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# European car

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APRIL 2015

## ALLARME ROSSO

NOVITEC FERRARI F12



### TESTED

- > BMW 535d
- > VW Touareg TDI

### DRIVEN

- > Audi Prologue Concept
- > European Spec VW Polo GTI

### PLUS

- > Ken Block Interview
- > 200-MPH MTM Audi Wagon
- > Project M3 Exhaust Performance



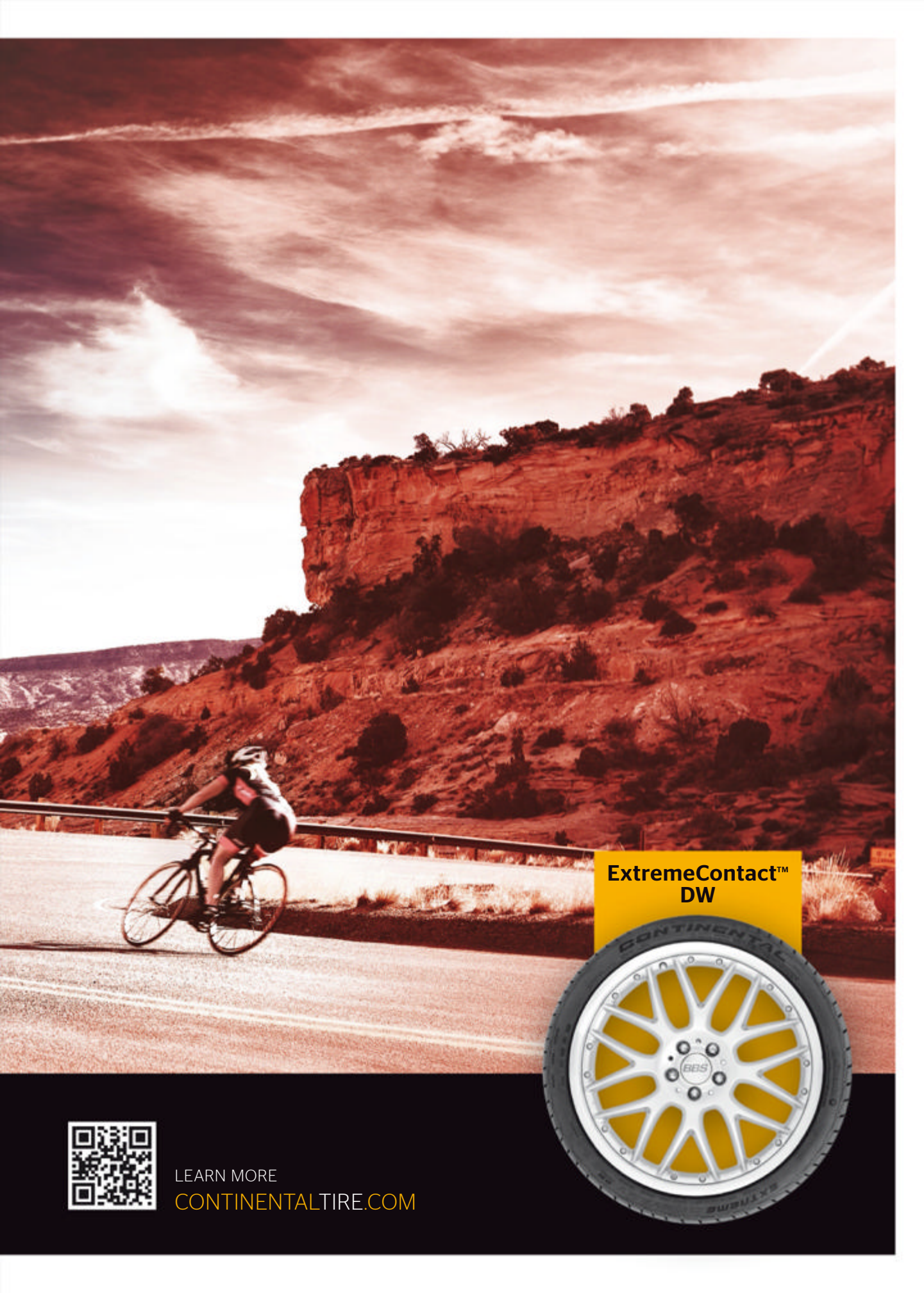


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## parts and labor



# I'M NOT TAKING THE HY-ROAD

**IF YOU HAVE THE SLIGHTEST GRASP ON REALITY**, you've accepted that powertrains are undergoing a major renaissance. Turbocharged four-cylinders are now supplying the performance of V-8s from just 10 years ago. Ten years from now, all signs point to even smaller combustion engines either assisted by or possibly even replaced with an electric motor.

At the 2015 L.A. Auto Show, every company was talking about at least partial electrification. Toyota—yes, I just said the T word in *European car*—is so sure about the future of things, it will start selling a hydrogen-fuel-cell-powered electric car in the next few months. In the beginning, they will be little more than

a novelty, selling the majority of them in California with a limited number of fueling stations. Right now, we have roughly 20 stations throughout California located in population-dense areas. There are plans to build another 20 or so in the next five years, with some of them located in more remote locations, making it possible to drive between L.A. and the Bay Area. Toyota and government money are currently financing the expansion of the infrastructure.

At first, most filling stations will be built in conjunction with preexisting gas stations, but that will only be for the sake of driver's familiarity. A hydrogen station could really be installed anywhere; it's just a question of customers being willing to fill up away from a supply of diet cola and jerky. The challenge facing hydrogen

as opposed to gas and electric charging stations

is power lines are already everywhere and gas trucks already travel all over. Hydrogen will require different trucks, which will also have to be used for long distances, where petroleum products would normally travel by pipeline.

You're wondering how this ties into the European business. Well, Audi and Volkswagen also showed hydrogen fuel cell vehicles at the show. I attended a VW/Audi technical seminar as well as a roundtable discussion on the subject; both of these were far more entertaining and informative than you might imagine.

The VW and Audi vehicles have no real production plans at the moment, even though both companies insist the powertrains are production ready. Apparently, a hydrogen fuel cell and plug-in hybrid power train could be fitted to just about any vehicle in the family at any time. In my opinion, the addition of a larger

battery that can be charged in a more conventional manner makes these a far and away better idea than Toyota's, but that's another story.

The question is, if they are ready to go, why wait? The VW/Audi Group has never been one to shy away from new technology. According to Dr. Ulrich Hackenberg, board member for technical development, the future of hydrogen is uncertain and the investment is too great. In this county at least, we already have Tesla and several third-party companies rapidly expanding electric charging stations. VW, BMW, and Chargepoint just partnered up to increase the current charging network on both coasts. As opposed to the roughly 50 hydrogen sites in the next five years, Chargepoint has more than 3,000 locations currently, with the VW/BMW money adding another 100 just this year. So infrastructure is one of the main reasons, but not the only one.

Hackenberg also explained that the need for hydrogen fuel cells may not exist by 2025. Battery technology is evolving rapidly, and it is possible that in the next 10 years alternatives that are being developed internally within VW/Audi will likely have three times the best current technology's capacity as well as taking less than half the time for recharging. Right now, you can buy a Tesla with a 200-mile range that can be charged to 80 percent capacity in under an hour, not the best solution but almost livable. When Tesla's battery swapping goes online, you can have that 200-mile range in the same time it takes to fill a tank with gas. If Hackenberg is right, the next couple of generations of electric cars will bring charging times similar to battery swapping while supplying the range of a gasoline-powered vehicle.

I think The VW/Audi Group is on the right track. I like the idea of hydrogen fuel cells. I don't like the fact that at this time, the best place to get hydrogen is from natural gas, another limited resource. We can get it from electrolysis, but that requires more energy than it produces. Even if you do it with solar or wind power, you still need to transport the hydrogen afterward, which is less efficient than just wiring the electricity to a charger.

In the end, I don't want to see the internal combustion engine die at all. I do believe that we need to develop more sustainable and cleaner ways to power our transportation. Jumping onto something like hydrogen right now only seems logical for commuter cars in a very confined area. I am putting my money on the group who historically has been known for making technological innovations that have revolutionized the car business. I'll let Toyota fans play in the water and I'll hold onto my combustion engines until the batteries are fully charged.

**Michael Febbo**, Editor  
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[034motorsport.com](http://034motorsport.com)



## CORBEAU RETRACTABLE HARNESS BELT

This three-point belt offers the freedom of movement to look over your shoulder, reach for the audio controls, etc. Yet a sudden movement will force the belt to lock up. There's also a control to turn it from retractable to full-time harness mode. It comes in a variety of colors. **\$99.**

[corbeau.com](http://corbeau.com)



## ULTRA RACING FRONT STRUT BRACE

Extra torsional rigidity is no bad thing. It helps with handling and steering precision. This piece will enhance the '06-and-younger Audi TTS Quattro. As with the company's braces for other vehicles, this steel unit takes the most direct route from one front suspension turret to the other for optimum rigidity and is designed to work in conjunction with the car's crumple zones. **107.80 GBP.**

[potn.co.uk](http://potn.co.uk)



## RED LINE RL-600 DOT 4 SYNTHETIC BRAKE FLUID

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[redlineoil.com](http://redlineoil.com)



## HRE SERIES R1 ALLOY WHEEL

According to HRE, maker of beautiful wheels, this is the most advanced light-weight track wheel it has ever produced, a "culmination of years of supplying teams with a wheel that can last multiple seasons and take on the most challenging forms of motorsport." Evolved from the company's R34 wheel, the Series R1 Monoblok comes in a single style with diameters ranging from 17 to 19 inches and widths going from 7 to 14 inches, plus configurations for center lock setups. **From \$1,900.**

[hrewheels.com](http://hrewheels.com)



## FORGE MOTORSPORT TWINTERCOOLER

That's not a typo. The Twintercooler is a smart way of keeping a MkVII GTI from heat soaking. It's a twin-core cooler that sits in front of the standard radiator, intercooler, and air conditioning condenser, yet remains hidden behind stock bodywork. Forge claims a drop in temperature by as much as 69 degrees F. All necessary parts and instructions are included, and it should take less than two hours to fit by someone who knows what they're doing. **\$800.**

[foragemotorsport.com](http://foragemotorsport.com)



## EAGLE ONE SURFACE PREP MITT

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[eagleone.com](http://eagleone.com)



## AWE TUNING TOURING EDITION EXHAUST SYSTEM

AWE has a whole range of Touring systems for various Euro cars. The latest lucky recipient is the Audi A6 3.0T (the current C7 generation). This is made specifically for the A6 and not just a repurposed system from the A7. Maximum power gains are a claimed 12 hp and 11 lb-ft of torque (measured at the crank). It won't affect emissions adversely, is street legal, and guaranteed not to set off the "check engine" light. AWE's "180 Technology" is available where sound waves are controlled and reflected out of phase to cancel noise. **From \$1,839.08.**

[awe-tuning.com](http://awe-tuning.com)



# GEAR



## M7 TUNING TURBO HEAT SHIELD

M7 Tuning makes and supplies a lot of good stuff for the Mini. Like this heat shield for '11-'13 R55 through to R61 turbocharged models, made to save the factory hood-scoop and paintwork from excessive radiant temperatures. Similar items are available for other Mini models, too. The company reckons it'll take between 15 to 25 minutes to install, and all the required bits and bobs come with the package. Just supply a few basic tools. **\$199.**

[m7tuning.com](http://m7tuning.com)



## FONDMETAL KV-1 ALLOY WHEEL

It has to be said that Fondmetal doesn't go in for many details on its website, but we do know that the KV-1 alloy wheel is made in Italy and has met with TÜV approval. It's made by using a special low-pressure casting method and then additionally heat-treated. It's a five-spoke design with a concave center. Sizes range from diameters of 20 to 22 inches, along with widths of 9, 10.5, and 12 inches on the 20-inch version, plus widths of 9 and 11 inches on the 22. The company says applications include Audi, BMW, and Mercedes-Benz.

**From \$558.**

[fondmetalusa.com](http://fondmetalusa.com)

## RONZO POWER BANK

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[ronzopower.com](http://ronzopower.com)



## GIRODISC ROTORS

Larger diameter, less weight. That's just one plus point of this brake disc upgrade for the current 991 generation of the Porsche 911 C2S and C4S. Where the OEM units are 340 mm and 330 mm (front/rear), these two-piece replacements are 350 mm (13.8 inches) at each corner. Aircraft-grade 6061 billet aluminum hats bring weight down by 9 pounds at the front and 7 at the back. They're made in-house, using high carbon content iron, are slotted instead of drilled for better pad/disc contact, and employ curved vanes for efficient heat dissipation. **\$TBA.**

[girodisc.com](http://girodisc.com)



## VORSTEINER V-FF 103 ALLOY WHEEL

The V-FF 103 Flow Forged lightweight alloy wheel can now be bolted to the current F32 BMW 4 Series. The image shows the Carbon Graphite finish with a 20x8.5 at the front and 20x10 at the rear, with a staggered fitment. This split five-spoke beauty comes with a standard or concave profile. Vorsteiner says a V-FF 103 will take 245/30 and 275/30 tires and still not rub after a moderate drop. **\$600.**

[vorsteiner.com](http://vorsteiner.com)



## BOSCH PERFORMANCE GAUGES

We know Bosch from wiper blades, car electronics, and ABS. And power tools and home appliances, and probably a bunch of other stuff. But we don't normally associate this company with automotive gauges. That might be because these are the first performance gauges Bosch has brought to North America. There's a full line displaying the usual things like revs, pressure, and temperature, and they come in Sport, Custom, Style, and Retro designs. **From around \$35.**

[boschperformance.com](http://boschperformance.com)



## CLEVER CRATES

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# '15 Volkswagen Polo GTI

THE PASSION BEHIND THE PRAGMATISM

Words Nick Maher



## THE POLO GTI HAS ALWAYS HAD AN IMAGE

**PROBLEM.** It has never quite managed to live up to its potential as a convincing understudy to the iconic Golf GTI. Blame its foundation. For all its upmarket appeal, the Polo is the chaste, bookish, flat-shoed, and cardigan-wearing student rather than the outrageous sorority girl.

Perhaps stung by buyers preferring Ford's really rather brilliant Fiesta ST, Volkswagen has been busy updating the Polo GTI. No minor changes, either. There's now an evolved 1.8L EA888 turbo-charged four behind that red pinstriped grille, the bigger-capacity unit replacing the previous 1.4 TSI "twincharger."

This new engine features a combination of direct and manifold injection, variable valve timing, and an electronic actuator for the turbocharger's wastegate in a bid to minimize turbo lag and improve drive-ability in general. The turbo also enjoys water-cooled exhaust gas recirculation that's fully integrated into the cylinder head.

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Along with some other revisions, the new Polo GTI delivers 190 hp, compared with the old car's 178. There is a corresponding improvement in the zero-to-62-mph time, too: 6.7 seconds rather than 6.9. Torque is increased to 236 lb-ft, available between 1,450 and 4,500 rpm. This substantial increase is made possible by Volkswagen offering a manual option.

Yes, purists can rejoice. The once DSG-only Polo GTI is now available with three pedals and a stick—a good thing in this marketplace. The DSG remains an option, but in the interests of longevity, Volkswagen has dialed down that version's twist by 52 lb-ft, its peak torque of 184 lb-ft delivered between 1,250 and 5,300 rpm.

Those seeking economy will be giving their left foot a rest. We'll take that slight penalty for the joy of a six-speed manual. Indeed, a considerable part of the fun wringing every bit of performance from diminutive hot hatches is in shifting gears oneself. A look at the plummeting European sales of the once market-leading and now paddle-shift-only Renaultsport Clio illustrates that.

And so it proves with the Polo GTI. The numbers might suggest that the three-pedal Volkswagen offers the same performance, but the manual's additional torque manifests itself on the road with seemingly greater in-gear urgency and faster response. It's a cracking engine, with an impressive keenness to rev. Yet the substantial midrange urge makes for a less frenetic pace when you're in less of a rush. The DSG is as quick and smooth shifting as ever in auto mode, but it feels somewhat detached in comparison, even if it does gain an extra ratio.

Decent pedal spacing allows for throttle-blipped downshifts. The shift quality itself is predictable, with Volkswagen's signature springiness allied to decent accuracy. It's just a shame the gearstick isn't capped with something a little more tactile than a plastic-topped sphere—no fancy, dimpled golf-ball-like knobs like its bigger relation.

An oversight perhaps, because the interior otherwise echoes that of its Golf GTI sibling, right down to the brilliantly supportive sports seats covered in signature black/gray/red plaid, with red pinstriping and stitching here and there. Otherwise, it's business as usual: an impeccably built interior short on flair, but high on functionality and user-friendliness.



