of the 8 taught Renault a few things about selling hot models: it shifted 9000 examples of the rear-engined 'La Gorde' between 1964 and 1970. In rallying, it won three consecutive Tours de Corse.

5 TURBO
A Group 4 special that allowed Renault to go rallying with a mid-engined car, the 5 Turbo had a 1.4-litre motor to drive its rear wheels. A marginally less special version, the Turbo 2, followed once the homologation run was done.

CLIO WILLIAMS
Renault needed to build 2500 Clios with a 2.0-litre engine, the maximum displacement for its rally class. It was brilliant, and Renault could've sold lots more. So it did, adding second and third build phases to the irritation of many Mk1 buyers.

SPORT SPIDER
The first-ever road car to bear Renault Sport badging was the Sport Spider of 1996, a two-seat roadster for which a windscreen was optional. It was fun, but it weighed 930kg and arrived at the same time as the Lotus Elise.

CLIO V6 RS
The original Clio V6 Trophy models were made by TWR, but the second-phase version, introduced in 2001 and much better to drive, was a full-on Renault Sport production from the Dieppe factory in which Alpine is based today.

The 275 Trophy-R possesses fantastic cornering capabilities

Back seats are just unnecessary kilos

300 Trophy-R steers more naturally than its standard siblings

Heritage earned and proudly boasted

6%
The amount – or 29sec – by which Renault has lowered its Nürburgring lap time since the R26R set its record in 2008.

the R26R is relatively delicate and mild-mannered, the 275 Trophy-R is much more brutish and physical.

To that end, it's not unlike three cars we ran in another test featuring a decade-old car: a Porsche 911 GT3 RS from 2010, which lined up alongside a recent 911 GT2 RS. There, as here, the newer car felt all of more rigid, heavier and larger and yet simultaneously more responsive, grippy and accelerative – if not necessarily any more enjoyable.

The 275 Trophy-R isn't the same as a GT2 RS, obviously; there's the small matter of 425bhp between them. But there are similarities between the ultimate Renault Sport line and GT Porsches. And there's no denying that, in the same way that the most powerful new car, the GT2 RS, is the most extreme model, the latest Mégane 300 Trophy-R is similarly the most ballistic and hardcore of all the Renaults.

For the 300 Trophy-R's concept, the same path as with the other two cars here is followed: there are no rear seats, so weight is reduced, and power hasn't been increased. This time, the big weight loss comes from ditching the active rear steering mechanism that makes the standard 300 Trophy such an unpredictable drive, leaving you wondering just how much it'll turn on each steering input and coursing bends like it's outlining a 20p piece.

You'll need a lot of those coins to get one. I wonder if Renault, buoyed by the relative commercial success of the 275 Trophy-R, has overstepped here. I love the 300 Trophy-R dearly – more than most of my colleagues – and, given the depth of engineering changes, I'm happy to explain away its asking price of £51,140.

Add carbonfibre wheels, carbon-ceramic brake discs and a straight-feed air intake to that, though, and you're looking at a price of £72,140, for a car with the Nürburgring Record Pack. Worth it? It depends. I like this car very much even without them, but nothing other than a back-to-back test on the same road will truly reveal what difference the wheels and brakes make to driver feel. But the fact is that it won't go as fast without them. Only 32 examples of the 300 Trophy-R will make their way to the UK, and only two of those will be fitted with the Record Pack.

Either way, by gum it's fast. The lap time has fallen to 7min 45sec but, in a straight line, the gulf between the 275 and 300 feels a strong as between the R26R and the 275. It zaps to the redline with such ferocity that it feels like the clutch is slipping, and there's a real breathiness to it, making more intake noise and less exhaust sound than the 275 – over which it also feels bigger and heavier again. And, in rather sophisticated style, the 300 is exceptionally agile: if you turn in with no power on, it moves around predictably, quickly and controllably (who needs rear-steer?), with a steering system that, at 2.3 turns between locks, is pretty fast, but somewhat distilled like the rest of the car. It's a sports car with more front-end bite than the others, and that lets you lean on it much harder.

The 300 feels softer than the 275, but neither matches the delicacy of the R26R. In this company, that car almost feels an entire class smaller.

So, while each of the three cars in this series is today still in the category of 'thoroughly enjoyable and a bit too quick for the road', there is a fairly natural progression: each is bigger, faster, grippier and yet more responsive to its steering, in the same kind of way that a modern Range Rover leaves a 40-year-old one feeling like a creaky compact car.

Only the R26R isn't that old – and coming as it does with fixed-back seats, harnesses and half a roll-cage, it's just as rigid as it was when it was new, which is still pretty rigid by today's standards. So yes, there are faster Méganes and more expensive Méganes, but I don't think there are such immersive, charming and fun Méganes as the original R26R. A

NORTHERN EXPOSURE

The North Coast 500 has become a magnet for driving enthusiasts, but in summer the route gets congested. Automotive agoraphobic **Mike Duff** takes his chances in winter – in a soft-top Porsche

PHOTOGRAPHY LUC LACEY

Spectacular scenery and feats of civil engineering pepper the NC500

There are plenty of petrol stations on (or near) the route, but also gaps – especially as many of the smaller ones close at night. It's definitely worth planning ahead, especially in something with a smaller range.

Driving the North Coast 500 in the winter was meant to be an adventure, but perhaps not quite as adventurous as this could turn out to be.

We arrive in Inverness with the far north of Scotland under a severe weather warning and conditions bad enough to have earned a name. This is going to be the Porsche Boxster T versus Storm Brendan.

I've never really held with the idea that driving for fun is a seasonal activity, or understood why so many interesting cars get tucked up for the winter. Many of my most memorable journeys have involved miserable weather, introducing another challenge to those of car and road. The minimalist Boxster T is particularly well suited to such an austere adventure, combining almost all of the Boxster's chassis-sharpening options with the basic 296bhp 2.0-litre flat-four turbocharged engine and – in this one – a six-speed manual gearbox.

The other motivation is to experience the North Coast 500 in what should be its purest form. Since it was first branded as such and publicised back in 2015, this coast-hugging 512-mile loop around the historic Scottish counties of Ross, Sutherland and Caithness has become hugely popular and a feature on many automotive bucket lists. But the thousands since drawn to drive and ride it have also created a marked increase in traffic during the summer, sometimes causing congestion on the often narrow, single-track roads and even bad feeling among locals. Hopefully that won't be a problem during an amber weather alert in January.

Heated seats, a wind deflector and beanie allow for top-down motoring

Snowplough foretells the conditions ahead

CALM BEFORE THE STORM

It's an early start from Inverness. Photographer Luc Lacey has done the NC500 before, he and Richard Webber looping it in a Fiat 500 in 2017 on a three-day schedule that he says turned out to be pretty tight. A potential problem already, then, as I've allowed just a day and a half.

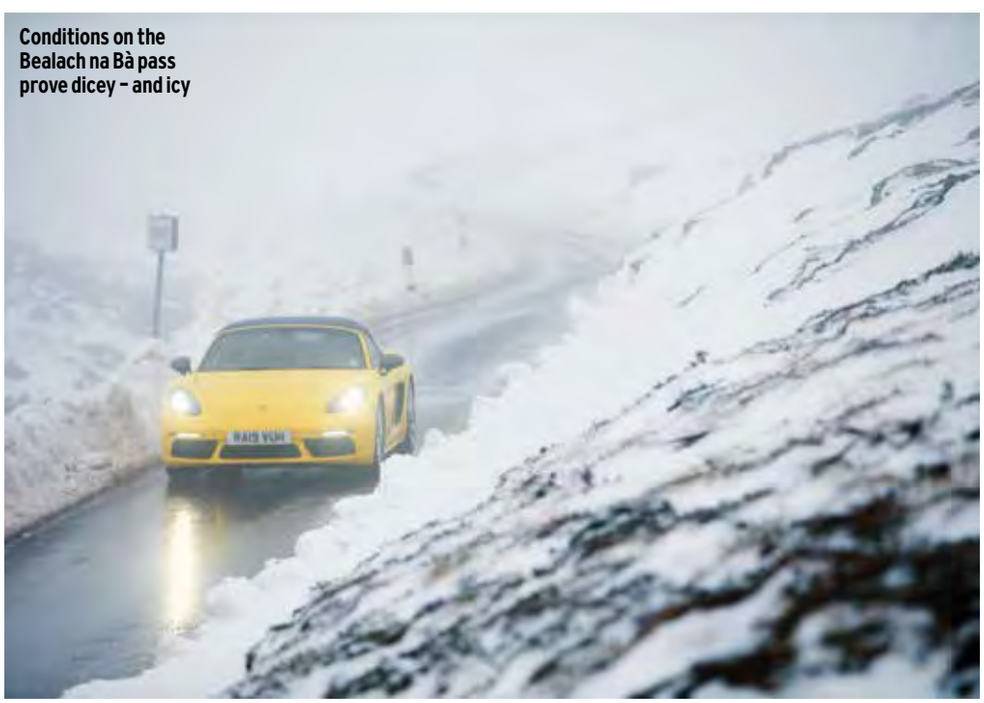
The weather is mild enough to start with the roof down, the Boxster's combination of seat heaters, wind deflector and an effective heater keeping the cabin temperate even with the thermometer reporting 5deg C. The scenery starts gentle – rolling rather than rugged – and with no rain and little wind I'm actually wondering if taking up Porsche's offer to switch the Boxster to winter tyres wasn't excessively cautious.

Tourists tend to stay away in the winter, and for good reason

Muir of Ord is where the climatic adventure starts. Once on the A835 and heading west, traffic drops right off; frequently there are five minutes or even longer before seeing other vehicles. The woods that flank the road start to drop back as we climb into more angular terrain, the sort of Highland scenery chosen for shortbread tins. It's also starting to feel gustier, with some serious steering input required to keep the Boxster on track.

Stopping next to the bleakly beautiful Loch Scaven reveals just how windy it is, and Lacey struggles to stand upright as he fights his →

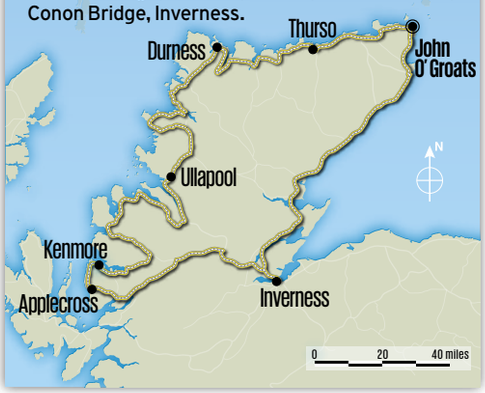
> “It’s starting to feel gustier, with some serious steering input required to keep the Boxster on track”



Conditions on the Bealach na Bà pass prove dicey – and icy

NAVIGATING THE NC500

Navigation is normally made easy by the lack of alternative routes, but sat-nav will try to avoid the NC500’s coastal loops unless you select a destination halfway along them. By plotting the following waypoints into the Porsche’s navigation system, we got it to follow the route almost exactly: Beauly, Muir of Ord, Applecross, Fearnbeg, Gairloch, Ullapool, Clashnessie, Laxford Bridge, Durness, Thurso, John O’ Groats, Conon Bridge, Inverness.



DARREN JONES

> “Doing 50mph in a roadster with a 50mph tailwind turns the cabin perfectly calm”

way to a vantage spot with camera gear. Driving forwards and backwards for pictures delivers the revelation that doing 50mph in a roof-down roadster with a 50mph tailwind turns the cabin almost perfectly calm. It's like being in the eye of a storm, although there is a 100mph buffeting the other way.

Porsche's recent announcement of the 4.0-litre 718 GTS might have thrown the perceived failings of the flat four into sharper relief, but there's still plenty to like about this engine. It never tries to hide the fact it's turbocharged, with a boosty delivery that makes it feel exciting and quicker than it is. But there's also an abundance of mid-range that's well suited to roads such as this, with plenty of immediate urge even cruising in sixth. Past Strathcarron, where the road narrows to one lane with passing places, average speed stays respectable.

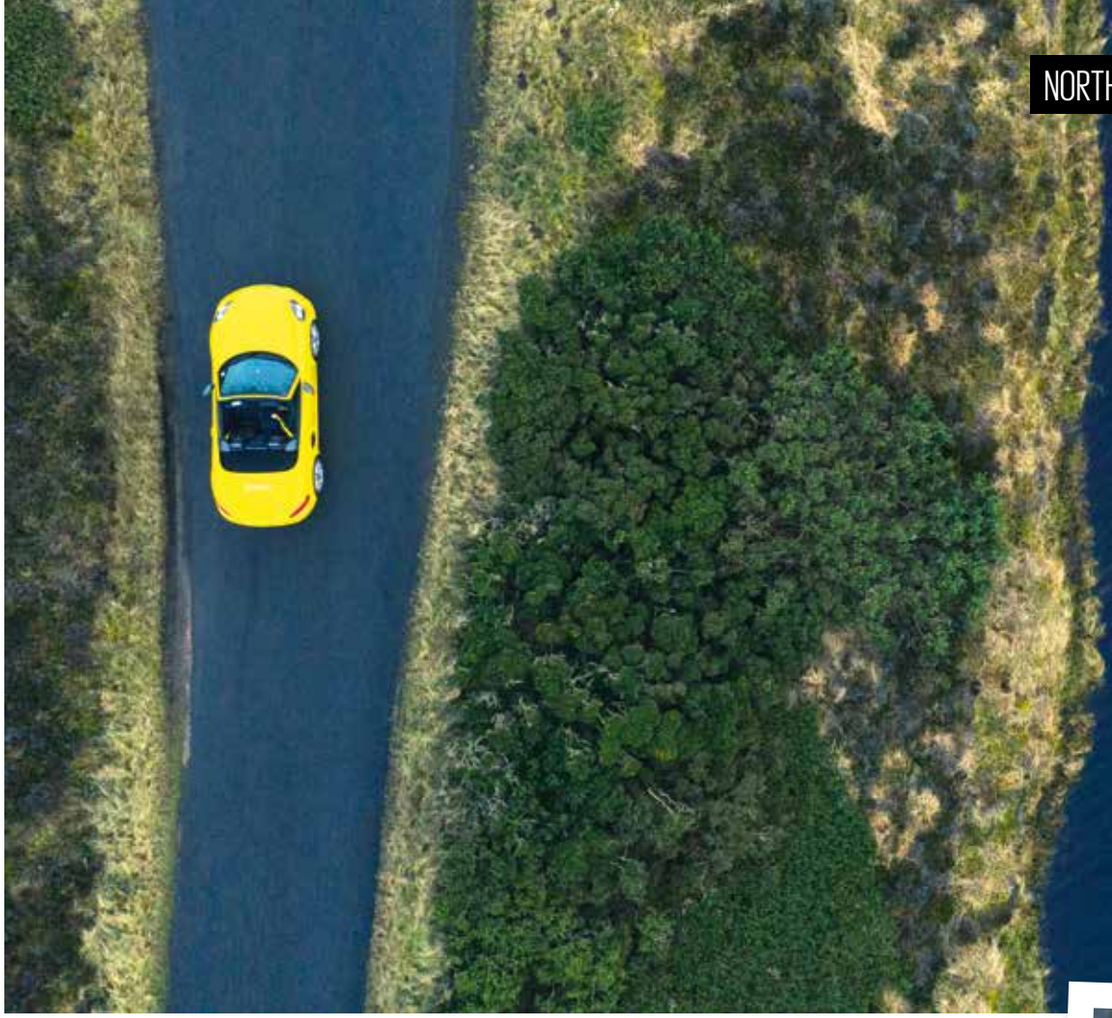
Not for long, though. The weather gets rapidly worse, the rain hard enough to defy the best efforts of the wipers' full monsoon setting to clear the screen and the sky – before 11am – twilight dark. Then at Tornapress it's time to turn off the A896 onto a road that looks more like a driveway than a thoroughfare, and past a sign that reads 'Road Normally Impassable in Winter Conditions'. To emphasise the point, a snowplough appears in the other direction, its driver clearly surprised by the prospect of a bright yellow sports car.

The Highland wildlife poses as much of a hazard as the weather

The grunty, fleet-footed Boxster T is well suited to the rugged terrain

This is the Bealach na Bà, or Pass of the Cattle, which cuts across the mountains of the Applecross peninsula to reach the coast. It was opened in the 19th century and features the steepest ascent of any road in the UK, a 2045ft summit and an impressive crop of Alpine-style hairpins on the way to the top. Normally it's the sort of location on which photographers would happily spend days, but as the Boxster climbs so the angry clouds seem to come down to meet us. Before long we're travelling through a soupy greyness with visibility well under 100 yards. By the time we reach the top we're travelling between tall snowbanks, with the Porsche's stability control light strobing as even the season-appropriate ContiWinterContact tyres struggle to find grip.

Progress is slow and careful, especially on the long descent, and plans for a lunch at Applecross are nixed by the realisation there are now only four and a half hours of daylight left. The Boxster isn't even the most adventurous vehicle to have made



> The storm is still on top of us, savage squalls limiting the view of some of Scotland's finest scenery

← it here today – massive respect to whoever has beaten us here in a Tesla Model 3, which is charging through an extension lead outside the inn.

The storm is still on top of us, the Boxster's cabin snug beneath the fabric roof but with savage squalls and near-horizontal rain limiting the view of what should be some of the finest scenery in Scotland. Inclement-weather drivers often take five or more days for the full NC500, packing it with stops and detours. But in the sodden conditions there's no sense of loss in keeping rolling, covering pretty much every point of the compass on the long loop around Gairloch and Poolewe.

Four hours after leaving the A835 we rejoin it, having covered 160 miles. The direct route would have added just 19 to the odometer. There's a slightly surreal moment shortly afterwards as a Morgan 3 Wheeler appears out of the greyness heading in the other direction, its driver wrapped in layers of weatherproofing. It turns out to be a German journalist doing an even more adventurous Highland drive story, although he is being followed by a Range Rover support car.

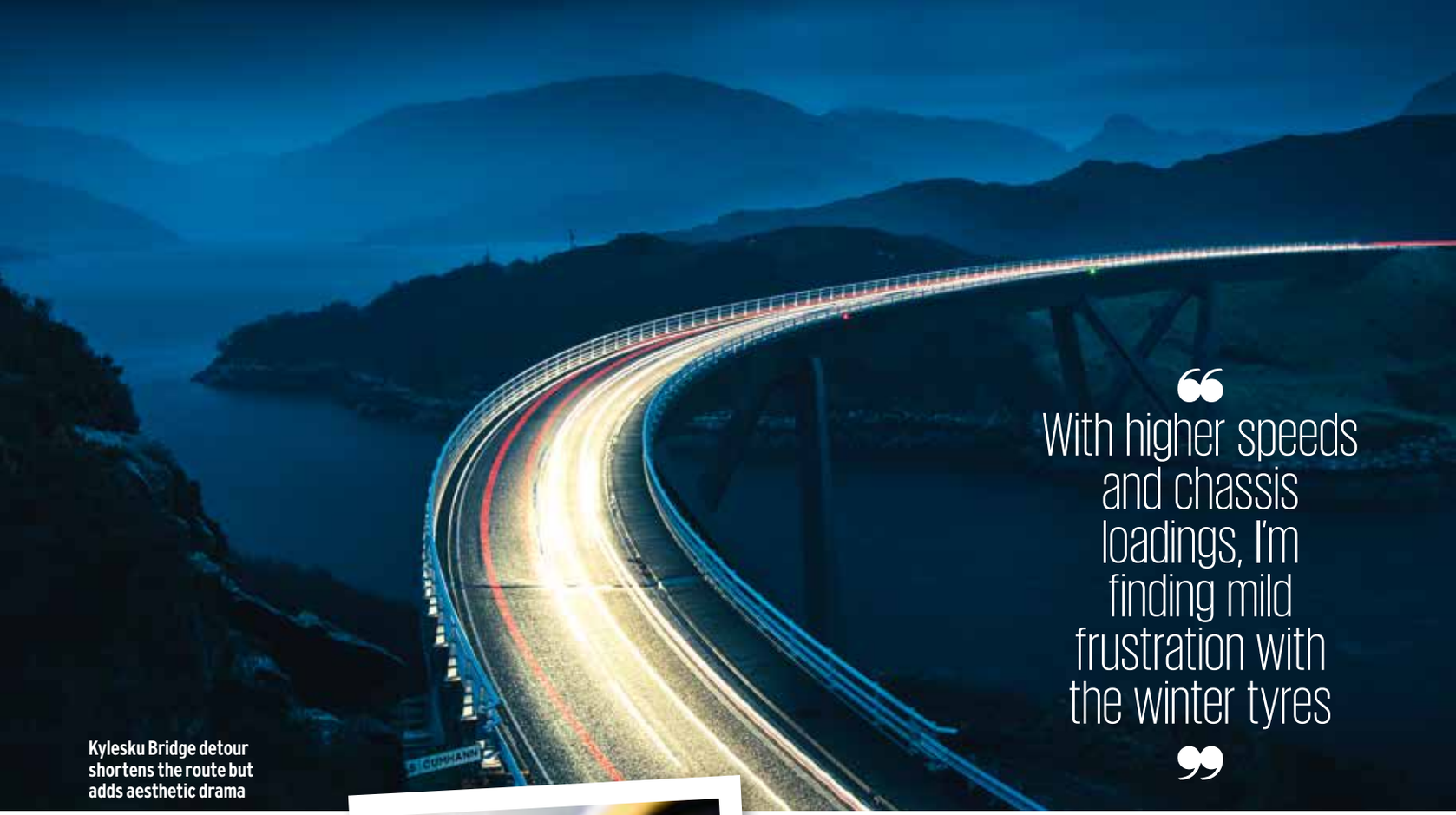
A winter lap of the NC500 means quiet roads but short days

Travelling at dusk in winter brings a substantial risk of meeting some sizeable wildlife. North of Ullapool we saw dozens of deer near the road and a fair number making their way across it.

Thurso offers a welcome stop, with food and fuel for all

Ullapool feels like a big city, with a sizeable CalMac ferry loading for what will doubtless be a storm-tossed run to Stornoway. After 200 miles the Boxster still has nearly half a tank left – the trip computer reporting an impressive 29mpg – but it's still wise to take the opportunity to brim it with super unleaded.

There's no time for more than a rushed sandwich before getting back in the saddle – and facing up to an ethical dilemma. Lacey is keen to take a picture at the spectacular, curved Kylesku Bridge, but following the full NC500 route to get there means another coastal detour past Lochinver, meaning it will be night when we reach the bridge. We opt to cut the loop out, saving 25 miles and an hour's travelling but turning this into the NC475. On the plus side there's still enough grey light when we reach the bridge for Lacey to take a spectacular shot lit by the Boxster's headlights. →



Kylesku Bridge detour shortens the route but adds aesthetic drama

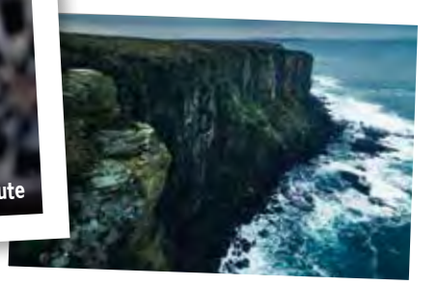
> “With higher speeds and chassis loadings, I’m finding mild frustration with the winter tyres”

But now we’re out of light and – to no great surprise – it is raining hard again. The rough plan called for us to be considerably farther around the route before stopping, meaning a cautious drive north over an A-road that lacks cat’s eyes or painted markings, and is barely discernible from the moorland it traverses. Out-of-season accommodation in Durness turns out to be limited and, after a (brief) debate about staying in a backpacker’s hostel, we opt to push on for another two hours to get to Thurso. I know from previous trips that the bleak northern coastline is frequently spectacular, but we don’t see any of it beyond the blackness.

Thurso is short on frills but provides everything we need: dinner, bed, breakfast and another tank of 98 octane for the Boxster. As dawn breaks we’re already rolling, heading for a stop that isn’t on the official NC500 route but which is well worth a brief diversion. Dunnet Head, about five miles off the A836, is the northernmost point on the British mainland and one of the most bleakly beautiful spots I know. Early on a cold Thursday morning we have it to ourselves – the lighthouse is unmanned – with clear views across the savage-looking sea to Orkney. There’s another, briefer, pause at John O’ Groats, more famous than Dunnet Head because of its greater distance from Land’s End but with considerably less rugged charm.

This leaves only the small matter of returning to Inverness, with the NC500 following the A99 and A9 down the east coast. It is still handsome country, but the views are less distracting than yesterday’s and the roads are wider, faster and better-sighted. With higher speeds and chassis loadings, I’m finding mild frustration with the winter tyres for the first time – they definitely take the edge off the Boxster’s normally searing front-end responses. There’s also the novelty of other road users, the Porsche’s overtaking pace tested by a succession of lumbering trucks.

End-of-life oil rigs mark the end of the route



Boxster’s roof salutes Dunnet Head, Britain’s northernmost point

John O’ Groats is an essential if clichéd stop on the NC500

The speed of the Boxster’s roof operation – and the ability to operate it while rolling at low speeds – makes it brilliant for dodging showers. Across two days it was raised and lowered more than 20 times.

There’s a final stop at Invergordon to take in an impressive view, if not exactly a scenic one, of a dozen or so oil rigs in the Cromarty Firth waiting to be scrapped. Scotland’s energy business is shifting fast – we caught distant glimpses of one of Europe’s biggest offshore wind farms farther north; maybe next time this drive will be in an EV running on locally harvested electrons.

The shadow of the spectacular Kessock Bridge seems like a good place for an end-of-journey shot, across the water from Inverness but with the Porsche showing off its salt-encrusted flanks. Although an unlikely choice for a drive through a storm, the Boxster T has acquitted itself brilliantly – even when the weather has allowed few chances to demonstrate much of its performance or dynamic talent. It’s proof that rain doesn’t need to stop play. This hasn’t been a particularly glamorous loop of the North Coast 500, and certainly not a leisurely one, but it has been a proper adventure.

NORTH COAST 500 ALTERNATIVES

BEACH-RIDDLED COASTLINES, Tolkienesque terrain and charming waypoints linked by fantastic roads. For the most part, the North Coast 500 is all of those things. But its runaway popularity, in the summer months at least, means roads used to hosting more cows than cars have become busy with drivers, riders (both pedal and petrol-powered), caravanners and campers, each with different paces and priorities. And that's not all: single-track stretches regularly cork the bottle, some of the roads and landscapes are pretty ordinary and the route is arguably too long. But fret not, for there are countless undiscovered circuits for you to enjoy. Here are our favourites, each paired with the perfect set of wheels.

Scottish Borders 55

LOTUS EVORA GT410 SPORT

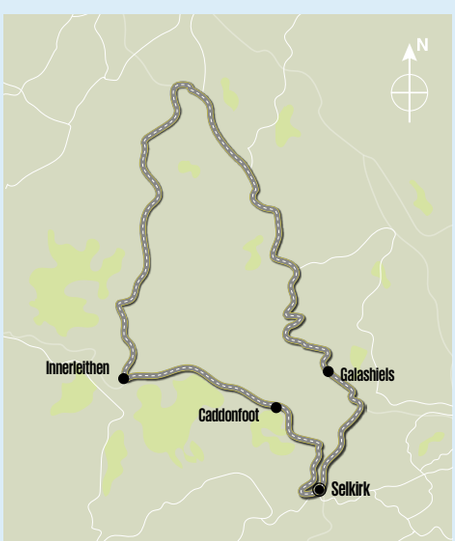
Few relish their daily commute, but the familiarity of a decade spent shuttling between Edinburgh and the Scottish Borders resoundingly failed to breed my contempt. This compact but varied loop explains why, and the GT410 Sport's dynamic versatility makes the ideal companion.

We begin in Selkirk beneath Sir Walter Scott's statue then follow a lazy hillside meander above the equally mellow River Tweed before passing Scott's baronial pile of Abbotsford and turning north at Galashiels.

This stretch of the A7 is exceptionally quiet and undeveloped for a single-digit A-road – and even quieter since the opening of the Borders Railway in 2015. The soft, rolling, agricultural terrain synonymous with the region yields swift, easy radiuses and well-sighted straights where the supercharged V6's ready throttle, heady punch and raucous yammer would delight.