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#### PROS

- › Typical VW refinement and quality
- › All the GTI toys of the bigger Golf
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#### CONS

- › DSG loses considerable torque
- › Priced too close to Golf GTI

### TECH SPEC

#### '15 VOLKSWAGEN POLO GTI

**BASE PRICE**  
\$20,000 (ex est.)

**VEHICLE LAYOUT**  
Front-engine, FWD, five-seat, four-door hatchback

**ENGINE**  
1.8L/190 hp/236 lb-ft turbo DOHC 16-valve I-4

**TRANSMISSION**  
Six-speed manual

**CURB WEIGHT**  
2,766 lb. (mfr.)

**WHEELBASE**  
97.2 in.

**LENGTH X WIDTH X HEIGHT**  
156.8 x 66.2 x 56.8 in.

**0-62 MPH**  
6.7 sec. (mfr.)

A flat-bottomed wheel reminds us of the Polo GTI's sportiness, if all those red stripes aren't enough. What's apparent is how VW has connected it to the front wheels, with an entirely new electro-mechanical setup. Response is quick and the nose is eager, if not quite as precise as some. There's precious little feel at the steering wheel's rim, but enough to convey the front end's typical press-on nature if corner entry speed is a little too ambitious, or if steering inputs are too abrupt.

There's some adjustability to the chassis. Back off mid-bend and the rear will come into play. Not in the wild, abundant fashion that's possible in a Fiesta ST at its best, but it's amusingly mobile, even if it retains its overall inherent Volkswagen sensibleness.

It's still worth checking the box for the Sport Performance Kit, which adds (among other things) electronic dampers. Press the Sport button and the suspension becomes tauter, the steering gains some heft, and the throttle map changes for quicker response. It'll make the DSG shifts brisker, too.

Further adjustment in the Polo GTI's makeup comes courtesy of the stepped ESP and traction control system. The ESC Sport setting enables that amusing mid-corner throttle adjustability. It's all impressively integrated and rarely, if ever, intrusive. The XDS+ torque vectoring system, borrowed from the Golf GTI, also helps sharpen turn-in, braking the inside wheel to turn the nose, while the brakes themselves prove powerful, progressive, and unlikely to run out of stopping power.

All rather enjoyable. And although the Polo GTI is significantly improved, Volkswagen isn't the type of company to offer its smallest hot hatch with some of the more indulgent delights of its rivals. It feels closer to its Golf relation than ever before, however, which is a good thing. It's just not quite the wild child the 2015 model year improvements suggest it really could be. **C**



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## GET SOCIAL







# '15 BMW 535d

FUEL ECONOMY IS JUST A BONUS

Words Michael Febbo

**I'VE HAD A NUMBER OF DIESEL-POWERED DAILY DRIVERS** in the past few years that led to countless conversations debating the value of oil-burning engines. The dollars and cents is only one variable in a much bigger equation. A full tank of diesel carries a price premium roughly equal to a Double-Double Combo, but skipping a cheeseburger with every trip to the pump gets you a mountain of low-end torque and cruising range that will surely beat your bladder's. The diesel variant of the BMW 5-series is the best all-around version whether it saves you money or not.

In 2014, both gas and diesel were substantially more expensive than they are now; I normally paid a decent margin over four dollars for a gallon of diesel. At my normal stations, a gallon of premium gasoline was usually within 5 percent, plus or minus depending on the week. Most people, however, swore that diesel was far more expensive, maybe as much as 40 cents a gallon, which as you math-minded readers realize is around 10 percent. Telling people that diesels are as much as 30 percent more efficient is futile when all they see is an extra outlay at every fill-up.

**"Telling people that diesels are as much as 30 percent more efficient is futile when all they see is an extra outlay at every fill-up."**





As I write this, diesel fuel has fallen significantly in price—but not as much as gasoline. Currently, the Chevron down the street is getting \$2.78 per gallon of premium, while diesel is still \$3.09 per gallon. The EPA rates the gas-powered 535i at 31 highway mpg and the 535d at 38 mpg. So every mile in the gas 535i is roughly nine cents, while the diesel is roughly eight cents per mile. Which means, in just 150,000 quick miles the diesel will repay you the \$1,500 premium you paid. In fairness, I should also point out that historically at least, diesels have demonstrated noticeably better resale value that often surpass the new purchase price difference. A quick web search shows 535ds are shifting hands at roughly two grand higher than its gas-powered equivalents.

**“A quick web search shows 535ds are shifting hands at roughly two grand higher than their gas-powered equivalents.”**







**“The car absorbs but doesn’t mask what the car is rolling over. You will know when the road is rough; you will know the suspension is working to attenuate the big bumps.”**

So, yes, even with cheaper gas it still makes sense to buy the diesel, but as I’ve stated earlier, that isn’t the best reason to buy a diesel. The 413 lb-ft of torque generated by the turbocharged 3.0L is. The diesel is 45 hp down on its gas counterpart at only 255 hp, which is rated at 300 hp and 300 lb-ft of torque. For most driving, the extra 113 lb-ft of torque is far more useful.

At our test track, both cars ran an identical 5.5 seconds from 0-60 mph. The gas-powered 535i edged out the 535d in the quarter-mile running a 14-second flat compared to the 14.2 seconds. Trap speed was to the gasser also at 99.3 compared to 97.1 mph. In normal driving, however, the diesel feels far more responsive and requires fewer shifts from the eight-speed automatic. Obviously, neither car has the old naturally aspirated feel old-school Bimmer fans once knew. For the most part, I’m OK with that. With each generation, the 5-series has added more luxury to the sports sedan equation.

The ride is firm, but controlled. This particular car was equipped more toward the sporting end of the spectrum and feels appropriate. The car absorbs but doesn’t mask what the car is rolling over. You will know when the road is rough; you will know the suspension is working to attenuate the big bumps. They won’t upset the car and they certainly won’t

upset the occupants’ beverages. How does that translate to handling? Quite well actually.

On the road, the 535d’s confident athleticism is a bit at odds with its ever-expanding girth. It’s a big car, but it can move. The large backseat invites passengers who may not appreciate the gusto this car encourages on freeway ramps and backroads. My son, however, loved it. There is certainly body movement, but it doesn’t detract from the experience. It actually may encourage it some, as all 4,085 pounds of mass can be shifted around with the throttle.

At the track, the car becomes more fun, and exploring the car at its limits illustrates the extra effort BMW engineers put into the chassis. DSC Sport mode allows for a pretty fair amount of on-throttle rotation before it steps in. With all the electronics defeated, the big 5er will swing its tail around with ease. This isn’t a subtle car; it doesn’t like soft inputs. It prefers a bit heavier hand and likes to be pushed around a little bit. Slow, easy inputs result in gentle understeer, and you can put all the power down with a widening arc. Turn in a bit more abruptly and jab at the gas pedal and you get far more response. It’s easy to overdo it and break the front tires loose, or even get the car too sideways and scrub all your momentum. Get it right and you get a satisfying and quick sideways drift on exit.

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## TECH SPEC '15 BMW 535d

**BASE PRICE**  
\$57,525

**PRICE AS TESTED**  
\$66,425

**VEHICLE LAYOUT**  
Front-engine, RWD, five-pass, four-door sedan

**ENGINE**  
3.0L/255hp/413-lb-ft turbo DOHC 24-valve I-6

**TRANSMISSION**  
eight-speed automatic

**CURB WEIGHT (F/R DIST)**  
4,085 lb. (50/50%)

**WHEELBASE**  
116.9 in.

**LENGTH X WIDTH X HEIGHT**  
193.4 x 73.2 x 57.6 in.

**0-60 MPH**  
5.5 sec.

**QUARTER-MILE**  
14.2 sec. @ 97.1 mph

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The advantage of the diesel's midrange torque is illustrated on the figure-8. While the 535i was a little faster in the quarter-mile, and consequently faster toward the ends of the straights, the 535d can get off the corners faster. The 535d turned in a 25.8-second lap, which is a tenth faster than the 535i. It is worth noting that the 535i was able to out-stop the 535d by a notable margin, 106 feet compared to 112. The diesel version is a mere 78 pounds heavier, which is negligible.


Besides the track and enthusiastic road driving, I did get a chance to use the 535d on a road trip as well. My average speed was likely higher than what the EPA considers normal. Over the roughly 600-mile trip, the BMW averaged 36 mpg. That includes some traffic and in-town driving as well. Observed fuel economy is by definition anecdotal, but it gives you an idea of what the car is capable of.

Our tester came in at \$66,425 and felt lightly equipped. It didn't even have a rearview camera, much less around view. The car itself still feels well

built and solid. Everything in the car has a heft and firmness. Nothing flexes or bends under load. The seats, once adjusted, feel as though they are welded in position. There is no movement in the backrest, no creaking, just support. The controls all feel modern, with a rubbery detent in buttons and knobs.

The steering wheel is a long evolution of BMW design. It isn't overly thick, like some previous cars, and won't tire hands by being too soft. All in all, the car is a pleasure to be in for the long periods of time afforded by roughly 700 miles of cruising range.

If I were buying a 5-series tomorrow, the diesel would be a no-brainer. Even if it returned the same fuel economy as the gas version, the torque and resale value would make the decision for me. Those things coupled with the extra fuel economy are a bonus.

Diesels are still a bit of a niche product in North America, but the European fans are without a doubt the most deeply involved. The 535d is a prime example why. 



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# '15 VW Touareg TDI

## REFRESHED, JUST TO BE SAFE

Words Michael Febbo

**I HAVE TO ADMIT, SUVs ARE STARTING TO GROW ON ME.** Maybe I'm getting old, maybe it's being a dad, or maybe, it isn't me at all. Over the last decade, a select few SUVs have gone from being fully enclosed trucks with a horrible ride and even worse driving dynamics to being a pretty decent substitute to a sport wagon. Testing and a quick road trip in a '15 Volkswagen Touareg hastened my conversion.

The Touareg has been blessed with good performance lineage from its beginning. The platform was, and still is, developed alongside Porsche's Cayenne, which is no slouch on or off road. The VW version is slightly more affordable and, in my opinion, has styling that ages better than Stuttgart's most polarizing model. The second generation of Touareg debuted in 2012, and the '15 model you see here is a refresh of that.

From the outside, the front and rear fasciae are the giveaways. The grille is wider and more aggressive, the headlights and taillights have received more attention, and overall, it just looks more modern. I would go so far as to call it handsome. The big family hauler is VW's most expensive model by a considerable margin, and it looks the part.

**"The Touareg has been blessed with good performance lineage from its beginning."**





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-Paul Rivera (Quattro Quarterly Magazine)

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-Greg Emmerson (European Car Magazine)

"They've designed a simple plug-in harness, and a really clean display that reads all sorts of info, and it's in view of the driver and passenger while not cluttering the steering wheel or center console. Better yet, it's affordable in comparison to all those ancient analog gauges as just the desired boost, oil and water temperature and battery gauges would set you back over twice what the retail of P3 Car's VIDI gauge does at it's MSRP!" -Barry Brazier (MC2 Mini Magazine)

With this one gauge I can now read turbo boost pressure, engine coolant temp, intake air temp, exhaust gas temp, battery voltage, rpm, vehicle speed ... Hell, the new gauge even gives me the ability to read and reset engine trouble codes! I was sold the minute I saw it, and all the willpower in the world couldn't prevent me from plunking down my hard-earned cash for this marvelous instrument."  
-MJ Calabrese (Roundel Magazine)

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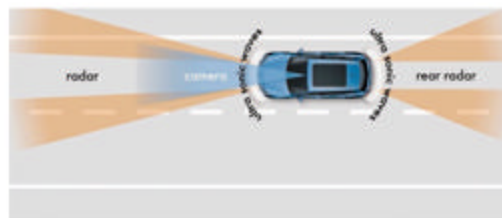
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**"If the car senses a closing speed with the vehicle in front that makes it nervous, it will first give audible and visual warnings."**

This refresh, however, is far more than just skin deep. The styling is the least significant part. For 2015, VW has added a host of safety features that I would hope someone buying in this segment would covet far more than bejeweled headlights. To start, the addition of active cruise control that utilizes dual front radar sensors also allowed the addition of Front Assist and Autonomous Emergency Braking. If the car senses a closing speed with the vehicle in front that makes it nervous, it will first give audible and visual warnings. If you don't react, the car will apply the brakes itself. In the early days of this technology, it was quite often intrusive and not very well executed. I vividly remember one instance five years ago when a car slammed on the brakes when a plastic shopping bag



blew across my freeway lane. Needless to say, I got a "What are you doing!?!?" from my wife sitting shotgun and something not nearly as polite from the drivers following me. After spending a couple of hundred miles driving the new Touareg, it never once brake checked following cars for airborne refuse.



## A red BMW 4 Series is shown driving on a bridge with a green railing. The car is in motion, as indicated by the blurred background and the motion blur on the wheels. The license plate area displays 'BMW' and '4 Series'.



- 

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## TECH SPEC '15 VOLKSWAGEN TOUAREG TDI

**BASE PRICE**  
\$63,110

**PRICE AS TESTED**  
\$65,610

**VEHICLE LAYOUT**  
Front-engine, AWD, five-pass, four-door SUV

**ENGINE**  
3.0L/240hp/406-lb-ft turbodiesel DOHC 24-valve V-6

**TRANSMISSION**  
eight-speed automatic

**CURB WEIGHT (F/R DIST)**  
5,085 lbs. (52/48%)

**WHEELBASE**  
113.9 in.

**LENGTH X WIDTH X HEIGHT**

188.8 x 76.4 x 68.2 in

**0-60 MPH**  
7 sec.

**QUARTER-MILE**  
15.4 sec. @ 88.1 mph

**BRAKING, 60-0 MPH**  
122 ft.

**LATERAL ACCELERATION**  
0.85 g (avg.)

**EC FIGURE-8**  
27.1 sec. @ 0.75 g (avg.)

**EPA CITY/HWY/COMB FUEL ECON**  
20/29/23 mpg

VW is not just worried about its drivers punting the car in front, however. Radar sensors looking back have been added for blind spot assistance, and a single camera mounted above the rearview mirror watches for unintentional lane wandering. Obviously, none of these safety systems can be considered out of the ordinary for the class, but it would be ridiculous to complain about their addition.



The new Touareg is available in three flavors of powertrain. At the entry level, you have a 3.6L VR6 with 280 hp and 266 lb-ft of torque. At the top of list, you have the hybrid. It features the sublime 3.0L supercharged V-6 found in Audi S4s and an electric motor sandwiched between engine and transmission. The gas engine is rated at 333 hp and 325 lb-ft of torque. With the addition of electric propulsion, those numbers rise to 380 hp and 428 lb-ft of torque. In the middle, you have what we tested here, the TDI. The TDI is the Goldilocks of the lineup with 240 hp and 406 lb-ft of torque. Both the hybrid and the TDI are rated at 20 mpg city by the EPA, who rates the hybrid at 24 mpg on the highway and the TDI significantly better at 29 mpg highway. The V-6 is rated 17 and 23 mpg—nothing to write home about.

I was able to drive all three briefly, but was only able to test the TDI. The hybrid is certainly the fastest, while the VR6 suffered from being driven last. All three models feed power through an eight-speed transmission. The VR6 utilizes as many gears as it can as often as it can. It likes to be driven in Sport Mode, and while adequate, it wouldn't be considered quick.



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The TDI turned in an impressive 7 seconds flat to 60 mph. Not too bad for a 5,085-pound, off-road, capable, family hauler. Perhaps more impressive, however, is that it is 0.7 seconds faster than the '12 Touareg TDI we tested when the second generation debuted. It continued pulling until it hit the end of the quarter-mile in 15.4 seconds at 88.1 mph. One Flux Capacitor short of time travel. The '12 would be stuck at Hill Valley mall, or require more than a quarter-mile as it's only capable of 85.3 mph in the 1320. The '15 only showed a single foot improvement in stopping distance, coming to a halt from 60 mph in 122 feet.

Our top-of-the-line, fully loaded TDI Executive came equipped with 20-inch wheels and 275/45 Goodyear Eagle LS2 tires. Not exactly sport rubber, but they helped to achieve a respectable 271-second lap around the figure-8. More important than the time, however, is how stable and reassuring the Touareg felt when pushed. While I don't think many—OK any—are buying this SUV for its at-limits behavior, it is fun to drive every day below the limits, and it's nice to know it's capable in an emergency. Body roll is nowhere near what you might imagine from a 2½-ton SUV and certainly a lot less than some rivals. The seats are surprising supportive, although the seat bottom bolsters are cut low to ease entry and exit. The seating position is great, with plenty of travel for a variety of sized occupants, and all the controls work intuitively. One thing to note is that the brake travel, feel, and resistance on the Touareg are as good as anything on the VW lot, better than hyper-assisted Passat TDI and GLI DSG.