I'd take the Evora in optional touring spec for gentler Bilstein dampers and Michelin Pilot Sport 4S rubber to better suit the next section, which is tighter, rougher and wilder. After briefly entering Midlothian we break onto the skinny B7007 that quickly snakes up the Moorfoot Hills for panoramic views across Edinburgh and beyond, before disappearing southward into a cosy valley that's more akin to Highland terrain.

The frost-crumbled Tarmac would barely bother the Evora, allowing full enjoyment of its direct steering and obliging chassis on the sharp corners that squiggle beside Leithen Water. It's an imperfect, real-world back-road treat.



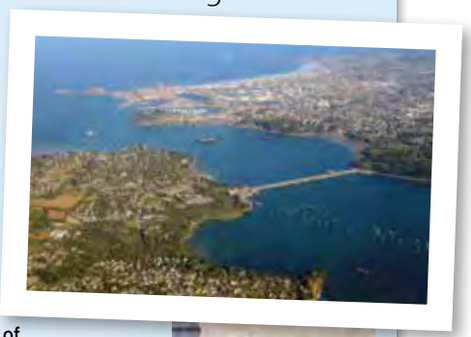
DARREN JONES

At Innerleithen it's left onto the A72 (not before an ice-cream at Caldwell's) for another languid Tweed-side stint. The main road peels from the river at Caddonfoot, allowing a final indulgence on the ducking, diving and downright beautiful A707.

Past the idyllic Yair House, a string of flowing uphill chicanes leads into a slippery, canopied section with a nasty tightening left before the intriguing remains of the Bernat Klein Studio peak through the trees. Then it's back into Selkirk to finish – or repeat. **RICHARD WEBBER**

The Brittany There and Back Again

CITROEN 2CV



Can a loop be a loop if you use the same road there and back? Of course, given you use the other side of the road for the return. It's just a rather narrow loop. And, in my case, short, at just 7.6 miles all in. And I've only done it in a Citroën 2CV, but it meant everything to me.

Living in the claustrophobic confines of Jersey, my father bought a tiny cottage in Brittany where we'd spend our summers and said 2CV lived. Each morning one of us would take the 2CV to the boulangerie to get bread. And save one junction, the idea was to do the whole trip flat. The only problem was a corner by a big house. It was easy on the way home because it was slightly uphill; on the way there it required more courage than I had. Both brothers reckoned they'd done it flat. I never did. And nor, I am sure, did they. **ANDREW FRANKEL**

Peak District Pass Master

ARIEL NOMAD

Doing this job for what is approaching two decades has taken me a long way in search of great backdrops for worthy cars many times, so I was delighted to find some comparably epic, scenic roads closer to my Midlands home. To those who've never discovered it, I humbly commend the Peak District.

My route isn't quite a loop but is none the poorer for it. It joins up several well-known passes between Yorkshire and Lancashire, on the lovely lower back of the UK: Woodhead, Snake, Cat and Fiddle. Who doesn't want to drive those?

Start on the Woodhead (A616) at Midhopestones and head south on the winding Mortimer Road past the superbly named village of Wigtwizzle. When you hit the Snake Pass (A57), head west to Glossop then south via main roads to Buxton, ending up on the Cat and Fiddle Pass (A537) running west again towards Macclesfield. Then, if you've time, turn around to explore the roads around Warslow and Hulme End to the south-east.

You could do it all in a longish spring day. There are one or two speed cameras and it's narrow in places, so you won't want to do it in anything wide or fast. And you want a widescreen view. I'd pick an Ariel Nomad, and perhaps a good coat and some thick gloves. **MATT SAUNDERS**

The South Hams 40

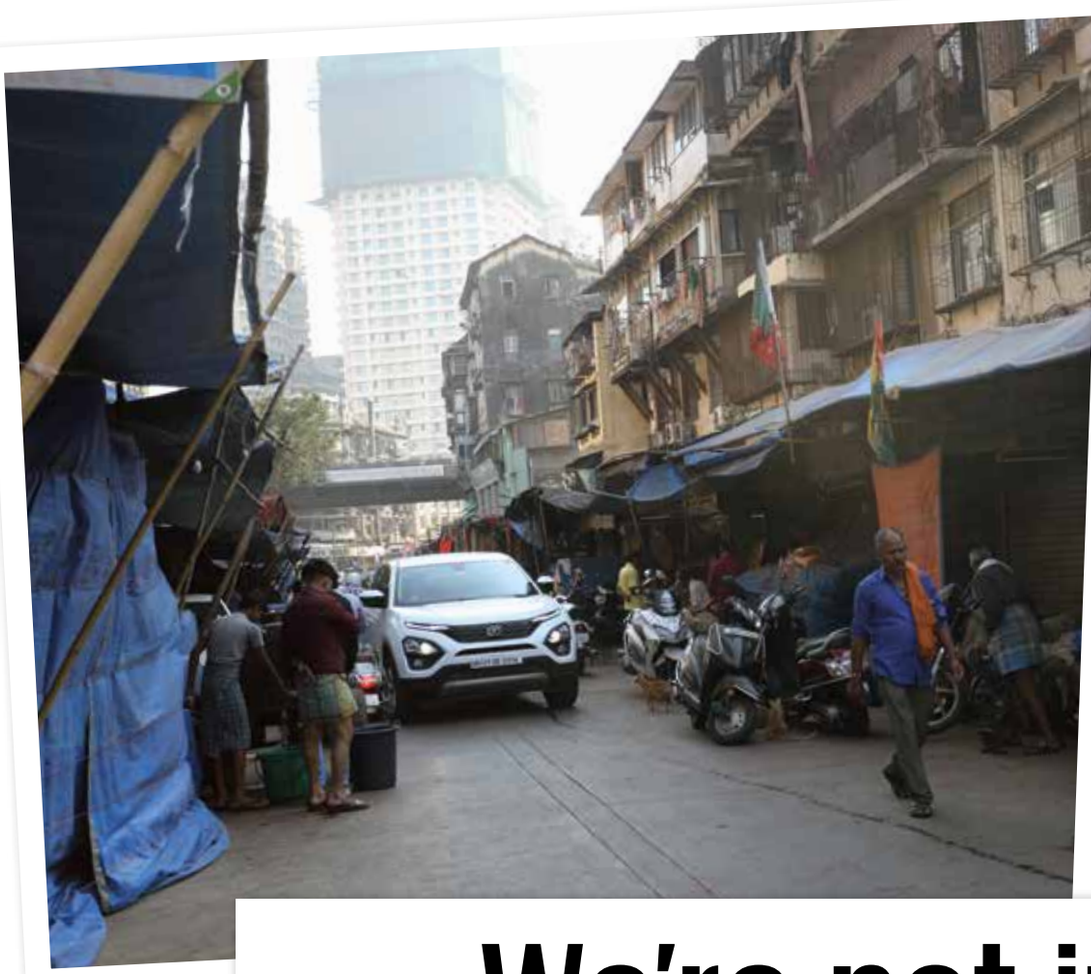
VOLKSWAGEN UP GTI

My formative driving years were spent in Devon, so I'm heading there for a loop that plunges through the heart of the picturesque South Hams.

Start by heading west on the A379 from Plymouth, following it through the pretty market village of Modbury, the other side of which is a quick right-left-right kink with a wicked depression that, in my mind's eye, has always made it a mini Eau Rouge (watch the dry stone wall on the exit).

From there it rollercoasters its way to Churchstow, where you hang a left onto the A381 and its heart-lifting elevation. Next it's the bohemian delights of Totnes, after which you head east along Plymouth Road to Avonwick, where the fast and flowing A3121 funnels you back onto the A379 at Ermington.

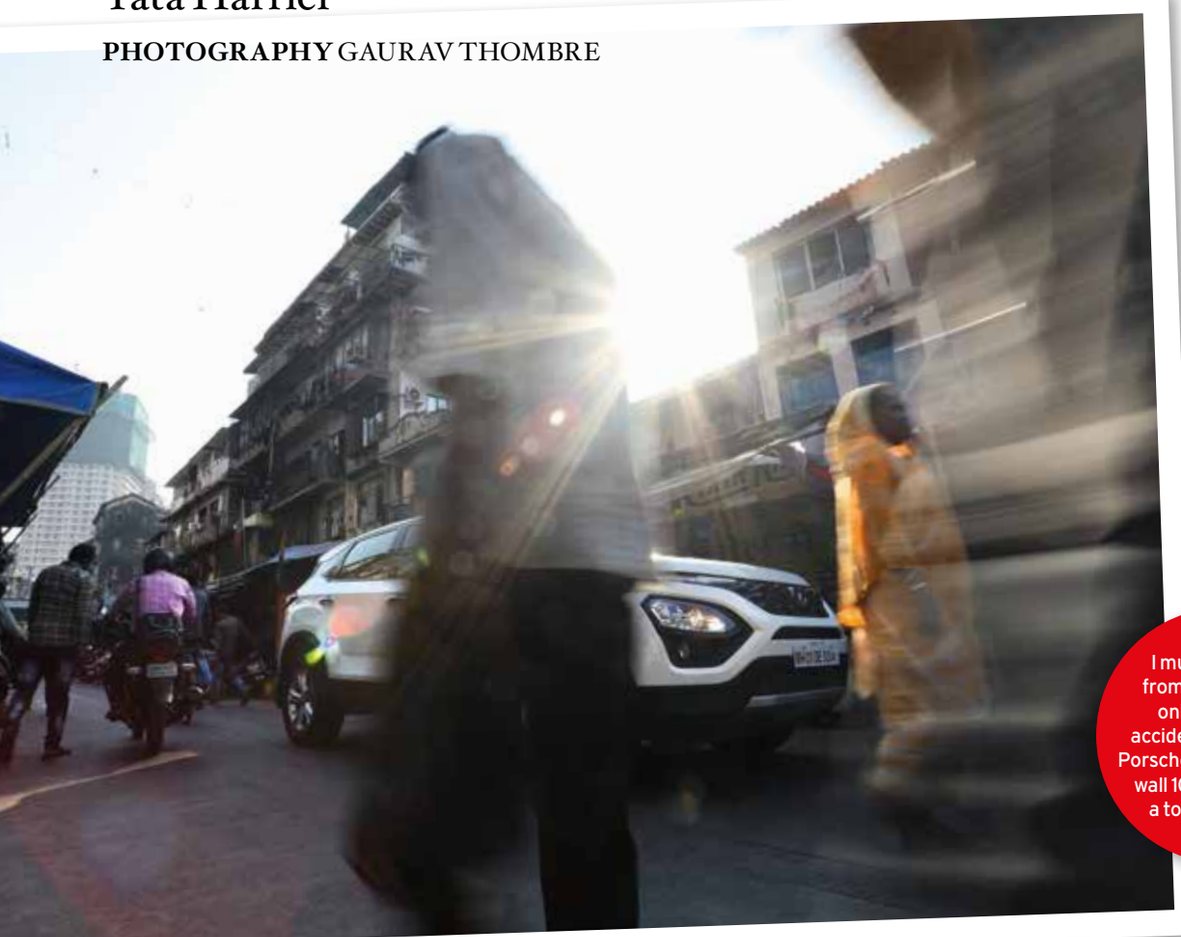
The car? Well, a blast along these typically high-hedged and sinuous Devonshire byways fills me with nostalgia for the lightly modded 1979 Mini 1000 of my youth, so a modern-day equivalent such as the Volkswagen Up GTI should do the trick. **JAMES DISDALE**



We're not in Coventry any more

Land Rover's Indian owner has borrowed parts for an SUV of its own. **Mark Tisshaw** takes on manic Mumbai in the Tata Harrier

PHOTOGRAPHY GAURAV THOMBRE



"What does everyone in the UK make of Jaguar Land Rover being owned by an Indian company?" This is a question that was asked a few times on my trip to India, and my reply was always the same: "It's not something that anyone really thinks about or is bothered by, to be honest."

British car companies have always enjoyed their best days under foreign ownership and, given that history, the fact that JLR is foreign-owned (as are Bentley, Rolls-Royce, McLaren, Lotus, Aston Martin and now even Morgan) hardly even registers. While an Indian conglomerate owning JLR was a headline back in 2008, it's still considered as British as Tetley tea.

Tata has been a very good owner for JLR. Despite the troubles of the past couple of years, the overall story since the conglomerate took over is pretty much one of exponential success. In its first full financial year under Tata ownership, 2009-10, JLR sold 208,000 cars. By 2018-19, that had increased to 578,000 cars. Tata backed JLR, gave it the capital to succeed and left the management to get on with it. And, with Land Rover in particular, it has had a happy knack of making the right car at the right time – best seen with the Range Rover Evoque.

JLR has done plenty for Tata, too. For a long time, that was typically seen through revenues and profits – and lots of them. But now, despite the huge price and positioning gap between the Tata brand in its native India and Jaguar and Land Rover around the world, some proper JLR hardware has made it over to India to be used on a Tata model.

That model is the Harrier, Tata's new flagship SUV. Underpinning it is a Tata version of the Land Rover D8 platform, which was used for the Discovery Sport until that car's update last year. Tata calls its platform Omega.

The two architectures share hard points and a fundamental design, but in going from D8 to Omega, plenty of changes were made to allow the Harrier to be sold in India at a price that works for a Tata and using locally sourced parts. That's not just through material changes but also through updating the rear suspension design, for example.

This is something that's becoming more common in India. For instance, the MQB A0 platform that underpins the Volkswagen Group's small cars in Europe has been remade in India using 95% local parts to ensure it can be sold at the right price. Whereas 'decontenting' was the word before, now it's very much 'rebuilding'. You're still making a sandwich, just you're using plain white loaf instead of fancy artisan bread.

That said, there's one big change from Land Rover to Tata: the loss of four-wheel drive. While the Harrier's underpinnings may be derived from Land Rover, its diesel engine and manual gearbox both come from Jeep, and repackaging them to fit the four-wheel drive system would be too costly, leaving only the front wheels to be driven by the diesel-and-manual combination.