Our tester had a sticker price of \$65,610 including delivery. Keep in mind this is only a two-row SUV. If you have no off-road aspirations, you can have a nice, roomy Passat for half that. Other options include the Mercedes ML, although I'm afraid it might seem a bit base-level at that price. A BMW X5 is another good option, but again, prices will quickly exceed the VW for a comparably equipped diesel. The Touareg is a compelling case, and while it seems like a bit of a jump price-wise from other VWs, it still seems like a pretty good deal. 🚗





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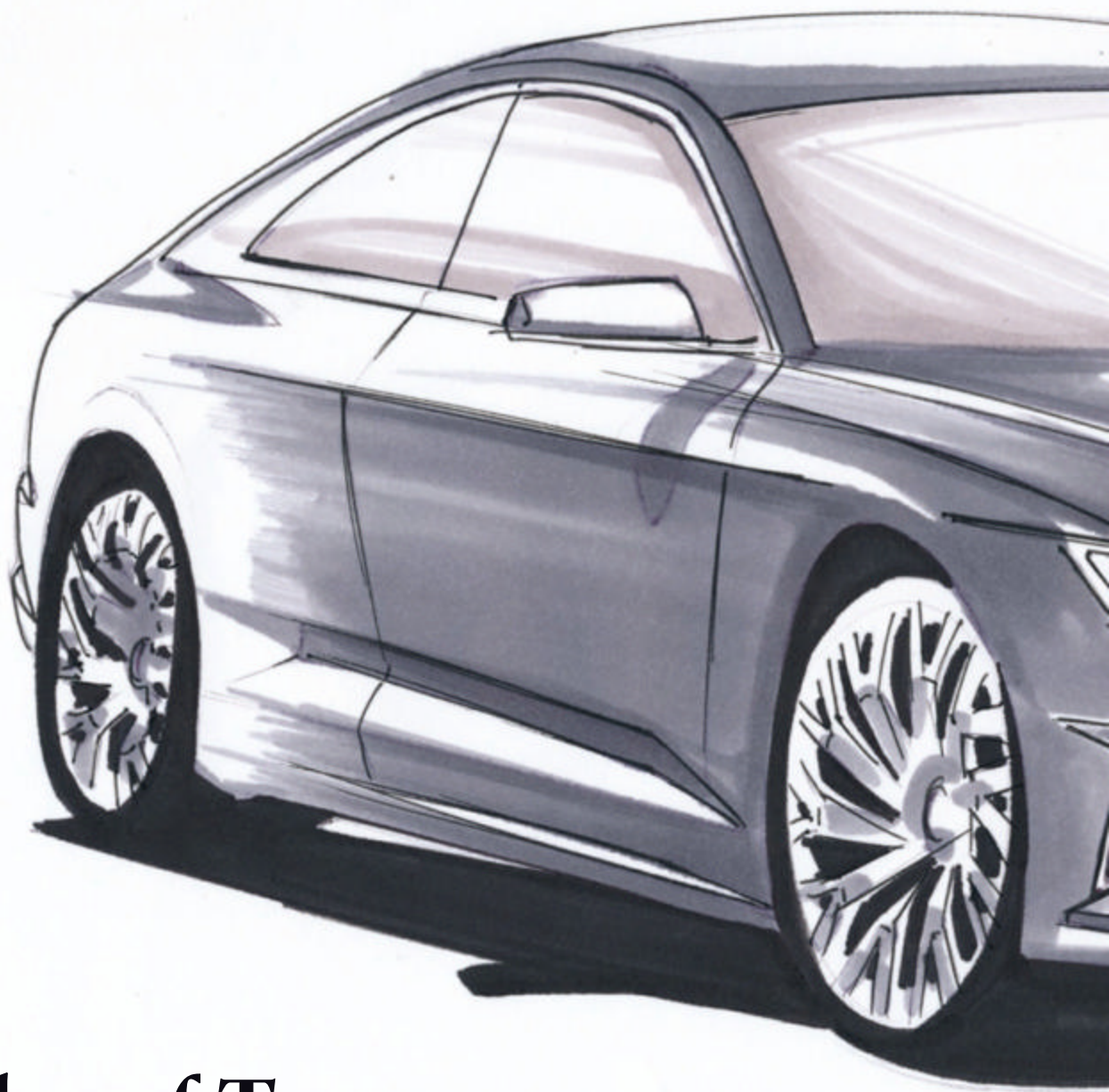
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# Edge of Tomorrow

THE AUDI PROLOGUE IS PULLED APART, FIGURATIVELY SPEAKING

Words and Photos  
Ezekiel Wheeler

**A TWIN-TARGET FOCUS ON DESIGN** and performance has helped create a distinct image for Audi. Preserving and developing that image is where the really hard work begins. It appears to have started with the Audi Prologue Concept, introduced at the 2014 Los Angeles Auto Show. Among the clean, deceptively simple lines is a stunning amount of detail.

This car makes several statements. Not the least of which is that it establishes a design language for future A6, A7, and A8 models. Word on the street (well, the auto show floor) is that this could even turn into an A9 flagship coupe.

The design benefit of a front-engine, all-wheel-drive platform is the ability to shift the greenhouse forward or back to achieve an individual silhouette. Manufacturers use the term "coupe" ever more loosely these days. The Prologue remains a traditional two-door GT. It's also massive. The hexagonal grille is intentionally so. Nearly everyone is opting for larger and more dominant down-the-road graphics, and Audi is also moving in this direction. Fortunately, the company benefits from this approach as those four rings are instantly recognizable, so having them float amid a sea of black and fine edges seems to fit the brand.



“The design benefit  
of a front-engine,  
**all-wheel-drive platform**  
is the ability to shift the  
greenhouse forward  
or back to achieve an  
individual silhouette.”



## behind the lines

Moving lower, fighter jet-like foils flank the grille. These planes remain nearly parallel to the ground but somehow ascend into the front scoops—a feat not easily achieved without skillful hands, keen eyes, and a strong character to fight for such elements. The design room can often be a place where battles are fought for certain details to remain true to the sketch and early scale models. Engineers have their say, executives have theirs; the designers often have to make a strong case for why they believe the car wouldn't make such a strong statement without those contested features.

The interior mesh of those scoops has intersecting lines looking as if they radiate from the center. Developing these concept cars runs into the millions, so why skimp on touches like this?

When Audi put box fenders on the A5, the decision was met with a mix of celebration and criticism. Most designers currently working at Audi have fond memories of box-fendered Group B rally cars dominating the WRC. The Prologue is an opportunity to evolve that design language but retain its heritage, all wrapped up in aluminum and high-strength steel.

While the RS5 received a slightly inflated version of a belted box fender, the Prologue takes it to another level. The Prologue allows the presence of its more pronounced fenders to be felt. Simple shoulder lines guide the observer's eye from the tip of the nose to the sweep and fall of the trunk in one uninterrupted action.

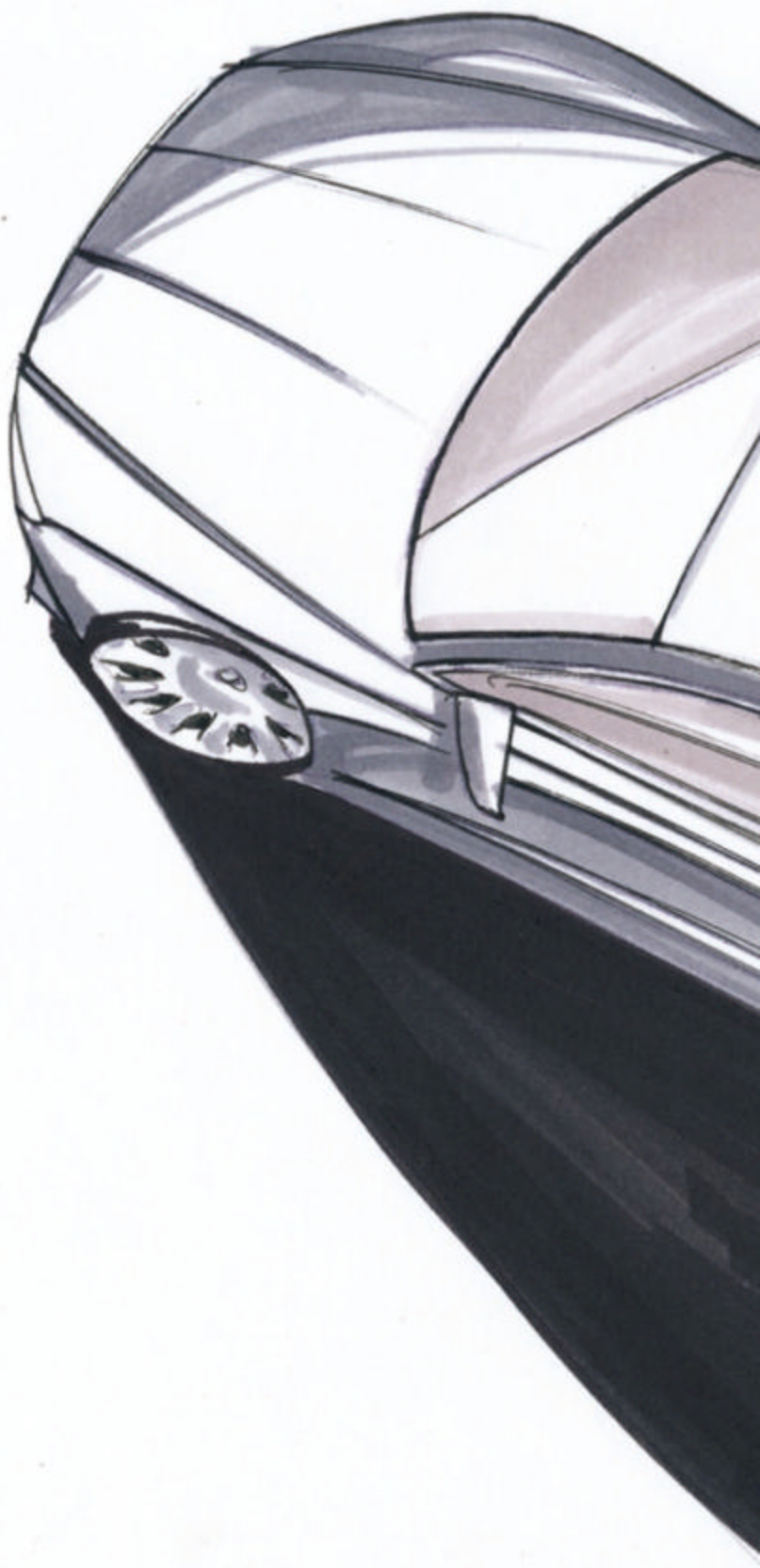
The C-pillar arches dramatically yet elegantly from the rear haunches up to the low roof. Turn the image of the vehicle vertically and it will appear to take on the shape of an archer who has just drawn his bow. Look toward the inward-curving rear glass and another familiar outline appears: a shape similar to the Dino of the late '60s. While this feature is not likely to reach production because of cost, it was needed to accommodate a trunk and maintain elements of Audi "DNA." Note also the lack of B-pillar and the high beltline.

An Audi without LED daytime running lights would look pretty plain. Since the company started this trend, it might as well push the envelope and draw shapes for others to imitate. The front has laser lighting. Lasers enable stylists to use smaller headlights, and they have an added advantage in terms of weight. At the rear, a line of 3-D LED lamps runs the entire width of the car. The middle brake light, when activated, has the effect of moving toward the observer.

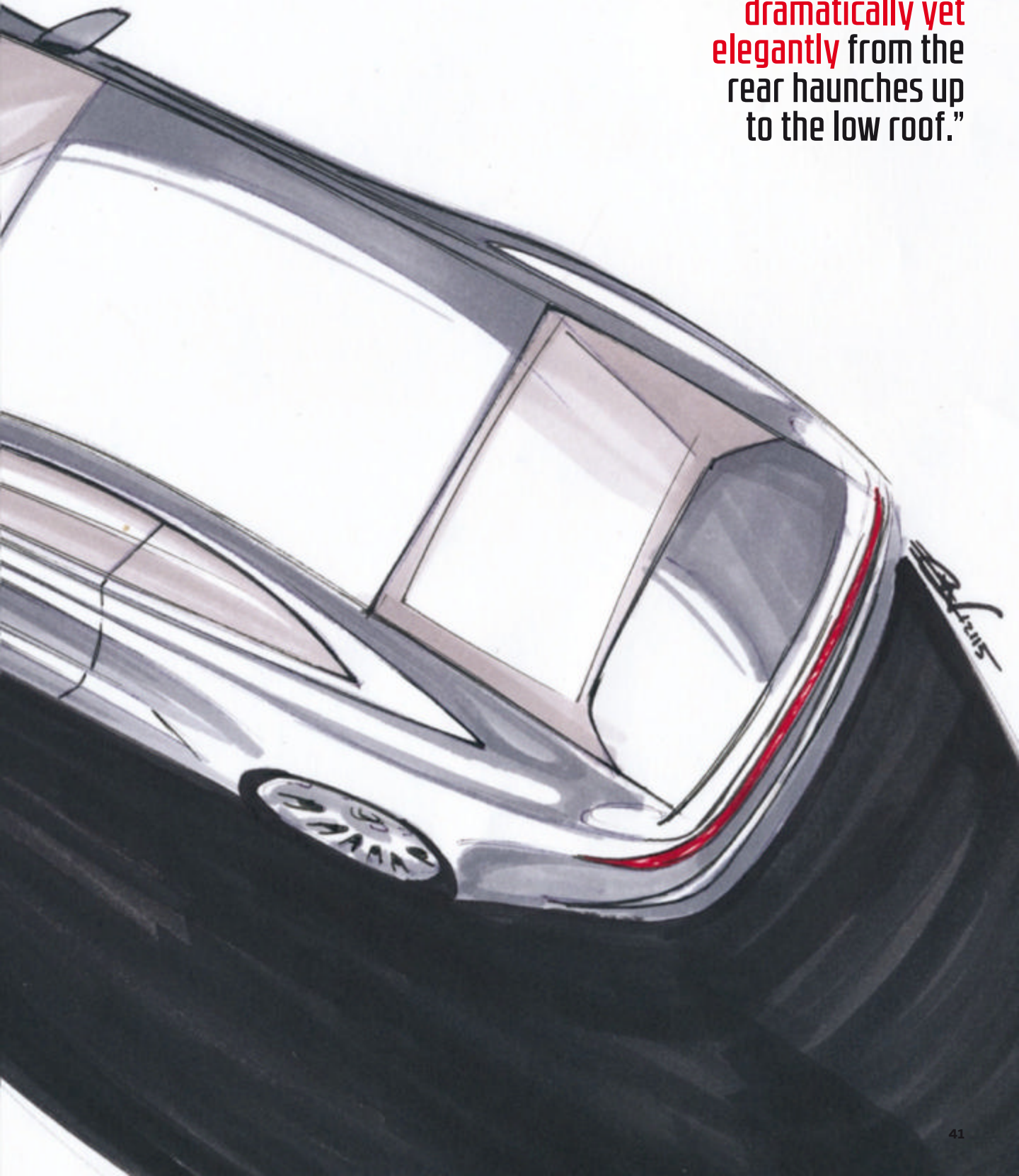
Let's talk about the 22-inch alloy wheels for a moment. Those 10 intertwining Y-spokes are just gorgeous. Incidentally, the Prologue also has dynamic rear-wheel steering to complement its Quattro drivetrain.

Amid the organic light-emitting diode-based displays in the cabin, accessed by an electro-mechanical touch sensor in place of a door handle, there's a steering wheel that doesn't have a flattened-out bottom. Perhaps Audi is leaving that look to AMG. Still, the brushed aluminum trim keeps the air of modernity.

If this concept really does become an A9, the world will be at least a much prettier place. 🚗



“The C-pillar arches  
**dramatically yet**  
**elegantly** from the  
rear haunches up  
to the low roof.”





ED ALERT RED ALERT RED ALERT

**TUNING HOUSES DON'T HAVE MUCH TO WORRY ABOUT.**

The solution is always a meaner stance and more power. The only question is how to do it. Some cars beg for additional inches on the hips and engines stuffed with more ponies. But things get more complicated when the car is already amazing.

Like the Ferrari F12, the cream of Italian grand tourers, a nigh-on perfect blend of impeccable style, purposeful presence, and unparalleled 730hp performance for around a third of a million bucks. One wrong move can disrupt the harmony that is the product of many years' work and expertise from one of the best car companies in the world.

A small workshop in the suburbs of Munich might not be able to add much to the mix. Unless it's called Novitec. Under the sub-brand Novitec Rosso, this tuning house has 25 years of experience perfecting Prancing Horses.

**NOVITEC ROSSO  
N-LARGES THE  
FERRARI F12**

WORDS MATT ZUCHOWSKI  
PHOTOS KONRAD SKURA



RED ALERT RED ALERT RED ALERT





Acutely aware of the risk that comes with overstepping the mark in relation to bettering Ferrari's efforts, Novitec Rosso has become known for careful, discreet changes of the cars' looks, doing nothing more than underlining the exclusivity and performance of these highly advanced designs. It's under the hood where the engineers let themselves loose: tweaking ECUs, adding superchargers, and doing all kinds of stuff to achieve crazy levels of power with V-8s and V-12s—even showing a bit of German humor by giving the cars precisely 777, 808, or 888 PS (those crazy Euros and their metric systems).

The N-Largo is a new kind of challenge. With this machine, Novitec took the opposite approach, focusing on the outside rather than the inside. The name was created by joining the first letter of Novitec and the word *largo*, which is Italian for "wide." The car takes up 4.3 inches more lane than the standard model, its width now a massive 81 inches.

It must have been a tricky job. Compared with the Lamborghini Aventador and some other shouty exotics, the F12 is a finely balanced and mature GT of classic proportions. Slapping on wider fenders just wouldn't cut it, so Novitec Rosso enlisted a true virtuoso of visual enhancements, Vittorio Strosek.

For the last 40 years, this Germany-based designer has been widening and lowering every car no one else deemed insufficiently wide or low, releasing special Porsches, Lamborghinis, and Ferraris in cooperation with Ruf, Abt, and Koenig, or under his own brand of Strosek Design.

With the F12, Strosek went for subtlety, blending seamlessly with the original Manzoni/Pininfarina-penned body. The outcome is anything but restrained, though. Taut lines and chiseled surfaces create a sinewy body with the muscles cut by contrasting details like the grille, big air scoops on the deeply carved hood, side mirrors, small roof spoiler, and a big airfoil (all made from carbon fiber).

Rear lamps are tinted black in typical Novitec Rosso manner, but still it's the massive five-piece diffuser that wins the title of Most Glorious Part, adding to the striking visuals of the rear. Novitec claims these wind tunnel-tested modifications also improve aerodynamic efficiency. The protruding splitter reduces negative lift at the front, wide rocker panels smooth out airflow between the axles, and big slots in the fenders direct air around each of the four carbon-ceramic brake discs to help them deal with the claimed top speed of 217 mph.

Amplifying the body's dramatic proportions is a bespoke set of deeply concave Novitec NF5 NL wheels. The massive 21x9.5 fronts and 22x12 rears (wearing Pirelli P Zero tires, 255/30 ZR21 and 335/25 ZR22, respectively) barely fit in the wells, but the effect is arresting. Novitec is better known for producing high-end wheels than body parts, so it's no surprise that these three-piece rims were made using highly advanced forging technology.

There aren't many changes to the original structure: Most of the factory parts could be retrofitted, since they are replaced with Novitec-manufactured carbon-fiber pieces bolted to existing mounting points. The real major mod is the significantly wider rear fenders (the front axle is 2.3 inches wider, while the rear adds a further couple of inches to that), where the original sections were cut away to make room for new fender liners (carbon fiber, naturally) to accommodate the bigger wheel/tire combo.

Considering an F12 puts 730 hp to the rear wheels, it's supposedly not far from its limits of traction. Extracting bigger numbers from this jewel of a 6.3L engine would be inefficient. Novitec still offers four stages of tune, but even the most advanced remains somewhat symbolic.







## TECH SPEC

### NOVITEC N-LARGO FERRARI F12

#### ENGINE

6.3L V-12; Novitec Rosso Tuned ECU and stainless steel exhaust; 781 hp/528 lb-ft

#### TRANSMISSION

stock seven-speed twin-clutch auto

#### BRAKES

stock 15.7-inch (f)/14.2-inch (r) carbon ceramic

#### SUSPENSION

Novitec Sport Springs with stock Magnetorheological dampers

#### WHEELS & TIRES

Novitec NF5 NL 21x9.5-in. (f) and 2x12-in. (r) wheels; 255/30 (f) and 335/25 (r) Pirelli P-Zero







These upgrades vary from reprogramming the ECU and raising the rev limit from 8,500 to 8,900 rpm (good for 773 hp and 518 lb-ft) to a stiffer suspension, dropping the ride by 1.5 inches (no worries, a lift system helps tackle a speed hump or a ramp in a parking garage), and a new quad-pipe, stainless steel, competition-derived exhaust that cuts 20 pounds and frees up a few horses and decibels thanks to the active sound-flap function. Removing catalytic converters altogether is the final step for countries where emissions regulations are liberal and supercar drivers are happy—such as the Middle East, where most N-Largos are bound to end up.

Fitting all the above modifications produces a headline-grabbing 781 hp, but the car we're driving (thanks to German supercar broker Vision of Speed) has the penultimate stage of tune with less intrusive 100-cell catalytic converters, the best we can get in the United States and Europe. With 774 hp achieved at



8,500 rpm (a dizzying number for an engine of this size) and 528 lb-ft at 6,300 rpm, it can't be said it lacks power. Mix those numbers with a fierce exhaust note that can shame even the loudest track cars and the N-Largo becomes a masterpiece. This is the point where I should say how much better this car handles and accelerates than its stock counterpart. But to be honest, you'd have to be used to driving the standard F12 or have Fernando Alonso's skills to fully appreciate Novitec's efforts.

Frankly, all of us would be blown away by the sheer momentum, unshakable traction, and how the engine delivers throughout the rev range in either car. What's crucial, though, is how Novitec Rosso draws more engagement from similar performance. Subjectively or not, the N-Largo feels even more intimidating (in a positive way, if there is one) than the untouched F12, with even more brutal reactions to throttle pedal movements, less body roll, and fearsome sounds coming from all four exhaust pipes.





Thanks to the wizardry of Maranello, the N-Largo is a sublime-handling, precise, and stable car, even if each rear wheel has to deal with nearly 400 hp. Things might have been different if I had put the little red *manettino* on the steering wheel to the CST OFF position, killing all the electronic driving aids. But knowing all too well what could happen even on a completely closed landing strip, I didn't dare touch it.

This is the first N-Largo ever made, serving as a testbed and show car for Novitec Rosso's R&D work, so it comes brimmed with all kinds of modifications to showcase the tuner's




catalog as much as possible. A client can cherry-pick his favorite bits for a uniquely spec'd car. This one doesn't have any changes to its cabin, but the company will be happy to modify an F12 interior to your heart's desire.

Another appealing aspect of Novitec's work is the impressive quality of fit and finish. Obtaining components of comparable quality to the high level of premium carmakers is tough, even among popular tuners. However, Novitec is proof that a small tuner can live up to Ferrari standards. The N-Largo has preserved all the virtues of the F12 and made them even greater. 🍷









**I VIVIDLY REMEMBER** my first time in a Mercedes SLS. It was running up and down a mountain, which the California Highway Patrol had been both gracious and paid enough to shut down. All for little ol' us. From the second I lifted the gullwing door, I was smitten. Firing up the angry 6.2L V-8 put me over the top. It was fast, exotic, and an instant icon. From the sound to the straight-line performance, it was intoxicating. But then there was the handling. On that mountain road, I would turn in and the entire front of the car—roughly the length of a bowling lane—would swing out in front of you. Even though the SLS has a high level of driver involvement, being so far away left it a bit disconnected. It's like trying to flip a light switch with the blade of a hockey stick while holding it at the very end. Note: I play neither hockey nor bowl, so my sports analogies may be exaggerated. I do, however, drive on racetracks quite often in a variety of cars, so I feel compelled to stress the legitimacy of my views on the cars.

# FLYING WITHOUT WINGS

'16 MERCEDES-BENZ  
AMG GT-S

WORDS MICHAEL FEBBO

The SLS got better with every new version and edition. By the time AMG was done, the SLS was up to something like a GT Ultimate Black Track Attack Pack, which was a fantastic driving car with a whacking big rear spoiler. The tendency to snap into oversteer, the secondary drivetrain movements, and the overly active rear axles had been tamed. The V-8 had become gluttonously powerful, although you still felt as though you were driving the car while sitting in the trunk.

All the lessons learned from the constant improvement of the SLS have been incorporated into AMG's second foray into scratch-built sports cars. The AMG GT-S is the culmination of the tireless improvement that went into the SLS, coupled with the latest in technology. The mighty 6.2L naturally aspirated V-8 is no more. It was thirsty on the intake side and dirty, by modern standards, at the tailpipes. In its place is a far more efficient and power dense 4.0L twin-turbo V-8 producing 503 hp and 479 lb-ft of torque. All 479 of those lb-ft are available from the low-low revolutions of only 1,750 per minute. To really get into the nerdery of the V-8, see the sidebar accompanying this feature.



A seven-speed dual clutch transaxle is mounted in the rear of the car, allowing for the slightly rear biased weight distribution. A claimed 53 percent of the mass sits on the rear axle, which AMG engineers claim is ideal for performance cars. Power is transferred from the engine in front via a filament-wound carbon-fiber driveshaft. The unit is stiffer and lighter than steel, cutting down on vibration. Inside the rear transaxle is an electronically controlled locking differential. By controlling the degree of lockup, AMG can change the behavior of the car to suit conditions, and the differential can be tightened up to stabilize the car under braking and also during acceleration to maximize grip. It can also be loosened up during turn-in or lighter power applications to free up the car to rotate easier without wheel slip.

Drivetrain movement was one of the issues on the SLS. Under lateral loads, the drivetrain

would move side to side. You turn in, the car takes a set, and then the drivetrain slides over and gives the car a little nudge from the inside. Since the drivetrain mounts below its center of gravity, it would do the same thing in roll as well.

The GT-S uses a passive unit, but the AMG Dynamic Plus Package features active, magnetorheological mounts to fix that movement problem without adding NVH, that's noise, vibration, and harshness. AMG engineers didn't eliminate the movement wholesale, however. The issue that challenged them in the past is now working for them, and the degree and timing of mount stiffening is tuned to match the desired dynamic characteristic.

Although active damping is available on the GT-S, the most notable changes are far more basic. AMG started by changing the basic kinematics of the new car compared

to the SLS. All the suspension components are forged aluminum. The front suspension was redesigned to incorporate more negative camber to increase grip while cornering. In the rear, the lower shock mount was located farther outboard, as close to the hub carrier as possible. Ideally, engineers look for a 1:1 motion ratio between wheel and damper. This allows for maximum attenuation of unwanted movement and vibration. To control unwanted geometry changes, the suspension bushings are molded out of rubber with roughly the same durometer as wood.

To get the full effect of all the changes, AMG invited us to drive the cars from downtown San Francisco to Monterey using the most scenic route possible. We ended the event lapping Mazda Raceway Laguna Seca, which my wife now refers to as my second home. A few more trips and she says it may be my first.





## TECH SPEC

### '16 MERCEDES-BENZ AMG GT-S

**BASE PRICE**  
\$130,825

**VEHICLE LAYOUT**  
Front-engine, RWD, two-pass, two-door hatchback

**ENGINE**  
4.0L/503hp/479-lb-ft twin-turbo DOHC 32-valve V-8

**TRANSMISSION**  
seven-speed twin-clutch auto

**CURB WEIGHT**  
3,400-3,450 lbs. (mfr.)

**WHEELBASE**  
103.5 in.

**LENGTH X WIDTH X HEIGHT**  
179.0 x 76.3 x 50.7 in.

**0-60 MPH**  
3.6 sec. (mfr. est.)

The SLS is a great car on the road, simply because of the sense of the occasion. For all its minor faults, it is still one of the greats. The SLS is now one of the greats, but we don't have all the faults to overlook. I will, however, start with my biggest complaint. No gullwing doors. I don't miss banging my head on them getting out of the car, but there is nothing that makes you feel more like Chuck Yeager than coming to a stop and swinging open that door. For bonus points, swing the cockpit hatch up while you're still rolling. But I digress. You can get in and out of the GT-S without any great feats of gymnastics.

The interior of the GT-S is a more hospitable place to spend long periods of time. While the GT-S is a smaller car, it feels far more open than the SLS. It turns out, those wing door hinges also take up a decent amount of headroom. The seats are supportive and mounted low to the floor. The seating position requires stretched-out legs, but the requisite flat-bottom steering wheel has enough range of motion that doesn't also require stretched-out arms. The dash and center console wrap around both occupants. The small electronic shifter feels like a spacecraft throttle and sits right behind the latest version of the Command System controller. The experience

is as luxurious as you'd expect of anything with the three-pointed star, yet still sporty. You won't confuse the GT-S with an S-Class Coupe, but I wouldn't want to.

On the tight streets of San Francisco, the GT-S wasn't at all intimidating to drive. The SLS sometimes left you wondering exactly how far out those corners hung. The GT-S is tighter and more manageable. The transmission around town is certainly a bit more aggressive than the traditional automatic found in other AMG products, but certainly smoother than most exotics. In comfort mode, gears click off with a little nudge and the burble from the tailpipes changes note. While cruising, the exhaust noise fades away and the car is nearly e-Class quiet.

Turn the dial to Sport and the exhaust wakes up, the throttle tip-in becomes more aggressive, and the transmission is more precious with gear changes. Traveling near the coast, the road transitions from a perpendicular grid to landscape following meandering. The GT-S eats this up and feels right at home ticking off miles. I decide this would make a perfect weekend getaway car the next weekend my parents are in town to watch their grandchild. More miles roll by and I start imagining a cross-country trip.







The Pacific Ocean gives way to mountain forests and meandering turns evolve to more urgent switchbacks. In the tightest of areas, the GT-S starts to show its size. Driving faster requires far more precision. Luckily, this car has loads of it. Unlike its predecessor, you know exactly where the car is and where it will end up; there's no sloppiness here. It comes off of corners well without smacking you with all the torque at once, unlike previous forced-induction AMG products. It delivers power in a similar way to the old naturally aspirated V-8. Most importantly, the car is fun. The early SLS had a quality that went beyond respecting the car and crossed over to fear.

This became more apparent on the race-track. I was able to work up to speed quicker than I predicted. It really is a driver's car. The stiffness of the space frame, coupled with all the advances in the suspension have made for a very planted car. The electronic rear diff is working wonders as well. If you find yourself a


little out of sorts around the apex, easing into the throttle immediately settles down the car. The weight rolls back, the nose snaps in line, roll in, and go.

The GT-S has both Sport+ and Race Mode; Sport+ being extremely forgiving and offering a helping hand without criticizing. Race Mode allows you more control of your own destiny. You can prod the back end loose and get the car to rotate around on braking as well. Traction control is still there, but once it's stepped in, you will have lost a decent amount of speed.

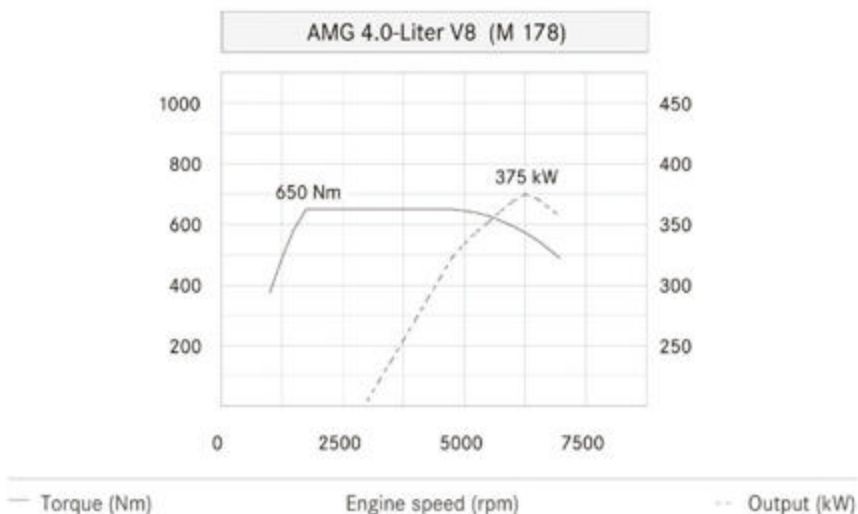
The car is fast, full stop. Off of corners, on the front straight, up the hill, it pulls and pulls. It sounds good as well. Nearly as good as the 6.2L. Even after seeing a cutaway of the mufflers, I still don't understand the voodoo magic involved with getting a smallish turbocharged V-8 to sound like a muscle car. The transmission is just as good. If the car was in Race Mode, I spent half of my time in

automatic, not seeing a need to use the paddles.

After a day of journalists lapping the cars at the track, the Michelins were definitely showing wear, but nothing abnormal. The shoulders of the tires weren't burnt off, more than likely a benefit of the added negative camber, and the tread wasn't coming off in chunks. Also a sign of good utilization of the whole tread width. The brakes never showed signs of fade, and the engine never showed signs of heat soak. The 911 has some real competition in the daily driveable track day special.

While I certainly miss the gullwings, I have fallen in love with the GT-S. The doors aside, I think this is a better-looking car from every angle compared to the SLS. It's almost what the SLS should have been. Mercedes says the first customer cars will begin arriving this spring. Pricing is \$130,825, which puts it right in the center of a very competitive market. Luckily, the GT-S has the chops to compete. 





## THE M178 IN DETAIL

As much as I love the 6.2L monster V-8 powering the AMG SLS and the C63, I knew its days were numbered as soon as the engineers from Affalterbach gained a renewed interest in turbochargers. In terms of efficiency and power density, you can't beat a force-fed engine gaining extra power from energy normally thrown away as heat out of tail-pipes.

Let's talk specifics. Maximum boost will be 17.4 psi, while the compression ratio sits at 10.5:1 thanks to direct injection. Bore measures 83.0 mm, while in comparison stroke is a relatively long 92.0 mm, which is good for that mountain of low-end torque. Those numbers might sound familiar, as this new V-8 is basically a pair of 2.0L I-4s that power the CLA45 sitting at 90 degrees from each other. The turbos sit in the V's valley, making this a "hot-V" layout.

Also like the CLA45's engine, using air-to-water intercoolers hanging off of the front of the engine minimizes the path of the charge air, and the diameter of the charge pipes is kept consistently large from the compressor's outlet to the throttle body. The turbo's turbine sides exit into a large pipe similar to a two-strokes expansion chamber.

AMG says the assembled engine weighs in at 460 pounds, dry. The engine block uses a closed

deck design and is sand-cast in aluminum. The cylinders are lined with Mercedes' NANOSLIDE technology, which has been in service in more than 200,000 engines since 2006. Once the cylinder liners are in place, the bores are conditioned using a process called "spectacle-honing," which involves bolting a fixture to the block and torquing it in place to replicate whatever distortion may be caused by the installation of the head. All of this work combined with a specially designed low-friction piston ring package works to reduce fuel consumption, power loss through parasitic friction, and oil consumption.