Not that four-wheel drive is missed where I'm driving it: downtown Mumbai in Friday morning rush-hour traffic. As soon as you get off the plane and into a taxi in India, you know you're a long way from home in the context of driving. I'd arrived there on Monday morning, so I'd had a week wide-eyed and clenching my bottom in the passenger seat to see what I was in for.

A four-lane road? Try six or seven cars wide using the space, with bikes weaving in-between. And typically then at least one car or bike coming the wrong way towards you. Oh, and if you're driving at night, don't expect them to have any lights on.

Then there are the pedestrians: just walking out, zipping in and out of traffic like they're actors performing in a hazard perception test with little regard for their own safety. There are stray dogs, too. Not to mention terrible road conditions and the horn being used →

I must share this from Delhi: we saw only one major accident, and it was a Porsche 911, stuck in the wall 100 metres past a toll booth. Doh!

by everyone several times a minute. If you've ever driven in Naples, which is about as extreme as Europe gets, quadruple the intensity of that experience and you're still not there.

Not the ideal location to test a car, then. Yet it's a much calmer place at dawn, as I meet colleagues from Autocar India who have readied the Harrier for us. Mumbai is serene and beautiful in the early morning light, and this is the only real time you can get on the road if you want to move at more than about 10mph or have the chance to get out of second gear.

So I don't spend too long looking at the Harrier before it's straight to our first destination. Even on this short drive, I find a reassuring familiarity about the Harrier. Some of the switchgear and even the fonts used on the instrument screen and other controls are straight out of the Land Rover parts bin (and why not?), while the perceived quality is good for a car priced from the equivalent of around £13,500 (less than half of what an original Discovery Sport cost new), rising to about £17,500. Our test car sits nearer the top of the range. There's a good, honest robustness to the Harrier on first impression.

Our first port of call is Bombay House, which is Tata's global headquarters. A lovely old Edwardian building in the pleasant Fort district, it's also known for being a friendly home for Mumbai's stray dogs; when it was refurbished in 2018, a special kennel was opened inside it as a safe place for them to go. Company grandee Ratan Tata is known for his love of dogs, and they quickly surround me and the car – in a way nowhere near as threatening as that sounds.

Iconic Gateway of India is 85ft high

Parked outside Bombay House, the Harrier looks a smart-enough vehicle. It's fairly generic and nondescript, a bit like a previous-generation Hyundai. Hyundai, incidentally, is a brand that you now see everywhere on the roads in India, having become the second-biggest-seller in the country behind Maruti Suzuki, which holds a monopoly over the cheap small cars that continue to dominate.

So the Harrier is by no means offensive, even if it hasn't inherited the visual flair from Land Rover's design department like it has its underpinnings from the engineering team.

Back on the road and the traffic is starting to appear. We're on a photographic picture tour as much as a road-testing one, and if this is a tricky place to be writing about cars, that's nothing compared with what the photographers have to do. So it proves at our next stop, the bustling Chhatrapati Shivaji Maharaj Terminus (still known by most locals as Victoria Terminus), an extraordinary gothic Victorian railway station that's one of Mumbai's several Unesco World Heritage landmarks.

The 'no rules' aspect of Indian roads is now in full view. Waiting patiently for the storm to subside to appear in a picture, I'm swarmed by all manner of vehicles by the side of the road, anticipating the cue from the photographer. We get one clear shot of the Harrier after 15 minutes of set-up, so I'm glad not to stall the car's rather sensitive clutch and then manage to collect my colleague ahead of our next stop.

> "There's a good, honest robustness to the Harrier"

As the volume of traffic increases, the Harrier is beginning to show its limitations and why it hasn't been the market success that Tata hoped for. Offering customers various engine and transmission options is vital for success in India, yet Tata has so far sold the Harrier with just a 138bhp, 258lb ft 2.0-litre diesel engine mated to a six-speed manual gearbox.

Given the decline of diesel in India, having no petrol option seems an odd decision, and given the size and weight of the car (it's 4.6 metres long and weighs 1675kg, putting it in the Audi Q5 category), the lack of an automatic 'box seems even stranger.

It makes the Harrier far from the most relaxing car to drive, especially in the stressful downtown Mumbai traffic as we head down the bustling Mohammed Ali Road, with manoeuvring tricky and even greater anticipation needed to ensure that I'm in the right gear at the right time to exploit any sudden gap in the traffic. Still, at least the brakes work

The Harrier is based on the platform of the Discovery Sport

Driving in Mumbai required Tisshaw's full concentration at all times

I was a passenger during one 'prang' in Mumbai, as a motorbike scraped up the side of our Hyundai Kona. Its rider just shrugged and off he went...

Tata had Bombay House built in 1924 and has had its HQ there ever since

A moment of calm before the storm

well, as one pedestrian who steps out in front of us is glad for...

Our last stop is the Gateway of India, a monumental arch that's perhaps Mumbai's most famous landmark, where our tour of the city ends and the Harrier heads back into the care of Autocar India.

It's a car I'm pleased to have driven – yet, unlike Mumbai, I leave with no great memories of it. It is a sufficiently good product to have performed better than it has done, but is in no way outstanding, despite its touch of star quality from the Land Rover brand above. Endearing and likeable enough, then, but all a bit forgettable.

Yet perhaps the overriding emotion is one of relief at having handed back the car in one piece. Time for good lie down. A

THREE FAMOUS TATAS

TATA NANO

The Nano was billed as the world's cheapest car, costing around £1700 at launch in 2009. Tata hoped to build 250,000 per year but just 300,000 had been made when it was axed in 2018. Being known as a cheap car is what hindered it, as buyers instead opted for models with greater cachet.

TATA SIERRA

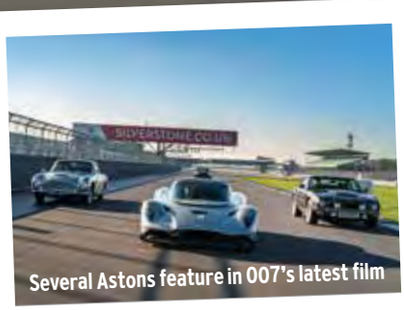
The Sierra was India's first home-grown SUV model. Launched in 1991, it gained a cult following and was even exported to Europe, for markets including Germany and France. It lived until the end of the decade before being replaced by the Safari. Tata recently previewed a return for the Sierra with a concept car.

TAMO RACEMO

Three years ago, Tata announced it would launch the Tamo brand, whose first model was to be a tiny two-seat sports car based on the Racemo concept. Its spec was impressive, with a carbonfibre chassis and double-wishbone suspension, but the project was put on indefinite hold in 2018.

Now pay attention...

The latest Bond film stars not one but three different Aston Martins. **Mike Duff** heads to Silverstone to drive the most famous of the lot


Several Astons feature in 007's latest film

Even by Silverstone's high standards of specialness, this Valentine's Day was pretty remarkable.

Out on the main circuit the new Mercedes-AMG Formula 1 car was making its moving debut, the W11 snarling and stuttering its way around the track as Valtteri Bottas and Lewis Hamilton put it through its paces, a smattering of VIPs standing trackside and with drones buzzing overhead to capture footage. Ordinarily I'd have been looking for a vantage point, but the cars on the junior Stowe Circuit – now Aston Martin's high-performance test track – proved to be even more compelling.

To celebrate its involvement in the forthcoming James Bond film No Time To Die, Aston Martin had assembled a group of cars connected with the film. That meant a DBS Superleggera, a 1980s V8 pretty much identical to the one featured in The Living Daylights and which has a modest cameo in the new film, and what appear to be four near-identical DB5s in the silver birch colour made famous by the one Sean Connery first drove in Goldfinger.

That turns out to be half right. Two of the DB5s are very much the genuine article. One is an immaculate 1964 car wearing the BMT 216A registration of the original film car, the other a similar-vintage model that's being used as a test bed for the gadgets in the forthcoming Goldfinger continuation version – and yes, it has replica Browning machine guns in its indicators. The other pair look identical but are pretty much entirely different, being two of the eight near-perfect replicas that Aston Martin built for stunt work.

I was lucky enough to get a chance to visit the set in Matera, Italy last year to see one of the set pieces of No Time To Die being filmed (see p56), but today promises to be even more special, with the chance to drive both the original DB5 and its high-tech doppelgänger back to back. And I'm not even wearing a dinner jacket.

While there are external differences between the real DB5 and the deepfake, you've got to be trying hard to spot them. The replicas use carbonfibre bodywork over what is essentially a steel spaceframe, the mouldings created from the scans of the original DB5 that were also used for the Goldfinger continuation


Duff's steely-eyed focus reflects this particular DB5's value



The 007-spec DB5s are swapped for stripped-out stunt doubles during action scenes

> "The stunt car is an absolute beast, with a driving experience at odds with the staid styling"

models. Look closely and you'll see that the replica car's radiator grille comes fractionally further forwards, the silver finishing on the front wing vents is shorter, the headlight bezels are more flush and the windscreens don't quite fit, with gaps around the beading. More obviously, the new cars also have socking great roll-cages in them, for fairly obvious reasons, given the demands of filming. But they are close enough to be barely distinguishable from 10 feet away, let alone when moving at speed. One of the stunt cars is also wearing plastic wrap to approximate the damage it's meant to have picked up during the chase sequence.

Interiors are much more different. The original DB5 features an abundance of chrome-bezeled instruments, what now seems like an impossibly dainty gearlever and a seating position that forces the driver to adjust to fit around the huge wooden-rimmed steering wheel, rather than the other way around.

The driving experience is equally special but equally dated. The straight six engine feels a little anaemic at low revs but turns raspy when pushed and delivers impressively strong urge. But the hugely heavy unassisted low-geared steering, limited front-end grip and copious body roll limit enthusiasm for pushing hard – as does the seven-figure price tag. The idea of hustling one in a high-speed stunt sequence is plainly ridiculous.

Not so the replica, which has been built for a life of pure abuse. The dashboard has holes instead of instruments, with nothing more than a speedo and rev counter. The wooden wheel is similar but mounted far farther out to be positioned for the motorsport-grade carbonfibre bucket seat. There's an AP Racing pedal box, a huge hydraulic handbrake – which I'm under strict instruction not to use – and a gearlever whose familiar shape rather negates Aston's refusal to say where the donated engine and gearbox comes from. The official line is that it's a naturally aspirated straight six making around 340bhp, but let's just say they didn't go to Q Branch, more M division.

The stunt car is also an absolute beast, with a driving experience completely at odds with the staid styling. With a mass of just 1000kg, it has more than twice the power-to-weight ratio of the original DB5, plus a much stiffer structure and rallycross-derived suspension. The hydraulically assisted steering feels spot-on, yielding instant responses without any of the slop of the →


Stunt cars are built to be abused


Stunt DB5s weigh 1000kg but pack a 350bhp punch

original car. There's a surprising abundance of grip considering the narrowness of the tyres – behind the period pattern is a racing compound – and the replica's cornering stance is surprisingly neutral considering how slidey it looks in the film's trailers.

Not that it's hard to make it go sideways, with the engine having more than enough torque to engender plentiful oversteer and the steering staying utterly faithful as the car starts to slide. But my modest efforts are nothing compared to those of lead stunt driver Mark Higgins, who is on hand at Silverstone to show what the car is capable of and treats me to a passenger ride that mostly involves looking through side windows.

It's no exaggeration to say that James Bond is one of the UK's biggest cultural exports; collectively, the films have grossed nearly £5.5 billion worldwide, or more than £9bn when adjusted for inflation. Getting a DB5 in Goldfinger – something Aston was then reluctant to do – is now regarded as one of the most successful examples of product placement of all time.

For No Time To Die, Aston has built and supported the use of the stunt cars but isn't paying Eon Productions anything for featuring either the DB5 or newer models. There's no official word on how much this cost, but a senior company insider says it's "unbelievably little" for the publicity it will generate. Long may the association continue.


Higgins (right) schools Duff on stunt driving

> "There's more than enough torque to engender oversteer"

ON SET IN ITALY

The DB5's role in No Time To Die was mostly shot in Matera, Italy, the spectacular rock-hewn city being the backdrop for an extended chase sequence involving the Aston and a pursuing pack of bad guys driving cars as diverse as a 1990s Maserati Quattroporte and an early-2000s Lancia Thesis. Former British rally champion Mark Higgins is the lead stunt driver, having worked on three previous James Bond films and today one of the acknowledged experts of action-packed precision driving.

Not that he had to do any on the day I visited the set, most of which featured the DB5's bulletproofing being tested after the villains have him cornered. Despite this, Higgins was still ready to go at all times – and wearing carefully applied dots on his face to make it easier to digitally morph Daniel Craig's more bankable features onto his in close-ups.

Matera's slippery stone streets proved to be a serious challenge, with Higgins admitting he was "sceptical we could make it work" when he first encountered them. The solution proved to be fizzy cola: about £50,000 worth of the full-sugar version was sprayed onto the surfaces to increase grip by about 50%. "Rear grip is never an issue, because you want it to look exciting," Higgins said. "But without grip you don't have speed, and without speed you can't do anything."

The key to movie stunt driving, Higgins reckons, is not only repeatability but also not making things look too neat and tidy: "The problem is that what they are looking for and what I think is cool can be very different. So you can have a lovely drift scene and it can feel great in the car, but it doesn't look real – you have to make it look scrappy, not fluid. As a driver, it can be frustrating, but I'm here to do what I'm told."

Higgins admits the DB5's big finale was particularly entertaining to shoot, and indeed to shoot – spoiler alert approaching – with the car having a substantial upgrade from the Connery-era machine guns to twin multi-barrel miniguns that deploy from within its headlights, then wiping out the surrounding bad guys with a spectacular full-power donut.

"I read that in the script and thought 'oh yes, that's very Bond'," Higgins remembers.


No priceless Astons were harmed during filming, only some very expensive ones


Facelift includes six-barrel machine guns


Matera's streets were too slippery

Kiwi single-seater started life as a Lotus project

So, you fancy yourself as a Formula 1 driver?

You won't get much closer than by driving the 675bhp V8-powered, 609kg Rodin FZED single-seater, as **Andrew Frankel** discovers on track in New Zealand

When people talk about a breathtaking experience, what they usually mean is that it was highly memorable. And driving the Rodin FZED was clearly that. But it was also breathtaking in the most literal sense: when I was finally allowed to let the car rip, I either momentarily lost the ability to breathe or simply forgot to do so. Weeks later, it's still not entirely clear.