At the bottom end of the engine, AMG has employed dry-sump lubrication to not only fight starvation under high-g loads, but the smaller sump also allows the engine to be mounted 2.2 inches lower in the car. At the opposite end, the four-valve heads are constructed of zirconium alloy to resist thermal loads and minimize heat soak inside the head. Variable camshaft timing is utilized on both intake and exhaust cams.

The M178 in the GT-S produce 503 hp at 6,250 rpm and 479 lb-ft of torque starting at 1,750 rpm and continuing up to 4,750 rpm. You can see the tabletop flat-torque curve in the accompanying graph.











# ROUND TRIP

LOOPING THE NARDO LOOP IN  
THE 200-MPH MTM RS6-R

WORDS & PHOTOS Ian Kuah

**NARDO IS A WONDER** of the automotive world. It's a proving ground in southern Italy, and nowadays it's owned by Porsche. The great thing about it is the perfect circle of a banked test track, nearly 8 miles in circumference. At most vehicles' top speeds, it seems like an infinite straight. It's only in really quick stuff like Koenigsegg does it ever begin to feel like a curve.

Add this to the "fast" list: MTM's RS6 R, clocking in a top speed of 205 mph. MTM has nothing to do with Mary Tyler Moore, at least not as far as we know. As our regular readers are aware, it stands for Motoren Technik Mayer, a tuning house in Wettstetten, Germany, conveniently just north of Ingolstadt, where the Audi marque makes its base.

In that magical land of unrestricted autobahns and gorgeous, high-powered Teutonic machines, MTM will gladly accommodate customers who want their Porsche, McLaren, Bentley, Lamborghini, or Audi turned into something even more special. The Mayer in MTM is Roland Mayer, the boss, and he's the one pushing this four-ringed wagon past 200 mph on Nardo's renowned super-loop. Incidentally, the stock Audi RS6 Avant tops out at 189 mph.

The regular model is a meaty piece of kit, blessed with 560 hp and 516 lb-ft of torque coming from its 4.0L twin-turbocharged V-8. The beauty of turbocharged engines is how easy it is to make more power. Manufacturers always launch a car with plenty of headroom left in the motor for updates at face-lift time, yet still with a big enough safety margin to deal with high temperatures and poor quality fuel in some places.





This EA824 V-8 uses a pair of IHI twin-scroll turbochargers running at peak boost pressure of 33.4 psi. The key to its efficiency is a configuration that places the exhaust manifold and turbos in between the cylinder banks. This makes the exhaust path as short as possible, eliminating pumping losses and maintaining full boost pressure. Using its Cantronic ECU to remap the fuel, ignition, valve timing, and boost curves, MTM raises the output to 722 hp between 5,700 and 6,600 rpm, underpinning it with 649 lb-ft of torque from 1,750 to 5,500 rpm.

Apart from improved throttle response, the design's other main advantage is a significantly smaller and lighter engine package compared with one sporting exhausts and turbochargers on the outside. MTM's stainless steel high-performance exhaust system and free-flow metal catalytic converters lower back pressure, which not only releases more power, but also lessens the thermal load on the engine and cooling system. Maintaining full power in high ambient temperatures is another issue. This is where the intercooling capacity and choice of materials come in. There are also numerous oil coolers for the engine and gearbox.

The banking at Nardo is designed so there is no lateral force up to 150 mph. Over that speed, the onset of lateral g-force adds stress on the suspension, wheels, and tires. With a car capable of 185 mph, 6 mph can normally be factored in for tire scrub.





On a flat stretch of autobahn, the MTM RS6 R has recorded 211 mph, which makes it faster than the Ferrari 458, Lamborghini Huracan, McLaren 650S, and Porsche 911 Turbo S. As impressive as this is, it's actually the raw acceleration that's so remarkable, considering it weighs between 880 and 1,323 pounds more than these supercars.

Give a big, heavy car enough power and torque, and providing it has sufficiently tall gearing and a decent drag coefficient, a high top speed is a given. The MTM RS6 R's terminal velocity is already remarkable, but the acceleration test is something else.

The combination of all-wheel drive and the massive slug of turbocharged torque propels the wagon down the tarmac to hit 62 mph from a standstill in just 3.4 seconds. It then passes 124 mph in 11 seconds, rocketing on to 155 mph in 18.7 seconds. To put this into perspective, it was not so long ago when a car was considered quick if it could reach 100 mph in under 20 seconds.

Where numbers count more than anything else, the Nardo session is a far cry from what most owners would consider such a car is all about. So my second meeting with the MTM RS6 R in Germany a month later is the flip side of the coin. After all, if a car goes really fast on a test track but is an absolute misery to drive in normal traffic, then the whole point of tuning it has been missed.







For progress around town, the throttle metres out its power in a sedate, limousine-like fashion. For greater thrust, there's that feeling of awe that happens every time serious mass gives way to supreme power. Despite the self-leveling abilities of the air suspension, the nose rises visibly in the first two gears as it launches hard under the onslaught of a massive torque curve. The eight-speed automatic transmission glides from one ratio to the next, giving the impression of one long, solid blast of acceleration.

Thanks to its classic Ur Quattro-style fender flares, the current RS6 Avant looks muscular straight from the factory. MTM complements this tough image by filling those big fenders to the brim with proprietary 10x21 Bimoto-style alloys. Wrapped in sticky 295/30ZR21 Michelin Pilot Supersport rubber, these forged wheels are much lighter than the optional 21-inch cast alloy factory rims (the stock RS6 comes on 20-inch lightweight forged wheels).

Nine spokes allow plenty of air to circulate around the huge MTM/Brembo brake kit that replaces the factory stoppers on the front axle. Measuring 16x1.4 inches, these massive front discs, clamped by six-pot calipers, are the biggest anchors MTM has in its warehouse. They're pretty much obligatory to rein in that

big stable of horsepower, which could easily overpower the stock 15.4-inch rotors. The factory option of 16.5-inch carbon-ceramic brakes is even more expensive, albeit lighter.

The fact that the current C7 iteration of the RS6 is produced only in Avant form speaks volumes for how Audi and its clientele view the original RS6 concept of a big station wagon with supercar performance. To purists, the Avant is the defining version of the RS6. Across its first two generations, starting in 2002 and 2008 respectively, the Audi RS6 Avant carved out a legend for itself that has assured its place in performance car history. The formula of roomy wagon with massively powerful engine, permanent all-wheel drive and unimpeachable build quality is appealing on many levels. So it's amazing that rivals have taken over a decade to respond, even as the third-generation RS6 firmly makes its own mark on the performance car landscape.

The MTM RS6 R takes this illustrious formula not just to the next level, but more likely two levels up. The fact that it has the sheer straight-line performance to not just beat but actually annihilate most of the junior-league supercars is merely icing on an already rich cake. A cake that costs the equivalent of \$211,000. **E**



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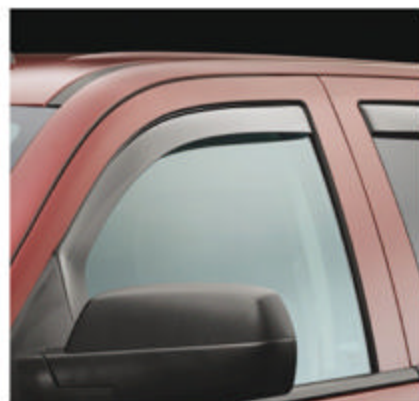
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# OLD-SCHOOL TIES

THE MKII GOLFORRADO:  
IT'S A HYBRID OF SORTS

WORDS COLIN RYAN  
PHOTOS JAKEB MILLER









**SCOTT STEWART IS A 41-YEAR-OLD TEXAN** whose Motorwerks company sells accessories for European cars. How very convenient. He's had this MkII GTI for around 17 years.

"I was a VW guy before I even got my license," Stewart says. "I saw this one sitting in the back of a lot collecting dust. No one could get it started. I threw the dealer a real low number and he took it. It was that model where the seatbelts were attached to the door and had to be clicked in before the car would fire up. I engaged the belt, started the car, and drove off." He's since changed those belts to the more conventional types.

For the first six or seven years, it was Stewart's daily driver. Modifications did not begin because Stewart was mad keen on customizing. It was to keep the car on the road. The original auto transmission was the first casualty of commuting, which was when Stewart replaced it with a five-speed manual originally made for a '93 Corrado VR6. That's the one with the cable-actuated shift that feels so beautifully buttery.

The alteration process wasn't quite as smooth, though. "It was pretty hard," Stewart says. "I had to replace the whole pedal assembly as well as the complete shifter linkage. I had to run a couple of wires together to trick the car into thinking it was in Park so it would start. Then I eventually took out all the auto trans wiring all the way to the fuse box." He kept the OEM flywheel and fitted a Sachs clutch.

After breaking the 200,000-mile barrier, the original engine combusted its last air/fuel charge and in went a stock 2.9 VR6 from a '93 Canadian Corrado. At some point, a mysterious chip came along. "I bought it at a VW swap meet and car show years and years ago, right after I did the VR6 swap," he says. "The chip says: 'German Motorsports 2.9 OBD1.' It's supposed to boost output by 10 percent, but I don't really know." Stewart has since rebuilt the engine, but hasn't done anything radical to it. He did the semi-shaving work on the engine bay as well.







## TECH SPEC

### '91 VOLKSWAGEN GTI

Scott Stewart/Rowlett, Texas

#### ENGINE

2.9L Euro-spec VR6; German Motorsports chip; Eurotek Tuning air intake; Scorpion stainless steel exhaust; semi-shaved bay

#### DRIVETRAIN

Corrado five-speed manual transmission; Sachs Performance sport clutch

#### BRAKES

Complete five-bolt conversion w/Audi A4 front calipers

#### SUSPENSION

Supersport coilovers; Neuspeed antiroll bars 0.98-in. (f), 1.1-in. (r); Eibach upper strut bar

#### EXTERIOR

OEM big bumpers; 16V/G60 front flares; custom pinstripe, taillights; Audi A6 HID lights; Crystal Clear fogs; Audi 5000 roof antenna; Euro VR6 chin spoiler; mono wiper conversion

#### WHEELS & TIRES

BBS RS 16x8.5 wheels; Falken 512 205/40 tires

#### INTERIOR

Complete Corrado dash swap including a European gauge cluster; MkIII complete center console, steering column; Recaro seats with matching door panels; BBS steering wheel, shift knob; MOMO pedals

#### AUDIO

Memphis Car Audio amplifier; Audio Control EQS equalizer, Epicenter processor; MB Quart speakers

#### THANKS

Jim Stewart (my father), Cub (John Pearson), Weezy (Wayne Arnold), and special thanks to my wife, Courtney





The air intake's piping is from a Eurotek kit that came from another car. "A buddy had it lying around and it suited my needs for how I wanted to route the intake," Stewart says. On the exhalation side, Stewart chose a Scorpion full exhaust system that came all the way from dear old England. Scorpion has enjoyed some success in the country's VW Racing Cup series over on the other side of the Atlantic.

"Over the years, I get moods," Stewart says. "Let's work on this and that." But one consistent factor is the use of Corrado parts. We could go into a long rant here about the much-loved and much-missed Corrado, and how VW adds the insult of not bringing the Scirocco Stateside to the injury of discontinuing the Corrado. But we won't.

Instead, we'll mention the swapping of the GTI dash for a Corrado unit and the G60 front fender flares. One of the main reasons for going deeply Corrado, though, was pragmatism. "They're the easiest pieces to bolt up," Stewart says. Which just goes to show that things don't have to be difficult to turn out right.

Stewart obviously has a keen and discerning eye, going for many BBS products such as the steering wheel and shift knob, plus those classic RS 16-inch wheels, which are currently wearing Falken 512 tires.

And there's nothing wrong with choosing Neuspeed antiroll bars along with an Eibach upper strut bar to complement the set of Supersport coilovers. "I first bought a 40/60 Supersport lowering kit for our MkIII and loved it. I saw these MkII coilovers pop up for sale and thought, 'Why not?' I've had several coilovers on this MkII, but ultimately, for the money, I love the Supersports." Ride height has been lowered by about 3 to 4 inches.

The Texas rain is no problem. "I use the mono wiper because it's one of the only ones I've found that sits in the stock position, but still sweeps the entire windscreen," he says. "It also gives the car a cleaner look."

Perhaps all this is just a subconscious longing for a Corrado, but Stewart owns one of those now. "I'm actually doing a VR6 swap at the moment." Meanwhile, this GTI is no

longer a daily driver. "I occasionally drive it on a weekend or a get-together." But naturally, it isn't finished. "I would love to raise it up a little and make it more comfortable to drive. Someday I will get motivated to put A/C back in, so I can drive it during a Texas summer."

Even if the joy, anguish, and challenge of modifying was never the initial motivating factor, Stewart is now firmly in that camp. "Family has been the number-one priority over the last several years, but I would love to build an '80s-'90s Westfalia Vanawagon with a Subaru swap to take the kids camping and still get to enjoy a VW project." ■







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# AUDI PROLOGUE CONCEPT

LOOKING  
A BIT  
FURTHER  
UP THE  
ROAD

WORDS RORY JURNECKA  
PHOTOS ROBIN TRAJANO

**IT'S ONE THING TO SEE AUDI'S PROLOGUE CONCEPT** on a revolving platform under the bright lights of the South Hall at the Los Angeles Auto Show. The two-door luxury coupe looks sleek and handsome there—futuristic even—but still not out of the ordinary. After all, next to Audi's stand is Jaguar and its racy Project 7 F-Type. And not far from that is Maserati's Alfieri masterpiece. But it's quite another thing to see the Prologue in a more organic environment, like the driveway of the SLS Hotel in Beverly Hills. Even crazier: I'm about to mix it up in city traffic with all-too-ordinary Civics (yes, Civics exist in Beverly Hills), E-Classes, Mustangs, and X5s.

This car is one of two built (the other is still sitting at the show), and Audi reps are rightly a little nervous about sending it out on the road. Before climbing in, I'm instructed to wear a set of white disposable coveralls in an attempt to preserve the delicate cream-colored leather interior. This car costs more than \$1 million to produce, and Audi would like to keep it looking pristine for the remainder of its public appearances. My co-pilot (an Audi engineer) and I climb aboard carefully, both looking like extras from a '70s science fiction flick.











The experience escalates quickly when an official police escort turns up—fore and aft—with sirens wailing and lights flashing at every intersection, stopping traffic and guiding us through red lights. Then there's the raucous bellow from the nearly straight exhaust system fitted to the Prologue's 597hp, 4.0L, twin-turbo V-8 (essentially a modified engine from the S8 sedan). Only there's some software glitch causing a miscommunication between the accelerator pedal and the engine. Basically, moving off from a standstill is a bit of a crapshoot. Maybe the car moves forward in a controlled manner, maybe it will roar off at nearly full throttle, maybe it will do nothing and threaten to stall. It's all part of the excitement.

We're attracting a significant amount of attention with a car that looks like a movie prop and sounds like it's ready to run at Circuit de la Sarthe in June. Old-money, middle-aged Beverly Hills residents stare angrily, wondering who dares disturb their relative peace. The younger set has camera phones out, recording the proceedings to upload to YouTube later. A car full of 20-something females pulls alongside, windows down, shouting things that aren't really discernible above the thunderous *grumbleblatblatpopbangrowl* coming from the exhaust. Nearly everyone at least turns a head to see what all the commotion is about.

Despite the madness surrounding our little circus, the Prologue is quite pleasant inside. The seats are comfortable, the ride shockingly so, the steering light and precise, and the brakes work well. Visibility out the front is excellent thanks to a large windscreen and thin A-pillars, and the car generally has a light feeling to it, which belies its actual size and weight.







The interior is uncluttered and ultra-modern, with OLED screens that cover nearly every function and nearly every surface. There's a large screen in the center stack, coupled with a strip of a touchscreen that spans the passenger's width of the dashboard. This unconventional screen shape and placement is something Audi says will be commonplace in the future, replacing most hard buttons, knobs, and switches. The only physical button that's immediately obvious is the one used to start the car. This approach is a progression of the new TT's Virtual Cockpit design, but leaves me somewhat skeptical. So I asked the Prologue's chief designer, Marc Lichte, about the feasibility of such design. His response: "Do you think your next-gen iPhone will have switches or buttons? Why should your next car be any different?"

Under the Prologue's skin is a combination of current and next-gen Audi A8 pieces. Some people in the company say the chassis itself is nearly production-ready—it just requires final tweaking. That doesn't mean all the components are production pieces. Many are custom-built just for this car. But the basic evolution of the chassis is strong enough that no major changes should be necessary.

How much of this car will we see in future Audi products? The design language is a certainty. Expect the revised Audi grille and front end to make its way into the A6/7/8 lines. Those wheels that look like they're being twisted by the car's torque are also production-viable. But will we actually see a two-door A8 to rival Mercedes' S-Class coupe? It's a possibility at the very least. Keep your fingers crossed. 🍀







# CONVERTIBLE

THIS 911 CAN MAKE PEOPLE





WORDS & PHOTOS PETER WU

# RENOUNCE THEIR OLD WAYS





## **SOME PEOPLE HAVE EPIPHANIES WHILE WALKING BAREFOOT**

on hot coals or dancing with venomous snakes. Tamas Opra saw the light from the passenger seat of a 911 SC as it sliced through the canyons of the Santa Monica Mountains in Southern California.

He was sure that every corner, taken at speeds he didn't think were possible, would be their last before they skidded off line and over the edge. But his friend Derek, the car's owner, had set it up for autocrossing, meaning it was well suited for tight turns and quick transitions.

It was Opra's first time in a 911. He could feel the effects of the engine in the back: the stability under braking, the traction out of corners. "This is a car that does everything differently yet better than the others," he said. "After the adrenaline wore off, I knew. This is it, this is the car I want."

He immediately sold his '93 RX-7, '96 Miata, and truck and got his hands on an '82 911 SC a week later. That was seven years ago, and he says he's never considered owning anything

but a Porsche since. Within that time, Opra bought and hot-rodged the SC, acquired a vintage '67 911 track car, and just recently finished this sinister fender-flared '69.

The previous owner was a friend who bought the car as a project, but never had time to finish it. For years, Opra made offers to buy it, but his friend would only respond with: "I'll think about it." Then, out of the blue, the guy called to see if he was still interested.

It started life as a '69 911T, enhanced by a previous owner with a set of more modern 930 fender flares (compared with the RSR flares that would be period-correct on these early long-hood models). The front and rear bumpers are fiberglass pieces from Getty Design, which also made the fiberglass hood and ducktail engine cover. Opra took out the rear window and replaced it with Lexan and then drilled the holes for the window straps himself.

The cabin was still incomplete, so Opra installed a pair of reproduction vintage Recaro race seats acquired from TRE Racing. The door cards are from an RS and the dash is a

recently restored piece from another car. He had the MOMO Prototipo steering wheel just sitting around and it works perfectly with the classic interior. Another friend, Dave Mason, made the shift knob and it nearly replicates the layered wood knob from the 917, except for a checkered flag pattern on top.

Above the gauges for the front and rear Tilton master cylinders are three Heuer stop-watches. They sit in a custom mounting plate in place of the factory stereo.

Not that a radio would be audible if the engine's running. Nor would anyone's favorite song sound any better than this 3.8L flat-six. The chassis is stripped of all sound deadening to save weight, so the entire car resonates when the engine fires up and settles into a barely muffled drumbeat idle.

Raising a 3.6L to 3.8 is fairly common among tuners of air-cooled Porsches. But Opra's is extra special because it was built as close to 993 RSR specs as possible. Starting as a 3.6 from a 993, it now uses the same Mahle pistons and cylinders, intake valves, valvesprings, and cam specs as the rare factory racer.





## TECH SPEC

### '69 PORSCHE 911T

#### ENGINE

3.8L flat-six; Mahle 993 RSR-spec cylinders and pistons; RSR intake valves; knife-edged crank; Carrillo rods; PMO velocity stacks; Rochester 72-pound injectors; ITG air filters; Autronic 500R ECU; Fabspeed RSR race exhaust

#### TRANSMISSION

Porsche 915 gearbox w/custom ratios; factory short shifter; 993 RSR clutch

#### BRAKES

930 Turbo brakes; Tilton dual master cylinders; Porterfield pads

#### SUSPENSION

Bilstein shocks re-valved to RSR specs; 23mm (f) and 31mm (r) torsion bars; Kokeln adjustable anti-roll bars; 930 tie rods; Elephant Racing polyurethane bushings

#### WHEELS & TIRES

Fikse multi-piece 17x9.5-in. (f) and 17x11.5-in. (r) wheels; 255/40 (f) and 315/35 (r) Sumitomo HTR-Z tires

#### EXTERIOR

Getty Design RSR front and rear bumper, fiberglass hood, RS-style rear spoiler; 930 fenders; Lexan rear window; Cibie rally lights

#### INTERIOR

Vintage Recaro rally seats; Heuer stopwatches; MOMO Protipo steering wheel; custom 917-style shift knob; RS door cards; custom rear rollbar







The crank was balanced, knife-edged, and heat-treated by Ollie's Engineering (specialists in air-cooled Porsches and based in Lake Havasu City, Arizona). It connects to the Mahle pistons via Carrillo rods to create an 11:1 compression ratio. Fuel squirts in via Rochester 72-pound injectors, while air inhales through ITG air filters and PMO velocity stacks. An Autronic 500 R engine management computer orchestrates the fuel and spark. Exhaust gas is routed through Fabspeed's Carrera RSR Maxflo headers and muffler.

In its current mild state of tune, Opra says it measures 330 whp on pump gas and thinks there's another 10 or even 20 whp to be extracted. Even at 330 whp, it probably cracks the 100hp/L threshold at the crank. Impressive for a naturally aspirated, air-cooled, two-valve engine.

Blip the throttle and the revs spike and drop effortlessly. Step on the firm RSR clutch and find First gear in the 915 gearbox, which has a factory short shifter as well as custom ratios. It needs revs to keep from stalling, because the RSR clutch engages quickly without much progression. But once under way, there's plenty of low-end torque and driveability.

Coincidentally, our test route takes in the same canyons where Opra was converted. And unlike some owner/passengers, he doesn't flinch as I work up to speed, taking the corners progressively faster, stepping a little further into the gas pedal on the straights.

The first thing to become obvious is the high level of grip. Up front, Opra put on 255/40 Sumitomo HTR-Zs on the 17x9.5 Fikse wheels. At the rear, 315/35 tires are mounted on 17x11.5 wheels. If you're wondering, a current 911 Turbo S uses a 245 in front and 305 in the rear.







Keeping all that rubber pressed to the pavement are 0.9-inch and 1.2-inch Schroeder gun-drilled torsion bars at both ends, controlled by Bilstein shocks re-valved to RSR specs, adjustable front and rear antiroll bars from Kokeln, 930 tie rods, SC rear trailing arms, and firmer polyurethane bushings courtesy of Elephant Racing.

It will understeer, but it takes a lot of speed to push those Sumitomos to their limits. This car never exhibits the snap-oversteer characteristics for which 911s are famous. Opra's car is well behaved partly because I make sure not to provoke it through the turns by lifting. Past experience has taught me to get on the gas at the exit to shift weight and plant the rear end.

The brakes are from a 930, coupled with Tilton front and rear master cylinders. In classic Porsche style, the pedal is firm, but since there's no assistance, it takes an even heavier foot before the stoppers start to bite. For those accustomed to power brakes, it takes some "leg recalibration" to find the right amount of effort.

Those short canyon straights don't allow us to fully utilize the 3.8's powerband. There are teasing forays into the upper ranges, but nothing close to the 8,000-rpm redline. It feels best from 4,000 rpm up and doesn't need redlining to shrink the straights. The car lunges out of corners, and then it's back on the brakes again.

Opra says it's a handful, but he doesn't mean the car is not properly sorted. It's a handful in the way that 383 hp propels 2,200 pounds. At 1 hp to 5.7 pounds, it has a better power-to-weight ratio than a GT3. It's a handful because it's fast, forcing the driver to play catch-up and then try to rein it in with flailing arms and legs. No PDK here, no ABS, no PSM to make



it easier or flatter with technology. Just an old-school man/machine interface.

After the twisties, there's one long, cop-infested stretch, a last chance to stretch its legs. Cruising in Fifth, I drop down to Fourth and then feel the RSR clutch slam shut as I let it out. It shoots ahead just as it did in the canyons,

except this time I let it wind close to 8,000 rpm. The power arrives progressively, getting more urgent with every tiny movement of the tach needle, never letting up. Then it's hard on the binders, followed by repeating the process for the next open stretch. I didn't have to do it, but it felt like the right thing. License be damned. ■





## AUDI PROLOGUE CONCEPT

There's a new guy sitting in the big chair of Audi's design department: Marc Lichte. His job is to steer the styling and expand the visual vocabulary of four-ringed cars. Here is what he (and no doubt his team) has come up with so far. It seems Stewie Griffin went into the future with his time machine and brought this car back. It doesn't even look like it should be powered by fossil fuel. Maybe a thorium reactor. The inside is just as *Jetsons*, with organic LED displays, 3-D screens, and leather possibly sourced from cloned cows (probably not). Size-wise, think of it as a coupe based on the A8; this could be a foretaste of an A9. But Lichte also says there are elements of the Prologue that will go into the next A6, A7, and A8. Thinking about it, it was probably Brian hoping to impress some woman. See our Driving Impressions on page 66 and a styling breakdown on page 38.

# HOLLYWOOD PREMIER

2014 LOS ANGELES AUTO SHOW

WORDS COLIN RYAN



## AUDI A7 SPORTBACK H-TRON QUATTRO CONCEPT

Considering Audi has been big on diesels and hybrids, and even diesel hybrids, should we assume the hydrogen fuel cell powering this car is the near future? It uses a plug-in element to the drivetrain, which helps out because hydrogen is still not easy to buy. And there are four hydrogen tanks on board. In EV mode, it's possible to travel for 31 miles. Total range is 311 miles, and consumption is claimed to be the equivalent of 62 mpg. One good thing about electron power is the torque—in this case, it's a healthy 398 lb-ft. Hydrogen fuel cell vehicles are still only available on lease in selected states. If this A7 ever went into production, it might well follow the same route.





## '15 AUDI R8 COMPETITION

No, this is not a way to win an R8. Competition is the name of this extremely limited edition of Audi's wonderful supercar. Only 60 units are being built for customers in the United States, and it's a nod to the marque's highly successful LMS cars. The best part of \$200,000 buys the fastest and most powerful Audi ever. Its 5.2L V-10 develops 570 hp as 60 mph clicks by in 3.2 seconds on the way to a top speed of 199 mph. The sole transmission is the seven-speed S-tronic. This model also bids farewell to the R8 as we know it. A second generation is due in 2016.



## BENTLEY GRAND CONVERTIBLE

This open-topped iteration of the magnificent Mulsanne Speed is not necessarily a production no-brainer. If it ever did reach that stage, Bentley says it will be "highly exclusive" and "extremely limited." So only a small fraction of the One Percent might be able to enjoy the Herculean 530 hp and gargantuan 811 lb-ft of torque emanating from the 6.75L, twin-turbo V-8. Almost makes you feel sorry for the merely well off, doesn't it?

**"A small fraction of the One Percent might be able to enjoy the Herculean 530 hp and gargantuan 811 lb-ft of torque emanating from the 6.75L, twin-turbo V-8."**



## '15 BMW 2 SERIES CONVERTIBLE

Now that the 2 has taken the place of the 1, it's inevitable that an open-top version would arrive soon. Here it is, in all its compact, rear-drive (or optional all-wheel-drive) glory. As buyers have come to expect, the roof will open or close in 20 seconds and can do so at speeds of up to 31 mph. The range starts at \$38,859 for the four-cylinder 240hp 228i and goes up to \$48,650 for the six-cylinder 320hp M235i. Incidentally, the M version comes with a six-speed manual transmission or an eight-speed auto trans.





## '15 BMW X5 M/X6 M/X6

Anyone who has driven an X5 M or X6 M on a track has probably had this thought: "Wow, I'm having so much fun here. This car is amazing. Hang on a second... I'm driving an SUV. How can this be?" Only BMW knows how this can be, because the company's M division has managed to transform these all-wheel-drive heavyweights into fast and lithe machines. Both are propelled by mighty 4.4L, twin-turbo V-8 engines endowed with 567 hp and 553 lb-ft of torque—that's 12 more horse and 53 more units of twist than the previous model. Zero to 60 mph takes place in a mere 4 seconds flat. And it's a shame there are no numbers for how confidence-inspiring and tactile the suspension and braking systems are. Pricing starts at \$99,650 for the X5 M. The Los Angeles Auto Show was also where the second-generation regular X6 made its debut, said to be 22 percent more fuel efficient than Gen One, starting at \$73,850 for the 35i.

## '15 FIAT 500X

Although there's a 500 in its name, this subcompact crossover is not based on the tiny and adorable runabout we've all come to know and, um, adore. The turbocharged 1.4L engine option, buzzing with 160 hp and 184 lb-ft, is the same as the one in the Abarth. But this vehicle is bigger and heavier than a regular 500, so Fiat also offers a 2.4L four making 184 hp. The smaller engine connects to a six-speed manual transmission, while the bigger unit employs a nine-speed auto. The 500X uses the same platform as the upcoming Jeep Renegade, but goes for urbane styling compared with the Jeep's more rugged countenance.



## '16 JAGUAR F-TYPE

It's really rather good, the F-Type. And the 2016 model year will be even better. Jaguar is offering a six-speed manual transmission. It's supposedly 22 pounds lighter than the auto unit. But that's not all—some versions will come with four-wheel drive. All the torque goes to the rear wheels in normal driving conditions, but the system can shoot 50 percent of it up to the front axle if necessary. It weighs 176 pounds, but if it's anything like the system in the XF and XJ (and it probably is), then it should be smashing fun as well as jolly useful for year-round driving.



## '15 MERCEDES-AMG C63/C63 S

New C-Class, new AMG version. It's a predictable formula, but no less wonderful for that. Actually, there are two new versions. There's the C63, with 469 hp, 479 lb-ft of torque, a zero-to-60 sprint time of 4 seconds, and a top speed of 155 mph. Sounds great, doesn't it? But there's also the C63 S. Oh, yes: 503 hp, 516 lb-ft, 3.9 seconds to 60 mph, and a top whack of 180 mph. Just for comparison, a '15 BMW M3 has 425 hp and 406 lb-ft of torque. Both C63 models get their juice from a twin-turbo, 4.0L V-8 and use the rear wheels to set the tarmac alight via a seven-speed dual-clutch transmission. Mercedes-Benz also claims that this new engine is the most fuel-efficient of high-performance V-8s.





## '16 MERCEDES-BENZ CLS63 AMG

Yep, pretty much a gung ho AMG version of the CLS making its North American debut at the 2014 Los Angeles show. But that's still reason to celebrate and revel in a hand-built 5.5L twin-turbo V-8 kicking out 577 hp with 590 lb-ft of twist. Standstill to 60 happens in a fleeting 3.6 seconds. And it's such a handsome package.

**"Standstill to 60 happens in a fleeting 3.6 seconds."**

## '16 MERCEDES-BENZ S550 PHEV

If anyone has just woken up from 1983, PHEV stands for plug-in hybrid electric vehicle. Yes, the newest, most glorious, and technologically rich flagship sedan wearing a three-pointed star now comes in hybrid form for buyers in the United States. Mercedes-Benz claims V-8 performance with compact-car fuel consumption. A twin-turbo 3.0L V-6 colludes with an electric motor to bring 436 hp and 479 lb-ft of torque to the chauffeur's right foot. Using just the battery, the S550 will trundle for 20 miles, but probably less if the occupants keep switching on that wonderful hot-stone massage function. At least the car has a special navigation function that will calculate the ideal route for a plug-in hybrid.



## '16 MERCEDES-MAYBACH S600

Once upon a time, the Maybach name was associated with zeppelins (not the Led kind) and made luxury cars as long ago as 1939. But since the Second World War was just kicking off, that was not a good year for Germany, and the marque subsequently sank into oblivion. Mercedes-Benz resurrected it in 1997 to spearhead ultra-luxurious versions of its then-aging S-Class platform. Despite the plush leathers and fine-wood trims, it never really took off, and Mercedes-Benz stopped building Maybachs in 2012. That hasn't stopped the company from creating a Mercedes-Maybach sub-brand, though, and outfitting the current S-Class (still new and incredibly tech-rich) with all the upscale appointments any emperor would be pleased to enjoy. Along with 523 hp and 612 lb-ft of torque from a twin-turbo 6.0L V-12. Lovely.



## '15 MINI HARDTOP FOUR-DOOR

Actually, the big news from Mini's 2014 L.A. Auto Show stand was much smaller than a Mini. It was the Citysurfer Concept, a scooter with electric assistance that folds up small enough to fit into, you guessed it, a Mini. But the serious stuff is a four-door version of the regular Mini. After all the SUV-wannabes and funny roofs, it's almost surprising that it's taken Mini this long to come up with a practical, no-nonsense version. The wheelbase has been stretched by 2.9 inches for extra passenger space. The four-door comes in Cooper trim with a 134hp, 1.5L, three-cylinder turbo or in Cooper S with a 189hp, 2.0L four-potter. Prices start at \$22,550, including destination.





## MINI SUPERLEGGERA CONCEPT

The Italian coachbuilders, Touring Superleggera, are responsible for this charming Mini concept. The company took part of its name from a construction process that allows vehicles to be super-light; this car is crafted from large sheets of aluminum. Light weight is especially welcome in this car because it deploys an all-electric drivetrain. Incidentally, Touring Superleggera is responsible for several gorgeous cars over the years, including the Aston Martin DB4. This car obviously won't go into production, but some of these elegant styling details might well find their way into road-going Mini models. Although probably not the pert tail fin and the Union Jack rear lamps.