But that's what happens when an engine making 675bhp is allowed to power a car weighing 609kg. For the world's fastest road car, the 300mph Bugatti Chiron, to match the FZED's power-to-weight ratio, it would need – wait for it – another 500bhp.

Rodin Cars' founder, Australian businessman David Dicker, reckons the FZED is the closest thing you can buy to a Formula 1 car while still keeping costs within the reach of the merely very wealthy, rather than the fabulously rich. The FZED costs around half a million quid, which isn't much more than one of the more expensive GT3 race cars you can buy, and its 3.8-litre Cosworth V8 will go 3000 miles between rebuilds – after which you will probably need rebuilding too.

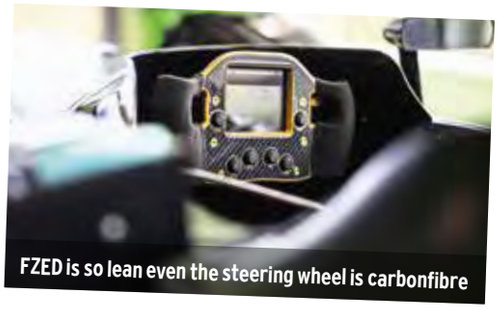
It doesn't require an army of boffins to fire up and even very tall, middle-aged men can be made to feel entirely comfortable within its confines and not in the least bit ridiculous.

The car started life in 2011 as the Lotus T125 project. After that stalled, Dicker bought five unsold chassis and set about turning them into FZEDs. By replacing as much of the car as possible with titanium printed in-house, including every single fixing, he managed to carve more than 40kg out of the already flyweight 650kg Lotus. The engine has more power for fun yet develops it at lower revs for reliability. The entire management system is new and aimed at making the car far more drivable. There's also a new pedal box, seat system, clutch actuator, steering wheel and so on and on. The car is now a very different beast.

The only problem is that if you want a test drive, you need to go to New Zealand's South Island and visit the extraordinary facility that Dicker has had built there, which includes three test tracks, a factory containing some of the most advanced titanium 3D-printing machines in the world and a full pits complex with garaging and hospitality. This guy is serious.

Dicker will fly you out, put you up and provide you with an instructor: affable, unflappable Aussie racer Mark Williamson, who will then spend two days with you until he feels you've seen and done enough to be let loose in an uncorked FZED.

To give you some idea of the level you need to reach, you learn the track in a derestricted McLaren 570S GT4 racer. It's some trainer. After at least two stints in that, each comprising →


FZED is so lean even the steering wheel is carbonfibre


A bespoke seat is created for each driver

Frankel is tall for an F1 driver, at 6ft 4in, but fits fine


Cosworth V8 is derived from Indycar unit


Rodin fabricates many of its parts in-house

dozens of laps, you do the same all over again in a Dallara Formula 3 car – because if you don't do that and therefore fully acquaint yourself with the dark art of downforce, there's literally no point even sitting in the FZED. After each session, Williamson assiduously talks you through the telemetry data and on-board camera footage. You'll then get two sessions in said FZED, one using about 80% revs and throttle, one unlimited. And if, after that, you buy one, Rodin will knock the entire cost of the trip off the purchase price.

So, and because space is short, we'll skip the build-up. Imagine that you're now in the FZED, fully trained and immensely comfortable, because your seat has been made for you and you alone. You hold the titanium steering wheel and as the external starter spins the engine, you catch it on the throttle and hold it at a deafening 4000rpm idle. The clutch is operated by hand, which I don't like, but there's space for only two pedals and your left foot has to operate the carbon-carbon brakes.

For the first two laps, all you think about are those brakes. They aren't like carbon-ceramic items: if they don't have temperature, they don't work. At all. So you drive with both feet on both pedals, accelerate up to 120mph and then brake harder than you've ever braked in a road car until they start to respond.

But the massive Avon slick tyres have been in blankets for hours and you don't want to lose that heat, either, so as soon as you're happy with the brakes, you go.

The acceleration is such that it actually redraws the circuit for you. In the McLaren and Dallara, the track has quite a long straight; in the FZED, there isn't one at all. Training means your fingers automatically tug the right lever four times, but the acceleration from, say, 60mph to 170mph is such that you have no time to even think about it, let alone savour it. You come out of the corner, the world goes stark, staring mad and you brake. That's it.

> “You come out of the corner, the world goes mad and you brake”

The FZED can sprint from 0-99mph in an unbelievable 5.0sec

Except it’s not because, compared with what it’s like under braking, the FZED’s acceleration is quite sane. Under full braking from more than 170mph, the combined effects of the downforce and those brakes are such that I’ve experienced less physical violence while crashing. One reason your belts are done up so tight that breathing becomes difficult is that you would be black and blue for days were they not. You could probably snap a rib or two for good measure as you’re slammed forward. But you must remember to back off the brakes as the downforce bleeds away, else you’ll be left with mechanical grip alone and staring at two stationary Avons while still doing 70mph.

Corners are actually easier than expected. The FZED has a brand new, Öhlins-based damper system, because Dicker thought the Lotus set-up wasn’t fit for purpose. And somewhat to my surprise, you can slide the car around a bit in the slower turns. The steering is light, hyper-accurate and thunderbolt-fast.

In the quick bits, you just have to commit, and do so at turn-in speeds that have genuinely never occurred to you before. And then you have to control the throttle.

Try to balance the car in the way that comes naturally to people like me, who race historic cars, and the resulting fore-and-aft pitch will play havoc with the floor under the car, from where most of the downforce is extracted. So that’s a bad idea.

I never found out how close to the car’s limits I came. I posted decent times in the McLaren and Dallara but was miles off in the FZED. I like to think I lost out mainly through failing to understand its unfathomable braking performance, but maybe not. Then again, if, as a prospective owner, I’d boarded the plane home from New Zealand feeling I already knew all there was to know about this car, I’d probably not buy one. As it is, you might go 10 seasons and by the end still be finding out things about not just the FZED but yourself, too. With such machinery, that’s how it should be.

FROM ZED TO ZERO

If you can believe it, the FZED is merely an amuse-bouche for what is coming next from the ever-fertile mind of David Dicker. His real focus is now on the FZERO, a car he has designed largely himself, for which a bespoke twin-turbocharged 4.0-litre V10 racing engine making more than 1000bhp is now being designed and whose name has nothing to do with emissions and everything to do with what’s one better than Formula 1. The FZERO is closed, will generate many tonnes of downforce and has a suggested 0-186mph time of 10sec. It can be made road-legal, will cost around $1 million (quite cheap, compared with anything comparable, such as the Aston Martin Valkyrie or Mercedes-AMG One) and should be on the track before the end of this year.

The next best things to buying a Formula 1 car

Actually, you can buy an F1 car. Functioning historic chassis can cost similar money to a front-line supercar like the McLaren 720S. But if it costs a small fortune to buy, it’ll cost a damn big one to run.

The Caparo T1 is probably the closest thing to a road-legal F1 car. This British creation gets 575bhp and weighs 500kg; you do the maths. On sale now for £189,995.

A recent Dallara Formula 3 car will teach you all you need to know about downforce and blow your mind in the process. A very fit, 15-year-old example should cost you less than £30,000 to buy.

MOTORSPORT IMAGES

HYTHE AND SLEEK

The petite car you see here is not a pre-war Italian racer but a special built in a Kent garage. **Colin Goodwin** meets its maker

PHOTOGRAPHY LUC LACEY

The view forwards is pure Fangio. A single pane of laminated glass set in an aluminium frame through which I can see a narrow bonnet and exposed wire wheels. My hands are on a wood-framed steering wheel with four alloy spokes and a stubby gearlever is to the right of my leg. White-faced instruments sit in an aluminium panel. It's very simple.

Although I'm in a single-seater, there's plenty of elbow room. I could do with the pedals being a bit closer, but unfortunately the seat isn't adjustable because this car has been set up for its owner, not a guest driver.

I first saw this car last summer at a Vintage Sports Car Club meeting at Brands Hatch, where it was parked in a line of kit cars outside the shops near the Kentagon pub. From a distance, I thought it was an Alfa Romeo 159 Alfetta, because it had a very similar egg crate grille. But as I got nearer and saw numberplates and indicators, I didn't know what it was. Whatever, it looked fantastic. Fortunately, in front of the car was a sheet of paper explaining all. A special, it transpired, built by a bloke called John Nash: a member of the Kent Kit Car Club, whose display it was part of.

I missed two races waiting for the owner to turn up. Why? First, because I wanted to congratulate him on his incredible workmanship. I've spent a lifetime peering at kit cars and specials and have never seen one so beautifully finished as this. Second, because I wanted to know what lay under the skin of the JNS Special. A Jaguar engine? An Alfa twin-cam? And, finally, I wanted to know how the hell Nash had managed to build such a wonderful-looking machine for less than six thousand quid.

Eventually he arrived, explained that he'd built it from scratch over five years and that it had been inspired by pre- and post-war grand prix cars. And that it had indeed cost only £5750 to build; 7000 man-hours had gone into it – and nearly one marriage.

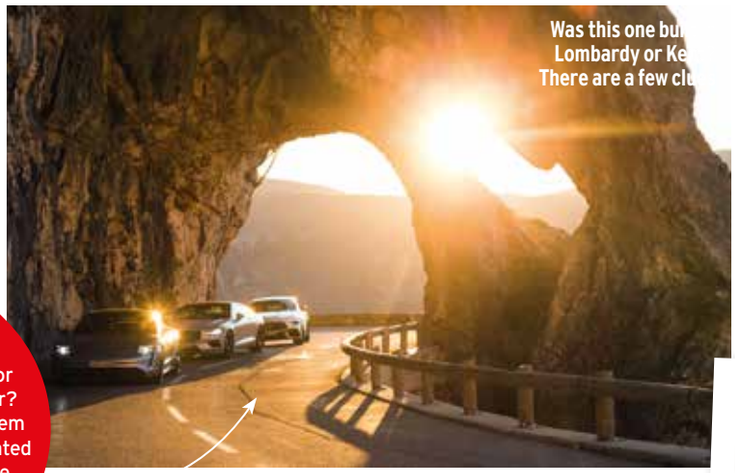
Several months later, we're examining the JNS in Nash's garage in Hythe. It's not the first car of his own design. "I built a three-wheeler that looked fairly similar," he explains, "but quite a few of my friends said that it would look a lot better with four wheels. I first thought about modifying it but realised pretty quickly that it would be simpler to start from scratch."

With the bonnet off, the powerplant is revealed, and it's not what I'd expected. "A club member had a couple of ropey Renault 5s going begging, one of which was a Gordini Turbo. I managed to buy the pair for £200 and chop them up in his barn, taking away the bits I needed.

"Building a rear-wheel-drive car is complicated because you need room for the propshaft, so I reckoned that it would be a lot easier to simply use one of the Gordini engines as it was fitted to the Renault: longitudinally

There has never been a front-wheel-drive F1 car, but Nash can be consoled that such machines took multiple Indianapolis 500 wins before and after the war.

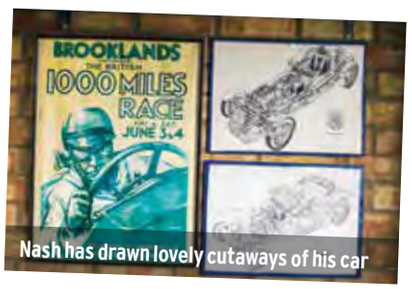
See the lovely bulges on the JNS's bonnet that make room for the carbs and rocker cover? Nash accidentally made them different lengths but fabricated fake rivet heads to fool the eye into thinking they're symmetrical. An artist's trick.



Was this one bu
Lombardy or Ke
There are a few cl

A DYING ART

Ground-up homemade specials are rare these days. They were common in the 1950s and 1960s, especially those built for racing. Gordon Murray's first car was a special, heavily influenced by the Lotus 7, built from scratch with a spaceframe of his own design. I've yet to show him a photo of the JNS, but I think he'll be impressed.



Nash has drawn lovely cutaways of his car

mounted with the gearbox in front. I was able to use all the Renault driveshafts, wishbones and torsion bar springs, plus brakes and hubs."

Nash spent a long time fiddling with the turbocharger. It sits in front of the engine in the Renault, but he wanted to position the JNS's radiator in a way that would achieve the low and narrow bodystyle he wanted: "Eventually, I came to the conclusion that having a turbocharger was just asking for a load of trouble, so I junked it and modified the engine with higher-compression pistons to restore the horsepower lost."

How Nash managed to build such a lovely machine on such a small budget is a combination of doing virtually everything himself and using a lot of lateral thinking when it came to sourcing parts. "Some of the critical welding I farmed out to experts," he says, "like the rear trailing arms. They're from a Citroën 2CV, but I needed to shorten them because the rear wheels would have been too far back without doing so. I made all the moulds for the fibreglass body and made the panels, but I got a professional to paint them."

When I first saw the JNS at Brands, I was sure I was looking at the work of a man with an engineering background as well as some experience of design. "I did an engineering apprenticeship," explains Nash, "but I ended up doing technical drawings for what was the Central Electricity Generating Board and, before I retired, illustrating operations manuals at Dungeness Power Station." That explains it, then. As does the beautiful cutaway of the JNS on the garage wall, drawn by its creator.

Driving valuable supercars never bothers me. One-off concept cars are a bit more of a worry, because they cost millions and often years of work to make. But they're still owned by big car companies. Driving the JNS is much more worrying. I've had it insured for £30,000, but it's not the money; it's the time it would take Nash to rebuild it if I stuffed it.

So I shall be damned careful. I'm sitting in a wide seat that was once fitted to a Vauxhall Viva. Those white dials came from a Triumph Dolomite (£10); Nash fitted the faces and made the numbers using Letraset. My feet, when they're not resting on the chequer plate aluminium floor that came from a toilet (£5), press pedals from a Triumph Spitfire.

The now-naturally aspirated Gordini engine breathes through a pair of Weber DCOE carburettors that Nash already owned, but he made the air filters from a sheet of foam and chicken wire. You don't want to buy expensive K&N filters when you can make some for a few quid. The engine sounds excellent: not loud, with just the right balance of noise from induction and exhaust.

How do you criticise the work of such an enthusiast? Easily when there's not much to fault. I'd rather there was less travel in the brake pedal and I might not have used a servo, plus there's a fair bit of slop in the gearlever. Nash has tried to sort that out but reckons he's got it as good as he can. These are just niggles; the overall dynamics of the car are quite extraordinary for a home built and designed machine.

The steering is wonderfully direct yet light and, because the engine makes only about 110bhp, there's no torque steer. Best of all is the ride: it's very pliant and comfy. At just 580kg, the JNS is plenty brisk enough.

Nash has been to Le Mans and back in his car with no problems. I can only imagine the pride he must feel every time he opens his garage door and sees that egg crate grille. A

Nash (left) did almost all the work himself

JNS is quicker than you might expect and rides very well

Interior was cheap as chips; turbo-liberated Gordini engine is good for around 110bhp

Ryton the money

The Special Vehicle Operations arm of Jaguar Land Rover does some extraordinary things. **Steve Cropley** visits its state-of-the-art base for a first-hand look

PHOTOGRAPHY LUC LACEY

First drive revealed that this Nürburgring special also works surprisingly well on the road

A batch of 300 Jag XE-based Project 8s were built to demonstrate SVO's engineering depth and bespoke performance capability. The last few are leaving the building now.

Your first thought when you step over the threshold of Jaguar Land Rover's £20 million Special Vehicle Operations division in Ryton-on-Dunsmore, just outside Coventry, is that you've arrived in the foyer of a Formula 1 team's headquarters.

The place has the same wall-to-wall modernity of a classy, new piece of industrial architecture, the same aura of forensic efficiency of a grand prix team and the distinct feeling that nothing here happens by accident or just the passage of time.

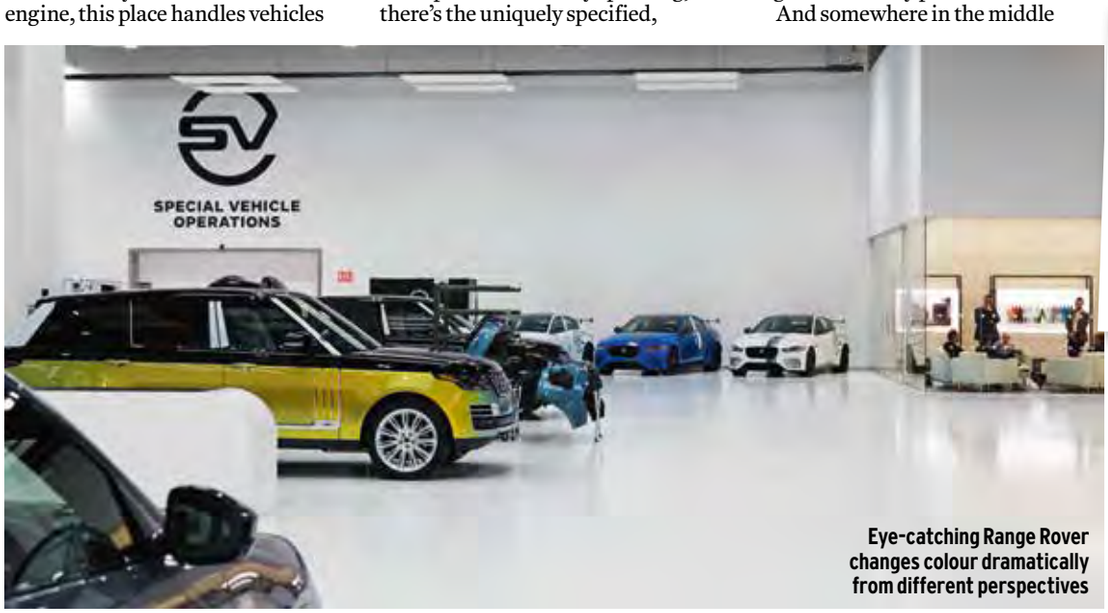
But whereas F1 teams make half a dozen cars a year and don't build the engine, this place handles vehicles by the thousand. Managing director Michael van der Sande says SVO's job is to take JLR's already potent and luxurious models and "amplify" their characteristics, at times "turning them up to 11".

Among manufacturers of premium cars, there's a powerful demand for bespoke and specialist vehicles that seems currently to defy economic cycles. BMW has its Alpina and Mercedes has its AMG, and on this spot, where Peugeot once built numerous undistinguished 206s, specialist Jaguars and Land Rovers now start their lives.

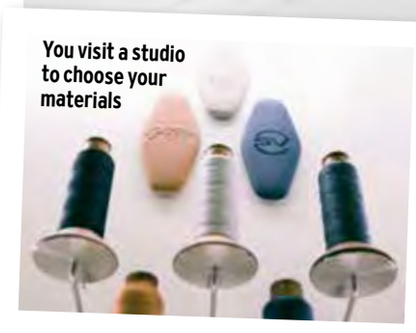
SVO builds several different kinds of bespoke car. Broadly speaking, there's the uniquely specified, hugely valuable type that involves wholesale re-engineering, complex painting and often lengthening and armouring to meet some ultra-rich customer's whim.

Then there's the most common type, production SVR models whose enhanced packages still allow them to be made on JLR's regular production lines; the Range Rover Sport SVR and Range Rover SVAutobiography Dynamic are good examples. Such cars, around 10,000 of them per year, don't need a special trip through the new SVO Technical Centre, because they're built to suit the facilities of JLR's regular assembly processes.

And somewhere in the middle



Eye-catching Range Rover changes colour dramatically from different perspectives



You visit a studio to choose your materials

> The Project 8 shows that SVO is equipped for complex engineering

of these is a breed of standard cars whose owners desire only special paint jobs: SVO handles around 5000 of these a year and has an innovative robotised plant whose smart ovens, JLR claims, save enough heating to power 65,560 homes for a year. Quality is extraordinarily high.

The production-line SV models may not be built on SVO's premises, but they're still very much the business of van der Sande and his engineering director, Jamal Hameedi, whose spectacular pedigree includes time as the global engineering chief of Ford Performance, responsible for cars including the Focus RS and latest GT. They decide in the first instance exactly what these profitable and strong-selling SVR cars will be like and then set about developing them.

SVO's contribution to group earnings is described by van der Sande as "very significant", although nobody inside or outside the group will talk precise figures. It's obvious, and becomes clearer as we walk around, that this is a very high-margin business. The most modified cars we come across, some kept secret until their owners see them for the first time, are akin to works of art and so can require months in preparation.

If you're a serious bespoke customer here on a visit, you'll probably be accompanied by someone from your local dealership. Having signed in, you turn right out of the foyer into a luxurious design suite where you can view, touch, feel and smell samples of paint and trim materials, fascia textures and badgework. This is where you propose and mock up – on a gigantic digital configurator – your desired vehicle. "People can spend up to half a day in here," says van der Sande. "We encourage them to do it. And we often offer one of our designers to assist with choices. Clients usually find their suggestions helpful."

Do customers ever insist on bad choices? According to designer Adam Hatton, who has particular expertise with bespoke projects, it's rare. "Clients have strong likes and dislikes," he says, "but they're rarely adamant. We advise them, no more than that. In rare cases, we might emphatically discourage someone from making a choice we think they'll regret. But we have to understand their priorities – that some apparently odd choices work better in different cultures and light conditions than the UK's.

"It's one reason why we usually issue high-quality renderings. They show what a car will be like with pretty good accuracy and they're especially handy for people who can't come to Coventry."

Beyond the design studio is a spacious, sumptuously curtained meeting room, all carpets and soft sofas, where clients can relax, chat with SVO experts and eat food specially prepared by in-house chef Graham Edwards, a former protégé of Raymond Blanc, whose task is to create dishes that suit clients from all corners of the globe. As well as being a private meeting room, this can be a superb viewing room: the curtains roll back to reveal floor-to-ceiling glass walls displaying the well-lit vastness of the 20,000-square-metre Technical Centre's car creation bays.

Immediately outside are the last handful of the Jaguar XE SV Project 8 super-saloons from the promised →

Bespoke items are tested, tested and then tested again

Range Rover Sport SVR was the division's pioneering product. Sales are still going up after four years. "We're bouncing off our production capacity limit," says SVO boss van der Sande.

batch of 300 being prepared for delivery. This machine is van der Sande's quiet pride and joy, not just because its 592bhp supercharged V8 engine makes it the most powerful road-legal Jaguar in history but also because of the extensive re-engineering it entailed.

"It's very different from the base car," he says proudly. "We even had to shift the headlights forward to make a bit more space. The Project 8 is a completely focused track car; only the bonnet is unaltered. We dialled everything else up to 11..."

Van der Sande views Project 8 as the perfect demonstration that SVO is just as well equipped for complex engineering as for amazing trim and paint makeovers. "You learn enormously from projects like this," he explains. "They test the limits of a design. Lessons we've learned from the Project 8's sealed aerodynamic floor are already being incorporated into the tooling of the next-generation models..."

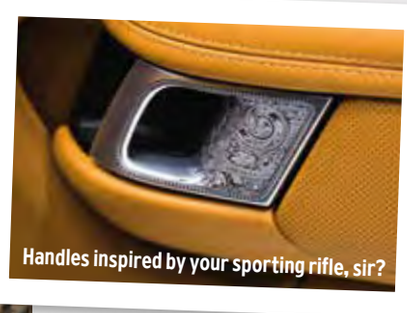
Past this line-up of Project 8s, we turn right, staring into the well-ordered build bays, where big projects are proceeding under the hands of technicians whose very body language tells you they're the best in the business.

On one side are armoured Range Rover Sentinels with reinforced floors and two-inch-thick armoured screens and side windows. They weigh four tonnes at the kerb yet still have the ability to jump kerbs and accelerate very quickly indeed.

Across the wide aisle is possibly the most eye-grabbing Range Rover I've ever seen, brilliantly black-topped but with an extraordinary metallic colour on its lower flanks that flips between a luminous greeny yellow and a more subdued grey. It's worth

> "This extraordinary metallic colour is worth £15,000 on its own"

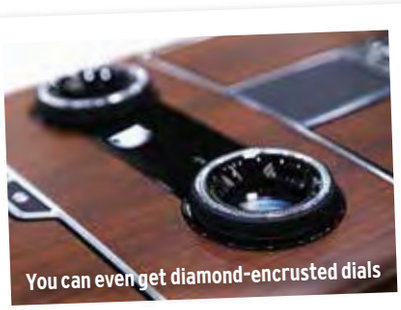

SVO has produced 300 examples of its 592bhp Jaguar XE


Handles inspired by your sporting rifle, sir?

£15,000 on its own, I learn, and when you examine the flawless edges and lustrous surfaces, you can see where all that money goes.

This car is at Ryton for much more than painting. It's to be completely retrimmed and equipped with a beautifully engineered SVO rear console (the work of Hameedi's team) that contains all manner of storage spaces, screens, switches and ventilation outlets. It's as expensive as the paint, we estimate,

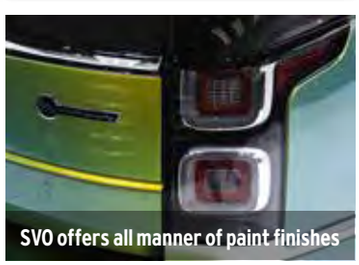
Supercharged V8 means bombproof Sentinel can still do 0-62mph in 10.4sec



You can even get diamond-encrusted dials

A BOSS WHO "ALWAYS WANTS TO DELIVER"

Michael van der Sande, managing director of SVO, has taken a more interesting path than most to reaching the job he loves. Dutch by birth, his mother and grandmother were rally drivers and one of his early girlfriends was a Ford dealer. As a kid, he made the key decision to follow a career with cars and arrived in the UK 25 years ago, landing at Bentley and Rolls-Royce in Crewe. From there, he began a 12-year marketing career with Harley-Davidson, working at the US firm's headquarters in Milwaukee, as well as in Africa and the UK. He then took a one-year posting with Tesla as global director of sales and marketing before moving to Aston Martin "at the depth of the crisis" but still helped launch the Rapide and One-77. Next he spent five years in Paris with Renault, working closely with design boss Laurens van den Acker, before leading the launch of Alpine for two and a half years. In June 2018, he started at SVO, which he labels the greatest gig of all. "When you're passionate about something," he says, "you always want to deliver."



SVO offers all manner of paint finishes

yet there's a demand for 800 to 900 of these every year.

"You don't just build that console and bung it in the car," explains van der Sande. "You test its functions endlessly, then you fit it to test cars and you subject it to tough road trials. After that, it might be okay.

"Cars earmarked for major work come to us as primed and recoated bodies," he continues. "We paint them, build them up and fit their complex body parts. It takes two weeks to paint and five or six weeks to build. And for the most complex jobs, like this one, you might need six to eight weeks more. We estimate five months for a job like this, then try to beat it by a week or two."

How does van der Sande view the future of vehicle personalisation? The demand is durable, he believes, but the challenge is to meet the rising quality standards of customers while growing slowly. Launching new line-built SVR models is another challenge; the reason the company began at the top of its price list with the Range Rover SVAutobiography Dynamic, Range Rover Sport SVR and Jaguar F-Type Project 7 was that the potential profit margins were very generous. Even the most recent pair, the Jaguar F-Pace SVR and Range Rover Velar SVAutobiography, cost £75,000 and often much more once extras have been taken into account.

Would SVO ever do a Range Rover Evoque SVR? It's a possibility, allows van der Sande, but not in the short term. SVO is limited by how quickly its engineering teams can grow.

"We're in an intentional period of slow growth," he says. "We want to build strong foundations, and we believe this is how you do it."

SVO enhances both the performance and luxury sides of JLR

SHIFT WORK

As the manual gearbox enters its autumn years, **James Mills** celebrates its finest hours by picking 10 of the greats where manual labour is a labour of love

In the US, where everyone has a cause, it's possible to buy a fairly complete wardrobe bearing the 'Save the stick' slogan. Stickers, too, are available to those who want to take up the cause. One wag came up with 'Anti-theft device: this vehicle is equipped with a manual transmission'. It's a gently amusing line with, perhaps, an unintentionally serious point.