## '15 PORSCHE CAYENNE GTS

In *European car* world, there are two sets of three-letter initials guaranteed to get attention. Not so coincidentally, both of them begin with "GT." Porsche has produced GTS versions of practically everything it makes, denoting high performance and extra-handling prowess. Even the Cayenne gets the GTS treatment as the company revamps its whole big SUV range. We're looking at a lowered and tuned suspension, aero appendages, sport exhaust, cosmetic upgrades, and a power lift gate as standard. Output is 440 hp and 445 lb-ft of torque from a twin-turbo 3.6L V-6, propelling this 2-ton-plus beast from standstill to 60 mph in a brief 5.2 seconds. Cost: \$96,495, including destination.



## '15 PORSCHE PANAMERA TURBO S EXECUTIVE EXCLUSIVE SERIES

This is no ordinary Panamera Turbo S. For a start, it has a longer wheelbase than standard, the two-tone paint is applied by hand, the rear seat entertainment system has 10.1-inch touchscreens, and the upholstery is Nappa leather. There's an optional matching luggage set finished in high-end Poltrona Frau Italian leather. A twin-turbo, 4.8L V-8 thrums with 570 hp and 590 lb-ft of torque. Only 100 will be made for the whole world. Which goes some way to justifying the \$264,895 (including destination) required to obtain one. But why bother? It's probably sold out already.

## VOLKSWAGEN GOLF R 400 CONCEPT

Well, this white-hot hatch has finally made it to the United States. At least an American car show. It's a take on the Golf R (sorry to state the obvious) with all four wheels driven not by the usual 292 hp but 394, which works out to 400 PS in metric measurement. The electronic stability control has a "race mode" for greater track-related shenanigans before bringing in the electronic co-driver. Zero to 60 mph takes just 3.9 seconds, and top speed is 173 mph, according to VW. But it's a concept, not a production model. Which sucks. Here's a suggestion: how about a limited run of 400 examples? We're sure there must be at least that many takers for what would be The Ultimate Golf.







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## VOLKSWAGEN GTI ROADSTER CONCEPT

There are times when life imitates art and times when it imitates Sony PlayStations. This is one of the more positive results of the latter, inspired by a digital version in the Gran Turismo 6 driving game. This two-seater uses a 3.0L V-6 to send 503 hp and 413 lb-ft of torque to all four wheels—20-inches, no less—through a seven-speed dual-clutch transmission. The body is a carbon-fiber monocoque, while the interior is swaddled in dark Alcantara. VW estimates this car could sprint from standstill to 60 mph in just 3.5 seconds and hit a top speed of 192 mph. It turns out that the inventor of Gran Turismo, Kazunori Yamauchi, is a fan of the regular GTI and has one in his collection of fab cars.

## VOLKSWAGEN GOLF R VARIANT

Back in the days of the VW Type 3 (the '60s, essentially), the people's car company made a wagon version and called it the Variant. That name is revived with this concept. Think of a Golf R crossed with a Jetta SportWagen, 296 horses plus 57.2 cubic feet for the German Shepherds, and that's the Golf R Variant. But conventional wisdom says Americans don't like wagons, so why would VW unveil this car in Los Angeles? We just don't know. Now if there was a slightly lifted version with cross-over pretensions, that might get the soccer moms and dads interested. A missed opportunity by VW's product planners, wethinks.



## VOLKSWAGEN GOLF SPORTWAGEN HYMOTION

More than a concept, really, since everything about this hydrogen-powered fuel cell vehicle works and is being tested on the road right now. The electric drivetrain and lithium-ion batteries are already available in the e-Golf, although this model has 134 hp compared with the e-Golf's 113. As well as the SportWagen, VW has a fuel cell Passat version running. Range is around 310 miles. Refueling the four carbon-fiber hydrogen tanks takes about three minutes, and naturally there are functions like regenerative braking for optimum efficiency.

## '15 VOLVO V60 CROSS COUNTRY

The new generation of Volvo V60 compact wagon is excellent. But, y'know, Americans and wagons, yada, yada. So this is a smart idea: take the V60 and give it a bit of crossover attitude, much like Audi does with its Allroad vehicles. Ground clearance is raised by 2.6 inches, the tires have higher sidewalls for greater comfort, scuff and skidplates are added, along with "fender extenders," and the all-wheel drive system gets Hill Descent Control. Mix in a fine 2.5L five-cylinder engine making 250 hp and 266 lb-ft of torque while returning an average of 23 mpg, and the starting price of \$41,925 seems quite reasonable. Especially when the level of standard equipment is taken into account. And we know it will have comfortable seats, because it's a Volvo. 🚗





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# BUDGET E9X M3 UPGRADES: PART II

FINDING 50 WHP WITHOUT BREAKING THE BANK

WORDS & PHOTOS JUSTIN FIVELLA





Last issue, we added 20 hp and 7 lb-ft at the wheels. This time, we relieve restriction and perfect the tune in search of that magical 400 whp. The World Series is to baseball what 400 whp is to the E9X community. Join the 400 club with bolt-ons alone and you're a one-percenter. In our case, it would mean overall gains of nearly 50 whp, an astonishing feat considering the limitations of pump gas and nothing more than stoichiometric pressure.

for most of us. Instead, our improvements come incrementally, after extensive research into a carefully selected group of parts proven to perform together in harmony without costing a fortune. This usually doesn't come in one wave, but in small steps over several years. With this in mind, we set our sights on the affordable approach to the big 400.

"There's a misconception that the already highly strung S65 V-8 in the E9X M3 is maxed out from the factory," said Tom Guagliardo at European Auto Source (EAS). "It's not, but it needs well-placed modifications to enhance its breathing."

Relieving restriction is one thing, but what about relieving the financial strain when it comes to buying these modifications? "That's another misconception—that E9X cars have to be expensive to modify," Guagliardo said. "Owners now have the choice of buying quality components at affordable prices or springing for higher-priced components made from exotic

materials. No matter what they choose, they'll still see tremendous improvements in performance." We sat down with the team at EAS and devised a plan to unlock power by relieving restriction, cutting parasitic drag, and optimizing ECU parameters. We wanted an additional (and affordable) 50 whp without resorting to a power-adder.

## PART ONE RECAP

In Part One, we began our bolt-on bonanza with Macht Schnell Performance under-drive pulleys and Stage II intake charge kit. To ensure a proper install, we not only commissioned the BMW gurus at EAS for help, but we also strapped our low-mileage '11 DCT-equipped E90 M3 to their in-house DynoJet 224LC to measure the gains. As it turns out, those additions were worth 20 hp and 7 lb-ft (measured at the wheels) with considerable gains across the entire power-band, all for just \$600. If you're looking for affordable power gains on your E9X, this is the best place to start.



The beautiful Mackin Extreme Products (MXP) Mevius stainless steel rear exhaust section uses the stock hangers for a factory fit.

**THEY SAID IT COULDN'T BE DONE.** Adding 50 whp and exceeding the 400-whp mark in an E9X M3 on a realistic budget was impossible. The naysayers said titanium race pipes, precious composite intakes, aftermarket cams, and other top-shelf parts were the only recipe for big, naturally aspirated power on the high-revving S65 V-8. But we believed with the right combination of affordable bolt-ons, we too could join the elusive and exclusive, naturally aspirated E9X 400-whp club without dyno tricks or other delusions.

This isn't to say we don't admire titanium exhaust systems, carbon-fiber intakes, magnesium components, and top-shelf parts. We do. But those aren't in the cards



The MXP Mevius system is proof that you don't need to break the bank to get a top-notch system. The burnt finish on the quad tips is also exquisite.



Note the quality of the welds. The MXP system uses four straight-through mufflers rather than a large single unit to save weight while still producing an aggressive yet street-friendly tone.



## THE PLAN: PART TWO

With the inlet side of the S65 uncorked and parasitic drag greatly reduced by the underdrive pulleys, it was time to relieve restriction aft of the motor as well as bring it into a better state of tune. After hashing details with EAS, we opted for a full stainless steel exhaust system and a software reflash instead of a pricey titanium system. "From a power production standpoint, a well-designed stainless steel system will make just as much power as a titanium unit," Guagliardo said. "It just won't save as much weight."

## MACHT SCHNELL X-PIPE

The stock X-pipe on the E9X M3 is notorious for killing power. It's widely regarded as the most restrictive portion of the factory exhaust system. This is mainly due to its four catalytic converters, a pair of primaries, and two secondaries. Unsurprisingly, EAS recommended we ditch the stock unit for a free-flowing cat-less alternative. "Simply replacing the up-pipes with cat-less test pipes helps," Guagliardo said. "But the most effective method is to replace the entire unit with an aftermarket X-pipe and up-pipes."



High-quality merges help preserve flow for increased power and a crisp sound. The MXP system is an octave higher than other systems, giving it a supercar tone more akin to a V-8-powered Ferrari under WOT.



The entire Macht Schnell stainless steel race X-pipe system bolts into place using stock mounting hardware.

Having crunched the performance-per-dollar numbers, we went for a Macht Schnell stainless steel race X-pipe. At \$1,095, it's a steal considering it's made from 2.5-inch tubing with impeccable welds and quality that fights above its price point. Other noteworthy features are a pair of resonators that cut drone and preserve power, smooth transitions, and an X-pipe design that promotes exhaust scavenging. More on that later. The unit also includes four OEM oxygen sensor provisions, utilizes factory mounting hardware, and bolts into place for a tidy install. No low-hanging contraptions, just a free-flowing X-pipe system that unlocks power and sheds more than 13 pounds compared with the heavy stock unit.

## X-PIPE VS. H-PIPE

As many of you already know, there are traditionally two different types of midpipes in the world of V-format motors: H-pipe and X-pipe. Some systems feature a Y-pipe that blends the exhaust from both cylinder banks into a single system downstream. But in most cases, a vee engine employs a dual exhaust system.

Before delving into midpipes (and without going into a lecture about laminar flow and velocity), just understand that exhaust flow isn't constant like water from a garden hose. It's a succession of pulses, or bursts of air from cylinder firing events. Smooth flow is best for power, but a poorly designed system can create a turbulent atmosphere and disruptions in flow that hinder horsepower.

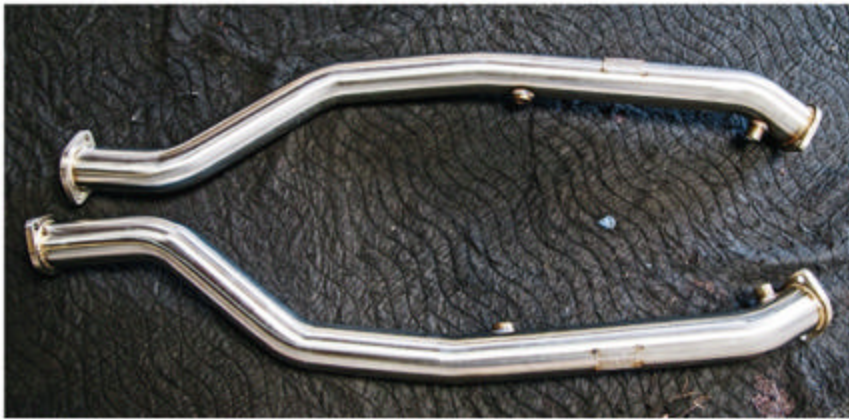


X is greater than H.



There's nothing worse than a droning exhaust system. Macht Schnell includes a pair of resonators in its X-pipe to help cut drone and lower decibel levels without hindering horsepower.





The Macht Schnell system also comes with up-pipes that connect the X-pipe to the factory exhaust headers. The units come with the four oxygen-sensor provisions, but an aftermarket tune from someone like ESS Tuning is required to negate the CEL when ditching the catalytic converters.



Here's a closer look at the impeccable welds and the stainless steel construction of the Macht Schnell up-pipes. These are a great deal, costing much less than their titanium counterparts while still dropping 13.2 pounds over the heavy stock midpipe.



Quality components need a solid tune, hence the ESS Tuning E9X M3 NA E-Flash ECU performance software. ESS builds some of the fastest BMWs in the world and has applied its extensive knowledge to this software.

Engineers discovered the key to power (and sound quality) was to balance pressure between the two banks. At first, H-pipes were the hot ticket. They actually look like the letter H. A balance pipe is placed perpendicular to the two primary pipes to act as an overflow, equalizing the pressure and promoting more power. H-pipes are popular with muscle cars or in applications with minimal space where an X-pipe simply won't fit. H-pipes enable balanced exhaust pressures, but flow seeks the path of least resistance and the majority of exhaust gases continue toward the tailpipes rather than making a 90-degree turn into the balance pipe. Why do you care? Because this phenomenon doesn't encourage exhaust scavenging.

The X-pipe also balances exhaust pressures between the banks, but promotes exhaust scavenging. Again, without venturing into serious engineering jargon, an X-pipe merges pulses from both banks into a single X-shaped pipe to scavenge (vacuum out) the exhaust from the primaries. Exhaust scavenging uses those pulses to accelerate gases through the system.

X-pipes aren't without their faults. The shape is harder to package under a car, and the placement of the crossover in relation to the motor also has an effect on power. Every combo is different, but a general rule is that the X-pipe should be as close to the motor as possible to maximize power.



We paid another visit to EAS for the installation and dyno time. The heavy factory rear exhaust section is the first thing to go. Adam Koch and Sam Morin of EAS make quick work of removing it.

### **MXP MEVIUS EXHAUST SYSTEM**

If ever an automotive component were as much art as it were a performance product, the Mackin Extreme Products (MXP) Mevius stainless steel rear exhaust section for E9X M3s would be it. Perfect welds, 2.4-inch SUS304 piping, highly polished quad exhaust canisters... and those 3.5-inch burnt exhaust tips are nothing short of jewelry.

The MXP is more than just bling, though. It was designed to be as powerful as it is pretty. The large piping feeds into those four lightweight canisters that preserve performance and sound. The massive tips are also available in chrome and are adjustable for the bumpers of both the coupe and sedan E9X. The system retains factory brackets for an OEM-like fit. It's also more than 10 pounds lighter than the stock system. Retailing at \$1,895, it costs a fraction of other systems. The sound quality is second to none, with a supercar-cool tone.

### **ESS TUNING E9X M3 NA E-FLASH ECU PERFORMANCE SOFTWARE**

Amazing hardware is useless without a proper tune orchestrating combustion. Since the S65 is highly strung, we couldn't trust anyone to tune it. We opted for one of the best in the business: ESS Tuning, BMW specialists with 800hp-plus M3s all over the country and experts at maximizing naturally aspirated models.

This software optimizes dozens of parameters for more power and better driveability. Improvements come from precise adjustment to air/fuel ratios; VANOS and ignition timing; and the ability to raise the rev limit to 8,600 rpm, delete the speed limit, fix "check engine" lights (CEL), delete the cold-start cat-igniter idle, sharpen throttle response, and a ton of other behind-the-scenes tweaks.

Other great features of this affordable \$895 unit include an OBDII adapter





Next is the factory X-pipe. Don't forget to remove the OEM panels followed by the oxygen sensors and the attachment clamps.



Now the OEM X-pipe must be discarded. All four O2 sensors must be unplugged.



Since the Macht Schnell X-pipe uses factory hardware, it's just a case of moving the applicable items to the new unit. Don't forget the four O2 sensors. Completing this process before the X-pipe is installed will make life a lot easier in the near future.



With the X-pipe in place, it's time for the beautiful MXP back system. Its installation is equally easy, thanks to individual sides that eventually bolt together.

that allows users to revert to stock tune, clear and check codes, upload tunes from ESS, and much more. We had ESS email a custom 91-octane pump-gas tune that also included the aforementioned raised rev limit and the removal of the speed limiter (should we ever find ourselves on the autobahn).

### DYNO MIGHT

Despite blistering temperatures in the high 90s, the moment our low-mileage E90 M3 belted out a healthy baseline of 353 hp and 262 lb-ft at the wheels, we knew 400 whp might be in reach. The Macht Schnell Stage II intake and underdrive pulleys pushed power to 373 hp and 269 lb-ft. The combination of X-pipe and exhaust system increased power

throughout the entire powerband, with even larger gains arriving near redline. The peaks rose by 22 hp and 14 lb-ft for new totals of 394 hp and 283 lb-ft.

We let the car cool while EAS uploaded the ESS 91-octane tune. With water and oil temperatures back to baseline, we spun the drum to the tune of another 4.61 hp and 3.13 lb-ft for totals of 399.05 hp and 285.88 lb-ft at the wheels. The whole shop let out a collective groan as we came up less than one pony shy of our goal. The ESS tune not only increased power from idle to redline, but raising the rev limit to 8,600 rpm provided a spectacularly strong top-end charge.

Ultimately, the 100-degree ambient temperature was the culprit, as EAS consistently sees upwards of an extra five horses in cooler temperatures. Nonetheless, we were ecstatic because even though we didn't hit the magical 400, we did add 46.5 hp and 24.2 lb-ft with nothing more than pump gas and affordable bolt-ons. If that's not impressive, we don't know what is.

### PERFORMANCE

All data was acquired with a Racelogic VBox Sport. Launches were conducted on OEM Continental tires without enabling launch control. Using launch control on an unprepared surface produces inconsistent times from excessive wheelspin. Our unofficial track has a slight downhill grade, which is reflected in the data. The differences between the baseline and the new results are more important than the outright figures.