The car industry is phasing out the manual gearbox, often claiming it is helping drivers by removing distraction when actually the truth is that economies of scale and emissions legislation are reducing choice, and sports cars in particular are becoming so powerful that the average driver would probably ruin their car's clutch or transmission faster than they could dial the number for the maker's roadside assistance.

And actually, setting aside the pleasure that is to be derived from driving a manual, operating one rather than letting an automatic do the work makes for a more attentive driver. All four limbs get involved in the physical act of driving, so there's less temptation to handle a smartphone, more focus on the act of managing the machine and – assuming it's a good gearbox – more pleasure to be had from perfecting all those upshifts, downshifts and heel-and-toe moments.

Obviously, it's almost too late to do anything about it. Electric cars spell the end for the stick shift. So if you want to continue to revel in the simple act of changing gear, set aside a car that will continue to offer you the interaction. Here are 10 that will get you engaged.

HONDA S2000

With a 2.0 engine that could rev to 9000rpm and didn't deliver all its torque until 7500rpm – beyond the rev limit of most of its contemporary rivals – Honda's S2000 would have been nothing without a masterpiece of a gearbox. Happily, the six-speeder was a gem – one of the greatest of all time.

HONDA CIVIC TYPE R

For two Hondas to feature in this list tells you all you need to know about the Japanese car maker's pedigree when it comes to gearboxes. The current Civic Type R has the best gearchange of any hot hatch on sale today and is all the better for shunning the dual-clutch automatics of certain competitors.

CATERHAM SEVEN

It's hard to overstate what a transformation the six-speed gearbox made to the Seven when it was introduced in 1993. The close-ratio unit made the lightweight roadster even more invigorating to drive, keeping the sweet-revving Rover K-Series engine singing away at the top of its rev range, with barely any discernible let-up between each gear. It had, and still has, one of the shortest throws of any manual gearbox and remains the highlight of the range after nearly three decades of service.

PORSCHE 911 GT3 RS 4.0

The final version of the 997-generation 911 GT3 RS featured an engine block that was shared with the 911 RSR race car and was able to summon more than 490bhp from its four naturally aspirated litres. Happily, the extra power and wider spread of torque over the regular RS meant the tall gear ratios worked better, while the gearshift remained a delight. But with only 600 of them made, prices have shot up faster than the engine's rev counter. They're now around £400,000, compared with less than £130,000 when new.

MAZDA MX-5

Although the latest, fourth-generation MX-5 runs it close, the Mk1 MX-5 will always be the original and best when it comes to the drivetrain. To appreciate why, read what Autocar's testers had to say in 1990: "The real ace up the MX-5's sleeve is its gearbox. Rising no more than a couple of inches from the transmission tunnel, the well-weighted gearlever snaps through its tiny throws with millimetric precision. The whole driveline encourages you to drive as precisely as it operates. Co-ordinate the light, quick clutch with that rifle bolt of a gearchange and combine the two with the split-second reactions of the engine and you will be rewarded with a rare degree of driver satisfaction."

PEUGEOT 306 GTI-6

Somehow, the 306 GTi-6 never seemed to earn the acclaim it deserved. After all, in 1996, this was the first hot hatch to feature a six-speed gearbox, and with almost 170bhp, it was more powerful than most of its rivals. The close-ratio gearbox helped keep the 2.0-litre 16-valve engine on the boil – a good thing, too, as it liked to rev – and the steering feel and poise of the chassis could teach most modern hot hatches a thing or two. These days, you'll need to source an example that has been well cared for, or it may prove a money pit.

AUDI R8

With its low-slung body gently enveloping the mid-engined aluminium monocoque and quattro four-wheel drive system, the original Audi R8 – designed by Frank Lamberty and Julian Hönig – is ageing far better than its angular successor. And there was something about the way the first R8 drove that made it feel less like a product of Audi (even Quattro GmbH) and more visceral, as though Porsche's GT division had had a hand in its creation. It was a high point under the watch of Stephan Reil, former technical director at Audi's sports car division. Both the V8 and V10 models were offered with a six-speed manual gearbox. And both gave a nod to Ferrari, with an aluminium gate celebrating the goodness of a stick shift.

FERRARI F430

The F430 isn't the very last road-going Ferrari to feature a manual gearbox, but it's one of the last and most accessible for anyone considering ownership of their first Italian sports car. With the exposed aluminium gate standing proud on the leather-trimmed transmission tunnel and the drama of an alloy ball-topped lever, it represents decades of theatre from Italy's greatest showmen.

FORD PUMA

Is there anything more satisfying than sliding behind the wheel of an affordable small car, setting off down the road and finding yourself grinning from ear to ear within the first mile? Ford was at the top of its game when the Puma arrived in 1997. Led by Richard Parry-Jones, the firm's engineering development chief, Ford effectively over-engineered its cars, investing in the ingredients that would make them feel good to drive. The Puma was a case in point: small, agile and perfectly happy to be taken by the scruff of the neck. The best examples had a zesty 1.7-litre Yamaha engine and a short-throw gearlever topped by an alloy cap.

LAND ROVER DEFENDER

When it comes to a rough-and-ready, hands-on feel, you'd have to reach inside a gearbox to get a more mechanical sensation than changing gear in a Land Rover Defender. Unlike most cars on this list, which carry sporting pretensions, the Defender is all about unhurried shifts, an appreciation for the components at work and the hope that it won't spring an oil leak out in the middle of nowhere.

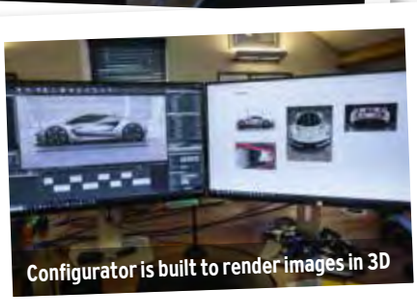
VIRTUALLY THE PERFECT EVIJA

To ensure Lotus customers can create the 1973bhp Evija electric hypercar of their dreams, there's a next-level configurator. **Matt Prior** visits the UK specialist behind it

PHOTOGRAPHY OLGUN KORDAL

RACING COLOURS
Black and gold, green and yellow, red, white and gold – if it's in the Lotus racing back catalogue, chances are you'll find it in the Evija configurator.

Light sources greatly alter how yellow looks



Configurator is built to render images in 3D

I was about to write that you wouldn't believe how good the computer-generated animations made by a small company called Realtime are – but the fact is you would. That's the point of them.

"Good CG is like a good sports referee," says Paul McSweeney, Realtime's client services director. "You don't notice it. You have to believe it straight away."

Realtime is one of those small companies that keep the big industrial wheels turning, specialists whose name rarely gets attached to finished products because they supply, often confidentially, work that slips seamlessly into somebody else's.

Realtime's work – CGI animation and visual effects predominantly for TV and film, gaming and the car industry – is so immersive that, having watched it online, I showed up to Realtime's converted barns, surrounded by farmland, a few miles from Blackpool, and wondered if this could really be where it all happens.

The banks of computers inside – big screens, gentle heat, lots of whirring – tell you it is. This is a place with a lot of processing and brain power.

And if you're not watching Realtime's stuff on the BBC's War of the Worlds or in games your kids know if you don't (Grid, Everwild, Game of Thrones and Jurassic World franchises), and you happen to have two million quid to drop on a car, Realtime will help Lotus sell you one.

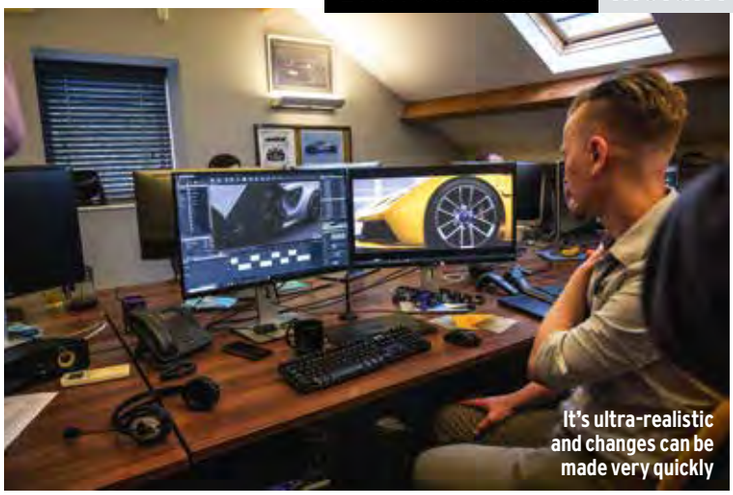
Not that you'd know. Realtime has made the world's most advanced car configurator but the idea is that a bod from Lotus shows up with a hugely powerful laptop – the sort that runs games with ease – to "a table, office, or wherever high-net-worth individuals hang out", says Alan Holroyd, Lotus's digital marketing manager, and talks them through specifying an Evija electric hypercar.

The Evija is not the kind of car Lotus has made before. Not just because of the price, but also because its electric 1973bhp will make it the most powerful production car in the world when builds start in a few months.

Between now and the last of 130 Evijas being constructed, perhaps half a dozen computers running Realtime's configurator will tour the world. "The car should be configured in a convenient environment, almost definitely not a dealer environment," says McSweeney.

"It needed to be portable and touchscreen," agrees Holroyd, "and show the Evija appropriately – and represent the technological leap."

It looks, on a high-resolution screen in front of me, like it does. The virtual Evija is sitting in a virtual studio, a digital recreation of Lotus's own design studio in Hethel, Norfolk.



It's ultra-realistic and changes can be made very quickly

"Why not go behind the secret curtain at Hethel?" says McSweeney. "This is the studio environment. But while every company will invest in a configurator, it shows one environment in most cases. We want to show how different a yellow can look in the desert, or in western Europe, or in a studio, so a customer doesn't take delivery and say 'this is not the colour I ordered' – which does happen."

A couple of swipes of the screen, then, and the car is sitting next to some palm trees and sand with warm sunshine on it, while a couple more prods later, it's in the sort of spot Autocar would shoot a car in the autumn – and its body colour looks a bit different each time.

"The change between specifying a car in a studio and taking delivery of it can be quite dramatic," says Tony Prosser, Realtime's managing director. So while this stuff is all very fancy and impresses casual browsers like me, the fact is that it helps customers get the precise car they wanted.

> "Good computer generation is like a good sports ref. You don't notice it"

So does how comprehensive the configurator is, how much you can personalise on the car, and how easily. "Some configurators are too complicated – and that affects the bottom line of the company," says McSweeney.

The Evija is a doddle to use. You can open doors, extend wings, look inside and freely roam an environment so complex that even the shoulder of the tyre changes profile depending on whether you've chosen Pirelli P Zero or Trofeo rubber. And while most online configurators are pre-programmed 2D renderings, this one renders it in 3D as it goes.

It uses – and this is where, dear reader, I tried to keep up but my limits were being challenged like a 386 processor running Doom (ask your dad) – Epic Games' Unreal Engine (v4), which looks hyper-realistic to me.

"The beauty of a game engine is that you can make changes very quickly," says McSweeney. That gives it a use beyond showing it to customers, too: Lotus execs can look at different materials and colours and see if they fly. "It's tremendous in that respect," says Holroyd. "You can show anyone in the company, deliver all of the colours and all of the materials quickly. In a way, it competes with the live-action photo shoot."

Next to me, a photographer shuffles nervously. A

EVIJA: OUR SPEC

Well. Where do you begin? "Where I might start is with some design editions," says Alan Holroyd. Lotus, like Aston Martin and others, has a few base ideas to get people's creative juices going.

There are general themes such as Origin, Launch, Heritage, Formula, Cup Yellow and Neon, or designs with dual-colour highlights that replicate some of Lotus's famous racing colours, and some it would rather you didn't see yet.

I go with yellow, subtle inside, with discreet wheel and brake caliper colour. Those and more can be changed – and little break-out boxes let customers write specific bespoke instructions, too. To be honest, I'd still be there now.

Each day, 350 vehicles are stolen. Vehicle thefts have risen by more than 50% in the past six years – and despite 'sophisticated' anti-theft tech, they're still rising. Why?

WORDS BY JOHN EVANS

One vehicle is stolen every four minutes on average in the UK

The image above is staged and not a real theft

One night in January, while Helen Chambers and her husband were asleep, a thief broke into the couple's home in Romford, Essex, and stole the key to their 2012-reg Audi A6 2.0 TDI parked on the road outside. The first they knew of the theft was when they looked out of their bedroom window to be greeted by the sight of an empty parking space.

"It was done so quickly and discreetly that I think the thief must have been staking out our house," Chambers told me when I phoned her after seeing her report of the theft and appeal for information on Stolen Cars UK, a public Facebook group.

The police were quick to respond and viewed the video footage that had been captured on the couple's CCTV camera. Unfortunately, the thief's face was barely visible in the poor light and he was wearing gloves so had left no fingerprints. It's a problem that police investigating car crime encounter all too frequently. Recently, Suffolk police admitted it had failed to solve 95% of car crime in the past three years, mainly because of what it described as "limited forensic opportunities".

Reflecting on the loss of the family's Audi, Helen said, despairingly: "You work hard, only to have your dream car stolen."

On the same day, around 350 other vehicle owners discovered exactly how she felt. That's the number of cars that police believe have been stolen each day so far this year. It compares with 330 stolen each day in 2019, or 120,000 over the year, and is further evidence of the apparently unstoppable rise in car crime that has seen vehicle thefts increase by over 50% in the past six years. According to the Office for National Statistics, just 40% of stolen vehicles are recovered. Most of these are damaged and 20% written off. The UK's car crime capital is Manchester, where there are almost 51 crimes per 1000 vehicles, a figure that includes theft from, as well as theft of, a motor vehicle.

It wasn't supposed to be like this. New technologies such as keyless entry and ignition systems were meant to make cars safe from thieves and render mechanical locking devices, such as the traditional Krooklok, redundant. What their designers didn't take account of, however, was car thieves' determination to overcome any new obstacle in their path and the changing nature of car crime, which has evolved from the casual thieving and joy riding of the 1990s to the organised and targeted activity it is today.

"There's a significant amount of organised criminal activity, with cars being stolen to order," says Clive Wain, head of police liaison at Tracker, a vehicle telematics and locater company. "Cars are stolen for one of four reasons: for export, →

> "Just 40% of stolen vehicles are recovered and most are damaged"

MOST STOLEN CARS IN 2019*

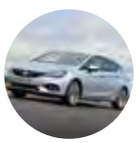

Ford Fiesta


Range Rover


Volkswagen Golf


Ford Focus

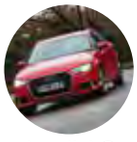

BMW 3 Series


Vauxhall Astra


Land Rover Discovery


Mercedes E-Class


BMW 5 Series


Audi A3

*Figures provided by the DVLA

Inside the Thatcham crime lab

Since the 1990s, Thatcham Research, the insurer-funded vehicle and technology research organisation, has been testing vehicle security systems for the insurance industry. Last year, it launched a rating system to help car buyers. Called the Consumer Security Rating, it includes a relay attack test. Cars achieving the highest rating, called Superior, include the BMW 1 Series, Land Rover Discovery Sport, Skoda Superb and Ford Puma.

The centre's crime lab is home to some of the equipment it uses for the test, much of it sourced by police forces during raids and arrests. Assorted relay attack devices, OBD (on-board diagnostic) key programmers, GPS jammers that can disrupt GPS-based trackers (this is a growing problem) and signal jammers that criminals can use to prevent a key locking a car fill one table.

"It's a game of cat and mouse," says Steve Launchbury, lead vehicle security research engineer. "As soon as a new car enters the market, criminals steal and strip it to learn how its security works."

Richard Billyeald, chief technical officer, says that Thatcham's new security tests are meant to inform and educate not only the public but also car makers.

"Our job is to help car makers understand their vulnerabilities and, partly as a result of our new consumer rating, they're responding," he says. "Sleeper keys with motion sensor technology that deactivates the fob when left undisturbed are a simple but effective step forward.

"The next big challenge will be the connected car that can be controlled from your phone. It's convenient but represents a new security risk."

Thatcham's crime lab has theft kit seized by police during raids and arrests

As well as high-tech devices, Thatcham uses old-school tools

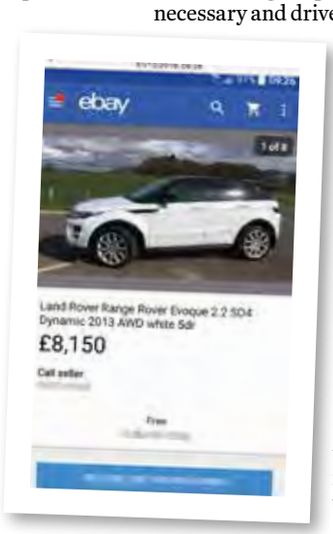
Thatcham's Billyeald (left) and Launchbury

often to Eastern Europe; to order, for their identity to be changed and the vehicle sold on within the UK; for parts, which is a growing problem and where the vehicle is stripped down in a so-called 'chop shop'; and to be used in further crimes."

Neil Thomas, director of investigative services at AX Innovation, a fleet management company, says car crime is like an industry. "It's run on the same scale," he says. "High-value models are being targeted by criminals who need specific cars to sell or to strip for sale or cloning. They'll place their order with an associate using an encryption messaging service such as WhatsApp. Their messages will include details of a vehicle's location and instructions on how to check for and remove tracking devices."

Increasingly, criminals are turning to county lines techniques borrowed from the drug world to steal cars. So-called 'clean skins', young people with no criminal record, are recruited to steal cars from outside the criminal's immediate area in return for cash or food for their family.

Thomas says that once stolen, many cars – a lot of them premium models including Audis, BMWs, Mercedes and Range Rovers but also hot hatches – are driven to a location and left for up to four days to establish whether a tracking device is fitted. When the all-clear is sounded, the car will be fitted with duplicate plates that identify it as an identical but legitimate vehicle so as not to trigger any ANPR cameras, started using a reprogrammed key if necessary and driven away. It might then be sold to a black market buyer, who is unlikely to pay much more than £2000 for a stolen Range Rover, for example. A Ford Fiesta might be sold for just £200.



Having bought the stolen car, a criminal may attempt to sell it to an unsuspecting member of the public, advertising it at less than its market value to attract interest. On arrival at what is likely to be a rented address, the buyer is told there is finance to settle, a story intended to reassure them that the seller and the car are legitimate.

Thomas tells how a 2013-reg Range Rover Evoque 2.2 SD4 Dynamic (inset, left) was sold in this way. It had been stolen in Oxford, cloned in Birmingham and given a new identity, before being advertised for £8150. The criminal gave the buyer a settlement letter purporting to be from the finance company and quoting an account number and sort code. In fact, the finance company was a national charity with no connection to the car.

The buyer settled the finance, paid the criminal a balance of £5000 in cash and in return was given the vehicle's key and a logbook. The key was a replacement that had been reprogrammed and the logbook fake.

However, disposing of an entire car in this way is a risky affair for the criminal. That's why breaking vehicles for their parts, either to sell to other criminals for cloning stolen cars or to unsuspecting members of the public, is an increasingly popular alternative. High-value cars including Bentleys and Lamborghinis, but also Range Rovers and Jaguars, are often disposed of in this way.

Many are broken down and stripped in chop shops. In the case of vehicles with tracking devices fitted to them, depending on the age of the car, the subscription to the service may have lapsed, allowing the vehicle to go unlocated. Thomas says that police are increasingly targeting chop shops. One recent raid by West Midlands Police yielded three stolen Mercedes E-Classes. "It's a more effective approach than trying to solve every car theft because you get straight to the criminals who are

> "Criminals are turning to techniques from the drug world to steal cars"

ordering the thefts and disposing of the cars," he says.

Other forces are reporting similar successes. In February, Essex Police raided 20 properties as part of an investigation into a gang suspected of having stolen up to 90 cars worth a total of £4 million since 2018, including Range Rovers and sports cars. They made 15 arrests and recovered 25 stolen vehicles. As part of the raids, the police targeted criminals suspected of coding replacement keys, enabling the vehicles to be cloned and sold to unsuspecting buyers.

The police haul included the equipment that the criminals used to overcome the keyless entry systems fitted to the cars they had stolen, a technique called a relay attack. It works by one criminal holding a device up against the door of the car, amplifying the signal it broadcasts around the perimeter of the vehicle. Another criminal stands near the owner's home with a device that picks up the signal the key emits and relays it to his accomplice, who can then open the car's door and start the engine.

This vulnerability of keyless systems is well known and was demonstrated in a number of security tests by our sibling title What Car?. In 2019, it tested seven popular cars fitted with the systems and found that two of the cars (an Audi TT RS and a DS 3 Crossback) could be accessed and driven away in just 10 seconds. Others took up to 60 seconds, although one, a Land Rover Discovery, could not be started.

Tracker's Wain claims that 92% of the cars stolen with the company's location device fitted to them were taken in this way in 2019. The year before, the figure was 88%. He says keyless theft is spreading from London and the home counties to the Midlands and the north of England. The Association of British Insurers, which last year reported a steep rise in motor theft payouts, has urged car makers to tackle what it describes as this "high-tech vulnerability".

Keyless car theft is a serious and growing problem but, arguably, car owners should be even more concerned about a method of theft known as a Hanoi burglary, named after a major police investigation of the same name into car key burglary carried out some years ago. Not only were cars broken into but, in order for the burglars to get their keys, homes were, too.

The point is this: as car makers improve their keyless entry systems with features such as motion sensors that disable the key and prevent it from transmitting when left undisturbed (using this feature, the cars that What Car? tested could not be entered or driven away), criminals may be forced to break into homes for the key itself.

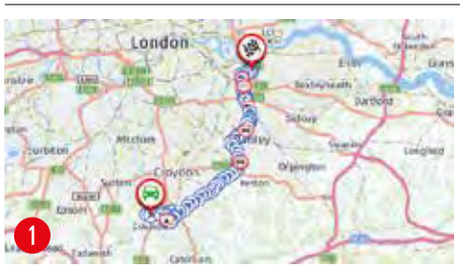
"We're not there yet," says Thomas. "Most car thieves who use keyless entry want a quiet life but, given the scale of the industry they're supporting, they may, if sleeper keys become more widespread, be forced to take desperate measures.

"It's why you should leave your car keys at the bottom of the stairs. Better that than a thief going any further to look for them." A

HOW TO KEEP YOUR CAR SAFE FROM THIEVES

- Keep your keys away from windows and out of view but don't hide them away.
- Have the car windows etched with the vehicle's registration and VIN numbers.
- Remove all valuables, including portable sat-navs.
- Park in a well-lit place. If it's on your driveway, park the car facing the house so the thief will have to reverse it.
- If your car has keyless entry, check if you can disable the system and, if not, see if a software update is available so you can. Store the key in a Faraday pouch that blocks the signal but check it works.
- Manually check the car is locked in case the locking signal has been jammed.
- Fit a mechanical lock such as a gear or steering wheel lock as a deterrent.

TRUE STORY: HOW A BMW X5 WAS STOLEN AND THEN RECOVERED



AX Innovation helped recover this X5. After its theft, data (1) shows it was driven within speed limits to a 'safe' location (2) to check for tracking devices. CCTV (3) can also...

...be used to help trace its route. X5 was then left in a quiet cul-de-sac (4) where spotters in a flat (5) kept an eye on it. Damage (6) included criminals' search for tracking kit.

REVEL IN THE DETAIL

The average car is made up of around 30,000 parts. Not all of those parts are created equal, of course, and some, whether minor features or useful innovations, deserve celebration – so here are some of our team's favourites

Ariel Atom 4 spaceframe

I suppose it's a bit of a cop-out picking a whole spaceframe as a car part, but that's what I'm doing. The bronze-welded tubular steel spaceframe of the Ariel Atom 4 really is a work of rare genius. Not only does it define the totally inimitable look of the car from without, but it's also the filter through which so much of your enjoyment of the car is delivered when you're within. You can see the front wishbones bobbing away through it; the brake caliper and brake lines, too, running to the beautiful milled-from-billet nearside front wheel hub. You can worship and adore the expensive Eibach pushrod suspension bolted to it; even poke your right elbow through it when you need a bit of extra leverage on the steering wheel. It's no exaggeration to record that it, more than anything else, is what makes the Atom brilliant: like some full-sized Meccano set built on money-no-object terms. **MATT SAUNDERS**

Pontiac GTO hood-mounted rev counter

No doubt current pedestrian impact regulations would rule out a comeback for one of my favourite car details. It's the bonnet-mounted rev counter that was fitted as an option to Pontiac Firebirds from 1967 onwards and also to the Pontiac GTO. Buick pinched the part for its 1970 Skylark GSX as well. A pal of mine had a 1969 GTO and later a 1970 model, both of which had what Americans call 'Hood Tachs'. I don't remember either of them ever working but they looked cool and were quite a good idea because the last thing you wanted to do in a muscle car from that era was take your eyes off the road. **COLIN GOODWIN**

Bentley Continental GT rotating display

A gauche choice, given that you can buy a very respectable used car for the same money, but Bentley's £4500 rotating display wins hands down, purely for its James Bond-esque element of surprise. Admittedly, the three sides of the rotating display don't offer features such as weapon or ejector buttons, but nonetheless, this cool set-up has raised a smile on every person whom I've seen witness it. **RACHEL BURGESS**

BMW 3 SERIES (E21) DOOR HANDLE

The best interior door handle known to humanity belongs to the E21-generation BMW 3 Series. It is ergonomically perfect. Instead of a plastic or chrome pull, which wastes valuable space on the door card and is a pointless engineering indulgence, the handle is incorporated into the pull. You don't actually see it, just squeeze it. The more you use it, the more natural it becomes – until you try to exit from another vehicle and realise that the door pull won't let you out. **JAMES RUPPERT**

FERRARI 365 GTB/4 'DAYTONA' EXTERIOR DOOR HANDLE
They say the shape of the shark ceased to evolve millions of years ago because it had reached a state of perfection. The door handle should have gone the same way half a century back. The world of car design should have looked at that tiny little silvery hook, so elegant in its own right, yet so respectful of and deferential to the rest of the car's styling, and said: "Okay, no one is ever going to do it better than that." And in the past 50 years, no one has, and I suspect no one ever will. After all, how do you improve on perfection? **ANDREW FRANKEL**

Mini head-up display

The first car I drove with a head-up display for any length of time was the third-gen Toyota Prius, about a decade ago. For no real reason other than being a luddite back then, I didn't like it, and over the months running it, I actively tried to come up with ways to block its projection out of the top of the dashboard, such as with sheets of A4 that would then just glare onto the windscreen and make it worse... A head-up display next turned up again on a Mini Cooper I started running in 2014. For no real reason other than no longer being a luddite, I thought it was brilliant. Now, it's my favourite piece of car kit bar none. Head-up displays stop your eyes from leaving the road to check the speed and reduce cognitive load and strain on your eyes. Sorry, Prius, it was me and not you. **MARK TISSHAW**

SKODA BOTTLE CLENCHERS
Set into the bottom of cupholders aboard most Skodas are five raised moulded plastic mounds. They look like a design quirk, or possibly a way of raising your drink above any spillages, until you place a bottle of pop (or similar) in there, whereupon they transform into the most useful thing you never knew you needed, vice-gripping the base of a bottle while you turn and open the lid. Anyone who has ever tried opening a bottle while driving – using either two hands or both legs and one hand – will immediately appreciate the safety significance of such a simple detail.
JIM HOLDER

VOLKSWAGEN GTI TARTAN
It's tempting to pick Volkswagen part number 199 398 500 A, but since the firm has never actually used currywurst in a car build, it apparently doesn't count. Instead, I'll opt for another VW classic: the GTI's tartan fabric trim. Forget plush leather, Alcantara or similar: GTI tartan is the only fabric I can think of that's absolutely synonymous with a particular model. It's as much a part of the GTI recipe as a tuned engine, revised suspension and twin exhaust pipes. **JAMES ATTWOOD**

FORD MONDEO ESTATE MK4 DASH VENTS
I've been thanking them for nearly three years.
HILTON HOLLOWAY