	STOCK	MODIFIED
0-30	2.71 seconds	2.14 seconds
0-60	5.35 seconds	4.72 seconds
0-100	11.1 seconds	9.85 seconds
1/4 MILE	13.67 @ 113.6 MPH	12.9 @ 117.7 MPH

STOCK	WEIGHT
OEM MID-PIPE	38.67 LB
OEM MUFFLER AND PIPES	52.8 LB
MODIFIED	WEIGHT
MATCH SCHNELL RACE X-PIPE	25.44 LB
MXP MUFFLERS AND PIPES	42.75 LB



With everything mounted to the X-pipe prior to returning underneath the car, it simply bolts into place. Here Nick Tsui joins Adam and Sam to help with the install.



It also uses the OEM hardware for a stock-style fit that's as tidy as they come.



As expected from components of this caliber, the MXP back system and the Macht Schnell X-pipe harmoniously join forces.



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EAS is renowned for attention to detail. Adam was meticulous with the alignment of the quad exhaust tips.



With everything torqued to factory settings, we fired it up and listened to the S65's new lungs. We also heat-cycled the system several times before rechecking the torque. Because the cats have left the building, a CEL was inevitable. But ESS Tuning had the fix.

With the new pipes in place and the ESS tune uploaded, it was time to strap the LeMans Blue E90 to the in-house DynoJet 224LC dyno at EAS to see what the latest additions were worth.

The Macht Schnell Stage II intake and matching underdrive pulleys gave us 372.48 hp and 268.63 lb-ft at the wheels. Adding the Macht Schnell X-pipe and MXP exhaust system increased power throughout the entire rev range with new peaks of 394.44 hp and 282.75 lb-ft. The ESS Tuning software pushed output another 4.61 hp and 3.13 lb-ft for 399.05 hp and 285.88 lb-ft.

That's an additional 46.5 hp and 24.2 lb-ft from an intake, underdrive pulleys, full exhaust, and a tune on 91-octane fuel. We didn't hit the magical 400, but nearly 50 whp from affordable bolt-ons is nothing to sneeze at.

## SOUND CHECK

Measuring decibels (dBs) is a dark art. Ambient noise, instrument of measurement, placement of said instrument, and many other variables can easily skew results. Some perceived noise can't be measured in dBs, but frequencies. The point is this isn't the most accurate form of sound measurement, so instead of focusing on the measurements themselves, the most important aspects are the differences between stock and modified.



Adam uploads the ESS Tuning custom naturally aspirated 91-octane tune. Should we make changes that necessitate a re-tune, the provided OBDII port connector and cable make it easy to get tunes from ESS via email.



EXTERNAL (30 feet behind car)	STOCK	MODIFIED
STEADY	74 dB	82 dB
WOT ON THE DYNO	107 dB	117 dB
INTERNAL (measured in cabin)	STOCK	MODIFIED
STEADY 2,500 RPM, 7TH GEAR	74 dB	78 dB
WOT IN CABIN, 2ND GEAR	84 dB	89 dB

All sound levels were measured with a Radio Shack Digital 2055 meter. Stationary levels were checked from a tripod mounted in the same location relative to the car with similar ambient sound levels. In-car tests were conducted on the same stretch of road, at the same speed, gear, and rpm (two days apart).

## DRIVING IMPRESSIONS

This E90 M3 is a whole new animal. Few naturally aspirated project cars have seen such dramatic increases in performance and driving dynamics with so few modifications. From the moment the S65 fires up, there's no hiding its transformation. The exhaust note is hair raising and intoxicating, whether it's the crack of a rev-matched downshift or the crisp tenor under wide-open throttle.

With the stock car, traction in the lower gears was always a problem. Now the car is some 25 pounds lighter and packing an additional 46 hp and 24 lb-ft; it's startlingly quick. The thrust is felt from bottom to top. Power comes on sooner and hangs on much longer, thanks to the hardware and the ESS Tuning software. It's in "take me to jail" Third and Fourth gears where the car absolutely flies, as the power and revs produce a car that never stops pulling.

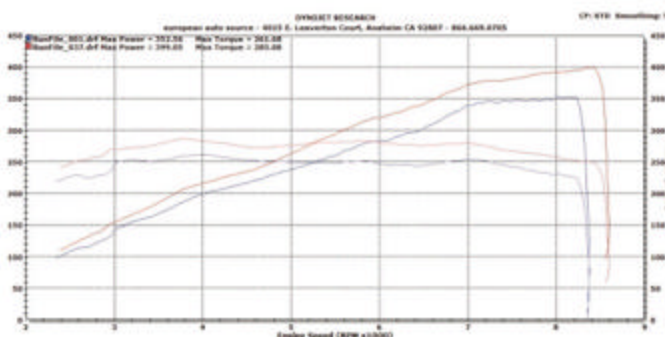
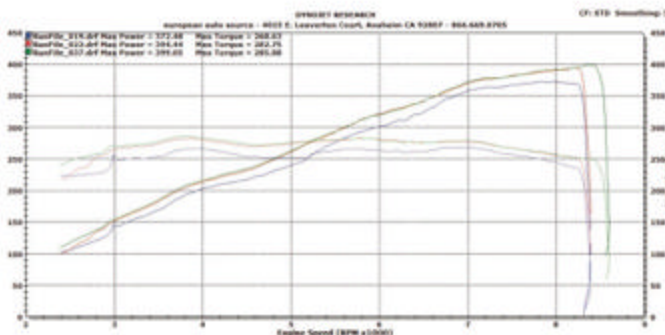
Power and good sounds aside, dynamics are also improved with heightened throttle response and faster shifts for an almost telepathic connection between the right foot and the throttle bodies. Boost is the future, but nothing can replace the amazing personality of a highly tuned naturally aspirated engine.

## WE'RE NOT DONE YET

Now that we've injected nearly 50 whp into our E90 M3, it's only proper to have at least one more installment with some affordable additions to bolster the dynamics and improve the stock aesthetics. Sure, we'd love top-shelf bits, but sometimes small things make the biggest impact. Enough with the hints, you're going to have to wait until next issue for the full reveal. For now, we'll enjoy our new symphony of speed. 🎵

## SOURCES

European Auto Source (EAS)  
[europeanautosource.com](http://europeanautosource.com)  
 ESS Tuning  
[esstuning.com](http://esstuning.com)  
 Macht Schnell  
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WORDS & PHOTOS EZEKIEL WHEELER

# BLOCK PARTY

KEN BLOCK FIGHTS THE EUROPEANS ON THEIR HOME TARMAC

## THE MONZA RALLY SHOW IN MILAN

draws serious talent. It's a multi-stage tarmac rally where drivers from around the world test their pedaling skills and mental strengths. This ultra-tight 1-mile course includes tricky chicanes and hairpin esses. For the 2014 event, held in November, speed stars like Valentino Rossi, Robert Kubica, and even NASCAR champ Kurt Busch joined Ken Block to take part in the rainy festivities. It was especially heartening to see the recovered Kubica looking back at home, dive-bombing Busch a few times during shakedown sessions.

For a spectator, screaming Peugeot 208 GTIs, brake-screaming DS Citroëns, and explosive Ford Fiestas make this a most visceral experience. But to truly understand what goes into the cars and what skills the drivers need, Pirelli thought it was a good idea to strap me into the passenger seat of Ken Block's M-Sport WRC Ford Fiesta. After a night session on fog-bound Monza tarmac (now also known as the ride of my life), I watched the video of the experience to study what I said at the time. Most of it was expletives.

First, I need to learn how to keep my head in one place. Second, I have even more respect for Block and his ability to learn, master, and explore the limits of his machine and the sport he embarked upon only 10 years ago.

It's rare for an American to take part in rallying. It's rare for an American to even have heard of rallying, despite it being arguably the world's most exciting form of motorsport. The levels of car control and fearlessness required border on the supernatural. But it seems that Europeans have a lock on it. It's only natural, since they've been racing cars almost as soon as they invented them.





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Frenchman Sébastien Loeb has won the World Rally Championship a record nine times, but he could sit in the bleachers at a NASCAR race and not once be bothered for an autograph. Tommi Mäkinen of Finland is partly responsible for those amazing Mitsubishi Evo cars, just as Scotsman Colin McRae brought the Subaru Impreza WRX STI up to legendary status.


Californian Ken Block, now in his late forties, started off in Subaru rally cars, but moved to Ford in 2010. In his first year (2005) in Rally America, he was named Rookie of the Year, and he's been a strong competitor in various X Games ever since.

Block has done a lot to bring the joys of rallying across the Atlantic. His Gymkhana 2 was 2009's fourth most viewed viral video. Those Gymkhana videos have been criticized by "drivers" who think mastering a track in a gaming simulator is the same as a car on the road. It's not. "I've been in million-dollar simulators and you'll never be able to simulate grip," Block says. "You simply have no comprehension of what it's like to educate, practice, build, manage, market, train, condition, compete, and win in an arena where the status quo of driving experience started at the age of 5.

"There is so much more of this generation who have been playing video games and are looking for something that is still competitive, but still based around fun. We try to show everything as something we truly love doing. And it translates to the fans. When I first saw this all-wheel-drive car, I thought the thing was incredible. But it was always at a racetrack. My thoughts were, 'How do I get this thing away from the track and do more with it?' I think that helps make it more relatable to kids than, say, Formula One. Formula One is pretty technical, and if you're not into it at that time, it can seem not as much fun."

What's next for Block? How will he inspire the next generation of drivers to pick up their keys and hone their skills? He hinted at one possibility that involves classic cars. If that comes to pass, Gymkhana 8 should be one hell of an exhibition.

"To me, keeping the act of driving fun is important. Nobody wants to hear a driver jump out of a race car and explain what's wrong with it. They want to hear how fast it was and how fun it was. As long as I can be competitive and still like it, I'll continue to do this as long as possible. If I'm not competitive at that level, I might end up in a classic Escort."

The 2014 Monza Rally Show was won by Robert Kubica. 



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# '02-'06 Mini Cooper/Cooper S

TIMELESS LOOKS AND LIMITLESS FUN

Words Colin Ryan

**WHERE DID ALL THOSE YEARS GO?** The first generation of Mini Cooper (R50/R53) debuted in the United States in 2002. Yet it still seems like a newcomer. Perhaps because it has kept its freshness. For that, we have to thank designer Frank Stephenson, an American who has since gone on to work for Ferrari, Alfa Romeo, and McLaren (interesting dude, Google him for more info). Subsequent generations and face-lifts have made no radical difference to the original styling, even if every panel has been changed.

Just like the classic (and much smaller) Mini, this one was made in Britain, although BMW took ownership of the brand, bringing the old marque into the 21<sup>st</sup> century, furthering the concept of the small premium car along with retro styling that was also popular at the time.

The Mini is a hatchback and came with a wide array of customization options. The center-mounted speedometer and that row of aircraft-style toggle switches below it are just two of the cool things about the interior. Contrasting roof colors and door mirrors, stripes, and some handsome alloy wheel choices help to liven the exterior even more.

At its North American debut, the Mini came as a Cooper (R50) with 115 hp and 110 lb-ft of torque, and

a Cooper S (R53) making 163 hp with 155 lb-ft. Both used a 1.6L four-cylinder engine. The Cooper S uses a supercharger for that extra output; this is the model with the airc scoop in its hood.

Squeezing forced induction hardware into a constricted engine bay, however, meant relocating the battery to the trunk and evicting the spare wheel completely. So this model uses run-flat tires and keeps an aerosol can of gloop in the trunk that's probably out of date by now.

The Cooper name comes from John Cooper, a Brit who was renowned for preparing tuned versions of the old Mini. Which also goes to explain the John Cooper Works packages available for the S models from 2003, starting with 203 hp and 177 lb-ft of torque.

Levels of standard equipment in the Cooper and S are not that generous, so chances are the first buyer spent quite a bit on the many options available. The trouble with that scenario is that they might not be the choices of subsequent owners. Standard electronic driver aids include traction control, stability control, and BMW's Cornering Brake Control. The Cooper comes with a five-speed manual transmission, the S with a six-speeder. A CVT was optional.



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## TECH SPEC '02-'06 MINI COOPER/COOPER S

### LAYOUT

Transverse front engine, front-wheel drive

### ENGINES

1.6L, SOHC, 16-valve, I4 (supercharged in the Cooper S)

### TRANSMISSION

Five-speed manual/CVT (Cooper); six-speed manual (Cooper S)/six-speed auto (from 2005)

### SUSPENSION

McPherson struts (f); multi-link (r)

## PERFORMANCE

### PEAK POWER

115 hp @ 6,000 rpm (Cooper), 163/168 hp @ 6,000 rpm (Cooper S), 200/207 hp @ 6,950 rpm (JCW), 215 hp @ 7,100 rpm (JCW GP)

### PEAK TORQUE

110 lb-ft @ 4,500 rpm (Cooper), 155/162 lb-ft @ 4,000 rpm (Cooper S), 177/180 lb-ft @ 4,000/4,500 rpm (JCW), 184 lb-ft @ 4,600 rpm (JCW GP)

### 0-60 MPH

8.5 sec. ('02 Cooper), 6.9/6.8 sec. ('02 Cooper S), 6.4 sec. ('03 JCW), 5.9 sec. ('06 JCW GP)

### TOP SPEED

126 mph (Cooper, manual), 136/134 mph (Cooper S, manual), 140 mph (JCW), 145 mph (JCW GP)

These cars are not considered too expensive to run or tricky to maintain as long as everyone stays away from the Steptronic CVT auto versions. This transmission has been dogged by failures and was the subject of a successful class action, leading to compensation payouts and an extension of the warranty. But anyway, a Mini with a manual trans is so much more fun.

The company says: "Most U.S.-spec Minis have dedicated tuning based on model and body style. This is because American roads vary greatly compared to other nations." Coopers have the kindest suspension tunes. Earlier models with wheels larger than 16 inches will probably provide a ride that's too uncomfortable for most people.

The range was face-lifted for the '05 model year. The Cooper S received a new ECU, exhaust, and shorter gearing, while a limited-slip differential joined the options list. A conventional (planetary geared) Aisin six-speed automatic transmission was also offered. Interiors were upgraded with better-quality materials and the dash was simplified. However, tech changes meant saying goodbye to the popular two-spoke steering wheel and getting on board with the three-spoke version. That same year saw the introduction of the Mini Convertible in both Cooper and Cooper S trims, but let's keep it serious.

The '05 Cooper had its five-speed manual trans supplied by Getrag. The Cooper S was boosted to 168 hp and 162 lb-ft, while the JCW package now came with 210 hp and 177 lb-ft. There's also one more model to mention.

Only 415 examples of the '06 John Cooper Works GP were allocated for the United States. This has 215 hp, 184 lb-ft, bigger brakes, new exhaust system, revised engine management, and an even stiffer (and lower) suspension. It also ditched the rear seats. These are rare and, should you find one for sale, pricey. Great if you have \$20,000 or so. If not, read on.

Early models had their teething problems. Many

2002 examples didn't have the plastic protection pieces that stopped the engine from rubbing against the inside of the hood, leaving it vulnerable to rust. Then there are drying oil seals and gaskets, leaking coolant expansion tanks, ECU glitches, overheating of the electric power steering system, rattling dashboards, dodgy fuel gauges, iffy central locking, and noisy cabins. The whole generation has an issue with water building up in the rocker panels, but most cars have had that fixed under warranty.

There will probably be front tire wear, unless the seller has recently sprung for new rubber. Check them out, and perhaps they can help bring down the price. On the test drive, if the car is pulling to one side, the front strut towers may have been pushed out of alignment. And listen for noises from the rear suspension. Watch out, too, for failed engine mounts in early '05 models, plus clutch and flywheel troubles.

Recalls came in 2002 for a problem with the shift cable in the manual transmissions. In 2003, there could have been incorrect tire pressure information. And in 2004, there was the possibility of incorrect programming of the tire pressure monitoring system.

Ultimately, the Mini is worth the bother. Coming from BMW, there's some of that special enthusiast DNA, despite being a front-driver. The front suspension is McPherson struts and the rear includes a multi-link Z-axis arrangement, as found in the BMW Z3 and E36 3 Series. The Mini is one of the best-handling front-wheel-drive cars ever.

Buy as new as finances allow. Build quality improved in 2004 when the factory really got into its stride. The sweet spot would be an '05 or '06 Cooper S manual with the LSD. Minis have enjoyed exceptional resale values. Good for the seller, not so much for the buyer. An '02 Cooper in good condition bought from a private sale is valued at \$3,198. Looking through the classifieds unearthed a decent '05 S with leather and sunroof going for \$6,300. A budget of \$7,000 should snag a great car. ■





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## AVS MODEL F50

Advanced Vehicle System

YOKOHAMA's mold-form forged wheel history began with the AVS MODEL F7, which came onto the market some years long ago. Since then, however, forged wheels came out under the ADVAN Racing brand, and in the AVS brand lineup, the MODEL F15 followed the F7. We continue to aim for the very best in mold-form forged one-piece wheels. As YOKOHAMA broadened its forged wheel lineup, everyone was awaiting the arrival of AVS brand MODEL T5 design in a forged version. Now the version they were waiting for has finally arrived. The new model is the 4th model change since the original VS5 with its twin 5-spoke design arrived. The name alone, AVS MODEL F50, indicates the new model marks a great leap forward.



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